THE

TROPICAL AGRICULTURIST

MONTHLY.

Vol. X. COLOMBO, OCTOBER 1ST, 1890. No. 4.

THE FUEL QUESTION IN CEYLON.

ALTHOUGH matters are not in the critical position which Mr. Berry White in his left-handed benevolence toward Ceylon represented ("the wish being father to the thought"), and although the tea enterprise is not likely to fail because there is "not a stick of firewood left," yet the fuel problem is undoubtedly a serious one, from the fact that so large a proportion of the tea estates were formed on the sites of coffee estates, whence nearly every trace of timber had disappeared. If the heavy demands of the railway are included, we can easily believe in the correctness of the estimate, although it was questioned by our good friend, Mr. A. H. Thomas, that the produce of 100 acres of forest per annum would be required to supply the demands of the one district of Dimbula. That is with reference to the present consumption: but be it remembered, that while the demand for tea furnaces increases with the increasing yield of tea, there will soon be a large additional requisition on the Government reserve forests for railway purposes, when trains begin to run from Nanuoya across "Summit Level" to Uva. One of the speakers at the Nuwara Eliya meeting evidently understood by the felling of 100 acres of forest for fuel that a clean sweep would be made of the standing trees, large and small, young and old, on the space indicated, and he contemplated the passing of the cleared Government forest into private hands by sale. No wilder idea could be entertained, and that apart from the rule, prohibiting sales of forest land at an altitude exceeding 5,000 feet. The authority who estimated the extent of felling required undoubtedly meant the equivalent in firewood of 100 acres of Government forest, as dealt with on proper scientific principles, such as have been adopted in the treatment of the forest above Nanuoya, on the right hand of the road to Nuwara Eliya. It is only the mature, old and damaged trees which have, in the blocks dealt with, been cleared and converted into timber and firewood, while the younger and healthier trees and the saplings have been spared. In the spaces thus partially cleared of trees and thoroughly cleared from *nilu* and other undergrowth, fast growing Australian trees, such as gums, acacias and, we suppose, casuarinas, are to be planted, with reference to future supplies. It is not probable that any portions of the Government forest reserves will be alienated, unless indeed some enterprising capitalist, able and willing to wait for deferred returns, came forward and offered to take land on the condition of at once planting it up with trees, calculated, when grown, to yield supplies of timber and especially fuel. We fear there are few in circumstances to face the risks of an enterprise which would probably pay in twenty or thirty years, in view of the demand which must increase for timber suitable for railway sleepers and other purposes and for railway and tea estate fuel. The danger as regards the speculator would consist in what we all so earnestly desiderate for the benefit of the tea enterprise, the discovery of some cheap artificial fuel which would render unnecessary the present fearful waste of wood by combustion in furnaces and for the production of charcoal. When discussing this question some years ago, we noticed the fact that under the advice of their sagacious Visiting Agent, the proprietors of the group of tea estates known as K A W purchased forest sufficient to enable them to possess one-third forest for two-thirds cultivated land. We also quoted Mr. Rutherford's strong recommendation that trees good for fuel should be planted on every tea plantation not possessed of forest reserves. We now add advice which we are carrying out in practice: that is, as the reserve forest connected with an estate is denuded of the natural growth, to supply the clearings with good fast growing fuel trees. On estates possessing no forest reserves and where supplies of fuel from outside are not readily obtainable, it might be wise to plant up pieces of poor tea, the sides of streams (specially favourable for red gums), and exposed knolls. In calculating the amount of fuel available in 100 acres of forest in Dimbula, the character of the greater proportion of the forest reserves must be taken into account. In those elevated woods tropical luxuriance of growth does not take the shape of large trees thickly planted over the surface. The sparseness of well-grown trees, and the rarity of forest monarchs (hollow-hearted monarchs too often when they do exist,) strike the explorer of those mountain forests, as well as frequency of open spaces in the heart of the woodland, down into which the sunlight streams. In some cases these retreats of elephants and deer in the

solitudes of the forests, are merely covered with coarse grasses, with osbeckias and a few other shrubs scattered about. Generally, however, the sparseness and the small size of the trees is compensated for and the good character of the soil vindicated by dense and in some cases very tall undergrowths of *nilu*, the stems of which often furnish, in a convenient shape, "waratchies," which, tied to posts, form wattle and daub buildings of more than a temporary nature, when thoroughly plastered, well roofed and protected by verandahs. Judging from our personal experience the hill forests of Dimbula and other districts with similar conditione, are likely to be increased manifold in value, when trees introduced from Australia, the Himalayan regions of India, Japan, &c., are substituted for most of the indigenous trees, and when really scientific methods of thinning, pruning and coppicing are resorted to. The readiness with which the Australian gums coppice and their tenacity of life make them valuable additions to our sylvaculture. A very considerable number of foreign trees have been introduced and are being tried, from the eucalypti and acacias of Australia to the oaks, birches and pines of of the Himalayas and Japan. As regards the Australian casuarinas and several of the eucalypts, we know that they are reckoned good fuel yielders in their native habitat and we suppose we may calculate on their retaining their characteristics as grown in Ceylon. But experiments such as have been conducted on a large scale in the United States in connection with the census would be valuable here. Specimens of all the American timbers have been subjected to combustion after a mode best calculated to test their calorific qualities and the results have been published. Something of the same kind effected, especially in regard to introduced trees—for the qualities of most of the native timbers have been eettled by railway and tea furnace experience—would be valuable. Meantime Mr. Wright's experience with coal is exceedingly interesting; and although coal alone may be too expensive for tea drying, it may be a question whether a small quantity of coal added to wood in a furnace might not largely increase the heat evolved without proportionate addition to the cost. In connection with the vast quantities of coal handled at the range of supplying stores on the Colombo beach, there must surely be a considerable quantity of waste in the shape of small fragments and dust, which might be sold at a moderate price for use on tea estates; pressure being applied to the loose stuff before it is carried by the railway at third-class rates, such as are applied to manuree, cement and other like goods, sent in quantities of 4 tons and upwards. Then there is the prospect now of Indian coals of a fair quality being available at a price considerably lower than the "black diamonds" from Cardiff and Newcastle can be sold for.

What the fuel demands of the railway are and are likely to remain, may be judged from the fact that to supply fuel for the 45 miles between Colombo and Polgahawela, Col. Clarke in his recent report proposes to appropriate 10,000 acres of forest along the line. That means over 222 acres for each mile of railway.

SUGGESTION *IN RE* CATTLE-DISEASE.

The figures published in Administration Reports and in the local newspapers of late, representing the loss of cattle through disease, have not been without their effect on the public mind; and once again remedial measures for the suppression of cattle-disease have begun to be discussed.

There is little doubt that every time there is an outbreak of murrain among cattle, the condition of the native agriculturist becomes more critical. The present distress in the Batticaloa district has the mortality among cattle for one of its causes, while the poor condition of draught animals in the agricultural districts directly bears upon the depressed state of paddy cultivation.

The question now exercising the minds of those who have the welfare of the agricultural population at heart is—what are the remedial measures to be adopted to minimize, if not to extirpate, the evils arising from a degenerate condition of the cattle of the country? Some would say, destroy all animals affected by, and predisposed to, disease; others, enforce stringent quarantine measures in times of disease; and others again, go to the root of the evil and endeavour to improve the breed and condition of stock. It has been conclusively proved, I think, that the first two methods can be carried out neither perfectly nor successfully in this island, the state and interests of the country being opposed to the adoption of these measures which may have proved efficacious elsewhere.* Choosing the alternative, let us inquire how the condition and breed of our stock are to be improved. Various useful suggestions have been thrown out; and good work has been done in eome quarters by collecting the advice of those who have had experience in these matters, and the suggestions of the commissioners who inquired into the state of cattle in 1869, also by putting these into a simple and popular form, translating them into Sinhalese and scattering this knowledge as far as practicable among the villagers. But the question is, will the people for whom all this has been done fully avail themselves of the advice and suggestions that have been offered them? From a knowledge of the people one cannot but answer "No," and ift he matter is to rest here little will have been done. But more must be done, and can be done if the subject of the improvement of stock received official recognition. Private efforts, however, honest and earnest, will never be successful, unless they received the *imprimatur* of the Government. There is no doubt that before long the legislature will become alive to the necessity of enforcing certain measures relative to the protection of cattle; and if, of the three alternatives to be adopted in dealing with cattle, either of the first two were favoured there will be a grave mistake, but if *the condition of stock is to be improved* there are ways in which the Government can help native agriculturists and other cattle owners. Firstly, it should be secured that cattle are kept under proper sanitary conditions: their surroundings should be cleaned, and they should be protected from undue exposure to rain and wind. The neglect of such treatment is nothing but cruelty and is worthy the attention of the Society that is concerned with suppressing such cruelty. But what is wanted is that certain minor officials—police, municipal, or special officers—should be empowered to charge cattle-owners (whether in towne or villages) who neglect to carry out orders enforcing the proper treatment of cattle as laid down by the legislature, with an offence involving a fine. It wae only within the last few days I became aware of the existence of murrain in two large cattle sheds in the heart of the town. The condition of especially one of these is shockingly filthy; and yet it seems that no action is being taken in these cases. Cattle are sold and removed, and I am informed that milk is supplied to two

* Not in the Madras Presidency, where utter failure is confessed.—ED. *T. A.*

large Government institution! At times when murrain is pretty general, especially in towns, why, I ask, should not the cattle-sheds where the disease exists be visited and disinfected, and the cattle as far as possible segregated. Municipal inspectors, when they hear of a case of smallpox or cholera, go armed with disinfectants and remove the patient to a hospital far away from town. Why should not the same thing be done in the case of cattle affected with murrain ? An animal that shows the first signs of the disease should be immediately removed to the hospital for cattle, situated on the outskirts of the city at one or more than one point, and there treated according to the most enlightened system. The proper feeding of cattle is, however, a matter that it must be hoped cattleowners will come to see is compatible with their own interests, and the desirability of which can be only impressed upon the careless villager by semi-official influence.

But there is yet more that can be done, and that in the direction of more careful breeding. Each district should be provided with a stud bull (one selected for specially good qualities), which should be at the disposal of the people of the district. This would obviate the evil of cows being mated indiscriminately, and would probably lead to a desirable result, viz., the gelding at any early age of males which are herded promiscuously with females in village pasture grounds. The studbull should be under the charge of the headman of the village, who should see that proper care and attention is paid to it. Where practicable a small fee may be charged for the use of the animal, which would go towards the expenses of its upkeep, but the use of it should be given free to the poorer villagers. This plan, I think, would be the best; but it might be suggested in its place that a number of stud bulls should be stationed in the capitals of the provinces, and that these should travel through the country at stated periods. There is a precedent for the Government coming to the rescue of the agriculturist at a critical time, and even now this is being done in "that most distressful country," the Eastern Province, in the matter of paddy cultivation. So that it would not be too much to expect at a time when the extinction of our stock is threatened by disease, mal-nutrition, and bad-treatment, that the Government will supply studbulls and even give the use of them free.

If there are any better suggestions to be made let him who can make them speak: but these are the convictions of AGRICOLA.

NOTES FROM THE NORTH COUNTRY.

GLASGOW, July 24th,—Just a line to hand you the enclosed advertisements by Lipton & Stuart Cranston & Co.:—

LIPTON IN CEYLON.—To Lovers of the Fragrant Beverage.—Mr. Lipton who has just returned from Ceylon, has pleasure in intimating to his customers and the public in general that the extensive purchases he has made in Tea Estates enables him to supply the most delicious Tea the world can produce, at prices impossible for any other tea dealers to sell at. His estates, which cover many thousands of acres of the best tea in land in Ceylon, are at an elevation of 5,000 feet, where nothing but the choicest teas are grown; and, to give an idea of the labour reqnired in the cultivation and manufacture of tea on these estates, there are upwards of 3,000 natives, independent of Europeans, constantly employed. In buying Teas from Lipton, you get them at Planters' Prices. Consumers of the fragrant beverage thus save not less than six or eight intermediate profits, or 1s to 2s per lb. Note the Prices. Magnificent blends, rich, pure, fragrant. 1s and 1s 4d per lb. Extra choicest Ceylon and Indian blend, 1s 7d per lb.

☞ This is the finest and most delicious Tea the world can produce, and is equal, if not superior, to what is sold by most Tea dealers and grocers at 2s 6d to 3s 6d per lb. 5, 7, 10, and 20 lb. Packed in patent air-tight canisters, without extra charge. Lipton's Teas have a more exquisite aroma and delicions flavour than any Tea ever introduced into Britain. They have undoubtedly reached a pinnacle of success never before attained by any Tea in the world."

"DELIBERATE FALSEHOOD is the only term that can be applied to those who are familiar with the long prices obtained for fine Tea at Public Auction and by Private Treaty, and who yet strongly advertised the 'Finest Tea the World can Produce,' 1s 7d per lb., We prove the falsehood by offering our blend of Indian, Ceylon, and China Tea at 1s 6d per lb. Those strong, dark, bitter Teas—which grip the palate—are doing more real injury to the digestive organs than would result from the same money's worth of Raw Grain Whisky consumed within an equal time. Our Teas are mild and refreshing, and, like old matured whisky may be drunk with relish, and are followed by no evil effects. To clench this argument, We Stuart Cranston & Co., Trained Tea Tasters of 25 years' experience, admitted to be the keenest buyers in Scotland of fine China and fine Darjeeling, still pay regularly in the open market—patent to every Teaman in Mincing Lane—2s 10d, 3s 3d, 3s 10d, and even 4s 7d per lb. (duty paid) for the choicest China and Darjeeling Teas, buying them in lots of £300, £500, and £1,000 sterling in one line for one kind. The 4s 7d was a small lot, but long after it was sold out our customers came back, eager to purchase more—a clear proof that the quality and value were not fictitious but real."

Will it do the Ceylon planter any good for Lipton or any other man to advertise that he can sell the "finest (Ceylon) tea the world can produce at 1s 7d"? I very much doubt it, and I find many here of the same opinion. Ceylon folks at home have been greatly amused to read of Lipton's reception in Ceylon. When honorable members of Council and the leading members of the planting and mercantile community have vied with one another in doing honor to Glasgow's principal retail ham dealer, I suppose we may reasonably infer that caste prejudices are destroyed and the once despised "shopkeeper" is no longer to be looked down upon as a social outcast. If this be the result of Mr. Lipton's visit to Ceylon, then I for one will indeed rejoice. You remember the story of a visitor who, unable to understand the fine distinctions drawn by Colombo Society, asked a member of the mercantile community what was the difference in Colombo between the merchant and the tradesman as it seemed to him (the visitor) that they were all in trade. "The difference," replied the merchant, "is that the tradesman 'arfs 'is 'ams!!" Great Scot! what will the members of Ceylon Society say now after bowing the knee to one who not only "'arfs 'is 'ams" but will sell you a much smaller quantity of ham any day you like to step into his shop just round the corner from where I now write. Well done Lipton, if he has helped to knock this nonsense out of Ceylon folk's heads. May he prosper abundantly by his Ceylon investment. At the same time I would ask him not to attempt to enrich himself by doubtful advertisements and by ways which can only injure his brother planters.

Enclosed is advertisement from the Edinburgh *Gazette in re* "The Indian Tea Bazaars Company Limited," of which Andrew Polson is chairman:—

(Excerpt from *Edinburgh Gazette* of 3rd June 1890.)

In the matter of the Indian Tea Bazaars Company, Limited. Notice is hereby given, that at an extraordinary general meeting of the above-named Company held in the office of Messrs. H. & R. Lamond & Lang, Writers, 93 West Regent Street, Glasgow, on Friday the 30th day of May 1890, the following extraordinary resolution was passed viz.:—"That it has been proved to the satisfaction of the Company that the Company cannot, by reason of its liabilities, continue its business,

and that it is advisable to wind up the same, and accordingly that the Company be wound up voluntarily."

It was thereafter proposed, and unanimously agreed to by the said meeting. "That Mr. Robert Dempster, Chartered Accountant, 149 Hope Street, Glasgow, be, and he is hereby appointed, Liquidator of the Company for the purpose of the winding up."

ANDREW POLSON, Chairman.

THE DETERIORATION OF IRISH STOCK.

Miss Cooper, in a paper in the *National Review* entitled "Some Curiosities of Irish Farming," ventures, woman though she is, to lay her finger on the most serious point of the Irish difficulty, namely, the deterioration of Irish stock. Ireland, it should never be forgotten, is a great farm, and the lack of good sires is as much and more serious a matter to the Irish people than even the lack of good land laws or good landlords. Miss Cooper says:—

It became the general custom for landlords to keep a good bull, ram, or boar for the benefit of their tenants, and one of the evil effects of the land agitation and the Bill of 1881 has been that the practice is now given up, and the consequent deterioration of stock is becoming quite perceptible, it is said, in many parts of the country. There is great reason to fear similar deterioration in all branches of agriculture, now that the landlords and their agents are powerless to insist on some degree of good farming.

Miss Cooper does not say so, but one of the first duties of the first Irish Minister of Agriculture will be to establish a good bull, ram, horse, and boar in every district in Ireland. The first Coercion Act needed under Home Rule will be to compel the peasants to discontinue resort to "the shilling bull."

There is much in Miss Cooper's contention. To get rid of landlords is to banish capital and the benefits which follow on its use. The crusade has been against all landlords, good and liberal as well as bad and grasping. What Ireland wants is what she is frightening away: capital in abundance and well applied.

OOLONG TEAS—NEW USE FOR QUININE.

The following paragraph from a daily paper seeming to me to be likely to have interest from your planting readers, I give it place in this letter:—

FORMOSA OR OOLONG TEA.—The statistics for last year show a reduction in the export of tea from Formosa, which had hitherto escaped the depression in the China tea trade generally. On this subject the British Consul at Tamsui, in his last report, says that the tea season of 1889 has been most unsatisfactory both to foreign and native merchants. The teas of the island which formerly had a distinctive character are rapidly losing it, owing to the reckless competition amongst Chinese buyers for the Amoy market, and the careless preparation and fraudulent admixture by them of the teas after they come into their hands from the growers. This has told its tale on the consuming markets, and a lower basis of price than has ever been known before has been established, while the consumption shows a very marked decrease. With the yearly increasing competition from India, Japan, Ceylon, and Java, each of which countries fosters its tea trade while China does nothing for it, but rather taxes it beyond its endurance, the ground that Formosa has lost in the consuming markets is unlikely ever to be made up; and, in the opinion of those most competent to judge, the days of the trade are numbered, unless steps are taken by the Chinese themselves in the direction of radical reform. The Governor, who is one of the most energetic and liberal-minded of Chinese officials, has, in conjunction with a foreign merchant, procured the services of an experienced planter from India, who is to establish a model tea farm, and endeavour to show the people the advantages of the proper cultivation and manufacture of tea. The idea is an enlightened one, but whether it will be prosecuted with vigour and receive enough official support to ensure its success, remains yet to be seen. It is doubtful also whether the adoption of the most perfect methods can be attended with success while the inland and export duties on the article continue to be out of all proportion to its value and so far in excess of like imposts in all competing countries. America takes 90 per cent. of the Formosan tea, but there are indications of a growing change of popular taste in the matter of tea. As Oolongs seem to be little appreciated elsewhere than in the United States, any change of this nature would be the death-blow of the Formosan tea-trade as at present conducted. Hence the scheme already referred to is intended to include the preparation of teas of the Indian, Ceylon and mainland types, a market for which will, it is hoped, be found in London and elsewhere. It is merely peculiarity of preparation which produces the variety known as Oolong; the raw material is the same as that of Foochow, Hankow, and India, and a proper manipulation will produce a tea of precisely similar quality to the Souchongs and Congons of other tea ports of China.

It has never occurred to me to hear that quinine has been supposed to have the effect of absorbing actinic rays. My knowledge of such subjects is too defective to enable me to discuss the matter of the following paragraph cut from a scientific journal; but there may be those in your community to whom the subject treated of in it may be possessed of special interest, and who may be able to inform you of this property alleged, or presumed, to be inherent in the sulphate of quinine.

Dr. E. Liesegang says, in the *Photo Archiv*, as translated for *Wilson's Magazine*, "The expedient of covering a window with a fluorescent solution of quinine sulphate has not proved sufficient to keep out all actinic rays. This is better accomplished thus:—It is known that an aqueous solution of three parts green chloride of nickel, and one part red chloride of cobalt, is colourless by transmitted light, and quite clear when dilute. The two colours are complementary, and completely neutralise each other. Hence the light passing through the mixed solution has no effect on the salts of silver. Although it is quite white it is perfectly nonactinic, and does not any longer affect the sensitive film. To completely neutralise any possible rays in the ultra-violet, another glass is coated with a solution of quinine sulphate in collodion somewhat acidified with sulphuric acid. The quinine cannot be used in the same solution because it is precipitated by the cobalt salt. As the cobalt chloride, red when containing water, becomes blue when free from it, the mixture must not be allowed to dry. It may be made with gelatine and glycerine, but even a high temperature around the window may dry it. Silver paper which was left exposed for a week behind a thin layer of the cobalt-nickel solution thus prepared, did not show the slightest alteration. I have not as yet experimented with plates, but with sufficiently concentrated solution these also should not suffer change."

THE CHEMICAL ANALYSES OF TEA.

Any opinion expressed by Mr. John Hughes, the well known chemical analyser, we may be sure to be deserving of the fullest consideration. We need not, therefore, apologize for recurring to Mr. Hughes' opinions as to the tannin test of the quality of tea. The opinion he has given to our London Correspondent on the subject of the analyses of tea should therefore be well weighed by us. We, therefore, recapitulate the facts. In the *Tropical Agriculturist* for February last we published an abstract of a paper read by Mr. David Hooper on the subject of the propor-

tion of tannin in Indian and Ceylon teas, the main object of that paper being to proclaim the results obtained by analyses of high-grown and low-grown teas. We need not here enter upon the details of Mr. Hughes' references to what Mr. Hooper advanced. This has been sufficiently done in our London Letter; but the main point raised by him we think it to be desirable to offer some remarks, and to ask for fuller discussion by those interested in the subject.

Mr. Hughes' contention, as we understand it, is, that the conditions under which analyses of our teas have as yet been made have produced results which—although highly interesting in a certain sense—are practically useless as a guide to the great body of consumers of tea. These desired to be guided in their purchases, not by the outcome of what we may term "exhaustive analysis," but by that obtained by analysis performed under the conditions of general household use. Mr. Hughes thinks that the amount of tannin chemically found to be contained in teas affords no trustworthy data of what the results to household infusion may be. This infusion varies with most users only from five to ten minutes, though, as the rule we should ourselves recommend a limitation to but three minutes only provided the teapot be previously heated and the water boiling. It is contended by Mr. Hughes that what is required is that a systematic analysis of the results to infusion evidencing the proportion of tannin yielded by various teas during such brief treatment should be made to enable ordinary purchasers to decide what they would wish to buy for their household consumption. The time generally allowed by professional tea tasters for the "brew" to draw before tasting is five minutes. Probably this time might be adopted for the purpose we have referred to as being a safe medium. Ten minutes is certainly too long, while some deem three minutes too short. The medium of five, therefore, that we have suggested would probably meet the generality of tastes. Our Planters' Association has already been addressed by Mr. Hughes on this subject. It rests with that body to decide whether the course he has recommended shall be adopted by it. It certainly, for the reasons given, seems to ourselves to be one which might be with wisdom followed. To make our tea popular to the fullest possible degree we cannot take the public too much into our confidence. That public has now before it the statement that all that it has heard said about the proportions of tannin in the several varieties of tea offered to it is unreliable, in so far that it relates to conditions with which it (the public) can have nothing to do. To offer to consumers the results of analyses which *shall* afford them a guide, must surely seem to be a desirable course.

There is a second point in Mr. Hughes' communication to our London correspondent upon which we should desire to offer a few remarks in amplification of what we have in previous articles written on the subject. From what that gentleman has now and on former occasions stated, it would seem to follow that, however carefully analysis under the conditions above referred to may be made, its results must at all time be subject to the variable qualities of the water used for infusion. Our space will not admit of what we have before written on this topic being here recapitulated. We have, however, before expressed the opinion that the differences between the waters of different localities must form an important factor in forming judgment upon teas. But we were scarcely prepared to learn how highly necessary consideration of this point is deemed to be by experts at home. Mr. Hughes informs us—to quote from our London Letter—that "some London firms who do a large business in Ireland actually import Dublin water to London for the purpose of testing teas intended for Ireland." The conclusions to be drawn from this added testimony are important in considering the case upon which we have been writing. It will naturally be asked whether infusion in different waters may not altogether neutralize the results obtained from the short-time analysis of the liquors that are recommended? Indeed Mr. Hughes further tells us that in localities in England deriving their water supply from the chalk, it is found that high-grown teas meet with the most demand. Therefore conclusions based upon analysis with a single class of water will probably not hold good universally. These are matters claiming much attention. It was only lately that we criticized the variety of advice tendered to our planters by home experts; but it would seem from the facts above stated that but little else could under all the circumstances be expected. Of great value to us would therefore be some method of research which should place our procedure with regard to the growth and preparation of tea on a sound scientific basis, now apparently wholly wanting to us.

While the question of tannin is thus engaging our attention, the *Pharmaceutical Journal* of July 26th brings us interesting information in regard to the distinctive principle *theine*. Recent research, it will be seen from the extract we place below, shows that the proportion of this principle in tea is higher than was previously supposed. It is appreciably higher in "dry" than in "original" tea, meaning by the latter, no doubt, tea with the ordinary amount of moisture in it. The unnamed teas, we are unable, of course, to identify, but Ceylon dust shows well. Very strangely, however, the premier tea for theine is a 1s 2d Java tea. Cheap China and Japan show badly. It may surprise some readers to see that teas as originally received from retail dealers and brokers contained from 5·40 to 8 per cent of moisture in the first case and from 6·28 to no less than 8·98 in the second. As a rule the highest priced teas were richest in theine, the Java tea being a striking exception.

AMOUNT OF THEINE IN TEA.

BY DR. B. H. PAUL AND A. J. COWNLEY.

In the March number of the *American Journal of Pharmacy* there was a report of some results obtained by Mr. John Hamilton Small in the analysis of Japanese and other kinds of tea, according to which it was shown that the amount of theine in the Japan tea examined was from 1·79 to 2·30 per cent, while that in the samples of Chinese and Indian tea varied from 2·38 to 3·54 per cent. The method of analysis adopted by Mr. Small was that described by us in this Journal* and the results published by him are in accord with those obtained by ourselves for average tea. However, in a reference to Mr. Small's figures by a writer in a recent number of the *Apotheker Zeitung* it is remarked that the amounts of theine indicated there are "remarkably high," but that since the description of the samples analysed was given in very general terms, and there was no statement made as to the final purification of the theine obtained, further criticism was impossible. Obviously the suggestion was thus conveyed that Mr. Small's analytical results were too high, owing to impurity of the theine weighed, and the writer did not appear to have been aware of the fact that the amount of theine in tea is generally much higher than had been supposed on the bases of the older analyses which were made by methods unsuited for the complete extraction of theine in a pure state. We have, therefore, made a further series of analyses of different kinds of tea for the purpose of obtaining additional evidence as to the amount of

* *Pharmaceutical Journal*, Nov. 19th, 1887.

theine, and it will be seen from the following table that the conclusion we had previously arrived at as to the presence of theine in greater proportion than had been assumed is fully sustained by the analytical data there given.

	TEA.	Price.	Theine. Moisture. p. c.	Theine. Original Tea p. c.	Theine. Dry Tea p. c.
		Retail.			
29	... ...	2s 4d	7·60	3·54	3·83
30	... ...	2s	6·75	3·66	3·93
31	... ...	1s 6d	6·20	3·12	3·32
32	... ...	1s 6d	6·60	3·06	3·27
33	... ...	1s 4d	5·40	3·42	3·61
34	... ...	1s 8d	8·00	2·82	3·06
35	... ...	1s 4d	6·60	2·74	2·93
36	... ...	1s 6d	7·40	2·92	3·15
37	Ceylon dust ...	—	8·00	3·58	3·89
		Broker.			
38	China	1s 3d	8·60	3·46	3·78
39	,, ...	11½d	8·40	3·32	3·63
40	,, ...	7d	8·60	3·20	3·50
41	,, ...	4½d	8·98	2·20	2·42
42	Japan Congou ...	7d	6·42	2·74	2·93
43	,, ,, ...	5½d	6·28	2·72	2·90
44	,, ,, ...	5d	7·64	2·58	2·79
45	,, ,, ...	4½d	6·92	2·42	2·60
46	Java Pekoe Fl'y ...	1s 7½d	7·34	3·16	3·41
47	,, ,, ...	1s 2d	7·92	3·78	4·10
48	,, ,, S'chong...	11d	7·04	2·94	3·16

CRYPTOMERIA JAPONICA.

This timber tree which has flourished in and around Darjeeling at 7,000 feet and down to 3,000, ever since FORTUNE, nearly sixty years ago, brought the seeds from China, has been planted to a considerable extent in and around Nuwara Eliya. Dr. Trimen has expressed a fear lest the climate of our hills should be too wet for this tree; but in the latest report of the Royal Botanic Gardens, we have Mr. Nock's testimony regarding a specimen cut down at Hakgala, when only sixteen years old. It yielded 90 feet of 1 inch boards, measuring in width 16 inches at bottom to 6 inches at top. This is surely an encouraging result, considering the age of the tree, and until now all the accounts we have received of the Japan pine have been largely favourable. Mr. W. R. Tringham, of Nuwara Eliya, however, sends us the following extract to "show that the tree is not of such rapid or big growth, or the timber of such value, as was supposed":—

(Extract Notes upon Useful Japanese Timber, by J. N. T. Turner, A. M. I. C. E.)

The Sugi (*Cryptomeria japonica*) has a coarse fibre, and the annual rings of growth are distinctly marked. The heart-wood is ruddy brown, and the sap-wood straw colour. It is a feeble and perishable timber; but being very straight grained, it opposes considerable resistance to longitudinal stress. This property renders sugi a useful timber for uprights in houses of light construction; though it is most extensively employed in the characteristic scaffoldings of the country. For timber, the felling age is about 35 years, when the average girth is 3 to 4 feet; but for poles it is felled much younger. When full grown, a girth of 15 feet is not uncommonly attained. The present price is 25 sen, or 9d per cubic foot.

All the above timbers are inferior in strength to their European analogues, as they are, under the climatic conditions of Japan, of more rapid and exuberant growth. The trees are generally felled long before their full growth has been attained. Felling is carried on through all seasons, the summer months being the favourite &c. &c.

Taken from minutes of proceedings of the Institution of Civil Engineers, vol. 89, issued July 1887.

What is above stated, if accepted fully, does not disprove the value of the tree as yielding fuel from its prunings and thinnings, and timber suitable for tea boxes and packing cases and for such indoor work as ceilings and posts of houses and like purposes. We saw Mr. Nock's planks and they seemed to us to be equal to good fir or spruce fir deals. It seems probable that a twenty-year old tree in Ceylon may be equal to one of thirty years' growth in Japan. If grown extensively, it might yield soft wood railway sleepers which could be creosoted, vulcanized, or otherwise preserved locally. Gamble, in his Manual of Indian Timber Trees, writes of a specimen of the wood from Darjiling, "wood soft, white, with a brown, often almost black heartwood. Very uniform, with narrow bands of firmer and darker tissue at the edge of each annual ring. Medullary rays short, fine and very fine, extremely numerous." Of the tree he says: "*Its growth is extremely rapid*: One specimen shows an average of 1·2 ring per inch of radius, and many of the rings are one inch wide. * * It is brittle and the tops and branches are broken by high winds." Close planting may protect the trees from such misadventure. Von Muller gives a very favourable account of the trees thus:—

The Sugi or Japanese Cedar. Japan and Northern China. The largest tree in Japan, the trunk attaining 35 feet in circumference (Rein) and 120 feet in height. Stem long, clear, of perfect straightness; the plant is also grown for hedges; in Japan it yields the most esteemed timber, scented like that of Cedrela (Christie). It requires forest-valleys for successful growth. The wood is durable, compact, soft and easy to work; more extensively utilised in Japan than any other. In the Azores the tree is preferred even to the Pinus Halepensis for timber-culture, on account of its still more rapid growth in that insular climate. Several garden-varieties exist.

It would thus appear that the tree (which is easily propagated from seed or cuttings) is valuable in many respects and for various purposes. Teak, about the best timber in the world, if tested by the breaking weight strain, compares very poorly with Australian iron and stringy bark timber. But teak is still the superior timber, one of its merits being that it is easily worked. That is also one of the merits of *C. japonica*, and its perishableness in Japan may be due to the fact that the timber is not properly seasoned. It is curious that a tree which grows to a height of 120 feet and a circumference of 35 feet should be capable of being treated as a hedge plant. But the Japanese are great in the art of dwarfing vegetation.

CATTLE AND CATTLE DISEASE IN CEYLON.

Nothing could be more appropriate to the discussion of this question than the appearance of the amended Ordinance relating to Village Communities. Here we find, as we anticipated, that the native tribunals and committees are vested with very large powers for the repression of cattle trespass, cattle stealing and cattle disease. All that is needed is that the natives, to whom so large a degree of self-government has been conceded, should, under the judicious guidance of the Government Agents and their Assistants, use the powers entrusted to them wisely, actively and courageously, without fear or favour. They can make such rules as they deem expedient for places for the slaughter of cattle, sheep or swine, for taking care of waste and other lands set apart for the purpose of the pasturage of cattle or for any other common purpose; and for breeding, registering and branding cattle, for regulating the sale, removal and slaughtering of cattle, and for preventing cattle trespass, *cattle disease* and cattle stealing. The gansabhawa courts, too, in their criminal jurisdiction can deal with cases of cattle trespass under the Ordinance No. 9 of 1876. Wide powers are thus given to the natives to deal

with matters so deeply affecting their interests as the breeding and tending of cattle, measures for the prevention of disease and for its limitation and cure, when it has appeared. All that is wanted, we repeat, is that the powers vested in the people should be intelligently used by them for their own good. Government will, of course, see to it that while the Forest officers are demarcating reserve forests and repressing wasteful chenaing, a sufficient area of ground is left in connection with villages for purposes of common pasture. On such commons those interested ought to be compelled to bestow labour in clearing the ground of jungle and weeds, so giving the nutritious grasses fair play in the struggle for existence of various forms of vegetation. This measure alone will in most cases suffice, in ordinary seasons, to secure good pasturage on high lands, while water grass can be cultivated on portions of swampy land to which village labour ought to be applied for drainage purposes. The breaking up of cabook (laterite) by means of mamoties, or the application of a small quantity of good cabook as a top dressing to sandy or inferior soil, has an excellent effect. The late Dr. Thwaites of the Peradeniya Gardens, in the paper to which we have already referred as contained in the appendix to the report of 1869, stated:—

Taking into consideration the secondary interest, as compared with his paddy fields, which the native cultivator appears to take in his cattle,—these being allowed to roam about, to pick up food where they can find it—on paddy fields when the crop is off, on the sides of roads, and on scrubby chena lands,—without any attempt, so far as I have observed, to keep them in fenced-in pastures, or to improve the pastures by freeing them from weeds,—I hardly see what better step, as a preliminary one, can be resorted to, than to endeavour to induce the villagers to increase the extent of their pasturage by converting into grass land large areas of chena, which are now covered with lantana and other comparatively useless vegetation. The park-like portion of the Peradeniya garden has been formed by merely keeping cleared ground free from weeds, allowing any grass plants that shewed themselves to remain. After a few weedings the latter became so numerous by spontaneous growth (no seeds being artificially sown) that a fine grass-sward, on which cattle thrive well, is produced. The subsequent weedings which are necessary to keep it clean, are effected with a very trifling expenditure of labour. If arrangements could be organised for a similar process of clearing and weeding certain portions of the waste lands throughout the Island by village communities, who might be allowed to pasture their cattle, on certain conditions, upon such cleared land, an important addition would be made to the wealth of the Island, and, it may certainly be added to the beauty of its scenery.

Were systematic cattle rearing a more prominent part of the industrial occupations of the native population, more attention would doubtless be directed to the providing food for their cattle during the dry season, and in sufficient amount to meet any exceptionally long rainless period that might occur. Paddy straw appears to be a capital fodder, and to be extensively used as such. It is probable that some of the coarser grasses of the Island, which on account of their harshness in a fresh state are then unpalatable to cattle, might if dried into hay and then chopped or pounded, be found capable of furnishing nutritious fodder for cattle. Clearing away the small vegetation from the banks of rivers and streams, and planting them with Mauritius grass would be a most useful proceeding in very many parts of the Island.

As a tropical country, Ceylon is highly favoured in the amount of its grass land, and in the quality of many of its indigenous grasses. A superior description of pasture might no doubt be produced by sowing upon cleared land seeds of the most nutritious species of grass collected for the purpose. It would also be desirable to procure if possible, seeds of esteemed tropical grasses which we do not already possess, to be used for a similar purpose.

It must be borne in mind that for different zones of elevation different species of grass would, respectively be found to be best adapted; and the same would apply to differences of climate as respects excessive dryness or superabundant moisture. Investigation and experiments therefore, if thought desirable to be made in this direction, would have to be carried on in various localities in the Island, and with different kinds of grasses.

On the cleared pasture grounds of these gardens (without the addition of any other food) with Sinhalese and Coast varieties of cattle thrive exceedingly well, bringing forth strong and healthy calves, and yielding milk and butter of good quality. Very little attention is required to prevent ill effects arising to young calves from the bites of leeches. It is true that sheep cannot easily be pastured where leeches abound, owing to the leech-bites becoming fly-blown, and in this way incurable sores are frequently produced; but this particular obstacle to the breeding of sheep would hardly obtain in the drier parts of the Island.

Here we have the necessary measures for securing good pasturage and forage indicated. The one thing wanting is that the natives should voluntarily or under benevolent compulsion, bestow labour on the preparation and conservation of pasturage for their cattle instead of allowing the wretched animals to wander through jungles and swamps or fallow paddy-fields, picking up a scanty and precarious subsistence. It is gross exaggeration to describe the soil of Ceylon as "poor in the extreme." It varies, of course; but everywhere, if weeded and kept free of useless or noisome vegetation, it is capable, under the influence of our tropic sun and our tropic rains, of yielding very fair pasturage. The recommendations in the report of 1869 as regards food for cattle were as follows:—

Believing that the cattle of this country suffer greatly from the want of good and sufficient grazing during seasons of drought, and from exposure in their search for food in the rainy months, we would suggest the desirability of inducing village cattle owners to husband their paddy straw under shelter, to serve as fodder for their animals during the inclement seasons of each monsoon, as there can be no doubt that their herds would be much benefited by stall-feeding during such periods.

Mauritius grass dried and stored against seasons of prolonged drought or excessive rain, would form an admirable adjunct to paddy straw for purposes of stall-feeding, and we strongly urge its introduction into the rural districts of the country. It is a grass easily acclimatised, requiring no cultivation and of rapid growth, and it would be well suited for ravines in the hill districts and for swampy ground in the low country. The slight trouble involved in protecting it by fence or ditch from destruction by wild cattle would be amply compensated for in the valuable supply of excellent dry fodder it would afford, whilst the manure that would be accumulated in the cattle stalls at such times, could be employed in aiding the fertility of adjacent paddy lands, a matter to which native cultivators have hitherto paid far too little attention.

We believe that the "Prairie Grass" of Australia is also well suited to the climate of this country, and might be extensively introduced in pastoral districts with great advantage. It is a very hardy perennial,* grows to a great height if left uncut, and when grazed over makes a fine compact and enduring sward, capable of withstanding the effects of severe droughts. The grass is now being successfully grown on the Company's Farm at Peradeniya.

* "Prairie Grass."—This most valuable plant has become well and favorably known; it is a very hardy variety, stands drought as well as if not better than any other grasses, can be kept constantly under the scythe, and is well relished by all kinds of stock. It is most valuable to squatters, who by sowing a few bushels broadcast over their runs well secure a most permanent grass. The quantity required per acre is about two or three bushels.—*Melbourne Circular*, 1869.

With a view to providing better and more extended grazing in certain localities, such for instance as in the Badulla, Hambantota and Matara districts, we would suggest that a sufficiency of Crown chena land in the vicinity of each village or group of villages be set apart for this purpose, and the cultivators allowed to clear it from underwood, leaving only a few of the larger trees for light shade: beneath these, if the ground be kept free from undergrowth and weeds, good nutritious grazing could soon be obtained, which would be available for cattle in seasons when the grass on the lower and more exposed lands would be parched and burnt up?*

It would no doubt be very desirable if some of the European roots employed for cattle feeding could be introduced into this country, for stall-feeding during seasons when the ordinary grazing failed. Mangold Wurzel has been grown at Peradeniya with complete success, and, contrary to expectation, it has been found that this root is not attacked by pigs, or rats, which swarm in abundance on the land on which it was produced. The question of its preservation after digging, during certain seasons of the year, would soon be determined by a few experiments.

In reperusing the papers on the Grasses of Ceylon, contributed by the late Mr. Wm. Ferguson to the Journal of our local Asiatic Society, in 1880, we are simply amazed to see what a wealth of plants, indigenous and introduced, is available for cattle and horse food, if they were only properly treated and cultivated. Our attention is first attracted to *Hygroryza aristata*, which grows floating on water, and is a grass of which, according to Roxburgh, cattle are fond. This grass and others of a like habit, of which many are enumerated, might be encouraged to grow on the undrained water-covered swamps which occupy so large an area in the lowcountry extending inland from Colombo, along the route of the railway and by the sides of the Kelani river. *Coix-gigantea*, "kirindi mana" of the Sinhalese, although a tall coarse grass is freely eaten by cattle. *Paspalum scrobiculatum* in its wild state is common from the seashore to Nuwara Eliya, and cattle are very fond of it, whether green or dry. *Panicum sanguinale* is one of the most abundant grasses in the island. Cattle are fond of it and it forms one of our common pasture grasses. Of *P. ciliare* cattle are very fond. *P. javacuium* is greedily eaten by cattle. Of *P. Burmani* it is recorded:—

This is the Pagister grass, and Scotch grass of the West Indies. Writing about Jamaica., Loudon in his Encyclopædia of Agri. alludes to this grass as follows:—The island abounds also with different kinds of grass, of excellent quality, the artificial grass called Scot's Grass (Panicum hirtellum, fig 199, a. p. 195) grows spontaneously in most of the swamps and morasses of the West Indies; and it is so productive, that a single acre of it will maintain five horses for a whole year. *P. Crus-galli*, cultivated as a millet, grows wild as a grass, of which cattle are fond. So with *P. fluitans*, which floats on water and grows on the edges of sheets of water. Of *P. distachyum* and *P. prostratum* cattle are fond. *P. trigonum* is very abundant from the seashore to several thousand feet elevattion, and forms with *P. ovalifolicum* and *P. curvatum* the principal part of the fodder collected by he grass-women for horses in the Cinnamon Gardens. Of *P. repens*, "aetora tana" of the Sinhalese, it is said:—

This is one of the most common grasses in the island, and highly valued as fodder for cattle, large quantities of it being brought into and sold in Colombo. It is indigenous to Europe, Africa, Asia and America, and in Ceylon grows equally well in the dry sandy soil as it does in marshes, or water, its long creeping underground stems enabling it to endure the hot dry weather. It is one of the most difficult plants to get rid of once it establishes itself in any locality, and in this respect resembles the Triticum repens of Europe. It is found from the sea coast up to Nuwara Eliya, and is a common weed on some coffee estates.

Of another grass it is written:—

Roxburgh states that the *P. paludosum* is of a coarse nature and that cattle are not fond of it, but it is eaten greedily by them, and a supply of specimens collected by me for the Peradeniya Gardens was eaten during the night by a stray bullock.

Of *P. myurus* it is said:—

This is a very in grass found in the edges of canals or growing in the water with large swollen culms, and light green foliage. Cattle are fond of it. It is one of the grasses which rapidly spreads over shallow bits of water and helps to choke them up. Cattle also eat *P. interruptum*, *P. asperum* and *P. sordidum*.

We now come to the very best of our introduced and cultivated grasses, *P. jumentorum*, of which we are told:—

This is the famous *Guinea Grass* so well-known in the West Indies, in India and Ceylon. It is the Rata (foreigu) Tana of the Sinhalese. When and by whom it was introduced to Ceylon I find no record, though it is probable there may be one in the Royal Gardens at Peradeniya. It was grown in Ceylon in Moon's time, 1824, at any rate. The late Dr. Gardner introduced the seed of what he supposed to be a new fodder grass to Ceylon, but in 1843 or 4, he gave a full description of it in the *Ceylon Observer*, proving that it was identical with the Guinea Grass. It was introduced to Jamaica about 1744, from the Coast of Guinea. The following is an extract from Lunau's Hortus Jamaicensis:—

This most valuable grass is a native of Africa, and was introduced into the island many years ago by the merest accident. Mr. John Ellis got some birds from the coast of Guinea, and with them some seeds for their support: the birds dying soon after, the seeds were thrown out of doors as useless. From these seeds grew some luxuriant grass, which attracted Mr. Ellis's notice, and he had a horse and a cow brought where it was, when both of them greedily ate of it. It was then transplanted into a garden and gradually cultivated, until it has become one of the most lucrative and useful plants in Jamaica. It agrees with almost every soil and situation, and has rendered many rocky and otherwise barren spots of Jamaica very valuable, as affording support to herds of cattle and horses. The growth of this grass is quick, for in wet weather, and in a favourable situation, it may be cut once in a fortnight. It resists dry weather for a considerable time, and even, when parched up, the slightest shower will revive it. It rises from five to eight feet high. When of proper strength it is a very excellent food for horses and cattle, which, when considerably lean and reduced, will be restored to flesh and fatness in two or three months by feeding upon it.

There can be no doubt that the Guinea Grass, and what is most erroneously called in Ceylon *Mauritius Grass*, are the two most valuable fodder plants growing in Ceylon.—I have seen the Guinea Grass grow in what seems to be the pure white sand of the Cinnamon Gardens near Colombo, to a height of 6 to 8 feet, and if well manured and kept free of weeds, it will in rainy weather give a very fair crop monthly. It grows freely up to an elevation of 5,000 to 6,000 feet on the Coffee estates, but though a valuable fodder grass at these elevations, it does not grow to such a height as it does at lower elevations. It is extensively planted along the edges of foot and bridle paths on Coffee estates, but Mr. Morris gave his opinion against this practice, as the grass is supposed to harbour the mycelium of the Coffee leaf fungus.

When coffee flourished, the paths of many estates were, as Mr. W. Ferguson indicated, defined by this grass. But it attracted numerous bares which proved destructive, and when the bad times for coffee came and it was proved that manure merely encouraged leaf-disease and white grub, the expensive culture of Guinea grass was very generally abandoned.

* See letter from the Director of the Botanical Gardens, Appendix, p. 70.

Next comes the grass which is even of more importance than Guinea grass, inasmuch as it is, though not so saccharine or nutritious, far more easily cultivated, growing readily in swampy lands in the lowcountry and in ravines on estates amongst the hills. Like all vegetation which is frequently cropped, this "Mauritius" or "water grass" requires to be liberally manured. Its cultivation in the swampy parts of the Cinnamon Gardens and in and around Colombo generally has now attained dimensions of very considerable magnitude, bundles of the grass being carried about in carts and sold as fodder for cattle and horses. Its history as recorded by Mr. W. Ferguson is very curious, thus :—

Panicum barbinode Trin. Sp. Gr. 3 t. 318. P. sarmentosnm, Rox. fl-ind. I. p. 308. This is the grass so well known, but very erroneously, as *Mauritius Grass*. It is not given in Bojer's Hortus Mauritianus dated 1837, and Moon does not give it a place in his Catalogue dated 1824. By whom and when introduced to Ceylon I do not know.—It has been a well known fodder grass for several years past, grown in ravines and on the sides of streams in Coffee estates, but in Colombo the cultivation and supply of this grass were nearly confined to the Firm of Wilson, Ritchie & Co., until their failure some years ago, when the natives, Tamil and Sinhalese, began to cultivate it extensively and now supply Colombo with this most useful grass. Unlike the Guinea Grass, tbis one grows best in swampy or low grounds, but which must be well drained and manured to produce good crops. The owners of Mauritius Grass fields near Colombo send their carts into town and carry out a large portion of its scavenging refuse as manure for this grass, and a very considerable trade is carried on by the sale of this and Guinea Grass in Colombo.

Trinius gives Brazil as its native place, but as far as I know Roxburgh's description is the first given of this grass, and that it originally came to the Botanical Gardens at Calcutta from Sumatra upwards of seventy years ago there can be no doubt, though I notice that it is referred to by one Botanist as a native of Behar and the mountains of Parasnath. That it has spread from the Calcutta gardens to the various places in which it is now cultivated is very likely. Roxbourgh's account of its introduction is as follows:—"A native of Sumatra, and from thence introduced by Dr. Charles Campbell into the Botanic Garden in 1804, where it grows luxuriantly and blossoms throughout the year."

Of *Pencillaria spicata* the record is :—

Introduced from India to Ceylon many years ago. This plant is extensively cultivated in various parts of India and Egypt, and is said to be the staff of life in the Deccan, Kandeish and Gujarat. It is grown by the Tamils in Ceylon and springs up in rubbish heaps about Colombo. Its grain is so like Canary seed, that it is sold as such, and small birds seem to thrive on it. The late Dr. Elliott used it in feeding Carrier Pigeons, so successfully employed in carrying news from Galle to Colombo for many years before the telegraph was introduced. Cattle are fond of the straw.

Of *Stenotaphrum complanatum* it is stated :—

Mr. Moore, of the Sydney Botanic Gardens, told me that this was the *Kangaroo Grass* of Australia, but that is generally given as the Anthistiria australis and now said to be identical with the A. ciliata Retz. The Stenotaphrum is a very common grass near Colombo covering moist banks and sometimes forming the entire sward of lands on the banks of rivers and under the shade of coconut and other trees. It is an excellent fodder grass and cattle are fond of it.

Arundinella nervosa is one of the poor patana grasses we referred to. Of it we are told :—

This is a very common grass in the Patnas in the higher ranges, but I do not think cattle care for it, though when cut and dry amongst other grasses it forms a good fodder.

Apluda aristata when cut and dried amongst other grasses is a good fodder. Of *Ischœmum muticum*, we are told :—

Large quantities of this grass are collected by the grass women for horse food in Colombo, but it is a coarse fodder.

Spodiopogon obliquivalvis is one of the most important of our native grasses, and of it we have a full record :—

Common throughout the island. A very variable plant, and the extreme forms of it very different in appearance, but, from the examination of a large number of specimens, I feel satisfied they may be safely arranged under one specific name. The larger hairy form occurs at a considerable elevation on the hills.

One form of tbis grass reserved in fields and under the shade of coconut trees in and near Colombo, and extensively brought into town as fodder for cattle, is well known as the Rat-tana, literally red grass, of the Sinhalese. This grass, the Ætora (Panicum repens, Lin.), Guinea, and Mauritius grasses, are the four grasses sold separately in cart loads as fodder grasses in Colombo, and perhaps the best known to the natives. I am quite familiar with several forms of this grass from the dry sand of the Cinnamon Gardens in Colombo up to an elevation of 6,000 feet in the plain of Nuwara Eliya, and if all these are one species it may be considered one of the most protean of grasses in existence as far as I know.

Details are given of the varieties, and of one it is said :—

It affects damp shady places from the coast up to the Kandyan country, and is very seldom found in flower. It is an excellent and abundant fodder.

We now come to the principal grass of our upland prairies or patanas, *Anthisteria ciliata*, regarding which we quote as follows :—

This is a very abundant grass in many parts of Ceylon but especially in the patnas in Upper Dimbula, in many of which it is the principal grass, and is often cut and dried for fodder for cattle. This was especially done by Mr. William Smith on the patnas near the group of estates at Mattakellie. It is perhaps in this respect the best substitute for hay of all the grasses found in Ceylon. Several years ago large quantities of this grass used to come from Bombay with batches of horses for sale. In tbe Bombay Flora, Dalzell states that this species, and A. cymbaria, Rox. are generally found together in the same field ; and that they form the greater part of the best specimens of hay in the country, whilst he thought that the A. ciliatus, which is also a native of South Africa, differed scarcely, if at all, from the famous Kangaroo Grass of New Holland the A. australis of Brown. I notice that Mr. Morris refers to the A. australis having been introduced to Ceylon as a distinct species from A. ciliata, but the following extract from Baron Ferd. Von Mueller's Introduction to the Botanic Teachings of the Schools of Victoria, p. 125, show that this eminent Botanist considers the Kangaroo Grass identical with A. ciliata :—"Every one is acquainted with our Kangaroo Grass (Anthistiria ciliata), long known before Australia became colonised in South Asia, and all Africa. Wby the younger Linne should have connected the flower-festival of Bacchus with this plant, if really the name was changed from Authesteria, is difficult to conceive."

Another, but a creeping patana grass is *Anthistiria heteroclita*, "an excellent fodder in a green or dried state."

We now come to the citrus-scented, great and prevalent grass of the patanas, known as *mana*. Its scientific name is *Andropogon martini*, and Mr. W. Ferguson gave the following details regarding it :—

I refer here to the best known and most remarkable grass in Ceylon, which covers thousands of acres of the patnas of the interior of the island up to 5,000 feet altitude, and which are snpposed to have resisted the encroachment of the forests upon them time out of mind. The Rev. Mr. Abbay, the late Mr. Nietner and others have written fully on these patnas, and their soil. In the open exposed patnas it grows to a height of 6 to 7 feet, but in moist shaded places and amongst trees and small clumps of jungle it grows tall enough to conceal

elephants. It is used extensively as thatch for coolie lines and other buildings where to be had, and for this purpose and for litter for cattle is grown on some estates. It is grown in several portions of the Western Province on the embankments of ditches as a sort of fence. Cattle eat this grass when it is young, and for this purpose the patnas on which the natives graze their cattle are annually burnt, but the milk, butter, and even the flesh of cattle fed on it have a peculiar aromatic flavor. The following remarks by General Martin who sent Dr. Roxburgh the grass from Balaghant named after him is applicable to our Ceylon one, if the grasses are not the same species. "I took particular notice of a sort of long grass which the cattle were voraciously fond of, which is of so strong an aromatic and pungent taste, that the flesh of the animals, as also the milk and the butter, have a very strong scent of it." I keep this separate in the meantime from the Citronella Grass, and what is called Lemon Grass in Ceylon.

We may add that mana-grass has been very largely used on estates to cover nursery seed beds, also as bedding for cattle, and now a new interest attaches to the product from the prospect of its being utilized as "strawboard" for the manufacture of tea boxes, in regard to which we have a separate article in type.

Andropogon pertusus "is an excellent fodder either in a green or dry state and cattle are very fond of it." Again we have a notice of one of our best native grasses in *Cynodon dactylon*, of which we are told :—

This is the famous *Huryalee* of the Deccan, and the *Arugam-pillu* of the Tamils in Southern India and Ceylon. It is the grass supposed to be the best fodder of the indigenous ones, and is invariably selected by the grass women who may be seen all over Colombo scraping the whole plant from the roadsides and swards, to the very great injury of both, as it is one of the best grasses for binding the roadsides, and for forming swards. It is quite common everywhere in Ceylon, from the sea-coast up to the plains of Nuwara Eliya. It is the Panicum Dactylon, Linn., Agrostis linearis, Retz. and has been described under about a dozen other names. It seems to be common over a great part of the world. It is found in England, and other parts of Europe, India, China, Thibet, Australia, South and Central America, and the Cape of Good Hope, and said to have been introduced into Farz and Khuzistan, by the British Expedition of 1856-7, according to Birdwood p. 126. Col. Otley has written fully on the cultivation of this grass as a fodder for cavalry, in the Madras Literary Journal, but some trials made by me near Colombo did not bear out the Colonel's recommendation. It is the Durva, Sans. Doorba, Doobla, Beng. Doob, Ganer, Hind, and Gherika. Tel. "It is the Agrostis of the Greeks according to Fraas. Its flowers in their perfect state are among the loveliest objects in the vegetable world, and appear, through a lens, like minute rubies and emeralds in constant motion from the least breath of air. It is the sweetest and most nutritious pasture for cattle; and its usefulness added to its beauty, induced the *Hindus*, in their earliest ages, to believe that it was the mansion of a benevolent nymph. Even the veda celebrates it, as in the following text of the *A't'harvana*: "May Durva, which rose from the water of life, which has a hundred roots and a hundred stems, efface a hundred of my sins, and prolong my existence on earth for a hundred years." Other grasses are mentioned, but we have quoted sufficient to show that Ceylon possesses, besides the straw of paddy and other grain, an abundance of fodder grasses, suited for "dry" and "wet" cultivation; so that, with industry and care, provision could be made for periods of drought as well as normal seasons. Besides the *gramineæ*, wild and cultivated, there are other fodder substances, such as sugarcane tops, manioc and other roots, and the very valuable foliage of the jak tree. Then in the higher mountain regions there is the small, dense-growing bamboo of the forests which when properly treated is eaten by horses. The gorse or furze (the "whins" of the Scotch) flourishes in Nuwara Eliya; and a Highland gentleman who visited Ceylon some years ago suggested that this apparently most unpromising of plants might be made a source of fodder. In the Scotch Highlands expanses of whins are fired as the patanas are here, and while the shoots which spring up are still tender, they are cut, carted to the farmers' barns, and after being subjected to a thorough *flailing*, the bruised and juicy stuff is fed to horses and cattle. We mention this as a matter more of curiosity than of probable practical value; but there can be no question that, even apart from the possibly successful cultivation of such fodder substances as clover, rye-grass, lucerne, mangolds and the like, there is a large choice of grasses and other plants, native and introduced in Ceylon, to keep cattle in good condition (not to speak of coconut and gingelly cake and cotton seed), were the available resources only utilized with conscientious, steady industry. The problem is how to create and bring into operation these moral qualities amongst the natives. Government cannot do the work of the Christian Missionary; and after thousands of years of debasement we cannot expect that the regeneration of the people will be other than a comparatively slow process. But Government can do a good deal by legislation, and has done and is doing much that is useful and good by industrial education and by training and scattering agricultural instructors over the land. But individual servants of Government (especially those of European origin) can further the march of agricultural and pastoral improvement indefinitely, by personal zeal and interest, by encouragement and moral suasion, and occasionally by benevolent coercion.

Before parting with the report of 1869, there are a few details of interest to which we may advert. The idea with a large proportion of Europeans is that the whole population of India are vegetarians, or that they confine their consumption of animal products to milk, ghee and curds. Europeans in India, however, know that the masses—the millions of Hindustan—are only too ready to eat all the flesh they can get hold of, including that of swine, and without fastidiousness as to the condition of the meat. The Report noticed the spread of murrain in Ceylon by the habit of the natives digging up and carrying away for consumption the flesh of animals which had died of disease and had been buried, instead of being burnt or chemically consumed. The lower caste Tamil coolies are special offenders in this respect and so common did this offence become at one time in Southern India that Missionaries of the American Presbyterian Church (sons of Dr. Scudder, so well-known in Ceylon) considered it their duty to regard the digging up and eating of diseased and putrid bodies of cattle as an ecclesiastical offence, of which if native Christians were proved to be guilty they were excluded from the Church. We are not aware whether our penal code or common law provides for the punishment of this offence against nature and the commonwealth, but punished it certainly ought to be. The difficulty of coping with the evil of cattle disease is shown by the statement that "in nine cases out of ten it will be found perfectly useless to expect that any directions as to food, cleanliness or the administration of medicines will be properly carried out, except under the immediate eye of a person of intelligence." Until the intelligence desiderated is far more prevalent than it now is the difficulty of coping with disease and the conditions which lead to it will remain. When there is an outbreak of true rinderpest amongst cattle

here or anywhere else, the proportion of deaths of seizures are as nearly as possible the same as amongst human beings when Asiatic cholera becomes epidemic; that is, three-fourths and more of the earlier cases are fatal. Hence the value not so much of treatment, as of preventive measures, in the shape of nutritious food, shelter, especially at night, cleanliness and the free use of such disinfectants as carbolic acid and other chemicals. The following is characteristic:—

On the Arachchi [in the Matara district,] being questioned as to the reason why garden cultivation was nowhere attempted, he replied that the want of water prevented any cultivation of this kind. He was reminded that in Jaffna, where less rain fell than here, a most thriving agriculture was carried on by means of well water. He remarked that such was not the custom here, and there was no one to show the people who to proceed in such a matter. To the question why did not the Headmen instruct the villagers in this, the characteristic reply was, "The Government had not given orders."

Again:—

A circumstance occurred here which illustates very forcibly the peculiarity of native character. The owner of one of the sick calves, a woman, had besought the assistance of the Commission for the sick animal with an importunity that showed her deep concern for it; as she said, she regarded it as one of her children. The utmost attention and deference was paid to the Commission: chairs were placed on a mat in front of the house, and coconuts were brought out in profusion. On returning from Dikwella and calling at this house, the woman peeped out of the door with a vacant stare, but no signs of recognition, and resumed her occupation: the eldest son lay stretched at full length on his back in the front verandah; hearing footsteps he turned half around, grunted, and resumed his former position, taking no need of any one. We knew by these infallible tokens that the calf was quite well, and so it proved. It was beyond all danger, and the Commission was no longer an object of civility to its owners!

The difficulty of obtaining correct information from the natives here and in India, even when a census has to be taken, from their inveterate belief that all inquiries are made with a view to fresh or enhanced taxation, is curiously illustrated in the following passage:—

An extensive cultivator, from whom some information was being obtained in regard to herds and agriculture, enquired when the new tax on cattle was to be levied, and how much was intended to be charged. On his being assured that no tax was contemplated, he enquired why Government was so anxious to ascertain the number of cattle in each district and village if not for the purpose of taxation, and listened with evident incredulity to the explanation that the information sought was for no other purpose than as a guide to the extent of losses suffered by the people in this respect, and as an indication of the necessity for some measures being adopted to prevent the spread of the disease. When reminded that the Government had undertaken an enquiry into Cattle Disease at the public cost, the rejoinder was that no doubt the new tax would pay for the Commission.

The opinions of the late Mr. R. B. Tytler, who kept fine herds of "Coast" cattle at Pallikelle, were thus delivered:—

Murrian of a variety of types may be looked for after every cycle of drought when succeeded by wet years and nothing I can think of can be done to prevent or alleviate it, beyond housing, separation of the attacked, dry warmth, good dry food, rock salt, scrupulous cleanliness, and such care as common sense dictates; all these would doubtless be beneficial, but will the people attend to it?

The commonsense of the whole matter was thus summed up by Mr. E. J. Browne of Melfort estate:—

So far as I have been able to judge, well-fed and carefully tended cattle do not appear to be so liable to the disease. Were cattle kept in good condition, and occasionally well groomed with a curry comb and brush, and above all kept *warm* and *dry* at night with a sufficiency of bedding, the cases of murrain in a herd, would, I believe, be reduced to a minimum. A fruitful cause of disease is the practice which native cattleowners have, by tying up their bullocks in the open air at night, wet or dry, without food or bedding; and then after over-working them the following day, turning them out into poor patna grass, where they eat ravenously the unwholesome food to be fonnd there. "Prevention is better than cure," and good food, plenty of water, housing in warm and dry sheds in bad weather, and cleanliness, will do more to arrest the cattle disease than all the specifics that have yet been discovered.

The late Dr. Thwaites (the well-known medical man, and not to be confounded with the botanist) contributed a paper on cattle disease in which he wrote:—

'Dr. Ferguson suggests large doses of Quinine, I understand, and, no doubt were Quinine accessible to the natives, even conveniently available to the Planters, in such large doses as Cattle would require, it would certainly be the best constitutional remedy we could propose; but we must look elsewhere for our resources among the remedies with which the natives are familiar, and which are not within their reach, and such as they would feel disposed from their own prejudices to employ. The Alkaloid preparation, termed Peperin, derived from common pepper is now attracting great attention at home, as a substitute for Quinine as a tonic and stimulant, being equal to it in efficacy and immeasurably cheaper. The natives are perfectly conversant with the use of Black Pepper as a febrifuge, and I have often employed it myself among them with great advantage. I would therefore suggest the following prescription.

"Whole Pepper well reduced to a powder one table-spoonful, *boiling* water one pint, to be well mixed and allowed to stand for half and hour, then given all together, and repeated every two hours until the Fever subsides.

The reference to Dr. Fergusson, as he spelled his name, then head of the Medical Department, arose from the fact that the present writer, as editor of the *Observer*, had recommended the use of quinine in cattle disease. There can be no question of the value of cinchona alkaloids as tonics and febrifuges, in the treatment of the lower animals as well as human beings, and now that those remedies can be obtained at so low a cost, we repeat the recommendation with more confidence than ever; that is where the symptoms are manageable debility or feverishness.—A passage from a report on murrain in the Matara district, by Mr. E. Elliott, may well be quoted. He recommended:—

The enforcement of more attention to the cattle by their owners, if not for their own sake, for that of the proprietors of other property, especially growing crops. A good deal of attention is paid to black cattle in the Gangaboda Pattu, where they are regularly tethered out whenever there is any cultivation likely to attract them in the neighbourhood. But in the other parts of the district very little trouble is bestowed on them; this is the case nearly everywhere in the Island, except in the Jaffna Peninsula and in the Wanny and Tamankadoowa, where the animals are driven home and tied up or kraaled for the night to protect them from the ravages of wild animals. One Mudaliyar here reports that he does not believe there is a single animal in his Pattu which has not done damage worth several times its own value.

There is much else of interest which might be quoted or noticed, but we have already dealt with the subject at such length, that here we must close,—at least for the present. We have done our best to summarize the information available; and if legislation is really resorted to it will be our duty to examine the regulations, imposive or prohibitory, which may be proposed.

THE PLANTING ENTERPRISE IN JOHORE AND THE MALAY PENINSULA GENERALLY.

(From our Special Correspondent)

There are several groups of coffee estates in Johore, but those visited on this occasion lie at the southernmost point of the Malayan Peninsula. Having been told by the proprietors that there was nothing in the way of soil, it was an agreeable surprise to find that, compared with the majority of the estates visited in Perak and Selangor, there was some very fair soil in parts of the property in Johore. The coffee is Liberian and planted on undulating ground, close to the seashore, a narrow belt of coconut palms and native gardens separating it from the open sea. The highest points are probably a couple of hundred feet above sea-level, and the higher you go, the worse the soil and the greater proportion of cabook gravel. This is exactly the opposite to what may be found in the hills of Perak, where the higher you go the better the soil as a rule, of course there are pockets of fine *surface* soil in the hollows. Amongst these little hillocks and sloping fields in Johore there are great stretches of swamp with black soil, and in these positions sago palms flourish, and great numbers (some hundreds of acres) have been planted up. The Liberian coffee is very much exposed to the winds from the sea, and is without shelter from the tropical storms that come tearing across the Straits. Very bad weather prevailed at the time of our visit. In spite, however, of this drawback and the want of richness in most of the soil, the coffee bushes looked very well—fine fields of dark-green trees, bearing a good crop. They had been a long time growing before they gave any appreciable profit, but there were many other reasons for this, apart from the conditions of soil and climate. The coffee is peeled on the estate by means of hammer pounders, working in mortars, and the superintendent could well be congratulated on having obtained the highest price for Liberian in the London Market. This estate can boast of an engine and steam-worked machinery.

These properties are unfortunately completely isolated from civilization and society, being some sixteen to twenty miles by sea from Singapore. Considerable extensions have been made and are still in progress, and before long the company to all appearance will possess a very valuable property. A number of Javanese coolies are employed, as well as Tamils, Malays and Chinese. Large numbers of nutmeg trees are planted at intervals through the coffee, and the produce is now coming in. Another source of revenue is cubebs, the vines of which appear to be flourishing and doing well. Ipecachuana is also grown on the estate and is said to prove a profitable cultivation. As regards the common enemy leaf disease with the green bug—these estates are no better off than those in the protected states, in fact are to all appearance rather worse. It may be mentioned that the green bug can be seen in Penang on a guava tree right in the middle of the town.

Speaking generally of the impression received during a trip through Perak and Selangor and a short visit to a small portion of Johore, it would appear that the Liberian variety of coffee is admirably adopted to the soil and climate of the country throughout the Malayan Peninsula, and that the Arabian coffee does very well on the higher slopes of the hills in Perak. With present prices the estates are paying well, and future prospects are very brilliant. The great question at the present day is that of labour. Present prices may admit of a daily wage of twenty-five cents of a dollar, but that amount is a very heavy one on which to estimate the working of the estates as a general rule for the future. Railway and road communications will shortly be such as never at any time advantaged the opening of any new district in Ceylon. The terms on which jungle land is offered to *bona fide* investors are extremely favorable more to what has obtained in Ceylon during the present generation of planters in the island.

There are many other products for which suitable land can be found in these settlements, such as sugar, pepper, tapioca, sago, tobacco, gambier, rice, coconuts, &c.

Of these the favorite amongst Europeans seems to be pepper. The method of supporting the vines adopted by Europeans usually differs from that of the native planters, who train the vine up the stem of a living tree. As a rule the dadap (*Erythrina indica*) is used for this purpose, it being a fast-growing tree and easily propagated either by seed or cuttings.

The European custom however is to train the pepper vines upon pieces of roughly split hardwood timber, which is said to withstand the weather and the attacks of white ants as long as will be required for use as supports to the vine, that is to say as long as the vine can be made to give profitable crops. In one Chinaman's garden we saw some very old pepper vines said to be twenty years old clinging to these supports; though in many cases it seemed as if the vine supported the remains of the decayed posts rather than the posts supporting the vines. It is moreover advanced by the advocates of the post support system, that the vines are more prolific when exposed to the sun than when grown under the shade of living trees, and it may well be that there is a good deal of truth in this statement. Pepper vines have their natural enemies like every other product. A little beetle lays its eggs in the knot from whence the new shoots spring. The egg develops into a maggot, which bores its way into the young shoot, and a foot or more in length of course dies away. Gangs of coolies are employed cutting off the affected shoots and putting them into buckets of boiling water. Some of the pepper fields are bearing heavily and should give a handsome return. They are mostly treated with manure of various kinds. The bats' dung guano found in the Batu limestone caves is said on analysis to be wanting in phosphates, but however this may be it seems to be very suitable for manuring pepper vines: some that had been treated with this guano were bearing a very heavy crop. An experiment was being tried on one estate. Dipping the clusters of pepper berries into boiling water before drying them is a common practice, but this experiment consisted in exposing them for some minutes to the smoke from a wood fire. It has not transpired what has been the result, but one would suppose great care about the selection of the wood should be exercised, especially if it were in a green state. Many woods produce a disagreeable pungent smoke—sometimes of a very disagreeable odour, and the pepper might become unpleasantly tainted either as regards taste or smell, or both. In Selangor large extents of land covering thousands of acres in the aggregate have been opened up by Chinese principally for the cultivation of pepper, tapioca and gambier. Their success has been great and a large trade has sprung up, so much so that an enterprising firm of Chinese at Singapore are running small steamers to bring out the produce and carry it to the markets at Singapore to be thence transhipped probably to other parts of the world.

There can be little doubt that in the course of time the whole of the Malayan Peninsula will become a British province including all the protected states and probably Pedah and other districts nominally under the King of Siam. At present life and property in the protected states are just as safe as they are in Ceylon or Burma: in fact more so. Consequently investors of capital need not fear anything beyond what is naturally inherent in any unopened country.

SÃO PAULO RE-VISITED.

TRAVELLING TOWARDS THE INTERIOR—VIEW OF THE CITY AND OUTSIDE—TRAMWAYS—TELEGRAPH AND TELEPHONE WIRES—GAS VERSUS ELECTRICITY—BUSY STREETS—NEWSPAPER BOYS—BAKERS—BUTCHERS—BREWERIES AND ICE MANUFACTORIES—HOW MILK IS SUPPLIED—COOKS—SUPPLY OF PROVISIONS—LEOTURING A PIG—FUEL FOR DOMESTIC USE—EARLY RISING HABITS OF THE PEOPLE—THEIR COSTUMES—HOUSES FOR WORKMEN—THE RAILWAY STATION AND TRAVELLING ACCOMMODATION—WANT OF IMPROVEMENT—TRAIN SERVICE—PHYSICAL FEATURES OF THE COUNTRY—DESCRIPTION OF THE JOURNEY—DIFFERENT GAUGE RAILWAY LINES—CULTIVATION—FESTIVITIES AND OTHER AMUSEMENTS OF THE PEOPLE OF CAMPINAS.

Travellers by the early train from São Paulo to the interior have to be on foot at 5 a m. Some little time is spent on fortifying oneself with coffee and bread and butter—the latter quite a luxury, fresh and firm, procured from the European colonists who live on estates near by or who have small farms of their own in the vicinity. Although we had seen few guests at the hotel the night before, we found them numerous now wishing to pay accounts. It is well that carriage fare to the São Paulo railway station be included in the hotel bill, for then one of the many carriages in waiting is secured by a waiter, and the luggage being put in, we have only to step in at the porch of the hotel, and there is no haggling with the coachman on arrival at the station. Four shillings looks a big sum for a four-wheeler, when a single passenger could go by tram-car for five pence, but there are two of us, and as each has a portmanteau, a saddle, and small things, the cab is preferable.

I mentioned that the station at which we arrived last night was near the outside of the town on low ground at the east end, the second nearest Santos and close to the São Paulo railway line owned by an English company. The comfort of the public could have been easily considered by making both stations at one place, with little cost to either company, but railway directors here make public convenience a secondary consideration; so the traveller from Rio has to find his way from the east end uphill to the centre of the city, and then descend to the west end where the other station is. The English company's station was made some years before the São Paulo and Rio de Janeiro railway was projected.

By the time we leave the hotel daylight has broken, and we can see from the open carriage what a delightful site has been chosen for the city. It is on rising ground facing the east. About 200 feet lower, and at some two miles distance, is the River Tiete, which is here little more than the outcome of a mountain stream which comes from the hills between São Paulo and Santos, and as the ground in the valley is flat the river winds slowly amongst small, artificially-made woods and natural pastures towards the west. The streets of the town are laid out regularly, at the outside part of the town, but in the centre they partake of the irregular Portuguese style, and some are not very broad. All are clean, and well paved with square granite blocks, the shape of bricks, with kerbstones and side paths of large granite blocks or of concrete.

Churches form the most imposing buildings, and they also monopolize the most conspicuous spots. Government buildings are also conspicuous by their massive forms, and large sums seem to be spent in elaborate houses of business, and retail-shops. The upper-floors of these are used as dwelling-houses, and one can observe that all are, inside and out—an imitation of the European style. Outside the business part of the town, and as we drive down towards the railway station, there are some very neat palacettes with surroundings of trees and shrubs of a kind not often seen in the same latitude as São Paulo. Very little indeed is seen to give one an idea of being in the tropics. It is rare to see a house with a verandah, yet at some seasons of the year the sun must beat strongly against these granite walls, and turn the inside rooms into an oven. Verandahs do not seem to have attracted the first settlers in this country, for certainly the warmer parts at the foot of the hills or the sea coast do not show many houses with these valuable additions to a house. Even in the warm seaport towns in the north they are conspicuous by their absence.

The city has a nicely arranged tramway service which seems to conveniently suit the dwellers of almost every street. The cars are all open, seats across with reversible backs, and for four have plenty of room on each seat; at the end of each seat is a support for the roof. The gauge looks to me to be one metre, certainly not exceeding 3'-6", and the motive power is supplied by two mules abreast, and an extra one is put abreast at the foot of the hills. These tram-cars run far out of the busy part of the town to the regions of quiet "chacaras" (as they call a house situated in the midst of a piece of pasture, shrubbery or garden ground), where the business man can spend his spare hours in domestic bliss, and the lady of the house can amuse herself with her poultry, her flower and kitchen garden.

One can observe by the number of wires suspended above the houses that there is an extensive telephone service, and in the centre of the town are several telegraph stations. I have already mentioned that the gas for lighting and for gas engines is supplied by an English company, and this is threatened annihilation when the contract time has run out by the substitution of electricity. I think the sensible people in S. Paulo will, before changing the system of illumination, examine well whether the electric light has been a success in the towns in the same province where it has been and is being introduced.

The numbers of people one sees in the streets at this early hour are not confined to those seeking the railway station. The streets are ringing with the cries of newspaper boys, and numbers of shoe-blacks are accosting pedestrians, and pointing to their feet. The bakers' van is seen rattling along with supplies of bread to their customers; the small provision shopkeepers in the various streets, bearers of large square willow-baskets, with the contents carefully wrapped in red blankets, are distributing hot muffins to houses as they go along, while others are stationed at the corners of the streets selling the same kind of wares "to such as choose to buy 'em." By a wise arrangement beef is distributed to the butchers the night before, after having been inspected by competent authorities. There is more than one brewery in S. Paulo judging by the number of springcarts one sees conveying bottled beer. Nor is the aerated water

manufacturer less alive to the advisibility of delivering his full syphons, and soda water and lemonade bottles, and taking away the "empties," early in the morning. Cool as the weather is, large blocks of ice, the shape and size of paving flags, are to be seen conveyed in spring vans, exposed to the air. In some towns in the interior one notices at this early hour milk boys with bottles in square baskets of perhaps two dozen, on each side of the mule on which he may be mounted, or he may see single bullock hackeries laden with vegetables as well as milk, and these all sent from farms in the vicinity of the town, but here the milk distribution is different. There are to be seen large black and white cows with short horns and with udders reaching to near the ground; a man goes before with the halter in his hand, and a calf with a piece of leather fixed over its mouth is tied to the cow's tail and follows behind. These go in solemn Indian file through the streets; the buyer of milk hears the tinkling of the bell which is tied to the cow's neck; and presents the man with a tumbler or a tin vessel; the milk is drawn directly from the cow up to the quantity required, and then the procession resumes its course until another customer appears. There are also houses at which he calls daily. Now, my good housewives, is not this a capital plan? No chance of baby's milk being mixed with chalk and water here, and if "child's milk" should be always drawn from one cow, here you have it in its unadulterated purity and your temper does not get ruffled in the early morning.

[In this matter of milk certainly Brazil is far in advance of India and Ceylon.—ED. *T. A.*]

Cooks, both male and female, of all colours, from the white-skinned, olive-eyed native of Southern Europe to the rolling-in-fat ebony-black, descended indirect line from the land owners of Angola or Mozambique, are to be seen returning from the market with the daily supplies, for both large and small culinary establishments, conspicuous amongst which are beef and vegetables of local production. Nor are New Zealand products wanting, for the frozen-meat steamers, which call to coal at Rio de Janeiro twice a month, leave each time a large quantity of potatoes, butter, cheese, game, salt-beef, salt-pork, hams, bacon and other things which are all sold cheaper than the same kinds; the produce of this country; carcases of fresh mutton are also left. The cook's reticule willow-basket is a recipient for a varied assortment of eatables, and live produce is often seen hanging outside in the shape of chickens, ducklings, etc. Live pigs are bought and carried to be killed at home. One beautiful twenty to twenty-five pounder, a good specimen of pure Berkshire, was dangling by the hind feet at the end of a stick, which was slung over the shoulder of a stout negro who was every now and then stopping and turning round to give his very unruly charge a lecture as to the advisability of giving expression to its sentiments in a less noisy manner, and threatening to reduce the term of his life by a couple of hours by letting him fall at once on the hard stones, which lecture the pig did not mind much; and the negro did not carry out his threat.

Railway freights seem to make coals scarce for culinary purposes, for boys are seen carrying bundles of firewood split in sticks of a metre long, and two to three inches thick; a bundle of ten will cost about a shilling. Charcoal enters largely into consumption in the laundry, and is also a costly item in the S. Paulo household.

Brazilians are noted for their early rising, and we are not surprised to see many well-dressed people enjoying an airing, ladies and gentlemen walking, rosy-faced children being driven about in perambulators under charge of clean tidy looking Italian and German maidens, youths on bicycles are flying about, and there are also to be seen the lords of the soil on thorough-bred English horses with English grooms with cockades in their hats, and the regulation groom-clothing.

As before mentioned, everything suggests a temperate climate, and a people bent on copying European customs. Top-coats, Scotch plaids, and muffler shawls are general amongst the male portion, and beneath these are suits of West of England black, or Scotch tweed, the head cover being either a Parisian chimney-pot or a Christy or Townend stiff felt hat.

The dresses and outside coverings of the fair sex are similar to what one would see in the large towns in Europe in spring. The newest Parisian styles are always adopted, and the *artistes* in ladies' dresses are either of French nationality, or have had a training in Parisian establishments. An American gentleman who lived at the same hotel with me told me he had been over the *whole world*, and he "never saw *women* dress so *mightily* fine, and whose looks were so *mightily* improved by their dress as in Brazil." There is some truth in these remarks, but as regards these São Paulo *brunettes*, the erect carriage, the correctly formed figure, the healthy glow shining through the slightly tinged features, the long raven locks hanging down behind often a long way below the waist, offer very little exercise for the improver's art. I know a great difference since I was here some eight years ago. Then there were large empty spaces near the railway station which are now filled up with large buildings, the lower portions of which are used as warehouses for country produce, particularly coffee, and the upper floors as counting-houses for commission merchants, or dwelling houses for commercial men. Santos, the seaport, which is distant some 56 miles by rail, has turned so very unhealthy of late years, that much of the business which was done there is done now in São Paulo.

There are many neatly built houses for European artisans near the railway station. These are kept very tastefully. The occupiers are employed principally in the workshops of the São Paulo Railway Company and many are in service of large mechanical, and industrial establishments which have sprung up near the railway station of late years. There are iron foundries, brass foundries, machine-shops, sawing and woodworking shops, employing principally English speaking people, while amongst those employing a mixed population, and in industries heavily protected by an import duty, are cotton mills, breweries, distillers of spirits, and makers of natural and artificial wines, French tile works, granite and marble works, lucifer match-makers, hat making establishments, boots and shoe-making factories, potteries, glazed pipe makers and many other occupations which have had an existence of only a few years as yet. There was always an ice manufactory, and lately to the list of labour-saving establishments is added a laundry filled with the most modern steam appliances.

The railway station itself shows little improvement on former years. It has not half the accommodation which the large increase of traffic demands. The trade of the province has increased at least ten times ever since this station was made, and the railway being the great trunk line, which is fed by all the various branches whose ramifications extend through the length and breadth of the province for many hundreds of miles, has to receive all the passengers and goods, either to and from the seaport, Santos or to and from the capital of

the empire, Rio de Janeiro. The luggage department is too small, and is constantly filled by unruly crowds of people; porters, barrowmen, and mule cartmen, are continually fighting round a single weighing machine, placed on a narrow verandah about 20 feet by 10, open to the street and divided from the platform by an iron railing. A single clerk has to do duty of writing out the receipts and receiving the money at a window opening from the end of the verandah beside the weighing machine. Passengers have to pay for all that goes into the luggage van, a rate per kilogramme.

The passenger has to depute someone else to see after his luggage, and all he knows of it is from the receipt which may be handed to him in at the carriage window, just as the train is starting from which he supposes it is safe. The platform is broad but not enough of it, and there is a crush at the arrival and departure of every train; and if colonists, newly arrived from Europe, are going with the same train, there is scarcely moving about at all on it. The refreshment-room is a dark dismal looking place, and the lavatories are repulsive. A new station ought long ago to have been built, and the engineer of the line told me he had planned and estimated for one years ago, but the sanction of Government had always been withheld. Although the fiscal engineers allowed liberally for general upkeep of the line, they were always averse to improvements which were to cost a large sum of money. On all guaranteed railways the Government have a fiscal engineer who watches over all expenditure, so as to keep down to a low limit the Government quota for interest on capital guaranteed. The contract with the São Paulo Railway Company allowed 8 per cent to go to the shareholders, but all above this, in the net profits, had to go to the Government, to repay it for, interest paid during construction, or on account of other expenses connected with the guarantee. The Government have now been paid up all that had been so spent, and I daresay São Paulo will soon have a railway station built on British lines with grand accommodation for all.

As few carriages are run, in proportion to the number of passengers, there is some difficulty in securing room for ourselves, and for the small parcels which we are allowed to take into the carriage, but at the junctions with other lines we find more room as we go along. The old cross-seated English carriages formerly on this line have been turned into saloon carriages with one door in the middle opening directly on to the platform, but the barbarous practice of locking the passengers in still prevails on this line and on others in the province of São Paulo. This was adopted at the commencement of railway travelling in this country, because of the dread that the ignorant native would be often opening the door, and accidents might happen. Now that the native is educated, the railway officials stick to it because it saves them bother in having to wait for passengers who may get out at small stations on the line from mere curiosity. This being the starting point of the train it starts punctually to time at 6·20 a.m. I had met no old friends in São Paulo, as I arrived too late at night and had to leave early next morning. A white mist lies low on the valley of the Tiete, but the hills beyond towards the north are clear; from these at a distance of some twelve miles comes the water which supplies the city. The water company although having its head office in São Paulo has many British shareholders, and the engineering of the work was executed by British engineers, and piping and other materials not found in the country, were imported from England. The river Tiete is crossed by an iron lattice bridge about six miles from São Paulo. Here the elevation is about 2,380 feet above the sea.

The physical features of the country are not very remarkable. From Rio de Janeiro as noted formerly after crossing the Serra de Mar we arrived at Barra de Pirahy. The latter place is 67 miles from Rio and the height above the sea is 1,180 feet.

From Barra de Pirahy we go alongside the river Parahyba for 196 miles to Guararema, which is 1,824 feet above the sea. We pass over some hilly ground on our way to São Paulo, which is 46 miles further on, and has an elevation of 2,503 feet. We have had the rangee of the Serra de Mar to our left and *east* of us, and the Serra de Mantiqueira the highest peak of which is Statiana on our right and *west* of us. The hilly ground alluded to forms a sort of connection between these two great ranges of hills, and the hills we notice to the north of the city of São Paulo are some of the spurs of the Mantiqueira, and these join on to another range which runs east and west called the Serra Negra, and forms for some distance the division between the Provinces of São Paulo and Minas Geráes. These do not rise to a great elevation but they form the water-parting between the river Tieté, which flows through the centre of the Province of São Paulo and the Sapucahy which runs through the southern part of Minas Geráes, and both run into the Paraná. It is in the smaller ranges of hills scattered over the Province of São Paulo where coffee, the principal agricultural product grown for export, is cultivated. These hills and mountains both large and small which we have at present under notice are all more or less of the same formation, granite or gneiss forming the foundations; and laterite sometimes sandy often chalky but generally shaly and largely impregnated with oxide of iron, underlies the cultivatable soil. As we go further west in the Province of São Paulo the formation partakes largely of this latter description, and it is of this slatey clay that the famous *terra roxa*, a red waxy soil, is formed and which is the most valuable for coffee growing. Indeed we do not find much coffee grown in the Province of São Paulo until we go west, where this soil is to be found. We notice the improvement in agriculture as we go west owing to this superior quality of soil.

At Belem, 24 miles from São Paulo and 2,544 feet above the sea, we go through a tunnel perhaps 200 yards long. The hill it passes through is not over 150 feet above the level of the railway. At 30 miles from São Paulo, Campo Limpo is the junction of a line to Bragemea, a metre gauge called the Bragantina Railway. It goes direct north towards the Serra Negra, a distance of 32 miles. at 37 miles from São Paulo we come to Sundiah, 2,330 feet above the sea, and here the English Company's railway ends. At Sundiah is a beautifully commodious station and finished quite in the English style; here is the junction with the Stuana Railway. The Stuana goes south to the town Itú, famous for its schools and convents, and has an extension to the river Piracicaba on which are small steamers. To Itú the distance is 44 miles and the extension is 57 miles more: the gauge is a metre. It was first opened in 1874 to Itu and has been going on gradually extending. The guarantee is 7 per cent on £200,000. The branch towards Piracicaba taps a large coffee producing district. There are also three sugar factories on the side of the line, enjoying a Government guarantee, but the planters do not supply them with enough cane.

The São Paulo Railway which ends here starts from Santos, and has a length of 93 miles: the gauge is 5ft. 3in. It cost £2,500,000, and the Government

guarantee was 7 per cent which is all repaid and the line gives now an excess of receipts over expenditure, £400,000 a year.

Railway communication is extended from here by a Brazilian Company called the Paulista Railway Company on the same gauge, 5ft. 3in, and has no guarantee. The English Company had the preference for extending some 80 miles farther into the interior—to Rio Claro—but in these days, in 1870, the coffee crop was not more than a quarter of the present yearly yield, and they did not feel their capital would be secure, and contented themselves in being the trunk line through which all the produce has to pass on its way to the sea-coast from the interior. The Paulista Company opened the first section from Sundiahy to Campinas, a distance of 28 miles in 1873, and to Rio Claro 55 miles farther in 1876 and to the river Magy-quassu some 40 miles more in 1878. Magyquassu was made navigable by clearing out the rocky obstructions with dynamite for some 120 miles farther, at the expense of the Company, and they put appropriate steamers and barges on some three years afterwards. The Company has never paid less than 9 per cent per annum.

The train stays only the length of time at Jundiahy to change engines and take out the luggage of passengers going by the Ituana line. Carriages are not changed; the English and the Paulista Company are the same gauge, and accommodate each other as regards passenger and goods wagons. Between Jundiahy and Campinas we see the first of the large coffee plantations, and we enter into the region of *terra rocha*. What a falling-off is there! In the Seventies these coffee fields by the side of the railway used to be loaded with coffee every year, and judging then from the healthiness of the trees and the strength of the soil one would have thought the planter was secure of a large income for a long lifetime; but weeds and wash tell on the best soils, and on even the best formed fields, and many of these are giving only as much crop as pays expenses. All available forest-land had been planted up years ago, and no young coffee could be seen.

Campinas was reached in due time and here we had to change carriages from the wide gauge of the Company Paulista to the narrow of the Moggana. There was time for us to take breakfast, but there was a crush in procuring seats. The tickets were checked at once, and the doors were locked and the train did not start for more than half an hour. This was annoying as we calculated on breakfasting at Campinas; but fortunately some of the sandwich loaf we bought from Rio the day before, was still to the fore, which stood us in good stead. Campinas still shows signs of having been the coffee capital of São Paulo, for there are no fewer than four large foundries, with machine shops attached. These are all new to me, for when I was here before, machines were made in Europe or the United States, and merely fitted up here. Now only steam engines, boilers, and iron water-wheels are imported, and what is properly called coffee machinery is made here. The workshops are all beside the railway station. In these four large establishments and in the repairing and erecting shops of the railways there are said to be some five hundred mechanics, comprising fitters, boilermakers, coppersmiths, millwrights, moulders, carriage builders, and painters, and these are nearly all British subjects. Here in Campinas I had many friends in "the days of old," but for reasons stated before I could not wait for a day to see them. The station is on rising ground—above the town to the *south* of it. The town itself is in a lowlying hollow: a sort of birds-eye view of it is got from the railway. Here as in all other places, the increase in size and the improvements in buildings are all on the side of the railway station. When I knew it before the station was surrounded by green fields; the hotels were all down in the hollow where all the houses of the planters were, and all the places of business. All this is altered; quite a new city has sprung up. Spacious hotels and lofty mansions and neat cottages cover a large piece of what was waste common.

Although coffee has well nigh abandoned the Campinas district, and the extension of railways has sent cultivators of the berry into the interior, where soil is much superior, and available land plentiful, still a great many of the old wealthy planters retain their establishments in Campinas and live with their families, alternately on the fazenda and in the town. They used to have their seasons of balls and parties, their race meetings, and above all their great church feasts, at which as much money would be spent in fireworks and tomfoolery, as would clothe and educate all the poor in the district; and there was the Carnival when for some three days all the youth of the town would turn out in masquerade and processions formed of emblematical pageants parade the town in fantastical dresses, caricaturing. Local and political events play all sorts of antics, and cut all sorts of practical jokes. Chief amongst the latter would be to blow with a tinhorn into the ear of some inattentive person or squirt scented water on the face or neck of some unsuspecting fair passenger. Nor are these fair ladies without their "bisnagas" (as they call them, made of lead which they squeeze to eject the water) and lemons filled with water which they apply in return. Then they will have their fancy balls in the evening where all classes mix in disguise, and dancing, mirth and fun go on till early hours of the morning. Easter week sends all to town to enjoy Newfoundland cod-fish for three days (as the only food allowed) and finish up with balls from which the faithful—which include nearly all those attending those luxurious functions—sally out to meet the midnight processions at which the images carried, the prayers read, and the sermons preached on the street are intended to impress the people with the death, burial, and resurrection of our Saviour.

Christmas week also sends many to town. I have always thought there was less warmth of demonstration amongst the people of this country than in those of Europe at their Christmas festivities.* Europeans, especially Germans, do their best to imitate the doings at these Christmas celebrations, and by them the priest is not put forward as the most important personage. Many other occasions send the planter to his town house.

It is considered fashionable to have a taste for music, particularly of the lyrical order, represented by Italian opera; and to secure good companies the rich people subscribe large sums which entitles them to boxes or stalls for their families during all the recitations. Often European operatic companies visit Rio de Janeiro, and some of these are induced—particularly since railway communication became so general—to visit the towns in the interior, when success is secured by a large subscription list. Nor must I forget to mention that Campinas is the birth-place of a contemporary composer—Carlos Gomes—author of some very good operas, which have been performed in Europe. Among these are "Salvador Rosa," "Fosca," "the Guaruny," and "Lo Schiava" The slave. Carlos Gomes had early developed

* This may be accounted by their having so many festivals during the year, and the great yearly feast which takes place at different times for each town or district, which outvies all other feasts.

musical talent, and the Emperor knowing of this sent him to Italy to be educated. He has visited Brazil several times, and last time a few months ago a committee arranged with a talented Company then in Rio to play his operas in Rio, S. Paulo and Campinas, which they did to crowded houses.

Campinas has its service of tramways, its gaswork, and at present a water supply is being provided for. But we must now leave Campinas and continue our journey farther on, the account of which we must leave for a day or two. A. SCOTT BLACKLAW.

PLANTING IN THE MALAYAN PENINSULA: PERAK.

(*From our Special Correspondent.*)

PERAK AND SELANGOR—WANT OF BRITISH ENTERPRISE AND CAPITAL—PERAK SUITED TO TEA AND COFFEE—ROAD COMMUNICATION AND OTHER CAPABILITIES FOR PLANTING—GOVERNMENT OFFERING LAND AND CAPITAL ON EASY TERMS TO ENCOURAGE CULTIVATION—THE CLIMATE AND SOIL—GENERAL FEATURES OF THE HILLS AND THE LAY OF LAND—FORESTS—COFFEE ON WATERLOO ESTATE AND ON ADJOINING PLANTATIONS—INSECT PESTS NOT SO VIRULENT AS IN CEYLON—LIBERIAN COFFEE—CACAO CULTIVATION—SQUIRRELS—INDIARUBBER—CINCHONA—THE HERMITAGE BUNGALOW—PERAK TEA—PLANTING PROSPECTS.

The good people in the Protected States of Perak and Selangor apparently don't make noise enough—they don't shout out sufficiently loud to attract British enterprise and capital. Possibly the greater number of the residents in these States do not particularly care to have a lot of outsiders running over the country, criticizing the position and comparing one State with another; but if we are to suppose that the authorities are wishful—as they say they are—to facilitate the development of the resources of the country and to attract European settlers, it may respectfully be suggested they should take the trouble to say so, and say so in such a way that planters in the colonies and capitalists in Europe cannot fail to hear them. Let them take Ceylon for example and follow suit in the policy which has made her capabilities known to the uttermost parts of the earth.* How often have we heard discussions about suitable localities for agricultural investment, and when these Protected States were mentioned the reply has been: "Oh! those native States, you never know where you are; neither life nor property is safe when a ruffian of a native has the chance of getting anything by interference in your affairs." To this assertion there is probably no reply, simply because people don't know what in reality is the fact, that the Sultans of these states have no more to do with their administration than have the editors of the *Ceylon Observer*. The young Sultan of Perak is a mere nonentity, and the decrepit old man who nominally holds a similar position at Selangor hardly ever visits the seat of Government (Kwala Lumpur), and has only done so three or four times since the British Government quietly intimated that he must be content to stand down. Were this state of affairs more widely known, and could capitalists at home realize the fact that life and property are as safe in the States as they are in Ceylon, there would without doubt be a better chance of speedy development of the resources of the country than will otherwise be the case for many years to come. And then again as regards communication with the outer world, how very few there are—unconnected with the trade of these localities—who are aware that steamers run daily between Penang and Port Weld in Perak and three or four boats a week between Selangor, Penang and Singapore.

Naturally in Ceylon more is known about these matters than is the case elsewhere, because there are so many Ceylon men in the Straits in all kinds of positions, from the Governor of the Straits Settlements to the cook at the Government Tea-garden Resthouse in Thaiping.

In Perak there are hundreds of thousands of acres of fine forest inviting the axe of the planter—forest which the local Government is anxious to see taken up by suitable men with money enough to turn it into plantations of tea and coffee. They have led the way by going to great expense in planting experimental gardens and growing tea, coffee, cacao, cinchona, pepper and indiarubber, as well as many kinds of fruit trees. The sites of these gardens, perhaps, have not been in every instance selected with great care, and are certainly in some cases very unsuitable for the purpose for which they were chosen; but even in this they were not without their use in showing what should be avoided as well as what should be availed of. Perak is already traversed in all directions with capital roads, and these are being extended as opportunity demands. A new road is now in course of construction through an immense block of forest adjoining Thaiping, where the well-known property—Waterloo—stands as a sample of what can be done with coffee in that quarter. This road will be about thirty miles in length, made, be it noted, through the forests in advance of its probable sale at some future day.

It is understood that the Government will alienate blocks of forest, up to 500 acres each, to the first five applicants, at the rate of one dollar an acre. It has even gone so far as to advance money towards the working of gardens and would probably do so again if a good case for assistance was made out in the case of those who took up the above-mentioned blocks; but of course men are wanted who have sufficient capital to bring into profitable cultivation the lands they have acquired on such very easy terms. The climate seems admirably adapted for the cultivation of such products as tea, coffee and cacao, there being no long periods of drought nor yet any long spells of cold and wet, such as characterize the hill-country of Ceylon during the South-West monsoon. The climate naturally differs slightly in distant parts of so extensive a country as Perak, but certainly not in the degree we are accustomed to in Ceylon, Mauritius, and India.

The soil over the great extent of the hill-country of Perak closely resembles that of parts of Dimbula, Upper Ramboda and Madulsima,—a yellowish clayey soil which grows more red and more friable the higher you get up on the ranges. This soil is of immense depth, but there is apparently an absence of any large extent of rich brown mould, which we should call really fine soil in Ceylon.

The general features of the hills are not sufficiently broken by precipices and rocky débris to admit of pockets and fields of rich soil which we find in most mountainous tracts of country. The lay of the land is often steep, but the surfaces not very rough. The rock that crops up is a fine white granite, with

* How? Not by Government, but by the Planters and Press—and very notably through the *Tropical Agriculturist*, which has sent the name of Ceylon and her planters and products all round the world. But Mr. Swettenham, in his recent report, contends that Government has done all that was possible to attract planters who refuse to come. The labour difficulty is the lion in the path.—Ed. *T. A.*

large crystals of felspar,—the latter, perhaps, it is which adapts the soil to coffee cultivation. Large blocks of limestone rock appear here and there throughout the country, and dark close-grained trap crops up as well in the same locality, precisely as it does in the Andamans. Before leaving the magnificent forests of Perak it must be noted that to the botanist—and perhaps even more to the casual observer—they possess especial interest, not only because they differ so much from the forests of Ceylon and Penang but because they exhibit vegetation in so many unique and startling forms; the creepers especially are most beautiful in form and colour, but where all are lovely it is impossible to award the prize to any particular variety.

Waterloo estate coffee is entirely of the *Arabica* species. A few trees only of Liberian coffee near the bungalow give sufficient proof of how this variety of coffee suits this part of the country. Those who in years past have followed the history of the Waterloo property are aware that it was almost abandoned when old friends Logie and Tom Fraser undertook to resuscitate its fortunes, and so well have they succeeded that the old coffee is again bearing well and the weeds and jungle stuff, which at one time almost choked the coffee, have disappeared, and the coffee bushes—now in the form commonly known as umbrella trees—are bearing well and at the same time are in vigorous condition. The two and a half years old field at the top of the estate, some two thousand and odd feet in elevation, is a very fine field indeed—as good as the best I have seen anywhere during my thirty years' experience of "the fragrant bean."

The young plants in an adjoining clearing have made a grand growth during the time they have been planted out; and with a sufficiency of labour to carry on operations the outlook of Waterloo is extremely satisfactory. As a fair sample of what may be expected by planters taking up land for coffee in the adjoining forests Waterloo amply proves that there is every prospect of success and a bright future before investors. The pests that have proved so disastrous in Ceylon are not unknown in Perak, but the testimony of those who are most interested and who have watched them for years past tends to prove that their attacks are not attended by the virulence and devastating effects with which we are unhappily so well acquainted. Of this a casual visitor is necessarily but a poor judge; and were it not that it is but right to mention their existence as a matter of fact connected with coffee cultivation in Perak, they would hardly have been alluded to at all.

Liberian coffee on a few bushes at about 1,900 feet flourishes exceedingly, as also down at almost sea level. At Kamouning, probably 500 feet above the sea, there is an estate of some 140 acres in different stages up to eighteen months or two years, and the coffee is looking vigorous and promises to do well. There is some fine soil on this property, and plenty of limestone available in one part of the estate. As far as could be ascertained there is no estate of any size in Perak at present where Liberian coffee has been proved to be a success, but the proprietors of Kamouning have estates in bearing in one of the adjoining states and are very confident of similar results from its cultivation in Perak.

Around Lady Weld's bungalow—some 15 or 16 miles from Thaiping—a variety of trees have been planted as an experiment, and amongst them are some very fine specimens of Liberian coffee, say fifteen feet in height, bearing well, with flower and fruit in all stages, as becomes the nature of the plant. The situation of the garden is not well adapted for cacao, being flat and at times of high flood actually under water, but some of the trees have evidently grown well, but are now much diseased and decaying away.

The squirrels from the adjacent jungle which surrounds the garden evidently make short work of the cacao pods.

Ceará indiarubber has grown to a height of 20 to 25 feet—perhaps more—and the seedlings have begun to show themselves amongst the dense jungle round about. This gives a hint of what might yet be done in Ceylon: a few bushels of seed collected year by year by those who still have Ceará trees on their properties, thrown broadcast in the belts or useless jungle adjoining their estates, might in a few years prove a profitable investment, in the same way as the cinchona seedlings promise to do in the forest around the Kandapola estates, or at any rate did some half-dozen years ago.

The Hermitage is a bungalow built on an isolated spur of the Buboo mountain, some 3,600 feet above sea-level, and is reached by a riding road nine miles in length, cut through the jungle from Lady Weld's bungalow which is 15 or 16 miles from Thaiping. On the steep sides of the knoll on which the Hermitage stands, tea, coffee and cinchona have been planted and have apparently done a great deal better than might have been expected, considering the steepness of the land and its exposed situation. The bungalow was originally intended as a sanatorium for the Resident, but another one has been erected on the summit of one of the hills overlooking Thaiping, and the Hermitage is occupied by an old Ceylon man, Mr. J. F. M. Cock, in the position of Superintendent of Government Gardens. Nothing much is now done immediately around the Hermitage, but half-way down the hill is an estate called "Cicely," where tea is made and coffee is grown in a small way. Just now the Perak Government is advertising 1,000 lb. of tea for sale; but it is understood that the garden has been rented out to a Chinaman. Some of the tea made at Cicely is very nice indeed, and fully justifies the encomiums showered upon it by some of the home journals; but, again, some of it—as served at resthouses and other places—is very poor weak stuff.

There can be no doubt that the moist warm climate of the Peninsula is especially adapted to tea, but in the meantime there is no possibility of its taking any place in the London market simply because there is none to send at present.

Perak has, no doubt, a great future before it when the labour supply is put on a better footing and capital is attracted by the advantages that are offered by the administration.

TROPICAL CULTIVATION IS SELANGOR, STRAITS SETTLEMENTS.

KWALA LUMPUR—LIBERIAN COFFEE CULTIVATION—SOIL AND CLIMATE—HANDSOME RETURNS—GEOLOGICAL FORMATIONS—A GREATLY-FELT WANT—COFFEE PULPERS—LEAF-DISEASE AND GREEN BUG—ARABIAN COFFEE——FORESTS AND LABOUR SUPPLY.

Selangor adjoins Perak on the East and South, lying nearer Malacca and Singapore. As yet tin mining has constituted the principal industry of Selangor, but large tracts of land have been taken up for cultivation of various tropical products—coffee, pepper, sugar, tobacco, tapioca, &c., &c.

To begin with, however, reference will be confined to coffee and what was learnt about it from personal observation. Kwala Lumpur is the capital town of Selangor, reached by nineteen or twenty miles of

railway from Bukit Kuda. In the neighbourhood of Kwala Lumpur there are two Liberian estates in bearing and a number of promising young properties lately opened. The largest of the two estates in bearing is Weld's Hill, some two hundred acres more or less in bearing and some young clearing. The lay of the land is (generally speaking) of an easy gradient on both sides of a valley. The oldest coffee, a few acres, is about ten years old, but the bulk of the bearing coffee is from six to seven and is planted rather too close to allow of the trees doing their best in crop, say seven and a half to eight feet square and topped at five to six feet. These fields of dark green coffee, covering the slopes of the valley, are really a fine sight for a planter, who has seen the best estates in Ceylon. It is difficult for an outsider not accustomed to Liberian coffee—to make an estimate of the crop on the trees, but it must come to a great deal, considering the picking goes on all the year round, There has been some correspondence in the Singapore papers about this estate and others belonging to the same proprietors calling in question certain statements which had been made about the crops. You have doubtless utilized this correspondence for your *Tropical Agriculturist*. There can be no doubt that large crops have been gathered, but there was no hesitation in admitting that they were produced by the aid of manure, so that putting them forward as an example of what the land is capable of producing in the way of coffee is not altogether a fair proceeding. Manure of the right description and properly applied can be made to produce almost anything you like in the way of crop, provided the experiment is made under favorable conditions of climate, position, &c. What capitalists want to know is what the land will do by itself unaided by manure and stimulants.

The soil of Selangor taking it all round is no better than that of Perak, especially as regards lowlying undulating country where new clearings are being opened up. In all probability a better soil will be found further away from the coast, at the foot or on the lower slopes of the higher hills. The railway is now being pushed on twenty-seven miles or so beyond Kwala Lumpur, and would be available by the time estates came into bearing, were any now commenced in the direction in which the line is being made.

In spite of the poor appearance of the soil on the knolls, the young Liberian plants are coming on fast and doing extremely well. In fact the younger estates are very promising indeed and should give handsome returns in a few years. The other property in bearing is Batu Cave estate, and here again large crops have been taken off a twelve-acre field. In the present year, as far as could be learned from inquiry on the spot, the yield will be about eight hundredweights an acre or thereabouts. It must not be forgotten that this little field is about five years old, and lies at the foot of an enormous limestone rock, in which are the famous caves full of bats' dung manure. One of these caves is open at the top, and the rain washes out the manure into the jungle at the foot. In fact this field may be said to be a "pocket" of the best possible soil, most favourably situated, with only one drawback, if it may be so termed; and that is its being on a level instead of on a slope. There are no long spells of very wet, cold weather in Selangor as there are on the hills of Ceylon; if there were, in all probability, the coffee in the field now under reference would die from "wet feet." The younger coffee on this property promises to do as well as that which is now in bearing; but in the same way as Weld's Hill the Batu estate has been manured, and the yield can hardly be quoted as a fair sample of what coffee should do unaided. On the principle of taking advantage of a favourable market manuring in order to insure handsome returns cannot be taken exception to; with present crops and current prices, a few years should give the proprietors a very handsome profit indeed. The greater part of the soil in Selangor is laterite, in various forms and stages of decay. There is plenty of limestone in huge masses cropping up in various directions. The principal rock is the white and grey granite, which seems to be present in all parts of the Peninsula. It may be added that the limestone is of very close, fine grain without presence of other gritty material; some is pure white and some of dark slaty blue. It seems rather unfortunate that the authorities at Selangor do not see their way to the appointment of a Superintendent of Agriculture, part of whose duty it would be to report upon the agricultural capabilities of the several districts of the interior of the country, with notes of climate, trees, indigenous products, &c., &c. Such reports would be of interest to all who had any wish to make investment in the country. It will be remembered that the Ceylon planters found such difficulty in pulping Liberian cherry, that it was said no pulper that had been invented was of any real use. This difficulty arose from the absence of the juicy saccharine matter so abundant in the berry of the Arabian variety. On the estates at Selangor and other places in the Straits this difficulty does not seem to exist, at any rate in the same degree as in Ceylon. It naturally requires more powerful pressure to break the tough, thick skin of the Liberian berry than the Arabica does; but when the skin is broken, the bean easily separates itself, there being a sufficiency of juicy mucilage to admit of its being squeezed out. Consequently an ordinary pulper, especially adapted for the larger berry, is made use of, and the bean can be sifted out in the ordinary Ceylon method. The pulper at Weld's Hill is an adaptation of the "Gordon's Breast" principle, the movable grooves being adjusted by screws.

Leaf-disease and green bug are by no means conspicuous by their absence, and on some of the fields powdered lime has been sprinkled over the trees, and acts in a double capacity at the same time being a manure and an agent for destroying the insects and fungus. There is but little *Coffea Arabica* in the vicinity of Kwala Lumpur, a few trees only in a native garden having fallen under observation.

It would certainly be wise before entering upon any venture of the kind in Selangor to wander further afield than the pioneers in coffee cultivation have ventured to do; that is, of course, if a permanent settlement is required. If it is thought sufficient for the coffee to last ten or fifteen years, and to get as much as possible fruit by manure or otherwise, after which it may be sold or abandoned, then, of course, by all means take the best piece of land you can get close to the source from which supplies can be drawn, say immediately around the Batu caves and on the neighbouring hills. There is plenty of fine jungle in that direction which the Selangor Government is prepared to lease or sell on easy terms, and there are roads of various kinds either made or in course of construction in all directions. Labour, no doubt, is dear, but not so much so as it was at one time, and a number of old Ceylon coolies are taking employment for a cultivation they have been accustomed to and which they prefer to learning something new as they have to do in Ceylon at the present day.

THE PROPOSED UTILIZATION OF MANA-GRASS.

We so very recently wrote relative to the proposals of the Stanley-Wrightson Syndicate as to the establishment of a factory or factories in Ceylon for working up mana-grass into the strawboard required for the manufacture of the patent tea chests, that we should have hesitated to so soon again reverting to the subject but for the information received from home by the last mail. We have thus learned that what has hitherto been but a prospect is now advanced to the position of almost a certainty. The Syndicate, when the last mail left, had resolved on submitting fourteen hundredweights of the grass just then received from Ceylon to treatment at a certain London mill for conversion into quarter-inch boards. If this experiment results satisfactorily, the Syndicate has decided to establish a Company to start a factory in Ceylon for the preparation of the raw material and to, at the same time, acquire the rights of the patentees of the Stanley-Wrightson chests and work these up locally from the material prepared from the mana-grass which covers our hill waste lands in such profusion.

This decision having been taken, and knowing as we do in what reliable and influential hands this Syndicate is, we may look forward most hopefully to the approaching commencement of operations here. These, we feel almost confident, cannot but prove to be as beneficial to their undertaking as we have every reason to expect they will to our planters and to the natives for whom a new source of remunerative employment will be opened up. As we have recently pointed out, our difficulties as to maintaining an adequate supply of wood properly suited for tea chests are now great and are certain largely to increase. The establishment of a factory for the manufacture *ab initio* of these chests on the spot will enable them to compete very readily in price with the wooden chests at present in use. The objection to some of these last we have of late had forcibly demonstrated by complaints reaching us from the trade at home. We must, therefore, be fully ready to welcome the improved prospect presented to us of an alternative at once efficient and cheap becoming shortly available. But the hopes that may legitimately be entertained need not, we are told by a friend who has made close inquiry into the matter of the manufacture of this so-called straw board, be limited to this one function of usefulness. What *papier mâché* is to the Japanese, that friend tells us, this strawboard may become to Ceylon and its people. Once the substance can be produced cheaply it may take the place of many objects for which wood is now used by us, and scarce and dear as this latter article is becoming a chance of superseding it is not to be despised.

The whole question of such comparative supersession, our friend tells us, depends upon two points only. The first of these is the cost of the raw material, the second that of—and the amount of—the power available. Given, as in the case of mana grass, an almost costless raw material,* and the unlimited power which may be derived from our upland waters, that question, our friend believes, is solved as regards Ceylon. With its unlimited supplies both of material and power it would only be a question of size and strength of machinery to turn out a board, absolutely jointless, of size and strength sufficient to form an end wall to a moderately-sized bungalow! Perhaps it may be that some day our upcountry planters may be living in bungalows altogether constructed of painted and varnished pasteboard! We are assured that there is nothing ridiculous in such an idea. Why should there be, while we know the Japanese to live in paper houses the material of which is formed by pasting sheets together. With adequate power, our boards would be both homogenous and waterproof, and by the addition of tungstate of soda during manufacture might be rendered practically fireproof. However, we must bridle our inclination to prophesy the possibilities of the future opening out to us, though when we know of railway wheels of compressed paper working satisfactorily, we can set no practical limitation to what the Stanley-Wrightson Syndicate may yet accomplish with the wild grasses of Ceylon.

* Since writing the above we have seen in the proceedings of the Haputale Planters' Association reference to a charge being made for mana-grass taken from Government patanas, but we should think areas of such grasslands would be leased on the most liberal terms to the introducers of a new manufacture.

PLANTING IN NETHERLANDS INDIA.

(From the *Straits Times*, Aug. 13th.)

The Planters' Association at Sukabumie in Java have petitioned the Governor-General of Netherlands India for a Labour Ordinance in that island, so far as mining and planting go. They also urge the passing of a law forbidding the engagement of labourers in Netherlands India for work in foreign lands, so long as the local demand for coolies in Java remains brisk. The Governor-General has returned a deaf ear to their prayers.

The Residents in Java have been officially directed to encourage the cultivation of useful fruit trees in their respective districts.

THE LATE MR. McIVOR ON CINCHONA CULTURE IN CEYLON IN 1876.

The following report, copy of which was supplied to Mr. A. M. Ferguson by Mr. McIvor, has never, we believe, been published, as it was regarded as confidential. It will still be read with interest as illustrating the history of a great and in certain senses a successful enterprise. We may say that ultimately the Poomong plantation, alluded to by Mr. McIvor, turned out a very successful enterprise, and that on the British plantations in Sikkim Mr. Gammie has been very successful with the yellow barks, including ledgerianas.—ED. *T. A.*]

Government Gardens,
Ootacamund, 9th May 1876.

From W. G. McIvor, Esquire, Supdt. Government Cinchona Plantations, to J. R. Cockerell, Esquire, Commissioner of the Nilgiris, Ootacamund.

Sir,—With reference to G. O. dated 27th January 1876, No. 239, I have the honor to inform you that on the 10th February last I proceeded to Ceylon to ascertain the condition of Cinchona cultivation in that Island. During the last three years a large extent of land has been brought under Cinchona cultivation by private planters; but prior to this period only a few acres were put down on Coffee Estates here and there, while on many Estates the boundaries are marked off by lines of Cinchona trees.

2. I shall first notice the plantation of the Ceylon Government at Hakgalla, begun in 1861 under the able management of Dr. Thwaites, the Director of the Botanic Garden at Peradenia. This plantation is now under the immediate superintendence of Mr. E. J. Thwaites. The site has been selected with great judgment; it lies near the East limit

of the South-West monsoon, and therefore receives the South-West and North-East rains, but in moderate quantities only. The elevation is from 5,200 to 5,500 feet, situated six miles South-East of Nuwera Eliya, and is well protected from the South-West by mountains rising to upwards of 6,900 feet. In this favourable position Dr. Thwaites succeeded early in 1861 in raising 350 plants of Red Bark (C. Succirubra) and 180 plants of Grey Bark (C. Micrantha and Peruviana), which together with plants of other varieties made 800 in all. These were the first Cinchona plants raised in Ceylon. In the same year the Yellow Bark (C. Calisaya) was received from Kew. In 1862 there were in all 2,434 plants at Hakgalla. In October 1865, these had been increased to 354,026. In 1862, 194 Red Barks, and 110 Grey Barks were placed in permanent plantations. In 1863-'64 the plants in permanent plantations were increased, the Red Barks to 1,345, Crown Barks to 1,474, Grey Barks to 300, and Yellow Barks to 82. After this date there seems to have been but little extension of permanent planting, as the object of the Ceylon Government was not to produce bark, but to multiply the best varieties of Cinchona plants in order to meet the great demand of the enterprising and energetic Planters in the Island.

3. At the date of my visit the plants in permanent plantations at Hakgalla were from 12 to 14 years of age. The Red Bark plants were healthy with a growth resembling that which obtains on the Neilgherry Hills at similar elevations. The Crown Barks were less healthy, a considerable number had died, perhaps one-tenth, and many were affected with canker. The Yellow Barks of the early planting were all in an unhealthy and unpromising condition. This was also the case with the Grey barks. In Ceylon as with us last winter was one of exceptional severity, and at the date of my visit some of the plants at Hakgalla had been injured by frost, and all of them had suffered more or less from the cold and exceptionally severe drought. They were therefore not seen to advantage. The surface soil is rich and fertile, but, unfortunately it is shallow, and when the roots penetrate into the subsoil, the growth becomes less vigorous, and the plants less healthy. This I fear in many of the localities in Ceylon will prove an impediment to Cinchona plantations attaining a great age and will possibly necessitate the cutting down of the trees in the earlier stages of growth. Mossing has been tried to a small extent, but the necessary precautions seem to have been omitted in its application.

4. Seedling Cinchona plants spring up in myriads all over the plantations and under the trees on the neighbouring forests. Advantage has been taken of these to form stock plants for propagation, and I was much impressed with the great success attained by Mr. E. J. Thwaites in the propagation of cuttings in beds, formed in the open, and simply covered with coir-matting, placed on a pandal about 18 inches above the ground. The skill shewn, and the attention bestowed by Mr. Thwaites on the propagation of the plants has been rewarded by unequalled success. On looking over the nursery beds it appeared to me that not one cutting in a hundred had failed.

5. Coffee Planters have entered into the cultivation of Cinchona in Ceylon with much zeal, and foremost in their ranks stands Mr. Corbett. This gentleman in 1862-63 formed a plantation of 3 or 4 acres on the famous Rothschild Coffee Estate, and also planted avenues along the main roads, and here and there lines of Cinchona trees among the Coffee plants. I understand that Mr. Corbett afterwards opened a tract of land for cultivation in Dickoya, and is now opening a large tract near Nuwera Eliya. The Rothschild Estate is situated in Pusilawa at an elevation of 3,200 feet. The plants are principally red bark, and the growth is fairly satisfactory, much resembling the growth of this species in the Wynaad. The plants I observed on other plantations in Pusilawa and in Rambody were much in the same condition. On the Nana-oya Coffee Estate, situated in Dimboola at an elevation of about 4,000 feet, is a very fine patch of about 4 acres of red bark. Here the plants were very healthy, and had made perhaps more vigorous growth than any I saw elsewhere. Some Crown barks also had been planted on the same patch; these however were unhealthy, the greater part having died, and the few remaining plants were all more or less affected with canker, and this I found to be the case with all the old Crown bark plants which I saw at low elevations in Dimboola.

6. In September 1873 a number of the larger Succirubra plants on Nana-oya were coppiced and the bark sent into the London market. Those plants have thrown fine vigorous shoots from the coppiced stools averaging about 7 feet in height, so healthy and vigorous that they give promise of a fair return by this method of cultivation. The ordinary size of the coppiced stools is 12 inches in circumference, and the largest I could find was 25 inches in circumference at a foot from the ground.

7. There are a number of very fine young plantations in Dimboola, especially on the higher portions, but, as the plants had only been in the ground 2 or 3 years, it was impossible to form any opinion as to their permanency.

8. Lool Condura is an extensive Cinchona Estate situated in Lower Hewahette and under the able and skilled management of Mr. William James Taylor. Here a large extent of land is now under Cinchona cultivation, and the young plants are healthy, and promising, although here and there the symptoms of Canker are evident in plants 3 and 4 years of age. The older plants on this Estate seemed to me in an unpromising condition, especially the Crown and yellow barks. On this property the cultivation was maintained in an exemplary manner, and every care and attention bestowed on the plants.

9. On the New Forest Estate, at a high elevation I observed some of the most healthy old crown bark trees which I saw in the Island; so far as I noticed there was scarcely a trace of disease among these plants.

10. On a consideration of all I saw in Ceylon, I was impressed that the cultivation of red barks in well-selected localities may be made profitable and to a certain extent permanent. With Crown barks the difficulty will be greater. The position of the plantation must be selected with great judgment if permanency is required, but if the intention is simply to grow the plants for 5 or 6 years, and then cut them down for the bark, the result would be different, and this system of cultivation may prove remunerative. The cultivation of the yellow and grey barks did not promise either permanency or profit. As a whole the plants in Ceylon are inferior to those grown on the Neilgherries, although the growth of the red bark is more rapid at low elevations in Ceylon than with us, but the deficiency of a rich deep surface soil, and the nature of the subsoil will, I fear, (with only a few exceptions), render cinchona cultivation somewhat hazardous.

11. On the 11th July 1866 Mr. J. Eliot Howard in submitting an Analysis of Ceylon bark observes, "I must remark in the first place that they contrast disadvantageously in appearance with the

specimens of cinchona bark received from Mr. McIvor. It looks as though the climate of Ceylon were less favourable than that of Ootacamund for the cultivation of this plant. No. 1 in particular, and next to this No. 3 would be considered poor and badly grown barks in commerce, and moreover they have not had the advantage of mossing which tends so much to increase the product of the alkaloids." Time appears to have established the correctness of these observations. In appearance the Ceylon barks are thinner, and deficient in the markings which are valued in the home market. and although these barks are really rich in alkaloids, they are in this respect also a little inferior to the barks of the Nilgiris.

12. On my visit to the Cinchona plantations of the Bengal Government in 1871, I observed disease in the plants and certain conditions of soil and climate, which forced on me the conviction that cinchona would not form a permanent and profitable cultivation in British Sikkim. My report detailing these facts was unfavourably received by the Government of India, the Bengal Government, the local authorities in charge of the plantations in British Sikkim, and especially condemned by Mr. Munro, the Superintendent of the Poomong plantations of the Darjeeling Cinchona Association. Time seems however to have led the Proprietors of the Darjeeling Association to acquiesce in the conclusions arrived at in my report of 1871, as I observe that referring to the Poomong plantation the *Darjeeling News* says:—"The present owners of this large cinchona garden, Major-General Angus and Mr. Lloyd have spent a large amount of money on the estate which was commenced some 14 years ago, and up to date received no return. The Government has larger cinchona gardens alongside, and may be said to have swamped the private enterprise. Any way we learn that the Superintendent of the Garden has received orders to cut down the trees and send the bark to the London Market. The trees are to be destroyed so as to get the bark from the roots, said to be rich in alkaloids, and the land is then to be put up in small lots for public sale among the tea planters. In this way the owners expect to get back the R325,000 they have spent, though they will never see the interest of the money they have been spending all these years. It seems a pity to destroy what has cost so much time and money. One would have thought that these gardens, which had been made far cheaper than any others in India, and were a great success would have paid well, but it seems that cinchona is not a paying speculation." I believe that the work of destruction has begun, and in a few months 1,800 acres of our Indian grown cinchona will have disappeared. I mention this fact as it may be worthy the consideration of Government when deciding what permanent course it may be desirable to adopt in reference to the disposal and future management of our plantations. I have &c.,

(True Copy.) (Sign W. G. McIvor.

MR. McIVOR ON TEA AND CINCHONA IN CEYLON IN 1876.

The following letter by Mr. C. W. McIvor, amongst the last he wrote, was addressed to Mr. A. M. Ferguson, senior, and will be read with interest, now that cinchona in Ceylon has had so vicissitudinous a history, and that tea has become, as McIvor anticipated, a great success:—

Ootacamund, 11th May, 1876.

My dear Mr. Ferguson,—I was very much pleased to get your letter of 27th April, and although I missed you in Ceylon, I fully expected to have the pleasure of seeing you here, and regret time would not allow you to pay us a visit. I hope however as you suggest you will be able to finish off our Indian trip, by a visit to the Neilgherries.

Your son and nephew both showed me much kindness when in Ceylon, and were of great assistance to me, and I hope you will come over, so that I may show you what we are doing both here and in the Wynaad, in coffee, tea and cinchona.

I was much pleased with the tea, I saw in Ceylon. It offered promise of success, and you have some fine varieties which, if propagated from cuttings, would give fine stock. The finest kinds I saw were on the New Forest estate, and as these were large trees, any number of cuttings could be procured from them. You will have learned a great deal about tea during your trip to the North. It is likely to prove a profitable investment here also. The fact is the plant is very hardy and thrives best in a wet climate.

I could not understand until I visited Ceylon how it was you could not grow coffee at a high elevation, say 6,000 feet, as we have same fine coffee estates at that elevation; but I find that it is the wet climate of Ceylon, which causes plants not to bear at high elevations, and it is the same on the wet side of our hills also, where plants above 5,000 feet bear little or nothing.

* * *

It rained nearly the whole time I was in Sikkim, and you were fortunate to have had fine weather there; the fact is, as I stated at the time of my visit, Sikkim is unsuited for the growth of cinchona, the latitude is too high, the soil too thin and the climate too damp. I saw patches of 30 acres together with scarcely a healthy plant. As you will see when you come over here, our plantations are quite different; of course I do not like to depreciate the labours of any one, but we are bound to speak out, because if the conditions are unfavourable the results must be unfavourable, however skilful the management.

I am glad you have had favourable rains at Abbotsford and that you already have begun to plant. I was much pleased with the place, and especially the fine garden and house. Dimboola seems to have an excellent climate.

I have no objection to the cultivation of ledgeriana as it is a variety of great value, and if it was suited to our climate, I would cultivate it as extensively as they are doing in Java, but here it is quite useless, it is unsuited to the climate and liable to disease. With you I fear it will be the same. This plant is found in Bolivia, between 15° and 16° south, Java is also south about 6° or 8°, and the plant does better there, but I am informed that it is even there very liable to disease.

I will prepare a case to send over to your son some of our best plants. It will be better to send them in a wardian case. I left with him seeds of all the best varieties we have.

In Ceylon you are north of the line. The varieties which do with us are likely to do with you also. However, there can be no harm in trying the different varieties of calisaya, but all the plants I saw in the island are unpromising, and I fear it will only be time and labour wasted.

I am sorry to say that I have been seriously ill. I had a great deal of exposure after my return from Ceylon, and got laid up with liver and dysentery from which I am but now slowly recovering.* * * * —Believe me, yours very sincerely, W. G. McIvor.

* The recovery was but temporary, a relapse ending in the death of this able and useful man.—ED. *T. A.*

MR. CLEMENTS MARKHAM ON CINCHONA IN CEYLON.

The following letter addressed to Mr. A. M. Ferguson, senior, by Mr. Clements Markham, whose name is so honourably associated with the introduction of the fever plants of the Andes to India and Ceylon, forms an interesting supplement to Mr. McIvor's report:—

India Office, S. W. April 27th, 1876.

My dear sir,—I have to thank you very much for kindly sending me the interesting photographs of the cinchona trees on the Dimbula estate, and for the pamphlet on the climate of the locality where they are growing. You will be able to obtain seeds of *C. Calisaya* from Mr McIvor, at Otacamund; but I think *C. Officinalis* is the best for Ceylon, and will always fetch a high price from quinine manufacturers. The *C. Succirubra* (red bark) is the best of all in a utilitarian point of view, because it yields the largest percentage of febrifuge alkaloids; and it is certain that cinchonidine, its chief product, and the other alkaloids, are as efficacious as quinine. But it will take some time to overcome ignorant prejudices among doctors in England on this point. About this I am now taking a great deal of trouble, and I have already got the excellent febrifuge medicine from the red bark, manufactured by Mr Wood at Calcutta, introduced into the London hospitals.

I am sorry to say that the authorities here, since the change of ministry, object to the full information given in my "Progress Reports"; and have taken their preparation out of my hands. Now a mere abstract of reports received from India is prepared by a clerk. It is a sad pity.

I shall, however, be glad to receive from you any Reports respecting cinchona and coffee plantations in Ceylon which I could utilize in other ways.

We have already got all the best kinds of Calisaya, including the variety Ledgeriana; and plants or seeds can be obtained from the Nilgiris; so that it would be a waste of money to send again to South America.

Ever yours very truly,

Clements R. Markham.

PLANTING IN DELI.

(From the *Straits Times*, Aug. 13th.)

The Deli *Courant* of the 2nd August can hazard no definite opinion as to the prospects of this year's tobacco crop. No wonder when even experts differ in the forecast and find it hard to foretell the turn of events. The disturbing element in the calculations arises from a recent long drought in the planting districts, and many growers fear that they are much the worse, for it. So far as appearances go, the coming crop will fall below the average in quantity, but a few smart showers in the present month may materially improve the outlook. Langkat, this year, has fared better in weather than Deli where several estates, in consequence of early planting, have turned out very badly. Upper Serdang, too, has lost heavily by the drought, but Bobongan not at all. In Assahan, there is every prospect of getting 6 to 7 piculs from every field, but Siak, save on an estate or two, makes as dismal a show as in the past. Planters report favourably on crop prospects in Labuan Batu. The drought has taken effect in a predominance of dark quality in the yield. In fermenting the product, the managers will be hard put to it how to give their tobacco that light coloured appearance which alone takes with consumers in Europe and America. Though planters can do little in this line, shareholders and directors in Europe will not see it, and continually cry out for the more taking colour, and complain of other estates being more fortunate in this point than theirs. A manager who gets put out by this becomes a marked man. Managers too find a big estate with hosts of coolies no easy matter to handle. Experience has proved that the size of an estate has its limits to admit of profitable working. Four hundred fields to an estate seem to be the maximum limit, which cannot safely be overstepped. The Deli Company has profited by it, and its managers show that they do not hesitate to curtail extension when circumstances prove adverse. Other managers manifest less prudence and to deem the more coolies in the fields the merrier, but the results of such unreasonable extension speak sufficiently for themselves to deter others from following the example.

In Assahan the planting outlook takes such a bright appearance that applications for railway concessions there begin to be talked of.

Two East Sumatra planters have just been called upon to answer for themselves before the Criminal Court at Batavia on charges of illtreating coolies. Facts like these happening now and then come in handy to those who want to make out that planters on the East Coast of Sumatra are a rough lot, given to harsh dealing with their labourers. But it should be borne in mind that this report only holds good in newly opened districts, where the absence of police and the weakness of government authority lessen security. Planters finding themselves in the midst of coolies mostly of bad character as well as naturally turbulent and unruly, have to depend upon themselves to keep order among such a mixed multitude. That under such circumstances they should take the law into their own hands and administer rough and ready justice is nothing surprising. They may be mistaken in so doing, but the Government must bear the blame of driving them into it, by neglecting to station police in districts which planters and coolies have begun to open out.

A TRAP TO CATCH THE INDIAN MARKET.

(By the "Peripatetic Planter.")

An attempt is being made to get Indian tea dealt in in the Clearing House, like China teas. A few days ago, a number of representative importers and Indian tea brokers were invited to meet the authorities of the Clearing House, it was understood by those invited, to discuss the feasibility and advisability of Indian teas being so dealt in. No sooner had they entered the room, however, than they were informed that the feasibility was already decided; and, moreover, that Indian tea would be dealt in from the 1st Oct. next! Some had held aloof from attending, but a good many were induced to attend under the idea that it was well at all events to hear what could be said in favour of the scheme and not to abstain out of mere prejudice or preconceived notions; the more so, as they were led to understand that the conveners of the meeting promised a way to improve the Indian market, attempting enough bait. This readiness to be convinced will show, that if the scheme fails to obtain the support of those who have heard its details described, and who at the same time were deemed experts—or they would not have been invited—the scheme should be looked upon with suspicion at least, if not condemned offhand by those who, whilst interested, were not able to attend the meeting. Instead of suggesting any means of introducing new capital or legitimate new development of real business, it at once became evident that Indian Tea was merely to be made the battledore and shuttlecock of a small group of speculators, like China Tea. There were to be 5 or 6 "typos" as standards, and a committee of valuers and so forth. A very little consideration has already induced a good many of the Importers and Brokers present at that meeting to already withdraw their names from the enterprise; and the

belief is held that most, if not all, will soon do the same. It is the opinion of some of the objectors that the scheme is a mere trap into which to drag Indian Tea to the ultimate advantage of China Tea. It should be understood, to make the reasons for this opinion clear, that ontsiders are rarely tempted to speculate in tea, and that the market thus made is the sport of a small gronp who play shuttlecock with contracts between themselves, and create a fictitious quotation at their own sweet will. Thus they can at any time send up the prices. It is not by any means impossible that the uncertainty thus created in the case of China Teas. has not done much to disgust Grocers with the vagaries of China Teas of late,to the great advantage of India Teas.—*Indian Planters' Gazette.*

THE KOLA NUT AND ITS PREPARATIONS.

Amongst the vegetable products of the Great Dark Continent, perhaps none are more interesting than those which, under the various names of *kola*, *gourou*, *ombéné*, *nangoué*, and *kokkorokou*, are used as articles of consumption throughout tropical and equatorial Africa, and for preparing beverages equivalent to our tea, coffee and cocoa. African explorers have often described the uses of the kola nuts. They are used medicinally in the cure and prevention of disease; they play an important part in the social customs of many of the tribes, figuring as emblems in the formalities of declaring war, making peace, and marriage. So high a value is placed upon these nuts in certain parts of Ceutral Africa, where they are not growu, that they are readily purchased for an equal weight of gold-dust. The kola nut is the fruit or seed of the *Sterculia acuminata*, a tree which grows to a height of from thirty to sixty feet, and in its general aspect resembles that of the English chesnut tree. There are at least two varieties of the kola, so-called, which are yielded hy two families of plants, and differ very much in appearance, hut the kind which is most widely distributed is the "true kola," which is called by some of the natives the "female kola." The true kola grows wild upon the western coast of Africa comprised between Sierra Leone and the Congo or Lower Guinea, and extending inland some five or six hundred miles, when it appears to fol'ow the limits of the palm. It is also found growing wild in the country of the Momhoutous (24° E. loog., 3° N. lat.), and in the moist hot woods near the southern coast of Venezuela, but is believed to have been sown in this latter country by African negroes about the same time as it was introduced in Martiuique.

The kola tree commences to yield a crop about the fourth or fifth year, and by the time it is ten years old the tree is in full bearing. Like the orange tree, the flowering is continuous, blossoms and fruit occurring at the same time. The crop is gathered in October and Novembei, and again in May and June. The ripe kola nut consists of a brownish-yellow capsule, inclosing both red and white seeds, which vary in number from five to fifteen. They are collected with great care by women, who remove the husk and episperm and pick out all damaged seeds. The sound seeds are placed in large bark haskets lined with "bal" leaves, and then are ready for transport. In Africa, the kola nut is an important commodity in the caravan trade, aud the great centres of this trade are in Goree and Gambia. In the form of a dried powder these nuts find a ready sale at fabulous prices even so far away as the remote Soudan and Timbuctoo. In addition to those native uses of the kola to which we have already referred, it is used, fresh, as a "masticatory," for improving foul water, and for rendering tainted meat edible, also for enabling persons to undergo prolongel exertion without fatigue. Some of the tribes of the interior make a very agreeable, stimulating and nourishing beverage hy mixing the powered nuts with milk and honey. As to the chemistry of the kola nut, this has chiefly been investigated by Heckel and Schlagdenhauffen. who have made a large number of experiments. The dried seeds were finely powdered and treated with chloroform, and also exhausted with alcohol and boiling water. In each case a careful examination of the matters taken up in solution was made. These analyses revealed high percentages of caffeine (the active principle of tea and coffee) and theobromine (the active principle of cocoa), and at once suggested the suitability of preparing a beverage from kola nuts, of the same character as tea, coffee, and cocoa. And in view of this it is instructive to compare typical results obtained in the analysis of these substances. In each case the authority is given.

	Cacao (Mitscherlich).	Coffee (Payen).	Green tea (Peliglot).	Black tea. (Peliglot)	Kola (H. and S.).
Fat	53·00	13·00	0·28		0.585
Proteid matters	13·00	13·00	3·00	2·80	6·761
Theobromine ...	1·50	—	—	—	0·023
Caffeine	—	2·25	0·43	0·46	2·348
Essential oil ...	0·40	0·003	0·79	0·60	undet.
Resin	—	—	2·22	3.64	—
Sugar	0·5	15·50	—	—	2·875
Starch	—				33·754
Gum	—	—	8·58	7·28	3·040
Cellulose ...	—	34·00	17·08	26·18	29 831
Colouring matters	—	—	17·24	19·20	2·561
Ditto	5·00	—	2·22	1·84	1·290
Extractive ...	—	—	22·80	19·88	—
Tannin ...	—	—	17·80	12·88	1.618
Ash	3·60	6·697	5·56	5·24	3·395
Water	6·00	12·00	—	—	11·909

We may fairly conclude that the yield of caffeine from the kola nut is greater than in most commercial teas and coffees, and that the proportion of theobromine is greater thau that contained in cocoa. By a special process a paste is made from the nut, called kolatina, which produces a refreshing and sustaining drink with boiling water or milk. It is also stated that kola is of use to tea-tasters in counteracting the effects resulting from their occupation, and that it cau he used for "improving" low-grade cocoas. The analytical table shows that kola does not contain anything like the quantity of tannin that tea does, nor the fatty matter that cocoa does; hence people having weak digestions will find none of the inconvenience in the use of kola preparations which they experience when they take certain other beverages.

If kola paste is mixed with cocoa it gives a chocolate of good quality, which is nutritious, and, according to the chemists, five times more sustaining than cocoa. Kola chocolate again is said to be ten times more nutritious than the best kinds of ordinary chocolate. Mr. T. Christy, F.L.S. &c., to whom the introduction of the kola into this country is due, has a large number of testimouials from cyclists, journalists, and others, which speak in terms of praise of the beneficial effects of using kola preparations during extreme muscular or mental exertion. Kola was used by the director of telegraphs of Egypt on his journeys into the Soudan, when bulky stores could not be carried. The French Alpine Club has just adopted it as a stimulant and nutrient in their mountain-climbing expeditions. The German War Office has recently ordered thirty tons of the nuts, owing to the beneficial results of experiments with them during the autumn manœuvres of last year. The British Government are also giving their attention to the kola preparations. Kola is made up in various forms: first, there is the kola paste, or kolatina: then it is made up in tablets as kola chocolate. According to the *Cycling Record*, "it is a fact that a single cake of kola chocolate contains sufficient nourishment for a cyclist to ride from morning till evening without requiring other food." Another from is the kola lozenge, which can be carried in the vest pocket. There is also a kola cordial; and Mr. Ohristy is shortly going to bring out a kola "cocoa" and a kola "coffee."—London *Grocer.*

VULCANIZING TIMBER.

The *Indian Engineer*, in writing on railway sleepers, says:—

The only way in which inferior descriptions of timber can be made useful is by using some preservative, and great interest has been taken in this matter by the American Forestry Congress, who were specially appointed to consider the best method of relieving the forests from the heavy calls made upon them for sleepers, trestles, and other railway works. Kyanizing, Orcosoting, and Burnettizing, have each been found wanting, but "Vulcanizing" bids fair to prove a success in every way, and it is thought that the difficulty has at last been grappled with. The *Inventor* says of this process:—"The curing or *drying* of wood until the discovery of the vulcanizing process, had received no new idea or improvement from the earliest time; while in the matter of working other materials, such as the amalgamating of metals, the making of steel, &c., the records of the past century show a marked advance; but for wood, the greatest product, the consumption and uses of which overshadows all other useful products of the earth, substantially nothing of any value has been accomplished." To properly preserve and cure wood and lumber, we have only to consider a few simple and self-evident facts. In its growing state wood is stronger and more elastic than when dry. It contains in its fluids all the antiseptic qualities and elements of self-preservation. The tree in the forest, exposed for centuries to atmospheric changes, does not decay; but gird and deplete it of its fluids and the disintegration of the fibre commences. This then is the basic idea upon which the new discovery of vulcanizing is founded, and the results obtained accomplish more than is claimed by all previous inventions and discoveries. In the application of the vulcanizing process a cylinder made of boiler plate, one-half to three-quarters of an inch in thickness, sufficient to withstand a pressure of two hundred pounds to the square inch, is used. This receptacle is made of any desired length and diameter, according to the number of feet of lumber required to be treated daily. The wood is piled on small iron cars, in a shape to conform to the contour of the cylinder, and the cars are then run into the tank on small rails fastened in its bottom. A number of cars are made into a train sufficient to charge the tank, and the door is closed making an air-tight fastening. From a large compressor air is pumped through pipes into the cylinder until the gauge registers the desired pressure, varying from 100 to 175 pounds to the square inch. After leaving the compressor, and on its way to the tank, the air, by a system of pipes, passes through a small stove or furnace and is heated to the required temperature—varying from 400 to 600 degrees Fahrenheit, according to the kind of wood in treatment. The air pressure holds the sap or fluids in the wood, effectually preventing their evaporation, or the charring of the fibre of the wood, while intense heat passing through and clear to the centre of the stick, so sublimates and attenuates the fluid matter of the wood that a new compound is formed, or rather the constituent elements of the sap are now in combination which otherwise are, under lower and different degrees of heat, distilled separately. All preconceived methods of curing timber are here reversed, and instead of distilling out these valuable antiseptics, they are distilled in the wood itself, a sufficiently high degree of heat being used to allow of their complete affiliation as a new and oleaginous compound. The heat and pressure then being removed, the door is opened, and the tank is emptied and ready for the next charge. Thus it will be observed that no foreign material being necessary, the process is not only rapid but so inexpensive as to recommend its adoption to all users of wood. When the timber is removed from the cylinder, the new compound now permeating the entire fibre, a chemical change or oxidation takes place while the wood is cooling down, rendering it impervious to moisture, never affected by the changes of the atmosphere, or the alterations of wet and dry; consequently it cannot rot; cannot shrink or swell; offering no point of attack like seasoned or kiln-dried lumber; its pores are filled with its own material,—a material composed of the best known antiseptics, and in such shape as not to be soluble in water. Wood vulcanizing, from ample proofs during the last seven years, establishes the fact that it not only prevents the rotting of wood in the most exposed situations, but also prepares any kind of green wood for immediate use. Vulcanized cross-ties (sleepers) can be supplied in America at a cost of from 40 to 80 cents each, according to locality and variety of wood, and will last at least 30 years.

Cotton-wood is the worst wood known for railway sleepers, but it is claimed that by vulcanizing this wood it can be made as durable as the best oak.

Taking the prices quoted for this process in America, we should be able to vulcanize deodar, or any other soft wood, sleepers at a cost of Re 1 each, and as the present price of this class of sleeper—for broad gauge lines—is from R3-4 to R3 8, the total cost of vulcanized sleepers would still be ten per cent lower than is now charged for *sâl* sleepers.

POSITION OF THE CHINA TEA TRADE AS COMPARED WITH INDIA AND CEYLON.

Foochow, 21st July, 1890.

To the Editor of the "Foochow Echo."

DEAR SIR,—I am sure that we are all under obligations to you, for the interesting articles on the tea trade of this port which have lately appeared in your paper, and I beg your forbearance whilst I make a few remarks on that in your issue of 19th instant. And firstly, as the author of the original article which appeared on 5th instant, allow me to thank you for the gratuitous addition by you of the words "Communicated," and the introductory and deprecatory paragraph which you so *kindly* inserted regarding it. Curiously enough, I cannot find either of these two "additions" in your last issue pertaining to what I may presume to be a reply to my remarks.

May I assume from this that you endorse and adopt the views contained in that reply? I will be as brief as I can in my review. I pass over the first portion of your article and come to the question asked therein "Are our teas so very bad after all?" Then follow the words "We only know this that there are several markets in the world which will still have them, and *no others*." Why not name those markets? If Australia is alluded to, I must ask what means the export from India and Ceylon of some 4 millions of pounds to that Continent? What mean the figures in Greig and Murray's Circular of 28th May last? Stock in bond 24th May, China 3,408,389 lb., Indian and Ceylon 1,031,895 lb.

If America and Canada be meant, there is no foundation for the statement, because Messrs. Gow, Stanton & Co. of London, assert in the public papers that the consumption of Ceylon Tea is spreading quickly. If the "Cape" be meant, the statement is probably true, but affects only a total quantity of about 1¾ million pounds. As for saying that in London in spite of the tyrant "fashion," they cannot do without them, see what Rucker and Bencraft in their Circular of 5th June last say, "The increase in the deliveries of Indian, 10 millions, and "Ceylon," 8 millions=18 millions *has displaced* 18 millions of China Tea." I come now to the paragraph speaking of the marked superiority of the Souchongs and Soomoos this season, and arguing therefrom that other kinds may improve in the future.

Souchongs, formerly a very paying item in the London Trade, have now, alas, become of very slender importance, the taste for them dying out, and the losses on their shipment last season being exceptionally heavy.

Soomoos and Chiangloks are it is true superior to last seasons, but they form but a small proportion of our crop, for out of a total of 312,000 chests of Congou to hand up to date, they only number 26,000 chests.

Per contra, I may ask, are the Saryunes superior to last seasons, or the Suey Kuts, or the Yung Hows, or

the Packlings? Decidedly *No*, and your contributor admits the inferiority of the Packlums and Panyongs, which latter figure for 128,000 chests out of the total of 312,000.

Now for the remarks concerning India and Ceylon. Granted that the rise in exchange will prejudically affect returns from estates, but it will not do so to the extent hinted at in the question asked by your contributor, "*How about the Dividend?*" Let us take the case he instances. An estate producing Tea to sell in London for £10,000, must yield some 220,000 lb. weight. To give that, the estate should be say 800 acres, the expenditure on which would be about Rupees 50,000 per annum. Take a loss of 15 per cent on that sum we have only Rupees 7,500 or say £650, which is about 6½ per cent only on the sum realised for the Tea. So that, to go further, assuming that the capital required for the above estate to be £30,000 we have *under* 2¼ *per cent* as the actual loss in dividend arising from a rise in Exchange of 15 per cent. As to your contributor's remark that we have not much to fear from Ceylon in "*the long run*," I can afford to pass it over, facts being stubborn things, and proving that the decline in the China Tea Trade is due in a great measure to the increase of Ceylon Tea. Tea is a hardy plant, and one which nothing seems to injure, not even the utter neglect of the Chinese;—why then when it is cared for scientifically should it, "*in the long run*," meet disaster in Ceylon? Touching on the drawbacks alluded to by your contributor as those which China Tea has to contend with, I notice he mentions *a higher rate of freight*. A glance at the Colombo papers would have shewn him that freights there are as often 30/- to 40/- per ton for tea, as in China.

"*The Chinese are wonderful adepts at meeting the inevitable*," continues your contributor. Granted, but not in the spirit in which the article views the point, the inevitable means rather the decline of the Trade, witness the descent from 800,000 chests, 12 years ago, to a probable 360,000 chests this season. This is indeed adapting themselves to the inevitable! Again, the rate of wages paid to the pickers in this country, we are assured on good authority, cannot well be lowered, it is paid on the amount plucked per day by the picker, and if the production of Tea continues to decrease it follows that fewer pickers will be needed. As it is, the plantations on which any labour but that of the owners family is used, are already few and far between. Only with the introduction of railways and the abolition of the Lekin tax will the cost of carriage to this port ever be reduced. I come now to a still more sweeping statement in the article under notice. It is that "If we cannot beat India and Ceylon in the matter of the very peculiar flavours imparted to their Teas *through the unsavoury manures they use*, we shall at any rate be able to compete with them and perhaps outdo them, in the cost of production."

Your contributor evidently knows little of the subject concerning which he makes such bold statements. Will he be surprised to hear that not *one twentieth* of the acreage under Tea in Ceylon, *ever receives any manure, savoury or unsavoury*, and that he must therefore seek elsewhere for the reason of their peculiar flavours?

Might I ask him what unsavoury manures are used in China to produce the marked and peculiar flavours shown in the comparison of a Tong Foong Tong and a Panyong, or a Saryune and a Packlum?

From all one can learn, and it is at best perhaps, somewhat unrealiable, the reduction of the *cost* of producing tea in this country, has, exoluding the subject of Lekin and taxes, reached its limit.

I will conclude by disclaiming any desire to injure the trade of this port, but rather assert that it is only by baring our wounds and endeavouring to find their remedies that we can hope ever to see a healthier state of business.

Apologising for trespassing so much on your valuable space.—Yours faithfully,

FIAT JUSTITIA, RUAT CŒLUM.

THE FINANCIAL AND GENERAL POSITION OF PERAK,

as exhibited in the report of the British Resident for 1890 shows that

The Revenue of the State amounted to $2,776,583, a sum $236,876 in excess of the Estimates and $766,343 over the actual revenue received in the previous year.

The expenditure for the year amounted to $2,090,116, a sum $223,634 less than that voted in the Estimates. The year's expenditure was $686,466 under the year's revenue.

The trade returns for the year give the following result:

	$	c.
Value of Imports	7,048,045	78
Do. Exports	10,812,673	00
Total ...	17,860,718	78
Decrease over value of Trade in previous year...	1,937,298	51

The decrease is more apparent than real, for there is reason to believe that the statistics of previous years were not thoroughly reliable and, owing to the price at which tin (the chief export) is officially valued, the returns of 1889 show a decrease of $850,000 on this item while the actual export exceeded that of the previous year by 16,812 piculs. There is also a decrease of $850,000 on the import of specie.

The excess value of Exports over Imports is noteworthy.

From the 1st September Mr. Spence Moss was appointed Government Engineer for Railways in Perak as well as Selangor, and gave his attention to the surveys for the proposed Kinta Valley Railway.

The total area of land alienated to the 31st December last was—

Mining Land ..	11,995	acres.
Agricultural ..	145,674	acres.
Town Lots ..	4,829	lots.

During the year 6,500 acres of land were demarcated, against 2,600 acres in the previous year; 10,000 acres were surveyed against 8,000 acres in 1888.

In all districts of the State, except Krian, the difficulty is to keep pace with applications for land so that even temporary titles may not be issued until the ground applied for has at least been demarcated. It is by no means possible to do this, for in the Kuala Kangsa District 2,982 lots of new land were alienated during the year, and in Batang Padang 1,326 acres of mining land were given out, though undemarcated.

The most notable features of the year are that the experiment of pepper cultivation, begun in 1885, with the sanction and approval of His Excellency the present Governor, has proved so successful that there is a general desire, not only in the Kuala Kangsa District but elsewhere, to take up large quantities of land for this purpose. The danger is rather that some who have undertaken this cultivation without much knowledge should be discouraged by the time which must elapse and the trouble that must be taken to nurse the vines before any return can be gained. There are many thousands of acres in Perak admirably suited for pepper, and it is difficult to over estimate the advantages of making this cultivation generally popular with our large Malay population.

The success of Liberian coffee has been demonstrated by Messrs. Hill and Rathborne, who have done so much for agriculture in the Native States. Their Kamuning Estate, in the Kuala Kangsa District, promises to be finest Liberian Coffee Estate yet opened. An experiment in tobacco proved that a leaf of excellent quality could be grown in Perak, and I trust that efforts will not be relaxed till it is also shown that the cultivation of this plant can be made a financial success.

A Chinese has taken up a block of land in Larut on which he proposes to grow mulberry and rear silkworms. The mulberry trees grows here like a weed and the experiment is one of much interest; if successful, the Malays, who are skilful weavers, would probably take to it as a congenial industry.

A sample of tea grown in the Government Plantations was sent to London, and very favourably reported upon, while the future of Arabian coffee is so far as-

sured that I am told the only estate in existence in Perak (Waterloo) showed a profit on last year's working, and its experienced Manager (Mr. Fraser) expresses a most decided opinion in favour of Perak as a coffee-growing country. As an independent and reliable opinion on a subject of much interest I quote Mr. Fraser's words:—"The cultivation of coffee promises well and, where land is judiciously selected and opened, it cannot fail, in my opinion, to be a success."

The sugar estates of Krian exported 59,763 piculs during the year, and as the price has improved on the very low figures of past years it may be hoped that there are fair prospects for cane growers.

I am, however, specially pleased to be able to report that throughout the State (always excepting Krian District) a larger area of padi (rice) has been planted this year than for many years past and so far the harvest promises to be an unusually good one. I have had special opportunities for seeing this myself and the native headmen are all agreed on this point. I still think it would be an immense gain if we could introduce into Perak a number of Chinese rice growers *with their families*, and, though the State does not grudge money voted to relieve the distressed agriculturalists in China it might benefit them as much, and Perak more, if a large sum were devoted to assisting them to settle in a country less liable to flood and famine. There are, however, great difficulties in the way of the emigration of Chinese with their families, and last year these difficulties seem to have greatly increased and even to a noticeable degree interfered with the usual exodus of the Chinese male population, a fact perhaps not altogether surprising considering the extraordinary reluctance of some to let the overflow of British Indian labour find a profitable field in these States; but, failing the immigration of a foreign agricultural people, it is at least encouraging to find that the Malay rural population is giving more attention to agricultural pursuits.

Piculs 235,651, or about 14,000 tons, of tin were exported during the year, an increase of 16,812 piculs over the export of the previous year. The price of tin averaged $34·93 per picul (about £92 per ton), and the large production is extraordinary in the face of the tightness of the local money market and the remarkable falling off in the numbers of Chinese immigrants. The fact is that times being hard the miners worked better and for longer hours.

This is much like the increased export of cinchona from Ceylon in the bad times. The report goeson:—

The Government Geologist (Mr. L. Wray, jun.) undertook a lengthened search for minerals in the neighbourhood of the Piah river, in Upper Perak, where he found numerous traces of gold, and the Magistrate of that district now writes to me that, having dug a pit 12 feet deep in his garden, he began washing with a wooden tray and found gold at every trial.

One hundred and twenty miles of cart-road and 254 miles of bridle-road were maintained, while 41 miles of new cart-road and 13 miles of bridle-road were constructed, and 11 miles of bridle-road converted into cart road. Over 24 miles of unmetalled cart road were metalled, and a large number of bridges constructed and maintained. It is matter of public remark that the cart roads throughout the State, most of them maintained by contract are in excellent order.

The estimated receipts of the Larut railway were exceeded by $12,670, a satisfactory result, in view of the fact that some of the rates were considerably reduced from the first January, 1889, and the year, as regards trade, has not been a particularly prosperous one. The total receipts amounted to $82,670 against $45,558 cost of working expenses, which left a profit of $37,112, equivalent to 8·36 per cent on capital invested.

Details of railway working and extensions are given, and Mr. Hanson, formerly of Ceylon, receives praise for his energy.

The sanitation of the various townships in the State is being improved, everywhere as to drainage and, where possible, in water supply, and the result, as might be expected, is better health. This is specially the case in Larut where, owing to better sanitation, the insidious beri-beri, which some years ago filled the hospitals and headed the list of fatal diseases, is no longer the dread scourge of Chinese miners and occupies a position of comparatively minor importance.

As far as the Government of Perak is concerned, it is difficult to see what more can be done except to find cheap labour, without which no planting enterprise is likely to succeed. The native of the country works little for himself and absolutely refuses to hire himself out as a labourer on any terms that a planter could accept. The mines absorb the attention of the Chinese, who prefer failure there to steady work and steady wages on an estate, and the planter's only chance of a labour force on which he can rely depends on the natives of Southern India. whom he must import into the State on certain conditions for a term of months.

There are many European employers of labour in the Native States who prefer to pay double the wages to an able-bodied free man who knows his work and will do it to whom wages are paid for labour performed, and who can be dismissed at an hour's notice, rather than be saddled with all the trials attendant upon the employment of the Statute Indian immigrant. Unfortunately planters are differently circumstanced, and it is absolutely necessary for their success that they should always have a large labour force at command to take advantage of the propitious moment for planting, to turn the variations of weather to the best account, or to save a crop from ruin. Under such circumstances the planter cannot afford to pay the same rate of wages that is given in the open market for much harder work, and he is therefore driven to engage his labour for a term of months and to accept all the responsibilties imposed upon him by special legislation. The interest that the State takes in his success or failure is due to the fact that he cultivates the soil, and for that reason it seems to me that he deserves all the assistance that can reasonably be given to him.

A COMING TEA DISTRICT.

"Ex-Planter" writes from Peermaad, Travancore to the *Asian* as follows:—"In your issue of July 18th 'Smoothbore' remarks: 'Ceylon has a great future before her in her tea; and India, Southern India at all events, cannot successfully compete with her.' If this remark refers to the growth of tea, I beg to inform 'Smoothbore' that if he will undertake a journey of some twenty-four hours from Kodaikanal, viz., to Peermaad, in Travancore, he will find himself in a district which far surpasses most in Ceylon and can compete favourably with the best. My own experience of Ceylon is limited to a thirty hours' stay in Colombo. I make the above statement on the authority of Peermaad planters who have visited Ceylon, and of a leading Ceylon planter who has visited Peermaad. A fact, which speaks for itself, is that a Ceylon paper has begun to speak of Travancore as 'a promising off shoot of Ceylon,' or something to that effect! Should 'Smoothbore' wish to see some really good tea I shall be happy to render him every assistance, and if I am still here, to put him up, if he will so far honor me."—*Madras Mail*.

THE TEA-BLENDER BLENCHING.

(A letter from Mr. Verdaunt Greene to his friend Donne Browne in Ceylon.)

London, July 25th, 1890.

Dear B,

There has been such a row in town
As seems very likely quite soon to bring down
Some of the houses at which you frown
As an owner of tea plantations.
For it seems that some of the 'upper crust'
Of the grocer class have got mixed with the dust
Of their blended teas, through an indiscreet trust
In their own sophistications!

And one of their number, presented at Court
Quite lately, has very despairingly sought
To put himself right with the people who 've bought
His teas and encouraged transgressions;
And it 's quite on the cards that your courtier friend,
Unless his mind and his manners shall mend,
Will be affably asked his way to wend
To the coming Quarter Sessions!

From all I can gather, the facts are these :
He has been in the habit of selling teas,
Indian or others, but mostly Chinese,
For several years in the city,
And had feathered his nest, so people say,
It 's a business, you know, where skill comes into play,
And is helped in rather an imbecile way
By the Government, more 's the pity.

For it seems they omitted to note the fact,
When they lately tinkered the Trade Marks Act,
That earlier registered marks would attract
The ignorant public buyer ;
And having forgotten to cancel these
They have left to the dealer in ' blends ' of ' pure teas '
A chance that his natural talents will seize,
Although not a regular liar.

So a man with a label of ancient date
Has no occasion for washing his slate,
But can still remain in his former state
Of sin and still gather his profit ;
And may use, if he wishes, a label of lies
With the words CEYLON TEA printed more than life size,
And with all the seductions of type to disguise
Each word that he ought to take off it !

Let me give you a case, my friend : suppose
I 'm a dealer in teas : I prefer, of course, those
That give the best profit : it 's this that shows
The gifts of a genuine grocer ;
So I start as a specially honest man,
'T is the principal part of my plausible plan,
And I hire the best assistance I can
From a deeply-designing engrosser.

In a specious circular I decry
All other grocers to show that I
Have the general welfare under my eye,
Of Purity, Sole Apostle !
And though, like the lark at heaven 's gate
I never can sing, if you 'll only wait,
I am sure I can nobly imitate
The note of a Seven Dials' throstle !

And I rake my head for fanciful names
For the teas I create, for a blender proclaims
Himself above Nature, and modesty shames
When praising his own production ;
And he wildly raves of the strength intense
Of his " Broken Leaf " and " Spring Pickings " : all sense
He will outrage in lust for the purchaser's pence :
Plain truth would mean simply Destruction !

My Registered Trade Mark is to me
As dear as my own morality,
And I 'm bound to sell under it all the tea
That I buy in the course of trade, so
I call myself an ' importer,' the force
Of circumstances compels me : of course
The buyer can't trace the tea to its source,
And what doesn't seem true is made so

By the Registered Trade Mark. Thus art lends
Herself to a fraud sometimes, but the ends
Of Justice are met in the case of the ' blends'
Made by myself as ' importer,'
For, aided by Art, I soon design
A label and wrapper that you would define
As ' misleading' perhaps, but you see *they are mine* :
To me they are bricks and mortar.

With these a reputation I build
As sound as the tea in the packets I 've filled,
And with trust in myself and in all of our guild,
I start as an honest retailer :
And I issue teas to the public as ' PURE,'
I *hope* they are so, but I cannot be sure,
For I trust to a buyer the stuff to procure
And he may be another black mailer !

My label, of course, I decorate
With a lovely sketch of a tea estate,
For a picture gives to the label weight,
And Art on the label runs riot !
And into the picture we introduce
A harbour, roads, carts and such items of use
In procuring the tea we are thought to produce,
And a name, to keep everyone quiet !

And, although we may stupidly show our Tea
As covered with flowers, which it ought not to be,
Or even in casks send it down to the sea,
The public have no one to guide them :
And if any who fancy themselves to be skilled
Should enquire of their grocer, who 's one of our guild
And of course with a fine fellow-feeling is filled,
For assistance, woe betide them !

The grocer can only point out the mistake
That the faltering purchaser 's prone to make
In supposing he would, for lucre 's sake,
Indulge in dishonest dealing,

And will warmly add that he can't understand
How anyone can, with a Registered Brand,
Suspect any dealer of tricks underhand ;
Why, it 's little short of stealing !

I have wandered away from the point, I fear ;
I was going to explain what has taken place here,
But I hope my digression has made things clear
As regards our commercial morality,
And I hope you won't think we are all of the stamp
Of this rascal retailer, this scandalous scamp
Whose reputation no tailor can vamp
With his vicious and vengeful venality.

He had lived, it appears, by the tricks of the trade
And on ignorant people for years he had preyed
With his gaudy Trade Marks and his labels displayed
Selling trash to the purchaser willing,
Till at last it was found that the hopes he had nursed
Were a little too bright, and the bubble then burst
And he by his customers roundly was cursed,—
You can get a good lot for a shilling !

Now, it seems that some people who somehow appear
To look on Ceylon as their influence-sphere,
Have lately combined as associates here
In a filibustering faction,
And their time and resources they seem to devote
To the utter destruction of all who may doat
On the value a Trade Mark is thought to denote,
And they threaten a legal action

To all who refuse to accept their terms :
Do they think that the grocers are grovelling worms ?
That the soul of the tradesman squeamishly quirms ?
Or, dubious, fears detection ?
He has a name to lose, not they
The mushroom growth of a darkened day,
What can they possibly have to say.
Against *Government Protection ?*

These parties, it seems, had accused the old gent
Of using a label with wrongful intent,
A label on which I believe he had spent
A large sum of money. He pleaded
His label was only intended to please
The eyes of such persons as cared for his teas :
The words and the picture meant nothing : than these
What further plain statements were needed ?

But the Magistrate took a wrong view of the case,
So the grocer opines, and it seems a disgrace
For a grocer, who held such a prominent place,
To be fined for fraudulent dealing ;
But it seems he admitted *in toto* the fraud
Though disclaiming its motive ! and gravely implored
That the *import* of words he might use be ignored,
But the finer had no fine feeling,

And the double-dealer was stabbed to the hilt
By the Magistrate's order : his blood was not spilt
Though the Court had endeavoured to strip him of g(u)ilt,
But it seems he can never recover.
He cries in the streets, and to drown his distress
He plays on the Middleman's Organ ; the Press
Is deaf to his cries and the doctors confess
That a cure they can hardly discover.

The disease is obscure and the case is unique,
And they know not as yet by what means they can seek
To check the sad symptoms; they hope that a week
Of low diet may be beneficial.
The strangest sign, perhaps, in the case
Is this, that he feels no more the disgrace
That years, one would fancy, could hardly efface
After such a sentence judicial,

But he stares at the people with jaundiced eyes
And asks if they would n't express surprise
If he were beguiled by his enemies' lies
To purchase the teas they offer ?
Though these very teas which he now derides
Are the teas upon which himself he prides
He has built up his pile with rapid strides,
This jerry-building scoffer !

The medical men are inclined to think
His mania due to excessive drink
In the form of ' lie' tea, but a grocer should shrink
From drinking his own preparation ;
It is certainly strange that a subtle sense
Of justice survives a long course of pretence
And leads a man charged with a grievous offence
To utter his own damnation.

(Note by Mr. Donne Browne.)

Can nobody save this wandering child
And lead him forth from Honesty's wild
Lest to further disclosure he be beguiled,
This wretched, elderly stripling?
As the Balaclava men applied
To the Poet for help ere the last of them died
Let him go, if he only can pocket his pride
To Mr. Rudyard Kipling !

FORESTRY IN CEYLON:

REPORT OF THE CONSERVATOR OF FORESTS FOR 1889.

Col. Clarke's report is on this occasion very elaborate, dealing with the many subjects to which attention has been directed so as to conserve the Forest rights of the Crown, without injury to the prescriptive and equitable rights of the people; to render the existing timber resources of the forests available and to provide supplies for the future wants of the country. Col. Clarke, with the assistance of an experienced Forest officer, whose services have been courteously lent to the colony by the Indian Government, has at length been able to organize the Forestry Establishment on a footing somewhat adequate to the largeness and the importance of the interests at stake. Col. Clarke, as Acting Conservator of Forests, is assisted as Deputy by Mr. F. A. Broun of the Indian Forest Department and commands the services of 8 Assistant Conservators and 5 Foresters, of whom one is specially devoted to the conservancy and provision of fuel; while 3 Probationers are going through a course of instruction in the Forest School at Dehra Dun. There are 8 Forest Rangers and 11 Forest Guards. Col. Clarke's report of the services of the officers during the past year is that

The officers of the Department have with few exceptions worked well. The prospects of the Department have been much improved by making its members eligible for pensions, and it is hoped that the scale of pay, which is quite inadequate to secure good men, will next be put on a proper footing. During the past year the work in every Province was more or less minutely inspected either by myself or by Mr. Broun, the Deputy Conservator. Clerical Staff.—Early in the year it was found necessary to increase the clerical staff at headquarters by carrying out reductions elsewhere. Even now it is as much as the present staff can do to keep pace with the work.

Of course good pay is necessary, as a rule, to secure zealous and efficient service, but regard must be had in this as in other cases to the means available, and as the Department becomes increasingly useful and profitable, its officers may rely on their just claims being recognized. Even more, perhaps, than Surveyors and Public Works Officers are they exposed to danger from malaria in their exploration of the often distant and as regards population, desolate jungles. There is a vast amount of work to be done in the survey and demarcation of the forests. As yet only 102,000 acres have been surveyed at a cost of R50,000, or at the rate of 50 cents per acre. Of the areas surveyed 68,000 acres are in the new Province of Sabaragamuwa which is rich in forest resources, 15,000 acres in the North-Western, Province, 11,000 in the Central, 6,500 in the Western and only 500 in Uva. Readers will be surprised to learn that

The area of forests reserved since the coming into operation of the Forest Ordinance (No. 10 of 1885) is very small, the total area, exclusive of the Walapane forest, of which no survey has been made, being only 809 acres.

Besides the forests actually proclaimed, however, 32 have "been taken in hand," and it is added: I would urge that an officer of some revenue and judicial experience be appointed settlement officer, to proceed from one forest to another until all the arrears are worked off. Some of the settlements hitherto made are not worth the paper they are written on. The Assistant Conservator of Forests, Eastern Province, reports that the forests abutting on Batticaloa lake should be reserved at an early date before they disappear. The Assistant Conservator, North-Central Province, reports that as a rule there is no urgency for reserving forests, but that the forests near Ritigala should be taken in hand. The Assistant Conservator, Northern Province, asks that the forests near the sea in the Mullaittivu, Punarin, and Mannar districts and those in Iranamadu should be surveyed as reserved forests as soon as circumstances permit. The Assistant Conservator, Sabaragamuwa, goes exhaustively into the question of reserves, and gives a map showing the position of the reserves he desires to have. The Assistant Conservator, North-Western Province, also gives a list of the most important forests for reservations, and deprecates any forest sales in Weuda Hatpattu. The constitution of reserved forests in the Southern Province is urgently needed.

Recently in discussing the fuel question we adverted to the principles on which existing forests, reserved by the Crown, were dealt with so as to reconcile the supply of present requirements of timber and fuel with conserving and specially providing for the interests and wants of the future. The principles we adverted to are illustrated in a very interesting manner in the following extract:—

Working Plans.—Nanuoya Forests.—No complete working plan was drawn up during the year, but a preliminary plan of operations was made for the forests between Nuwara Eliya and Nanuoya. These forests, as mentioned in my report for 1888, are of paramount importance for the fuel supply of the Railway, and at the same time being of indifferent growth, at high elevation, much exposed to wind, and situated on steep ground, are somewhat difficult of treatment. In altering the growth from ill-growing and stunted indigenous stock to exotics yielding a maximum of timber in the minimum of time, care has to be exercised during the work in protecting the forest against the effect of wind, in minimising the action of rain on the newly planted steep ground, and in preserving the natural beauty of a forest which forms so marked a feature on the road to Nuwara Eliya, our most frequented hill station. To attain these objects it was decided to adopt the following plan:—The forest was blocked out in parallel strips, two chains in breadth, and at right angles to the prevailing winds, broad belts being also left untouched on the windward side. The strips were again divided into rectangles ten chains in length, and the rule followed of leaving a rectangle untouched lengthwise, and two rectangles crosswise between every two exploited rectangles. In the rectangles or "coupes" thus marked out for felling, only such trees as were badly grown, crooked, hollow, suppressed, or of inferior species were taken out, while the finer specimens were spared. Thus the leaf canopy was by no means entirely removed, and between the standards thus left plants of *Eucalyptus globulus* and *Acacia decurrens* were put in at intervals of 6 ft. by 6 ft. By this arrangement of having narrow rectangles of exploited land alternating with untouched bands of forest, and having the rectangle so short that the rush of rain water cannot get up much impetus, while the mixture of exotics with indigenous species is not likely to be inharmonious, the object we have in view will in all probability be attained. It is proposed to work over the whole forest in 25 years. This year only a commencement was made, and the plantations were unfortunately taken up at the wrong moment, with the result that a large number of plants died.

Railway Supply Forests.—The first steps were also taken in the year under review for elaborating a methodical treatment of the forests set apart for railway fuel supply in the section Polgahawela-Colombo. These forests stretch on both sides of the line between Mirigama and Polgahawela, and lie within the Western, Sabaragamuwa, and North-Western Provinces. The Deputy Conservator, accompanied by the Superintendent of Fuel Supply, visited the forests about Mirigama and Ambepussa, made a few rough enumeration surveys, and submitted a report proposing to set apart 10,000 acres of forest for the section Polgahawela-Colombo. The report contains a proposal for working the forests on a 25 years rotation, utilising, as far as possible, a system already tried with considerable success in the Western Province, viz., that of giving out indifferent forest to the villagers to cultivate in dry grain and other food crops for three or four years and plant at the same time

useful timber trees. This system has been tried at intervals for years past, as already mentioned, near Mirigama, with good results, the areas so dealt with being now covered with a vigorous growth of young jak trees. It is proposed to modify and extend this system wherever the conditions are favourable and the villagers willing, and where it cannot be adopted the forest will be coppiced. Late in the year two surveyors were detached to make surveys of the available Crown forest and waste land in the neighbourhood of the villages above mentioned, separating the village claims and holdings, with a view to constituting these forests permanent timber and fuel reserves. By the end of the year they had surveyed an area of 3,850 acres.

It is a matter for regret that so much land has been alienated in the past that our nearest source of supply of fuel by rail for Colombo from Crown forests lies more than thirty miles distant from the city.

SAMPLE PLOTS.—The Department is at present without reliable data as to the rotation on which our forest should be worked. This is of course due to the infancy of the Department, and time alone can supply the information that is wanted. Instructions have been sent to the Assisant Conservators to select here and there sample areas, in which all the trees of more valuable species are to be measured at breast height once a year at the same season, and a record kept in order to ascertain the rate of growth. The data derived from these sample plots will enable us to determine the exploitable age of the trees and consequently the rotations on which the forests should be worked. Up to this the Assistant Conservator of the North-Central Province has alone made any progress in this work. He cut out two blocks of one acre each, the blocks being again sub-divided into two, one half being left untouched, the other half thinned of the useless trees.

ENUMERATION SURVEYS.—A memorandum has also been circulated showing the different ways of making enumeration surveys so as to ascertain the value of a standing crop in a forest. None have as yet been made except some rough ones in the Mirigama forest. These were carried out in order to ascertain the number of cubic yards of firewood obtainable from different classes of forest, including the jak plantations. Those of the jak plantations were also useful in order to determine the probable annual volume increment per acre of this particular kind of timber.

All this is in accordance with the established principles of forestry; and as the local experience of a series of years is collected, a body of information regarding the best timber trees, indigenous and exotic, to cultivate, and the best mode of treating such trees so as to render them most successful in growth and most profitable at maturity, will be available to the general public as well as the officers of the Department and the Government. For the provision of steady and plentiful supplies of fuel, it is obvious that trees which most readily coppice will be preferable, provided the calorific qualities of the timber are good.—Col. Clarke deals at length with the protection and improvement of the forest staff and as an illustration of the value of watchers who do their duty he states :—

For our reserved forests paid watchers are an absolute necessity. The Assistant Conservator, Eastern Province, reports that since the appointment of a watcher for the eastern shore of the Batticaloa lake, a large amount of timber theft has been stopped, and the result has been to compel buyers to come to the depôt for timber which they had previously purchased from the regular timber thieves.

Col. Clarke agrees with the general opinion that the Forest Ordinance requires important amendments. Amongst the rest, provisions ought certainly to be made for securing the punishment of thieves who steal timber from the Government forests although such forests may not have been proclaimed as reserved. Prosecutions, it appears, have sometimes failed for reasons which seem inexplicable :—

In the Eastern Province a bad character received six months' imprisonment for threatening a forest watcher with a knife. A contractor was mulcted in R100 compensation for damaging Crown property by unnecessarily felling trees to get at other ones.

In the Northern Province five men were proved to have felled and been possessed of eighteen logs cut in Crown forest, but they were acquitted, because the wood was not cut from *reserved* forest.

In another case, in which a wealthy Sinhalese proprietor had been helping himself on a large scale to thousands of saplings from Crown forests, for use on an extensive coconut estate in the Chilaw district, his agents and carters being caught red-handed in my presence, the prosecution fell through owing to some legal technicality.

Col. Clarke then proceeds to discuss the very important and difficult question of chena cultivation. On this subject widely divergent opinions have been and no doubt are still held by officers of Government, some leaning exclusively to the side of Crown rights, while others, in their zeal for the cause of the too often half-starved people (largely because they shirk the hard work of culti vating "wet lands" with rice), make no account of the interests of the Crown, which are, however, the interests of the general community. In this as in other cases there must be a happy mean, in which the interests of both parties meet. If the cultivators are expected to provide pasturage for their cattle, sufficient areas of suitable land must be left in connection with villages for the purpose. Exceptions, too, must be made in times of distress, such as protracted drought has now produced in the Eastern Province. On the other hand it is intolerable that well-grown and valuable timber trees, which cannot be replaced in a generation, or more, should be sacrificed for the sake of a few crops of Indian corn, millets and pumpkins. This is how Col. Clarke deals with the question :—

REGULATION AND CONTROL OF CHENA CULTIVATION.—The cultivation of dry grain in their henas or chenas, although one of the most wasteful forms of agriculture and belonging to the rudest condition of society, is a necessity for the people of those districts where rice cannot be cultivated for want of water. So long as this form of cultivation is kept within proper bounds, that is to say, so long as the people cultivate dry grain in the waste lands set apart for that purpose and do not abuse their license by clearing valuable forest, not much harm is done. But unfortunately the headmen have in the past connived at the destruction of valuable high forest by hena cultivators. A case in point may be seen in the report of the Deputy Conservator on the Eastern Province, extracts of which are annexed to this report (Appendix C.) It is quite true that in the case above quoted the chief headmen was only recently appointed, but this shows the danger of leaving a matter of such importance in the hands of inexperienced men. The Government Agent has now consented to let a forest officer accompany headman inspecting jungle for which hena applications have been sent in. In order to bring this class of cultivation under better control, the period of hena rotation for each district of the Island where paddy cultivation is precarious should be fixed, and a block of hena for each village, calculated on the number of inhabitants in it, should be permanently marked off and assigned to it for cultivation, a margin even being allowed for slight expansion. Owing to the vigilance of the forest staff, cases of illicit hena cultivation were brought up repeatedly in the magistrate's court, but the fines being in some cases nominal, not only were the officers disheartened, but the people were emboldened to repeat their offence where the infraction of the law was so lightly regarded. The Southern Province, especially Giruwa pattu east and Hambantota district, is now a vast sea of hena, owing to the reckless manner in which villagers have been allowed to devastate the country in the past. Even some of the old forest reserves set apart by Government Proclamation in 1865 have been attacked and ruthlessly

destroyed, nothing remaining in some instances of large forest reserves but a clump or two of trees surrounded by miles upon miles of lantana or scrub.

In view of the reckless devastation thus noticed it is certainly time that the wealth which the colony possecses in its remaining forests of standing timber should be duly protected. What follows is very interesting and important in its bearing on timber and fuel supplies in the future:—

Natural Reproduction.—On this important subject Mr. Broun confirms the opinion that I ventured to give in my Administration Report for 1887, that natural reproduction is not unfavourable in this Island. Mr. Broun further says that "it has hitherto not been sufficiently studied. It is, nevertheless, one of the most important items of forestry; for, with an abundant reproduction, fellings can be made with the knowledge that the place of the trees felled is at once taken by others, and without the necessity for filling up the gaps by artificial methods. As, however, seedlings of different species do not spring equally readily under the same conditions, it is essential to ascertain what are the conditions most favourable to the natural regeneration of certain species, and how these conditions can be promoted by forest operations."

It appears, for instance, that the swamp mendora (*Vatica Roxburghiana*) seeds abundantly at the time when the floor of the forest is several feet under water. The seeds are thus distributed in a fairly even layer over the surface where the leaf-canopy is complete, but where the fellings have been made with too heavy a hand, and the soil imprudently bared, the local rush of water carries away all seeds and no reproduction takes place.

Satin seedlings, on the other hand, are hardly ever seen in dense forest, but appear in chenas and in well lit localities on dry, sandy soil under the low shelter. Palu, milla and margosa require similar conditions, and in order to encourage reproduction fairly heavy fellings should be made not far from the seed bearers. Halmilla also requires light and a well-drained soil. If the latter is liable to floods all the better for this species. A gap caused by the removal of one or two trees is in favourable localities sufficient to cause numbers of halmilla seedlings to spring up and struggle towards the light. For this reason halmilla is one of our valuable species which reproduces itself most easily without much help from man. Pehimbia reproduces itself very much like halmilla. The forests between Passara and Nakkalla in Uva are full of seedlings of this timber. Na seedlings and saplings abound in some of the dense forests of the Southern Province and in parts of the Pasdun-korale. Ebony reprodnces itself fitfully. What circumstances are requisite for its reproduction are not yet known. This tree requires careful study.

Data are much wanted for a great number of important species, and I trust that all Forest officers will study and make a careful record of the most favourable conditions to the natural regeneration of the more valuable timbers.

The Assistant Conservators, Central Province and Eastern Province report that the year was a poor seed year for trees of valuable species, as compared with 1887, which was good; but the Assistant Conservator, Northern Province, says that the reproduction of satin and palu has been satisfactory. The Forester, Nuwara Eliya, brings to notice that natural reproduction in his district is good on slopes not exposed to the south-west mousoon, *e.g.*, Kandapolla and Maturata. Heen nillu is absent, and liyan, sapu, kina, mihiriya, and damba reproduce themselves well.

Artificial Reproduction.—It is a popular belief that the Forest Department should occupy itself chiefly in planting trees. Although plantations have certainly to be made where a quick return has to be obtained, or where other means of reproduction are not available, the Forest Department must depend for its continuous supply of timber more on the natural reproduction of the forests assisted by operations properly conducted than on plantations which cost much time and money, and require much supervision. In fact so costly are they that very good reason must be shown for their necessity before they are undertaken.

Up to the present time the areas planted have been small. They are as follows:—

Eastern Province.—Teak chenas.

North-Western Province.—Teak plantation, Puttalam.

Central Province.—(*a*) Blue gum and *Cryptomeria japonica*, Nuwara Eliya; (*b*) Plantation in strip felling, Nanu-oya.

Western Province.—(*a*) Old teak garden, Hanwella (*b*) Jak chenas, Mirigama.

Province of Uva.—(*a*) Patana plantation, Badulla.

Details of areas, cost, &c., are given in table (Appendix D).

The teak chenas of the Eastern Province were started in 1876, and have been added to at regular intervals up to the present time. The system followed has been to hand over forest land for chena cultivation to Moormen, on condition that after three to five years they should give back the land planted up with teak, for which purpose seed is supplied to them. Such chenas are to be found at Tumpalan-cholai, Divilana, Palukanawa, and in the Samantarai and Koralai pattus.

Mr. Broun, who has inspected these chenas, reports that they are not generally in a flourishing condition, the trees being flat topped, stunted, and far from vigorous. Some have been injured by fire, others by the bursting of a bund, and one large area has remained bare for want of sufficient seed, while in most cases illuk grass springs up as soon as the land is handed over by the cultivator. The earlier chenas are in better order than the more recent. To obtain these indifferent results, fine stretches of high tumpalai (*Vatica obscura*) forest have been sacrificed. Mr. Broun is of opinion that these chenas should be discontinued unless the cultivator is prepared to be contented with a forest of a class a good deal inferior to that which he has hitherto received, and I fully concur, as tumpalai is likely to turn out a useful timber for public works. In any case, conditions of soil and drainage should be more carefully studied, companion species of quick growth and light foliage introduced with the teak, while the neglect of the conditions imposed upon the cultivator should bar him from any future grant. Every chena cultivator should be required to keep up a small nursery to repair blanks. The tota area of the teak chenas in the Eastern Province is 639 acres, or nearly one square mile, and the total expenditure, so far as can be ascertained R353·53. The cryptomeria and blue gum plantation at Nuwara Eliya is situated behind the Assistant Agent's house. It was started in 1888, and covers about twelve acres, over which all low jungle had been cleared with the exception of saplings of the more valuable indigenous kinds. The plantation is on the whole successful. A record of the growth should be kept year by year. The plantation in the strip fellings in Nanuoya forest has already been mentioned. The planting, commenced in 1889, has not been very successful, about 50 per cent of failures having been reported. The old teak garden near the resthouse at garden near the resthouse at Hanwella is some three acres in extent. It was originally opened by the Dutch, but about eight or ten years ago all the trees were felled and sold for R1,000, a very small sum compared with their real value. What now remains is coppice growth from the stools, which had not been trimmed for that purpose; and the plantation is now stocked with a crop of coppice poles of seedy appearance, such as might be expected from the age of the parent trees and the bad shape of the stools. The poles will probably never grow into trees of fine dimensions.

The jak chenas at Mirigama have been already mentioned (see paragraph 24) in connection with proposals for fuel reserves. They have been planted in two separate blocks, one on Hatigankanda, forty acres in extent, and seven to ten years old; the other on Ponarrhuakanda, thirty acres in extent, and eight years old. The former block is planted with jak mixed with domba and wild almond; but of the three kinds jak is by far the fastest grower, outrunning completely the others. There are one or two patches of pure domba which do not seem to thrive at all. The average

height of the 10-year old jak trees is about forty feet, and the average girth about eighteen inches, a very good growth considering that no thinnings have been made. Light thinnings could now be made with advantage. The other block at Ponarrhua is also on the whole successful, except towards the top of the ridge, where the soil is inferior. The plantation is in some parts pure jak, in others jak mixed with Innumidella. Wherever the latter appears the jak is suppressed. Lunumidella is therefore not a good tree as a mixture with jak, and should be omitted, especially in a fuel plantation, its quality as a fuel being indifferent. Creepers in this plantation are pulling down the young poles and saplings, and should be cleared at an early date.

The teak plantation at Puttalam is, in Mr. Broun's opinion, the most successful of our teak plantations. It was started in 1880 by Mr. Maggiolini, Forester of the North-Western Province, who, with the help of his baggage coolies, and sometimes of road defaulters and jail prisoners, planted up a small plot of ground with teak 14 ft. by 14 ft. This distance apart proving too great for proper growth, the distance apart of the plant in the plantation made in the following year was reduced to 6 feet by 6 feet. The area was successfully extended in 1883; but the extension made in 1888 had rather a large percentage of failures, owing to the season (November) being too dry for proper germination and survival. Twenty acres more were taken in hand in 1889, at a cost of R1,082. The seeds on this occasion were put in 5 ft. by 5 ft., as even when six feet apart they did not form leaf canopy early enough. Seeds of satin were mixed with the teak, as the latter species seems to thrive better when in mixture.

The total cost of the plantation up to date is R1,573, and the revenue obtained by sale of thinnings in 1886 was R203, leaving a net expenditure up to date of R1,370 for a total area of 37 acres.

To the twenty-seven acres of patana plantation mentioned in paragraph 52 of my last annual report, the Assistant Conservator, Uva, has added another thirteen acres at a cost of R792, or about R56 per acre. The blanks in the older plantation have been filled with grevillea and casuarina, and the newer plantation consists of casuarina, sapu, and ingesaman. The plantation is a very successful one, and reflects credit on the Assistant Conservator.

The total expenditure on the Badulla plantation from the commencement amounts to :—Twenty-seven acres in 1888, R2,195·45, upkeep of do. 1889, R425·78; thirteen acres in 1889, R735·93, in all forty acres—total expenditure, R3,357·16, or nearly R84 per acre, rather a high figure considering the prices at which forest land has been sold in the past. Mr. Moss considers that weeding should be kept up for three years, and, although this is the cause of the great cost of upkeep, it is indispensable on account of the encroaching nature of grass roots.

At Haputale about a quarter of an acre was planted up with iron-bark by the depôt cooly. The Assistant Conservator, Northern Province, again brings to notice the proposal originally made by Mr. A. Clark of making plantations of palmyra on the vast expanse of sand near Jaffna. A large amount of this timber is exported to India annually by private parties, and the supply is now very limited. This wood has a pre-eminence in strength over Moulmein teak, is in great request for building, and white ants will not touch it. The food products of the tree are too well-known to require mention.

IMPROVEMENT FELLINGS AND CREEPER CUTTINGS.—Little systematic work has been done in this respect, but several of the forest officers when making their inspections are accompanied by two or three coolies with cutties, and these cut down the creepers met with on and near their routes through the forest. As regards improvement fellings, they are badly wanted, especially in the halmilla forests, where a little light should be given to seedlings, in order to encourage them to grow up. When the dominating tree belongs to a species not worth felling, sufficient light can be usually let in at small cost by girdling the trees. This is especially wanted, Mr. Broun reports, in the Verani forest, Eastern Province, between Futuvil and Panawa, which is crowded with halmilla advance growth. A beginning should now be made in most Provinces.

EXPERIMENTS IN EXOTICS.—By desire of Government this Department will undertake before the commencement of the south-west monsoon of 1890, a plantation of Para rubber (*Hevea braziliensis*) from seed supplied by the Royal Botanic Garden, Heneratgoda. The place selected for the plantation is near Nambapana in Sabaragamuwa, where the climate is considered by Dr. Trimen to be suitable, and whence export will be easy.

The Conservator of Forests, Travancore, has been asked to supply this Department with seed from localities in the hills where teak grows most vigorously. The seed having arrived, a site with similar conditions of soil and elevation to that of the Travancore hills will be selected, probably near Kadugannawa.

The Conservator of Forests, School Circle, North-Western Province and Oudh, has also been asked to supply us with small quantities of seeds of some Himalayan conifers, viz., *Cedrus deodora*, *Pinus longifolia*, and *Pinus excelsa*, for trial near Nuwara Eliya, where, if the trees succeed, they will be as ornamental as they are useful.

The Assistant Conservator, Northern Province, reports that a mahogany tree planted in Jaffna in 1852 is now 7 feet in circumference at breast height, and with a clean bole of 16 feet. This means an annual average increment of 2·3 in. in girth, or ·74 in. in diameter, or in other words, the annual concentric rings are on an average ·37 in. thick.

We have extracted at such length because the passage taken over supplies just the kind of information which many planters and others are anxious to obtain. It will be seen that jak is one of the best trees to cultivate on the plains and in the lower hill zones. As regards *Pinus longifolia*, the appearance of a beautiful specimen in the Hakgala Gardens affords strong proof that it will do well at Nuwara Eliya and in its neighbourhood. This tree yields excellent timber. Encouragement ought also to be derived from the fact that a tree of *Cupressus torulosa* about 20 years old, cut down last year by Mr. Nock, gave 176 feet of 1 inch boards, much like white pine in appearance and easy to work. Why *Cedrus deodora*, which is the Indian representative of the cedar of Lebanon, has not been a success in Ceylon we cannot say, but this tree and *Pinus excelsa* would be acquisitions. One of the best and most satisfactory trees which we have borrowed from Australia is *Grevillea robusta*. The *swamp mendora* alluded to is one of the most curious in its growth of our trees. Specimens may be seen at Kalutara, growing out of the water by the side of the Kaluganga, with roots springing up several feet in height, like vast sharp wedges. Satinwood, ebony and the allied "calamander" and iron-wood deserve large attention from our Forest Department. There are half-a-dozen young *na* trees near the plot where the band plays in Victoria Park, Colombo, which promise to vie in beauty of foliage with the splendid specimens of iron wood trees on the edge of the Kandy Lake. This and similar trees, some of the red-leaved Eugenias especially, ought to be largely used for the adornment of our towns. We are glad to learn that the blue gum and cryptomeria plantation at Nuwara Eliya is a fair success. Both trees coppice well, we believe: of the blue gum we are certain. The difficulty, indeed, is to stop the growth of the numerous shoots which spring from the stocks of felled blue gum trees. It is well to know that *lunumedilla* which grows very rapidly and supplies a pretty cedar-like timber for ceilings and curiously enough for canoe outriggers, although it is said not to stand exposure to weather, ought not to be grown with jak, if the latter is to get fair play. Satinwood and teak, on the other hand, grow well in association. What is stated of a mahogamy tree at Jaffna is

certainly encouraging with reference to the cultivation of this valuable tree. Meantime experimonts at Nuwara Eliya and around it prove tbat an allied tree, the *red toon*, grows rapidly and beautifully in form and vegetation. In rapidity of perpendicular growth it excels tbe *cryptomeria* and vies with the Australian Eucalypti and Acacias ("wattles"). The margosa (the *neem* of India) is closely allied to this tree.

We trust the idea of plantations of that most useful timber and food palm, the palmyra, which is rapidly becoming scarce, will be seriously taken up. We shall look with interest for accounts of the result of an experiment which is being tried in the arid Hambantota district. Palu, which combines, like the palmyra, the valuable qualities of food bearer and timber yielder, ought also to receive special attention.

Communications and buildings are dealt with, and Col. Clarke shows a desire to alleviate the hardships to which the forest officers are exposed:—

Foresters' bungalows are much required in the uninbabited portions of the Island, where their work takes them, *e.g.*, in the southern part of the Eastern Province, the Uva Bintenne, and tbe oastern part of the Southern Province. These I propose to supply by degrees, as it is not fair upon the officers to require them to endure greater hardships tban are preventible by a reasonable outlay. A Forester's life is not by any means a bed of roses.

Under the head of "Yield and Working" Col. Clarke notices disadvantages at which the Forest Department is placed in being compelled to hold large stooks of timber to meet the requisitions of the Public Works Department, without the certainty, for want of estimates, of such stocks being indented for. The prices paid, too, were inadequate:—

For instance, the Public Works Department in the Northern Province was supplied with palai at 50 cents per cubic foot, which would have realised R1·12½ if sold to the outside public for export to India.

It might seem to some persons that, the timber being the property of Government, it could not be of much consequence at what price it was accounted for. But any such loose system of accounting would cause confusion and worse. The Public Works Department would obtain undue credit for economy, while the Forest Department would appear to be conducted at a loss great in proportion. It is not surprising, therefore, to learn that a revised scale of prices has been framed. The report of the Committee on sleepers for the railways, which we some time ago reviewed and quoted from at great length, is adverted to. The result of the deliberations of that Committee was that a trial is to be made this year of 200 sleepers of each of 25 species of Ceylon timbers. Our readers may recollect that the two railway members of tbe Committee suggested that the trial sleepers should be supplied gratuitously by the Forest Department. This proposal Col. Clarke emphatically resisted, on the ground that the good quality of the larger proportion of the timbers was beyond question. Meantime 10,000 doon sleepers (*doon*, not to be confounded with *toon*, being our hardest and best wood) were supplied for the Bentota extension. The details regarding timber supplied to other public departments and to the public generally are so interesting and calculated to be so useful to many of our readers, that we feel justified in making a lengthened quotation:—

Timber of the value of R39,590·63 was sold to the Chief Resident Engineer, Haputale Railway Extension, for the construction of bungalows, &c. Among the other Public Departments the Postal is probably tbe next largest buyer, for telegraph posts, 503 of which were supplied during the year. Smaller quantities of timber were requisitioned by the Colonial Store for the Harbour Works, by the different Road Committees, by the Military authorities at Trincomalee, and by the Railway Department. The Railway Department applied to us for a timber which, while equally durable as jak, should be somewhat lighter in haulage. We supplied them with "kina," and it is now being tried for the flooring of railway carriages; but as it has been used when green it is hardly receiving a fair trial. It would be worth while to try hulanbik and margosa in lieu of teak for the interior of railway carriages, as teak has gone up considerably in price. Hulanhik has a beautiful satin lustre, while margosa is not only a handsome wood, but insects will not touoh it owing to the essential oil it contains.

The timber sold to private parties is usually for export eitber in the log or converted into casks, boxes, &c. The woods most in demand are ebony, satin, halmilla, palu, hal, and hora.

Ebony and satin will be mentioned later, under Central Depôt.

Hal and hora are much used for tea boxes and plumbago casks, respectively.

The palu and satin sold for export come chiefly from the North-Western Province and Eastern Province. Halmilla is largely bought for India, and has a considerable sale in Ceylon. The Indian Government was supplied with 3,229 cubic feet of picked halmilla at R2·50 per cubic foot, realising R8,062·50. That sold locally comes from private land, frequently from temple land in the North-Western Province, Central Province, and Eastern Province, and some from Crown forests in the same Provinces. The supply from private sources is now becoming limited, and as the oil mills do not offer as good prices as purchasers from India, most of that timber is sbipped for that country. A number of native coasting craft, which carry the paddy grown in tbe Eastern Province to India for clearing and winnowing, load up with timber of this and other kinds, for which they pay remunerative rates.

Central Depot, Colombo.—After considerable correspondence an arrangement was come to between the Engineer of tbe Harbour Works, the Railway authorities, and tbe Master Attendant, wbereby the Forest Department was permitted the use of the southern half of tbe Breakwater yard as a timber depôt, and a portion of the root of the Breakwater as an ebony stacking yard. The object of having a separate yard for ebony at the harbour was to avoid expenditure in the movement of it between shore and ship. It now remains on tbe spot to which it is brought from the interior of the Island until wanted for loading on board ship. As our occupation of the Breakwater yard is conditional, and has to be given up in tbe event of the Northern arm being constructed, there is an element of uncertainty in our tenure, and we cannot set up permanent sheds and saw mills. As a consequence, the sawing of timber at tbis depôt was done in an irregular manner, and we had in the long run to ask the Government Factory to saw the timber for us.

No business was done in ebony until the close of the year. The English markot was reported continuously througbout the year as flat, large stocks were still unsold in the docks, and tbere was very little demand either for Europe or China. A small quantity was offered in the Colombo market collected from private land and from temple land, but ohiefly of indifferent quality. By the middle of the year some 500 tons of Government ebony had been collected from all parts, and after shaping and trimming was divided into lots to suit tbe European and China markets. The higbest price offered early in the year had been R80 per ton at Trincomalee, but with the approval of Government the ebony was held until the close of the year, when 102 tons were sold for R14,280, or an average of R140 per ton for all classes, bad, good, and indifferent.

Then follow details connected with the difficulties of obtaining supplies of timber from distant parts of the island for the Colombo depôt. The

"Lady Gordon" is often not available, and we regret to find it stated :—

Getting timber by rail from Matale is almost prohibitive, the rates being 33 per cent. more than the steamer rates, and we never use the railway unless we are absolutely driven to it.

We should think this was a case for special rates, and if rates at which timber can be cheaply conveyed from the great north-central and northern forests cannot be arranged for a northern extension, such as is now under consideration, that fact will be "a heavy blow and great discouragement" to the enterprise. As matters stand, the Forest Department is compelled to resort to private sailing vessels for lower rates of transport.—Not only the tea planters with the demand for their tea factories, but all fuel-consuming establishments in Colombo and the general public who have year after year to pay high prices for firewood used for domestic purposes, are interested in the question of fusl supply. We need, therefore, make no apology for another long extract :—

The supply of fuel to the Government Railway remained throughout the year in charge of Mr. W. H. Clark. As a rule there have been no complaints about the quality of the wood supplied, but on one occasion a large amount was rejected by the Railway Department among the deliveries at Veyangoda. Most of it, however, was accepted at reduced rates.

During the year 19,964½ cubic yards was supplied from Crown forests at a cost to Government of R22,666·21, and 58,321¼ cubic yards from private forests at a cost of R79,553, or a total of 78,285¾ cubic yards at a cost of R102,213·53, exclusive of cost of establishment and other expenses. The revenue obtained from this firewood amounted to R118,180·70, which sum covers costs of establishment and sundrios, and leaves a margin to expend on the re-afforestation of the Crown forests set apart for the railway supply.

As seen from the above figures, the amount supplied from private forests is about three times as great as that from Crown forests. There is no doubt, however, that the supply available from private sources is diminishing rapidly and the time will come when the bulk of the supply must be drawn from Crown forests. The cause of this is due partly to the denudation of private forests without corresponding re-afforestation, and partly to the indirect results of the establishment of a Forest Department. There is no doubt now that much of the so-called private wood of a few years back really came from Crown forests. For instance, the supplies delivered at Kalutara came almost entirely from the Crown watmranas on the Kaluganga and its affluents, but since these forests have been more closely watched, it has become exceedingly difficult to get tenders for the supply of private wood to be delivered at Kalutara.

It is the intention of Government to increase gradnally the proportion of fuel yielded by Crown forests until, if possible, the entire supply comes from that source. Obviously this cannot be done at once, for until we know what amount of Crown forest there is available, risk would be run in over-working our forests on the mere supposition that the supply is sufficient. A survey is now being made of the Crown forests bordering on the railway, commencing near Mirigama, and the surveyors are working gradually eastward.

Later on it will be necessary to make fuel plantations on the upper section of the Railway above Kadugannawa, as it would be too costly to transport firewood up the incline from the lowcountry forests.

The rates per cubic yard at which firewood was supplied to the Railway during 1889 were as follows :—

	Class I.	Class II.	Class III.
	R. c.	R. c.	R. c.
Upper Section ..	1 65	1 50	1 37½
Lower Section ..	1 50	1 37½	1 25

It is considered that so long as first class firewood remains below R2 per cubic yard, firewood can compete successfully with coal. This rate, however, takes no account of wear and tear in the boiler tubes, which is far greater with coal than with wood.

The other Public Departments in Colombo supplied with firewood were the Convict Establishment, the Harbour Works, the Government Factory, the Master Attendant, and the Government Printer. The amount sold was R17,844. In Uva R61·70 was realised by the sale of charcoal to the Public Works Department.

FUEL SUPPLY TO THE PUBLIC.—In the towns of Jaffna and Trincomalee, the fuel for the residents is supplied from Crown forests. In Jaffna the wood is brought to depot, and retailed to purchasers. The rate at the beginning of the year was R4 per ton of dry firewood, but this was subsequently raised to R5. The quantity sold amounted to 2,187 1-7th tons, realising R10,103. In Trincomalee a system of licenses was introduced which leaves the establishment free for supervision. During the year R380 was realised on this account, a license fee of R10 being levied on each single bullock cart. Besides the above R66·40 was recovered for royalty on 332 tons, at 20 cents per ton. At Galle the firewood for the town supply comes almost entirely from Crown forests, but the Crown derives no revenue from the removal of firewod.

A wasteful system prevails in the Galle district of allowing the villagers to sell, after the harvest is over, the fonce sticks out by them from Crown forests. As fence sticks will last at least three years, if this practice were stopped, as undoubtedly should be the case, a large saving of straight and valuable saplings would be effected.

In Uva 148¾ cubic yards of firewood were sold for R290·60. A royalty of R35·05 was paid for 701 bushels of charcoal, and the Assistant Conservator sold for R196·75, 583 bushels prepared by the Department.

On receipt of a valuable memorandum prepared by Mr. Broun, the Assistant Conservator tried some Indian methods of charcoal burning, and eventually devised an improved kiln, which not only gives as large an outturn, but requires less care in construction and in supervision after firing.

As regards the supply of firewood to tea estates rules have been drawn up and passed during the year, which prescribe the conditions under which estates can lease tracts of Crown forest for the purpose. The notice of charcoal and improved methods of preparing it suggests the question, which, we suppose, must have been well considered, of the use of this substance in the locomotive furnaces, in which case it would seem that the carriage up the Kadugannawa incline of so light a substance ought not to be costly? Then again if, Indian coal of a fair average quality continues to come in at moderate rates when compared with the cost of the black diamonds from Cardiff the proportion to coal of wood fuel at R2 per cubic yard may cease to apply. Of course the quality of coal as well as its price have to be taken into consideration, and we suppose that coal of an inferior quality for calorific purposes will be damaging to boiler tubes in proportion to the degree of inferiority? Col. Clarke does not touch on petroleum waste, the use of which, if it could be cheaply supplied from the fire regions of the Caspian, or other sources, Indian perhaps included, would considerably affect the demand for firewood by tea planters, as well as by the railway and foundries and factories generally.

The royalty and share systems of dealing with forest produce are noticed, and here, as in India, North Borneo and other places, it is felt that the public have a right to some share in the value of minor products removed from the forests, jungles and patanas, or the grass lands which correspond to the latter. On this subject the report states :—

A great deal remains to be done by the Forest Department in bringing to market the minor produce

of our forests. Only in two or three Provinces has a commencement been made at present. In Uva R3,010 was realised for the right of collecting gall-nuts (*Terminalia chebula*), R17 for the right to quarry limestone, and R81·68 for the sale of mana grass growing on the Crown patanas. Certain planters have thought fit to object to paying for this grass, but considering that some of their members remove from two thousand to five thousand bundles (head-loads) per mensem, and are only asked to pay the very small fee of R2·50 half-yearly, and that they have no right of user whatever, there is no substantial ground for complaint. The Assistant Conservator, Sabaragamuwa, complains that although endeavours have been made to lease the collection of aralu nuts, these efforts had failed because the villagers have been accustomed to help themselves. This is another argument in favour of reserving forests without loss of time, and having the rights and privileges defined. In the Eastern Province the forest produce sold realised R1,252.

As already mentioned the sale of minor forest produce reqnires development. The right to tap inferior trees for resin, gnms, gamboge, &c., might be leased out. The bark of ranawara (*Cassia auriculata*) is largely exported for tanning from the Hambantota district, and there are other trees which yield tanning material, such as the fruit of bnlu and nelli, the leaves of dawa, and the bark of many trees, all of which should bring in revenue. Velan bark (*Acacia leucophlœa*), a large article of export, is freely taken from trees growing on Crown lands, the bark being stripped to the unnecessary damage of the trees. No royalty is of course paid, and the Treasury is a great loser.

In the Northern Province R336·80 was realised from the sale of green leaves from the commoner kinds of trees for manure for tobacco gardens. This is not a kind of practice which deserves much encouragement. The rnthless destrnction of palu trees for their fruit, the natives of the Northern Province boing allowed to break off large branches in order to obtain the fruit more easily, still goes on unchecked in this Province. Mora trees in the Eastern Province and beraliya trees in the Southern Province suffer in the same way. By allowing the people to break off the branches, rain-water penetrates into the holes so formed and rot speedily sets up. Our fine palu trees in the Northern Province are threatened with extinction, if the practice be allowed many years longer. Another pernicious practice is that of felling trees for the sake of getting at honeycomb. As the procedure is quite unnecessary, there is no donbt that it should be stopped.

Free Grants and Removal Under Rights and Privileges.—Owing to our principal forests being situated in districts where there is littlle population the forests are not much burdened with rights, and where natives are allowed certain privileges, these must be regarded as concessions rather than as rights. Besides grants of timberfor purposes of public worship, public institutions, and so forth, by far the largest amount of timber really given away consists of permits to cultivate chena. If the amount of timber given away annually in this way were calculated, the figures would be startling.

With reference to mana grass from the patanas, a fee of R2·50 per annum for, we presume, unlimited cutting does not seem unreasonable; and Government, in replying to the Haputale Planters' Association on the subject, seemed to indicate that the object of the exaction was mainly to secure the continued rights of the Crown in the land. Should a factory or factories be established for converting the patana grasses into "strawboard," for the manufacture of tea chests and for other purposes, we can only repeat our belief that all possible encouragement will be given to an enterprise calculated to utilize produce which now runs almost entirely to waste over hundreds of thousands of acres of our upland prairies.

The gall-nuts produced by *Terminalia chebula*, and the bark of the ranawara (*Cassia auriculata*), the latter a pretty yellow-blossomed shrub, are amongst the most highly valued substances used for tanning hides, an enterprise for which Madras is famous. This *Cassia* must not be confounded with the *Acacias* (popularly mimosas) so common in the jungles of the arid regions of the north and east of the island, the marked characteristics of which are formidable thorns and beautifully colourd flowers of sweet odour. The bark of one of these, *Acacia leucophlœa*, is amongst the minor forest produce which Col. Clarke desires should contribute something to the public revenue as well as to the profit of the persons who in stripping the bark, kill the trees. In this case, but much more in the practice of breaking down the branches of the *palu* tree to secure the edible fruit, the natives exemplify the moral of the fable of the goose and the golden eggs. Stringent rules, especially as regards the *palu* trees, can be defended on the ground of benevolent regard for the interests of the reckless natives themselves.

On the whole the report indicates satisfactory progress:—

The transactions of this Department show a considerable increase in 1889 over those in 1888, the value of timber and other produce sold being R280,199, as against R173,820; while the value of stock in depôt has increased by R83,796, being R244,264, as against R160,468 at the end of 1888.

Details of stocks of timber and firewood in the depôts of the various Provinces are given, and Col. Clarke observes:—

It is satisfactory to note that only in one Province—Uva—is the stock less than in the previous year, due in this case to increased sales involving the emptying of the depôt more quickly than it could be replenished. By adding the valne of the stock in depôt to the value of sales for the two years respectively, it appears that the timber transactions amounted in 1888 to R333,849, and in 1889 to R524,380, thus showing an increase of R190,531. As regards the actual sales, I shall now endeavour to show, so far as the very unsatisfactory returns permit, that there has been increased activitv in sales of timber, firewood, charcoal, bamboos, and cane, and minor forest produce.

Then follow the details, with the remark that the increase of firewood supplied by private forests is not taken into account, any more than "Drift and waif wood and confiscated forest produce." Col. Clarke then deals with returns of timber imports and exports supplied by the Customs Department:—

Excepting satinwood, it will be seen that the imports consist chiefly of timbers which have equally good representatives in this island. Teak, the chief import, has now risen in price to such an extent that a considerable saving would be effected by substitnting indigenous timbers for it. For ordinary railway construction, balmilla, satin, milla, and palu would all be suitable, while for railway pannelling, halmilla, margosa, hulanhik, paanaka, and many others would answer the purpose of teak. Flowered satin cannot be excelled for pannelling.

Large quantities of teak from Burma, and "white cedar" from Cochin, are imported for oil-cask staves and shooks, but experiments are now being condncted to find cheaper substitntes for such purposes. Halmilla is considered by oil-cask makers as good, if not better than teak. The price offered to the Department by the oil-mill proprietors for halmilla is not, however so high as those obtainable from Indian traders. Timber traders in Burma and elsewhere are constantly sending trial timbers, but np to the present, whether owing to brittleness, porosity, or to colouring matter, none have been accepted. It is imperative that something should be done to prevent this trade passing ont of the Island, and a circnlar was sent to the Provincial Forest officers inquiring what woods wonld be likely to be snitable, and asking them to send enough timber of the species selected to make half a dozen casks. As yet only doon has been submitted to trial, and a report on its merits is now awaited.

As regards exports, that of ebony has fallen from 12,352 cwt. in 1888 to 3,880 cwt. in 1889, the reason for which has already been explained in paragraph 87. The exports of satinwood have also been reduced probably also owing to an increase in the market price and partly owing to a better watch being kept on Crown forests. The export of halmilla has increased but the figures evidently do not include the logs exported in the rice dhoneys from the Eastern Province. These latter probably come under the heading "Wood of Sorts," which shows an export of 26,779 logs as against 6,909 in 1888. The exports from the Island deserve every encouragement, as they bring money into the Island, and because we have at present more than sufficient for our local works: while imports require to be diminished as much as possible.

We cannot wonder that teak is such a favourite timber. The logs can be obtained of so large a size and free from faults, the timber is so easily worked and from the oil it contains is impermeable to insect attacks and weather influences. But, at the present rate of consumption, the supplies are likely to become scarce. Hence the necessity as well as the propriety of trying experiments with others of the many timbers included in the Ceylon Forest Flora. A portable saw-mill with connected machinery has been applied for, and the formation of an establishment of elephants for dragging timber. The report is altogether so interesting that considerations of space alone prevent our giving it entire. But we must again quote:—

DESTRUCTION OF GAME AND FISH.—There seems to be no doubt that game, once so abundant, is now diminishing greatly, owing to its wholesale destruction by the natives for purposes not of legitimate food, but of trade. The trade is in the hands of Moormen who supply the villagers with gunpowder and shot. The villagers shoot every head of game that comes in their way, usually at night, over waterholes in the dry season. Any one whose duty it is to travel much, especially in remote parts of the Island, will bear me out in saying that seldom a day passes without meeting one or more men with guns in their hands going out shooting, while men carrying pingo loads of hides and horns constitute a regular service. There are also a great many so-called *savants*, usually foreigners, who come here to prosecute their studies and look to pay the expenses of their tours by carrying off quantities of skins of all sorts which they mostly purchase from natives. Last year the village of Mahakekirawa was literally carpeted with drying skins, which one of these persons had by timely notice beforehand induced the natives to shoot and bring in to be purchased by him at market price! When the supply was large, and the buyer a single individual, the market-rate may be easily conjectured —just what he chose to give them.

A great many lives of elephants are recklessly destroyed by elephant catchers, who shoot the mothers in order to get at the calves, or who drive a herd for weeks before they kraal them. The poor beasts are then so exhausted, that in many cases not 10 per cent survive. The killing of elephants in herds should be strictly forbidden and restricted to solitary rogues.

Like the game, fish is disappearing, or has quite disappeared from many rivers owing to the destructive and pernicious habit of driving fish into kraals. As this goes on at all seasons, and as fish of all sizes are taken, the rivers are being drained of their resources.

HERBARIUM OF FOREST TREES.—A herbarium has been started at headquarters. It is hoped that before long it will contain all the commoner kinds of trees of the Island, so as to be of use to forest officers all over the Island wishing to identify trees in their forests.

A small collection of sample Ceylon timber has also been started. This will probably be useful in order to make Heads of Departments and the outside public acquainted with the numerous and excellent Island timbers as yet practically unknown.

GIRDLING OF TREES PREVIOUS TO FELLING.—The great drawback to using palu for sleepers is said to be that in seasoning it cracks badly. The same timber, or one very closely allied to it that is found in the Andamans, when girdled and allowed to stand for year or so after the tree dies before it is felled, seasons well. Eighty-five palu trees have been girdled in the Central Province, and good results are looked for. White ants will not touch palu.

TENTS.—Two light field tents (double ply, 10 ft. by 8 ft., and weighing only 80 lb.) were ordered from the Cawnpore mills, and handed over to the Assistant Conservators of the Northern and Eastern Provinces for trial. Their cost landed in Ceylon was R212·39. Should they prove suitable others might be ordered from the same source, if they cannot be copied in this country.

Details of revenue and expenditure of the department are then given, and in the following paragraph it is shown that it was high time to intervene so as to prevent the annihilation of the celebrated ebony trees of Ceylon:—

That the benefit to the Department amounts to R80,495, or R63,977 more than the preceding year is matter for congratulation, considering that the expenditure has risen from R247,510 in 1888 to R393,962 in 1889 *i.e.*, by R146,452 of which R38,271 is on establishments alone. It has been said in some quarters that in spite of the appointment of a staff of forest officers the revenue as compared with former years has been small, and has been mostly swallowed up by the expenditure on that establishment. The answer to this is evidently that the forests were recklessly worked, as can be seen from the returns of ebony exported, which alone point to an export of over 1,000 tons annually during the years 1880-87, at which rate of cutting there would scarcely remain a tree left by the end of the century.

Col. Clarke states that

There is a great deal of money annually lost to the Crown by not collecting the drift wood in our more important rivers, the Kalu, Kelani, and Mahawel gangas, but I hope that this important duty will receive early attention.

Finally, we quote the conclusion of this very interesting report:—

There is every prospect that at the close of 1890 the Department will show itself self-maintaining, and in 1891 and onward there will be a growing revenue paid into the Treasury. In fairness to Uva, which does not come out well in the table showing benefit or loss to the Department in the respective Provinces, I should mention that it is really entitled to a large share of the outstandings which are put down to the Central Province, these outstandings being mainly due for timber supplied to the Haputale Railway Extension, which runs quite as much through Uva as through the Central Province. Uva has greater difficulties as regards transport than any other Province, and it is rather hard that it should not be able to show one of the few transactions over which it would make a profit at comparatively small outlay.

Ceylon appears to possess many timber trees which have been hitherto considered of secondary value or have been entirely neglected because their qualities had not been properly tested. Col. Clarke seemed determined that this shall no longer be the case; and the zeal with which he has thrown his energies into the task of developing our forest resources is worthy of all praise and justifies the choice of this officer as organizer of a department which promises to be very important and useful.

CHARCOAL OR NO CHARCOAL FOR ORCHIDS.—An interesting discussion is going on in the *Journal des Orchidées* as to the value of wood charcoal in potting Orchids. Count de Moran is an advocate for frequent repotting, and does not lay much stress on the employment of charcoal in the compost. He says very truly that the charcoal of itself contributes no food to the plant, but it certainly aërates the soil, and it is of advantage from its property of retaining gaseous ammonia to the profit of the plant.—*Gardeners' Chronicle*

COCONUT CULTIVATION.

Castor v. Coconut Cake.

A Native gentleman largely interested in coconuts, and who I believe now intends to cultivate his broad acres, recently asked me what I thought was preferable for coconuts—castor or coconut cake. An acknowledged authority on coconut cultivation told him the latter. My opinion, pitted against such an authority, will not go for much: but the analyses of Hughes and other chemists shew that the former is far and away the best cake we have for manurial purposes. Hughes' praise of good white caster cake is unstinted. In the analyses of manurial substances he instituted at the instance of the Planters' Association in 1878, castor cake occupies first place among oil cakes. He says, "Taking white castor cake as represented by analysis for our standard of comparison, and taking 100 as the equivalent of such standard, we have the following comparative relation between the cakes." In the table that follows, white castor is represented by 100 and occupies 1st place, and coconut poonac is represented by 53 and occupies a place only above Domba cake, and comes after China bean, rape, gingelly and other cakes. There are more recent analyses by Hughes, and more recent expressions of his opinion of the high value of it as a manurial agent; but I think the opinion I have quoted ought to satisfy anyone that, for matters of comparison manurially, the two cakes cannot be spoken of in the same breath, more especially as at the present moment their price is nearly the same, while a short time back coconut cake was about half the price of castor cake.

On the subject of frequent disturbance of roots I will not now enter, as I have expressed my opinion fully on the subject elsewhere in a controversy with a very old Planter. All I would say is that to me it seems opposed to reason to place food for a tree to feed on, and when it is being consumed and the requirements of the tree are increased, in consequenc , to lessen the "mouths" of that tree. I was told recently that my opinion is opposed to experience, because when a tree showed signs of distress by the yellowing of its fronds, the remedy suggested was to cut the roots, and that this treatment invariably proved successful. I pointed out in reply that the yellowing of the fronds may have been due to want of drainage in the soil, and that the improvement in the condition of the tree that followed the turning up of the soil was due to its aeration, and not to the roots of the trees having been cut.

The appearance of sickly tees in a plantation at uncertain intervals and surounded by healthy trees is an eyesore. The cause for this is so far a conjecture, for no one can say to a certainty what the resulting plants are from the seed he put down. While in European agriculture the selection of seed is considered as of paramount importance, and this mind you in the cultivation of cereals where the results of carelessness need not extent to beyond one crop, here in the cultivation of a perennial like the coconut, where a property is inherited by two or three generation in succession, the selection of seed is not considered to be of primary importance. Those who do not believe that an unhealthy tree is the result of an unhealthy seed, point triumphantly to the laws of heredity being often set aside by a weakly or stupid father having a strong or clever child. They will not allow that these are the exceptions that go to prove the rule. Besides, a child is the offspring of *two* parents, and very often if it does not inherit the characteristics of either of them, it does those of a member of the family to which they belong even to a few generations back. This is noticeable even in coconuts, All the varieties we have must have resulted from one original stock, as in the case of mankind. In planting coconuts we are not certain that the plants we raise from any particular seed will be true to type. I have on this Estate many trees raised from king coconuts. They bear the red skinned coconut which must have been the immediate progenitor in the first instance of the variety now known as the king coconut. This "harking back" is noticeable likewise amongst lower animals. We have frequently one of a litter of pups of quite a distinct breed to the parents, and when there is no uncertainty as to the sire. Very often the breed to which this pup belongs is not to be found in the neighbourhood. So in horses. There is one driven by a well-known gentleman in Colombo, known as well by his name as by that of the "Ceylon bell-ringer" in which he glories, that had for its sire a small-sized Tat pony, owned by a road overseer, and for its dam an equally small-sized Acheen. The filly resembles an Australian for all the world, and ought to secure first place for a long while amongst country bred ponies. All this, it may be urged, by no means proves that unhealthy trees result from unhealthy seed. It is not intended to.—Local "Examiner."

COTTON SEED AND HULLS.

Gradually the prejudice against the use of cotton seed and hulls as a food for stock and hogs is being overcome, and their value is being appreciated. During the past winter bundreds of heads of cattle were wintered on the hulls alone, which they eat as readily as hay, and with no evil results. Used with cotton-seed meal, in the proportion of one pound of meal to four pounds of hulls, they have been found at the North Carolina Experiment Station to form a profitable feeding ration for steers. We take the following details from a press bulletin issued by Dr. Battle:

"Four steers fed at the N. C. Experiment Station for 84 days, each ate on an average during this time 1,517 lb. hulls and 383 lb. meal, or an average per day of 18 lb. of hulls and 4½ lb. of meal, which is almost exactly in proportion of 1 lb. meal to 4 of hulls. The average gain for each steer was 148lb., and the total cost for food was $6.85 each. The gain in weight and the increased value of the beef over the original cost gave an average profit on the above steers of $9.38 per head in cash. The value of the manure in addition will doubtless pay for all the trouble.',

The roasting of the seed is advised by those who have used them for feeding hogs, and several machines have been introduced for the purpose. The one most commended is like a coffee-roasting mill, but made of fine wire gauze. Into this the seed is placed, and turned slowly over a fire until the lint is destroyed and the seed roasted so that it readily grinds in a mill. Hogs have been fed solely on these roasted seeds, and have made splendid fat animals, with a first-rate quality of meat. With all the facilities afforded by the abundance of cotton seed and hulls, why should the South buy either beef or bacon from the West? It can be produced here cheaper than there, and the freight be entirely saved. It seems almost as though Mr. Atkinson's prediction was yet to come true, that the lint would come to be the least valuable part of the cotton crop.—*Southern Planter.*

"Kew Bulletin."—The current number contains articles on the cultivation of Anotta in West Africa, and on the preservation of grain from Weevils, for which the employment of bisulphide of carbon, 1½lb. to the ton, is recommended. A ball of tow is tied on the end of a stick long enough to be plunged to the middle of the vessel holding the grain. The tow is soaked in the liquid bisulphide, and immediately thrust into the vessel. Naphthaline in powder is recommended for the same purpose, applied by means of a tube or funnel. The naphthaline evaporates, kills the insects, and in no wise injures the grain. Colombian India-rubber comes also under notice. This is said to be the produce of one of the many varieties of Sapium biglandulosum. The tree grows at higher elevations than most of its race, and is in consequence adapted for a cooler climate. The cultivation of Agave rigida in Bahamas is the subject of another note. The fibre is known as Sisal, and the progress of the culture in the Bahamas is described as something marvellous. —*Gardeners' Chronicle.*

CACAO IN TRINIDAD.—Mr. de Lemos has, while away, according to a contemporary, "travelled about a good deal, going, as far west as South America to see a brother who provided him with abundance of sport. He also visited Trinidad and speaks in terms in high praise of the magnificence of the cacao walks there, where cacao trees 100 years old, still bearing heavily and untouched by any disease, are to be seen! Mr. de Lemos also visited the sugar factories in that island and was greatly pleased and interested with all he saw."

MR. HARRINGTON'S INCINERATOR.—Mr. Harrington writes that during the ten days ending 30th June, 19,000 cubic feet (equivalent to 475 tons of refuse was burnt in his incinerator and that the consumption of coal during the ten days was 59 maunds—a trifle over 2 tons. During the three months of July, August and September, the incinerator is to be under official trial; and, to conform to the contract specification, it must burn not less than 2,880 cubic feet (equivalent to 72 tons) of refuse daily. Mr. Harrington writes that he intends to conform to his specification, and that he hopes not to use any coal whatever. The incinerator is now in full operation.—*Indian Engineer*, July, 5th.

TEA AND COFFEE CULTIVATION IN NATIVE STATES.—During the year 1889, there were 27 coffee plantations in the Native State of Travancore and 18 in that of Cochin. The area of the former was 3,917 acres and of the latter 8,452 acres. The approximate yield in Travancore, exclusive of six plantations with an area of 332 acres in Manachel for which particulars have not been furnished, was 376,148 lb. That in Cochin was 533,828 lb. The average yield per acre of mature plants was highest in the Shencotta Taluq (571) of Travancore and the lowest (152) in the Chenganacherry Taluk of the same State. The cost of cultivation per acre ranged between R50 and R100. The coffee cultivated in Shencotta was of the Liberian variety. As regards tea there were 57 plantations in Travancore and two in Cochin, all under black tea, with an average of 16.597 in the former, and 35½ in the latter State. The approximate yield in Travancore, excluding seven plantations measuring 300 acres, was 571,756 lb. and in Cochin 2,048 lb. The highest yield was in Pathanapuram in Travancore, where 788 lb. per acre was obtained, and the lowest 64 lb. per acre in Cochin. The cost of cultivation per acre ranged from R26 to R80, and that of manufacturing tea between 1½ and 6½ annas per lb.—*Madras Times*, July 19th.

FASTIDIOUS COLONISERS.—Chinamen are, says a contemporary, as tenacious as they seem to be capricious in their preference for certain towns. They are strongly attached to San Francisco, and in a less degree to Rangoon and Calcutta. On the other hand, they avoid Madras and every other point on the east coast of India, and are not to be induced to take up their abode in the Nicobars Islands, a fact which Government discovered as the result of a recent experiment. A scheme was formed three or four years ago for converting these useless islands into a thriving Chinese colony, and fifteen Celestials were bribed to leave Penang for one year and start the new settlement. They went, but refused to work, none of their kith flocked after them; and when the year was up, twelve of the fifteen returned immediately to Penang. The other three made a good sum of money by gardening, but at the end of the second year they too packed up their belongings and departed, for reasons which they kept to themselves. Thus the colonising experiment, which cost R3,000, ended in smoke.—*Pioneer*, July 24th. [The capricious preferences of the Celestials are extraordinary. While Batavia, Singapore and Penang swarm with wearers of the pigtail, the sight of one in Colombo is a rare event.—ED. *T. A.*]

SEA-AIR, according to M. Pierre Lesage, has the effect of thickening the leaves of plants and trees. Moreover, plants grown in salted soil produce thicker leaves. There is a notable increase in the number and size of the "palisade cells" in maritime vegetation as compared with that grown inland.—*Globe*.

PLANTING NOTES FROM PEERMAAD.—"Never within the memory of the oldest inhabitant," has there been, at this season of the year, such extraordinarily fine weather as that which we are experiencing; in fact, it is difficult to realize that we are now well into the middle of what we are in the habit of calling the monsoon, but which this year, so far as rain is concerned, bids fair to be conspicuous by its absence. The monsoon, for I suppose we must admit that it *has* broken, came in so gently last month, that it is almost impossible to fix the exact date of its advent, and after giving us a few fairly wet days, though with constant breaks of unusually fine weather, has apparently left us! For the past 4 or 5 days, not a drop of rain has fallen, and instead of the howling winds, thick mists and heavy downpours which are customary during June, July and August, we are having the most lovely and almost cloudless days, cool and pleasant weeks and the most perfect moonlight nights. Whether this total change in the usual order of meteorological arrangements is to be attributed to the unusually wet weather we experienced during what we call our "hot weather" in March, April or May, or to the eclipse, I am not prepared to say. Coffee prospects are, I regret to say, not particularly cheering. In the early part of February we were favoured with fine blossom showers, and great hopes were entertained of a more than average crop, but the high winds and fearful storms that followed, soon dashed them to the ground, and the coming crop will, I fear, turn out lamentably short. As, however, planters up here have, with a few exceptions, gone in heavily for tea, some of the old coffee estates having been entirely, and most of them partially, transformed into flourishing tea gardens, the effects of a short coffee crop will not be so disastrous as it otherwise would have been. Of the 5,000 acres under cultivation in the district, considerably more than half is under tea and it is satisfactory to note that, with the increasing yield of leaf and improved manufacture, and the introduction on some of the largest properties of the latest steam machinery, good prices are being maintained both in London and New York to which latter port some of the largest shipments are made. In the last "Wynaad Notes," reference is made to the visit of a Government Specialist in connection with the disease that has so seriously affected the cinchona—and Mr. Hooper's* interesting report has lately been published. About 20 years ago a large proportion of the cinchona planted in the Government Gardens up here, suffered in a precisely similar manner to that described by your Wynaad correspondents and at the suggestion of the British Resident, the services of the late Mr. W. G. McIvor were placed at the disposal of the Travancore Government. Mr. McIvor came and saw and reported. He was of opinion that both the climate and soil of Peermaad were unsuitable to the profitable cultivation of cinchona, and, if I remember rightly, advised the Travancore Government to abandon the experiment. In the face of such an unfavorable report, it was only natural that private individuals hesitated to embark capital in the enterprise, and no one thought anyhing more about cinchona until about 10 years ago when there was a great rush and thousands of plants were put in all over the district and are now doing well enough, no symptoms of canker having appeared amongst any of the trees planted on private properties. Last season's cardamon crop was very short, but the deficit is expected to be more than made up by the coming crop which, I hear, is to be a bumper. This valuable spice is a monopoly in Travancore, the cultivator only receiving 2-5ths of the market value of the crop.—*Madras Times*, July 10th.

* It was Mr. Lawson, the Government Botanist, not the Analyst who reported on the cinchonas.—ED. *T. A.*

Enemies of the Cotton Plant.—The Hon. W. W. Mitchell writes:—"I enclose papers I have received from the U. S. Consul showing that arsenite of ammonia is a remedy for attacks of enemies to the cotton plant, and if you can publish it for general information, it might be a great boon. We shall give the full details in the *Tropical Agriculturist*. Meantime, can the remedy be bought locally at a cheap rate?

The plant, known as the "Planters' curse" in Coorg, is spreading fast in Bangalore, and has taken possession of all waste places. The fruits are like currants in appearance and are greedily eaten by birds which convey the seeds all over the place. When well trimmed, the Lantana makes neat hedges, the flowers being of every possible hue and looking quite gay. Just now, the Conservancy Department is engaged in a crusade against this shrub; and it is being cut down and burnt on every side.—*Indian Agriculturist*, Aug. 2nd.

Artificial Coffee is now manufactured to an alarming extent, the spurious article consisting of the roasted meal of different cereals, worked up with dextrin. Two factories exist at Cologne which undertake to furnish the requisite machinery and plant, with directions for making the false coffee beans, for £180. The apparatus supplied by these wholesale swindlers is capable of turning out more than half a ton daily, at a cost of about £1 per cwt. good coffee beans being nearly five times this value in the market. The fictitious coffee is difficult of detection by ordinary examination, especially when a proportion of genuine coffee has been mixed with the artificial.—*Madras Mail*, Aug. 15th.

Mysore Coffee Planter's Grievances.—The agitation of the coffee planters in Mysore is at last likely to bear fruit. It will be remembered that the planters complained year after year that the working of the Breach of Contract Act was very defective and involved them in much loss. The Mysore Durbar have now partially redressed this long-standing grievance. It has been laid down that all *maestries* who take advances from the coffee planters and, in consideration of these, undertake to provide them with *coolies*, should register their names in the taluq cutchery and no one will be allowed to pursue the trade of a *maestrie* unless so registered. The effect of this ruling will be that the planters will be saved from the trouble of instituting inquiries in each case as to the antecedents of *maestries* who volunteered to provide coolies, and erring *maestries* can also be easily called to account in case of default.—*Cor.*, *Madras Times*, July 3.

Planting in Eastern Africa.—An upcountry correspondent criticizing the article from the London *Times* in the *Household Register* on "The Geography of the Anglo-German Agreement," says in reference to the country described as fit for rich tea plantations, "How silly not to state what the latitude of Uganda and Unyora is: if you can, let your readers have it." The country referred as 5,000 to 6,000 feet elevation decreasing towards the north is all within 10 degrees north of the Equator. The line of Equator passes through the Victoria Nyanza, a good deal north of the German territory which may be said to run from 1 degree to 11 degrees South Latitude where it borders with the Portuguese territory and on the south-west with the British again. On the coast and up to the Victoria Nyanza, the British Northern territory runs down to 4 degrees south of the Equator, but the fine country spoken of around and north of the lake, begins at the Equator and runs northward for five and ten degrees of latitude. Coffee and tea plantations will no doubt be opened, but slowly, and labour and transport will handicap pioneering work for a good many years to come.

Cassia Lignea in the United States.—In a review of the spice trade in the American *Drug Reporter* of 17th June we find it stated that Cinnamon compares well with last year, but the current rates remain extremely low, and chips exhibits no changes of importance. Cassia lignea is exceedingly cheap at 21s 6d to 22s per cwt. for good quality, and, notwithstanding a great falling off in the importations, the stock retains a comparative excess of 47,000 pgks. Cassia lignea at 2½d per lb. must be a formidable competitor with even cinnamon chips.

"Tea" in France.—"Claudius Clear" writes to the *British Weekly*:—Speaking of French conservatism, it is still rash, save in a very few places, to order tea. The traveller should provide himself with the necessary facilities—it is a simple process enough. The French, it seems, use tea as a medicine, and cherish the sound belief that all medicines should be nasty. I am inclined to doubt, however, whether they actually prepare it from the following recipé. Pour two quarts of tepid water on half a handful of chopped hay, add a soupçon of tallow, and one black currant.

The Tea Enterprise in Mauritius.—The following extract from the proceedings of the "Council of Government" shows that the Mauritians although on tea culture bent, have frugal minds as to expenditure:—

Employment of a Tea Curer for Experimental Farm.—The Committee recommend that, as suggested by the Experimental Plantation Committee, Mr. Corson be employed till the end of the year on a salary of R100 per mensem with a lodging allowance of R25 per mensem, provided that the appliances now in the possession of the Experimental Farm Committee permit of his services being at once utilized, so as to thoroughly carry out the experiment which it is proposed to make. Should, however, it be necessary to obtain machinery and erect buildings for the purpose, the Committee are of opinion that the expenditure above referred to should not be incurred until an estimate of the probable cost of such machinery and buildings has been submitted for the consideration of the Council.—Adopted.—*M. and P. Gazette.*

The "Unfounded" Charge of Ceylon Teas Not Keeping is thus disposed of in the London letter of the *Indian Planters' Gazette*:—

It is a curious and significant feature of a good market, that when Ceylons are up, one never hears a word as to Ceylon Teas not keeping. On the other hand, directly the market goes down, the old complaint is heard once more. Chaffing a friendly broker about this the other day, he frankly admitted that the complaint is unfounded, and that it was merely an echo of the disappointment felt by holders of fallen Teas. He illustrated this by saying, that, on opening Pekoes bought for 9d last January, now worth 11d, the purchasers can hardly believe their eyes. "Those Teas bought for 9d impossible! What a magnificent show of tip, &c., &c., &o.," and beauties are discovered in those Teas today, now worth 11d, which quite escaped notice when it was a question whether 9d was not rather too dear a price to have paid for them. The January eye was that of the *purchaser* on a *poor* market, the July eye is that of the *seller* on a *good* market—that makes all the difference; Beauty being in the eye of the beholder. Had the case been reversed, and had those Teas cost 11d and been now worth 9d, the Beauty would have been masked, and the keeping quality of Ceylon Teas would have again been in question. It is only human nature to bestow the blame of one's *faux pas* upon somebody or something else than one's self—if a scapegoat is conveniently handy. So much for the outcry against the tendency to "go off" in Ceylon Teas—we used to hear a good deal to the same effect about Indians once upon a time, when teas were tumbling by 4d and 6d per lb. If the complaint has no more substantial foundation than this, it is safe to suppose that it will be lived down—as Chinas die out more and more.

This confirms the opinion we have always held that "the buyer says it is naught."

TEA-DRINKING sometimes causes indigestion, which, it is said, may be obviated by tying the tea in a cambric handkerchief, before placing it in the pot. The handkerchief absorbs the steam.—*Madras Times.*

THE Belgian Legation at Mexico has reported to the Belgian Government on the guimbobo or angu, a textile plant found in the State of Vera Cruz. The fibre is of a very superior quality, while the plant is easily cultivated, and yields a nutritious fruit. Unlike ramie, cotton, or hemp, the fibre is within the bark, which can be removed by a simple machine. Its lustre is like that of silk, it is strong and fine, and of a creamy white colour.—*Globe.*

A munificent sum of from three to five million dollars has been left by Mr. H. Shaw to endow the Botanic Garden and School of Botany in St. Louis, Missouri, U. S. The trustees propose to improve the gardens, house and the herbarium of Dr. Engelmann in a fire-proof building, establish a botanical museum, and further botanical research. To aid in the latter purpose, travelling scholarships have been established.—*Globe.*

A wonderful revolution in flour-barrel-making is promised by a patent which has been granted for the making of barrels out of cotton-duck instead of wood. The new material is impervious to water and resists fire for a long time. It weighs to the barrel about fifteen pounds less than the wood and can be manufactured 10 per cent. cheaper. The cotton-duck barrel can be rolled up into small space and returned to the mills for frequent use. The flour merchants of Atlanta, Ga, pronounce it a success.—*American Grocer.*

A German engineer, Busse, of Linden, Hanover, was granted a patent some time ago for what he terms caoutchouc pavement. Within the past year it has been used for a bridge roadway at Hanover, with good results, and is now being laid down in one of the streets for a length of nearly a mile. Experiments are being made with it also in several streets of Berlin and Hamburg. According to the *Wochenschrift des österr. Ingenieur und Architekten-Vereines*, the new pavement gives rise to no noise from passing vehicles, and at the same time appears to be as hard as stone and is not affected by either heat or cold.—*Engineering Record.*

"TIMBERS, AND HOW TO KNOW THEM."—Dr, William Somerville, the newly-appointed lecturer on Forestry in the University of Edinburgh, has translated from the German the third edition of Dr. Hartig's work under the above title. It forms a small treatise of some eighty pages, with numerous illustrations. It is needless to say the book is good of its kind, and likely to be useful to beginners, especially if used as a guide-book and aid to the study of the woods themselves; but it is to be hoped that Dr. Somerville may be induced to extend it in a future edition by an introductory chapter relating to the formation and growth of wood in general, and the circumstances which favour or hinder those processes. Much might advantageously be added to the details relating to particular kinds of timber, such as the rate of growth under different conditions, the capacity for resistance, the specific gravity, &c. Dr. Hartig has a well-earned reputation as a botanist, but he hardly acted up to it when he suffered such a statement as this to pass:—"The 'Rose-wood' of commerce is got from various, especially Asiatic, species of trees!" Fig. 16, on p. 52, is said to refer to Platanus occidentalis, and it may be rightly, but we should have liked some assurance that the tree intended is not P. orientalis, which seems, on the whole more probable. The statement that the wood of the Austrian Pine (P. Laricio var. austriaca) cannot be distinguished from resinous wood of the Scots Pine is one that, had it been made by anyone else but Professor Hartig, we should have ventured to question. At any rate, the timber of the true Corsican P. Laricio seems different from that of the Scots Pine. Dr. Hartig's is a good book for beginners, but we have more than one English botanist who could have produced a more satisfactory one.—*Gardeners' Chronicle.*

MR. OSWALD has a paper in the *National Review* on Anti-Poverty Receipts, in which he argues in favour of substituting nuts for wheat as the diet of mankind. The Corsican chestnut will provide more food on waste land than anything else that can be grown by man.

TROPICAL PRODUCTS IN QUEENSLAND, NATAL, &c.—With reference to the inquiries of your correspondent "N. Z.," I know of several planters who, nearly ruined through the coffee-leaf disease, emigrated from Ceylon to Queensland in the hope of retrieving their fortunes, but they found the labour supply too deficient and expensive for practical purposes, although coffee appeared to thrive fairly well. I also know a gentleman, an experienced tea planter from Assam, and son of a well-known clergyman in Aberdeen, who started tea culture in Natal, but gave it up as he found it did not pay; he told me the rainfall seldom exceeded 40 inches per annum. In the best Indian tea districts the rainfall varies from 120 to over 300 inches per annum. Apart from the labour question, your correspondents would find New Zealand too cool for the profitable culture of the products he mentions. The labour question is a very serious one, as he would have to compete with the Ceylon and Indian coolies, who barely earn sixpence per day. Cinchona has had its day for the present, and there are thousands of acres of mature trees in South India waiting to be cut whenever the market shows a favourable opportunity, which is not likely at present with sulphate of quinine at 1s 6d and 2s per ounce. The *Tropical Agriculturist*, published in Ceylon, is by far the most reliable work on all matters connected with tropical planting. I have seen it advertised in your columns occasionally, notably on the back of the current year's Almanac. If "N. Z." is a novice in tropical planting, as he appears to be, I shall be happy to forward him full details on tea, coffee, and cinchona planting. *S. S.* —*Gardener's Chroniele*, Aug. 9th.

PLANTS FOR OVERCOMING DRIFTING SAND.—A correspondent, whose letter we inserted yesterday, writing on "Tree planting in Ganjam" stated that an excellent work in the matter of planting was being carried out by the Local Fund Board of Ganjam under the supervision of the Overseer of Chicacole. "Upwards of fifty acres of casuarina have been planted on the drifting sands of the Vamsadhara near Maripam. The wind has forced the sand into dunes, and it is constantly invading the high road, in fact near the river the road is completely obliterated. The planting has been carefully done; each individual plant is manured and those on the steep sides of the dunes are turfed round. . . . If the plantation succeed they will amply serve their purpose and not only protect the road but the fields behind them and the canal distributories." Another way of overcoming the effects of drifting sand would be by planting lupins, which have been proved most effective for the purpose. In Australia drift-sand is often very destructive to farms and pastures near the borders of rivers, and many thousands of acres have been rendered useless by the driving showers of grit which assail and cut all kinds of vegetation. Mr. Bundey, of East Wellington, writing to the Commissioner of Crown Lands last October, said that he had sown lupins with this view for fourteen years, and in no case had he to sow the land a second time. He had reclaimed 100 acres of the worst sand drive on the river by sowing lupins—the only plant that will stand the fearful cutting of the drift-sand. When grass begins to grow between the plants he lets the seeds fall naturally upon the land, and the result is that after the second year sheep can be put upon the pastures.—*Madras Mail*, Aug. 15th.

SUGGESTIONS AFFECTING THE PRESERVATION OF TIMBER POSTS FOR TELEGRAPH WIRES AND OTHER PURPOSES.

A correspondent writes us that it has only been within the last few years that he has observed means to be taken for roofing in, so to speak, the tops of telegraph posts; but that he noticed recently that it is now the practice at home always in some way or other to neutralize the effect of sun and rain upon such exposed transverse surfaces. According to our own recollection of the telegraph posts which carry the wires of electric communication along the less-frequented routes in this island, protection having such an object has always been ignored. The presumption possibly may be that, having regard to the relative rapidity with which the portions of such posts inserted in the ground decay, this matter of sheltering their tops is of comparatively little consequence. As to the justness of such a presumption, we cannot pretend to decide; but as we know that efforts have been made—and with a great degree of success—to lengthen the duration of life of our telegraph posts in-so-far as that is dependent upon the preservation of the part below ground, it might not be unworth the while of the officers of our Telegraph Department to consider some method of protection to their tops.

Whether, however, that department may be content to ignore this suggestion or not, it is certainly the fact that the question of timber protection may be usefully considered by our planters and all other users of timber. For, given a soil which in a greater or lesser degree preserves timber placed in it—and many such soils there are known to be—the life of timber posts exposed to weather might be greatly prolonged beyond what is now normal to them. We can recall very many instances of employment in which our suggestions might prove to be of exceeding use. The top of a post of course lays bare both to moisture and excessive sun heat (both conditions tending largely to hasten decay) the constricted vessels formerly containing sap which have been exposed by the transverse cut. It is well known to engineers and architects that the more the natural taper that is preserved to a pole, the longer will it remain sound. We have seen endeavours made to imitate this natural taper by cutting an artificial point. This is of course an absurd method; for it necessarily lays bare a larger area of cross cut vessels than would a merely flat top, and such cuttings expose further a large conical section of the vessels to which we have referred as being formerly sap-holders, while the area offered to perpendicular rainfall is precisely the same as if a flat top surface had been left.

There have been various methods adopted at home for protecting from the effects of weather the tops of posts. In the instance of square posts, two small boards mitred and nailed together will afford a sufficient roofing, and these are to be observed constantly fitted in the case of dressed signal posts. But for round posts, such as are the majority of those used for the support of telegraph wires, these miniature roofs will not do, and on most cross country lines in England a metal cap with a finial is fitted. We shall, however, have fulfilled our present object if we direct the attention of those who may use timber posts for fences or other purposes to the importance of giving protection to the tops of such timbers. Thought for the portion below ground only is not economical. In very many cases posts are found to be decaying downwards, while below ground they are as sound as when first put in. Indeed, as we have said, many soils are known—and clay among these very prominently—to have a directly preservative effect upon timber, and in such cases it may be regarded as almost certain that a post will become useless from downward decay long before it has to be drawn owing to that due to the soil it has been placed in. It certainly is not a common thing to see any precaution of the nature we would recommend adopted here, and we believe many among our readers might profitably give heed to our suggestion.

THE ANTISEPTIC QUALITIES OF COFFEE.

It has for a long time been thought that ground coffee possessed antiseptic or disinfectant properties. During some experiments upon the food value of coffee recently undertaken by Lüdevitz, which were reported in *Pharmaceutische Centralblatt*, the chemist found that bacteria were retarded in their development in nutritive gelatine by relatively small quantities of an aqueous infusion of coffee. Bacteria, as doubtless everyone knows, play an important part in the phenomena of putrefaction. The caffeine contained in the coffee appeared to be the ingredient which is thus specially active in retarding bacterial growth; but on making experiments with pure caffeine upon infusions containing various species of bacterium, it was observed that its action was quite inconsiderable. It is rather to the empyreumatic substances formed during the roasting of the coffee-berries that the anti-bacterial action of ground coffee must be attributed. In connection with these results we may recall a fact which has long been known, namely, that when fresh raw meat is dusted over with ground coffee it can be dried without the least sign of becoming putrid.—*Grocer.*

THE COCKCHAFER.

Great injury is done to the roots of plants of all kinds by the grub or larva of the cockchafer, one of the largest of beetles, the noisy flight of which may now be heard in the twilight. The grub, says a contemporary, spends several years in the soil, and, as it is a voracious feeder, it is frequently the unseen cause of much damage to crops, its ravages being nowhere more apparent than in young plantations of forest tree. In the extensive forest areas near Cracow in Poland, the mischief had progressed to such an extent that the maintenance of nurseries was found to be impossible, the grubs invariably destroying the seedlings. Dr. Laszezynski now reports, however, that the lupin has proved itself of great value as an insectifuge plant. Last year, after the usual planting of seeds of forest trees, one part of the area was sown with seeds of the yellow lupin and the young forest trees upon this portion were untouched by the grubs of the cockchafer, whilst on the rest of the area the seedlings were, as usual, destroyed. It would be desirable to test amongst field crops the value of a remedy which has proved so efficacious in the case of forest seedlings, and it is suggested that beetroot and other field crops which suffer from this pest might be protected by the sowing of yellow lupin seed.—*South of India Observer.*

[Many long years ago Liebig advised the coffee planters of Ceylon to grow lupin as a green crop amidst their coffee trees, to be turned into the soil as manure. Had the planters heeded the advice it seems probable they would not have suffered as they did from grubs. Lupins as insecticides could well be grown on our upland patanas.—Ed. *T. A.*]

PROGRESS OF TEA CONSUMPTION IN BRITAIN:

RISE AND PROGRESS OF BRITISH-GROWN TEA AND DECADENCE OF THE CHINA TRADE.

Messrs. Gow, Wilson & Stanton have prepared one of those periodical reviews of the tea trade illustrated by coloured and graduated diagrams which convey distinct and vivid impressions regarding the progress of tea consumption and the progress or decadence of the supplies received from different sources. This document will be circulated to our subscribers with an early issue, and meantime we proceed to notice some of the more salient facts in the advance copy with which we have been favoured. On the first page there are nine circular diagrams showing the advance in the home consumption of tea during nine quinquennial periods between 1849 and 1889. The size of the last circle of the series is considerably more than three times the size of the first, the increase having been from 50 millions of lb., all China, in 1849, to 185½ millions, mainly British-grown, in 1889. For the first three quinquenniums only China was consumed, the figures rising in the period ended 1859 to 76½ millions. In the 1864 period commenced the competion of Indian tea, but China continued to advance until it attained its maximum in the 1879 period with 126¼ millions of lb. Then commenced the "down grade" process, to 110¾ millions in 1879 and only 61 millions (the figure previously attained in 1854) in 1879. The red colour inside the circle indicating Indian tea continued to enlarge until from 2,800,000 lb. in 1864 the figures rose to 96 millions in 1889. Ceylon was late in the field; but its progress from a small yellow spot, indicating 1½ million of pounds in the 1884 period, was phenomenal: the yellow having enlarged to a proportion of 28½ millions in 1889. Up to the end of 1859 only China tea was consumed in Britain, and of that only 76½ millions. In 1864 the consumption rose to 88½ millions, of which 2,800,000 was Indian. In 1889 the figures for home consumption in Britain were:—

China	... ...	61,100,000 lb.
Indian	.. ...	96,028,491 ,,
Ceylon	... ...	28,500,000 ,,
Total	...	185,628,491 lb.

Together it will be seen that Indian and Ceylon tea made up 124,528,491 lb. British-grown against 61,100,000 China,—or more than twice the quantity of the famous product of Cathay which once monopolized the market. So compete a revolution and in so short a period has seldom occurred in the trade in any great article of consumption and the progress of supersession has by no means reached its final limits.

The compiler of the paper remarks:—

In 1889 the quantity of China Tea used in Great Britain was *less* than the Home Consumption in 1854—35 years previously.

In 1889 the quantity of British Grown Tea used was *more than double* the entire Home Consumption in the same year, 1854.

In 1889 the quantity of British Grown Tea used was in excess of the entire Home Consumption in 1871—18 years previously.

In the first six months of 1890, the consumption of China tea was only 28,686,000 lb. against 31,418,000 in the corresponding period of 1889 or 30 lb. percentage per head of the population instead of 35, or from above one-third of the whole to considerably below that proportion. In the case of Indian the rise was from 46½ millions to 51½ or from a percentage per head of 51 to 54. The progress of Ceylon was from 13,066,000 to 14,583,000 lb., or from 14 percentage per head to 16. To quote again:—

The figures below the Diagram show that the Tea consumption has nearly quadrupled during a period of forty years—since 1849.

In the ten years ending— lb.
1859 the Consumption had increased about 26 million.
1869 do do further increased about ... 36 do.
1879 do do do do 49 do.
1889 do do do do 25 do.

The quantity used annually per head of population had increased as follows:—

1849.	1859.	1869.	1879.	1889.
lb.	lb.	lb.	lb.	lb.
1·81	2.67	3·63	4·68	4·91

The increase in the actual weight of Tea used during the *last* ten years, was small when compared with the preceding periods. This may probably be in a great measure accounted for by the large proportion of Indian and Ceylon Teas used in the *latest* period. These Teas being so much stronger than China Tea, a greater number of cups can be prepared from the same weight of Tea—thus rendering British Grown Teas far more economical than China. It therefore, seems not improbable that a further expansion may take place in the Home Consumption as the *displaceable* quantity of China Tea becomes gradually less.

Reduction of Duty.—On the 1st May, the Tea Duty was reduced from *sixpence* to *fourpence* per lb.

The last time an alteration in the Duty occurred was on the 1st June, 1865, when it was reduced from one shilling per lb., to sixpence per lb, a reduction from 1s 6d per lb. having been made during 1863.

Although a reduction from 6d to 4d, at a time when the price of Tea is so slow as to bring it within easy reach of almost every class of the community, is not a parallel case to a reduction in the Tax from 1s to 6d per lb., at a period when the price of Tea was double its present figure; it may nevertheless be of irterest to compare the average consumption during the five years just preceding 1865 with that of the five years immediately following, viz:—

	Average Annual Consumption 1860-1864.	Average Annual Consumption 1866-1870.
	lb.	lb.
	81,464,027	109,883,329
Per head of population...	lb. 2·79	lb. 3·61

It may he mentioned that the average Consumption per head of population, has remained almost stationary during the last seven years—probably for the reasons given under the previous heading.

It is too early yet to judge of the effect of the reduction just made in the Duty, and it may be a mere coincidence that the Home Consumption during the last six months should show au unusually large advance—the whole of which is made up of clearances since the 1st May.

The immediate effect of the alteration in the Duty was to produce a strong demand for the lower grades of Indian and Ceylon Teas, and even a temporary but very transient demand for low priced China Tea. This demand was doubtless caused to meet an expected enquiry from the public for cheaper Teas.

This arrestment of the rate of progress, although undoubtedly due to the superiority of the British-grown teas, is a serious matter for India and Ceylon, which are so rapidly increasing their output of tea, and no effort should be wanting to open up new markets. It is satisfactory to learn, as we do further on, that the progress already made is promising. A diagram shows that medium Indian pekoe went down in price from 1s 6d per lb. in 1880 and 1881 to 9¼d and 10½d in 1890; the downward course of pekoe souchong in the same period having been from 1s 3d to 8¼d and 9d per lb. In view of a stationary consumption in Britain and lowered prices, our readers interested in tea (the great majority) will eagerly scan the

figures for exports from Britain, which are, of course, additional to exports direct from India and Ceylon to markets other than that of Britain. Here are the figures for the first half of 1890, which we trust may expand ten-twenty-thirty-fold before the expiry of the decade on which we have entered:—

Export.—Since the 1st January, the exports from Great Britain of Indian and Ceylon Teas have been shown separately from those of China Tea in the official figures. It is satisfactory to know that

lb. lb.

1,443,994 of Indian Tea, and 651,968 of Ceylon Tea were exported from Great Britain during the six months ending 30th June.

These exports were distributed as follows:—

	Indian. lb.	Ceylon. lb.
United States of America ...	423,776	189,636
Canada	235,595	96,203
Turkey	256,634	3,121
Holland	173,414	85,234
*Germany	47,391	121,842
Russia	15,664	6,943
France	22,172	9,040
Other places	269,348	139,949
	1,443,994	651,968

*Probably part of the Tea exported to Germany was for Russia.

On these figures the compiler makes remarks, some of which we quote:—

United States of America and Canada.—The exports to these countries are highly encouraging. Perhaps of all export markets, these two are the most promising. It is now beyond question that Indian and Ceylon Teas have at least taken firm root in these countries, and that the development of an important and increasing trade is merely a question of time. Wholesale houses in the large Tea drinking centres are keenly alive to the change which has of late been taking place in the public taste—and are already learning that it is to their interest to foster a trade which they see is an increasing one.

Both the Associated Tea Planters, Limited, and the Ceylon Planters' American Tea Co., Limited, are doing a good work respectively for Indian and Ceylon Tea. They are both working on somewhat similar lines in so far as, in addition to a wholesale business, they have each opened retail depôts in New York. They are doing their utmost to bring their respective Teas under the immediate notice of the consumers. As prospects open, their retail depôts will probably be extended to other towns, and their means of spreading information concerning Indian and Ceylon Tea be proportionately increased.

Other agencies of various kinds are also at work and there are strong grounds for believing that both these important markets will before long become extensive buyers of British Grown Tea.

Then follow references to South America and South Africa, about which we are not so sanguine as the writer. The races of Latin origin, and especially those with a large admixture of Indian blood, seem incapable of settling down to peaceful government and commerce, and it is surely discouraging that the recent outbreaks of revolution and war should have followed so quickly on the grand pan-republican demonstration in the United States. For South Africa, Natal *could* grow tea, but the crusade against Indian labour may prevent the development of the enterprise. We turn with far brighter hope to the as yet youthful British colonies of the south. The compiler of the review writes:—

Our Australian Colonies already draw considerable supplies from India and Ceylon and will no doubt continue to increase the proportion of these Teas used. The exports of Indian Tea from Calcutta to Australia and New Zealand, from 1st May, 1889, to 30th April 1890, in the past three seasons were as follows:—

1887-8.	1888-9.	1889-90.
lb.	lb.	lb.
2,408,019	2,869,184	3,595,712

It may also be mentioned that the direct exports of Ceylon Tea to these places for the past six months were nearly 1,000,000 lb.

The Paris Exhibition and the markets of Russia and Constantinople are referred to. But Russia will shut out British tea if she can, and we see little ground for expecting that the effete coffee-drinking Turks will ever become good customers for tea. But who can say? The consumption of tea in Britain itself was only 1·81 lb per head of the population in 1849, while now it verges on 5 lb, the figure for 1889 having been 4·91. Of the various foreign countries and British Colonies mentioned the compiler says:—

All these openings, insignificant though some of them may appear, form an important total in the aggregate and may eventually prove of *inestimable* value to the continually increasing production which is taking place both in Indian and in Ceylon.

The progress of Travancore as a tea-producer is specially noticed. There are 4,700 acres in cultivation, and the exports have risen from 3,577 lb. in 1882-3 to 678,363 in 1888-9. It is stated that Some forty different estates were represented in the London auctions last season, comprising a total of over 9,000 packages. In this district, Tea can be produced of good quality, well suited for self drinking, as also for blending purposes.

Of course every case of this kind reported constitutes an additional reason for the most active and persistent efforts to cultivate new markets for tea. There is a diagram showing the monthly average Home Consumption of China, Indian and Ceylon tea, during 26 years. From this we learn that China commenced in 1864 with 7½ millions of pounds per month, rose to 10½ millions in 1879, and sank to 5 in 1889. India, which began with about ¼ million in 1864, has gone on steadily and rapidly rising to 8 millions in 1889. The progress of Ceylon has been still more rapid from a few hundreds of thousands in 1884 to 2½ in 1889. The percentage of Indian tea to the whole consumption rose from 3 per cent in 1864 to 52 per cent in 1889; while the rise in the percentage of Ceylon has been from 1 in 1884 to 15 in 1889. The percentages of India and Ceylon together make up 67 per cent of British-grown tea consumed in Britain last year.

The details we have thus noticed and quoted are very interesting and in many respects important. With the progress of population, wealth and temperance, we have every right to expect a corresponding increase in the demand for the wholesome and fine quality tea we produce; and in this case we have the satisfaction of feeling that what subserves our interests as producers is entirely beneficial to the consumers.

OLD BONES IN BENGAL.

The Government of India, in their No. 67—12-1, A, dated the 4th October 1889, have invited the attention of Local Governments to the increasing exportation of bones from India, and asked the Provincial Department of Land Records and Agriculture to embody remarks on the use of, and trade in, bones in their annual reports. The following is the information which has been gathered on the subject:—

(1) Source and Use of Bones.—Within the last few years the collecton of bones from village wastes, for exportation to Calcutta, has become the re-

gular profession of a low caste of Hindus—Chamars—in the central and western districts of Bengal proper, and is gradually extending to the outer parts of Bengal, in proportion to the increasing demand of the Calcutta mills, and the extension of railway communication. Heaps of raw bones collected for transport to Calcutta may now be seen along the railway and principal river routes of Bengal. Bones are also collected by the indigo-planters of Behar for use in their indigo land. Many of them have erected mills for grinding them to dust. In Lohardugga many tea-planters make their own bone-meal, and use it as a manure for tea-plants. The bones are collected locally, and coarsely ground by the *dhenki*. The fragments are not so fine as are turned out by the mill, nor are they required to be very fine for a slow-growing perennial like tea. The bones brought into Calcutta are bought up for manufacture into bone-meal. There are four or five bone-grinding mills at the present time in and near Calcutta. With the exception of a comparatively small quantity of bone-meal sent out to tea-gardens, the whole of the output of the mills is destined for export.

(2) PRICE OF BONE-MEALS IN CALCUTTA.—The price of bone-meal ranges from R2 to R2-8 per maund. There are several sorts (about 10 in number) distinguished according to degrees of fineness and purity, the best of which resembles *satu* or parched barley meal, both in fineness and colour.

(3) MEANS OF PRODUCING BONE-MEAL CHEAPER IN BENGAL.—Raw bones as they come from the Chamars may be bought in the mofussil at eight annas per maund or less. In the tea-gardens in and near Ranchi they are delivered by the collectors at the rate of five annas a maund. At Dumraon in Shahabad bones have been collected at a cost of four annas a maund, and at Julpigoree Mr. Donald Sunder, Settlement Officer of the Western Dooars, has arranged with Chamars to have bones delivered at the jail at a price not exceeding six annas a maund.

A comparative trial was made in the Seebpore farm as to the relative merits, in grinding bones to dust, of the *dhenki* and an English-made bone-mill supplied to the department by Messrs. T. E. Tomson & Company. The results were that it cost two annas a maund less to prepare bone-meal with the *dhenki* than with the mill. Under the circumstances the *dhenki* can be safely recommended as a cheap and effective means of crushing bones. If ryots ever take to the use of bone-meal for manure, they will not have recourse to complicated machinery, but will use the *dhenki* in very much the same way that they grind wheaten and barley flour themselves, rather than buy the machine-made article.

(4) EXPERIMENTS IN BONE-MEAL THROUGH RYOTS.—Numerous experiments to test the efficienoy of bone-meal as a manure for paddy have been made in Burdwan and Hooghly. It is not always possible to show the results of the experiments in bone-meal in the form of a statement comparing the outturn of plots manured with it, with that of unmanured plots, for these reasons—(1) that in most of the experiments bone-meal was mixed with saltpetre, hide-salt, &c., so that it cannot be ascertained how much of the increased yield was due to each of these manures; and (2) that the experiments made by ryots are devoid of precision and cannot be thoroughly relied upon. The best guide to the value of this manure would be the evidence of the ryots who have tried it. In the Annual Report for 1886 87 mention was made of the steadily increasing demand for bone-meal in villages where it had been used in the preceding year. The results of the ryots' experiments in this year were also encouraging, as the figures given in the Appendix H. show. They give an average increase of 570 lb. of paddy per acre obtained by manuring with 240 lb. of bone-meal. The money-value of the increase in a year of ordinary prices may be taken as R9-8, while the price of 240 lb. of bone-meal applied is only R6 at its present high price in Calcutta. Experiments made with bone-meal on paddy, did not succeed in 1887-88 owing to great deficiency of rainfall; and in the following year (1888-89) they totally failed on account of floods, but the ryots who made the experiments appear to be very much interested. Last year an application was received from a single person for fifty maunds of bone-meal, which was supplied and paid for by the applicant. Inquiries were made in some of the villages in which bone-meal had been distributed in previous years. The testimony of the ryots and farmers was, according to Mr. Basu, nearly uniformly to the effect—

(1)—That bone-meal is quite as good as manure for paddy, potatoes and sugarcane (the chief crops of the village) as oilcake.

(2)—But that its effect does not last for more than a year, and according to some, a field manured with bone-meal will yield heavily in the first year only.

(3)—That better results were obtained in sandy than in clayey soils.

In Hooghly and Burdwan oilcakes (castor-cake in particular) are now being very largely used as manures not only for sugarcane, potatoes and various vegetable crops, but also for paddy, the chief staple of these districts. Although bone-meal is acknowledged to be a good manure, oilcake is believed to be superior to it in many respects. Besides that it is much cheaper than bone-meal, it is open to no objection on the ground of caste feeling. Until, therefore, bone-meal can be offered at cheaper rates than oilcake, there is no hope of its general adoption in native agriculture.—*Pioneer*, Aug. 18th.

INDIA'S POVERTY AND HOW IT CAN BE REMEDIED.

Here is the truth, plainly spoken:—

A correspondent writes to the *Madras Times*,—the poverty of India is becoming proverbial. In order to mitigate this rising poverty of India, there is a loud demand for technical institutions, in order to revive the old industries of this great empire which are now on the decay, and to encourage the arts *in esse* and *in posse*. The Good British Government, which has already conferred several priceless boons on India, is also opening technical institution for the amelioration of the poverty-stricksn classes. India is thought to be the poorest country in the world. When a careful examination is made as to her real position, one is constrained to say that it is the richest in the world; but the apathy of the natives, in commercial enterprises and in agricultural pursuits, has rendered this Empire the poorest in the world. Let us therefore briefly examine the causes which underlie this poverty. There are many men here who have amassed a good deal of wealth in different walks of life. The wealth so accumulated by them is, as a general rule, spent in ways which are of very little benefit to the country. Some of these wealthy people spend a mint of money in taking long pilgrimages, in erecting costly temples, in performing the marriages of their infant sons and daughters, some in preparing costly jewels, and some in immoral ways; besides these there is another set of superstitious people who keep the money in their iron safes and actually worship it; if the money that is spent in all these ways is laid out in such commercial enterprises as opening of Banks, the opening of spinning and weaving companies, and other mechanical and engineering works, how useful and beneficial would these be in reducing the poverty of India. The mineral resources of this fertile land are great. It boasts of gold, iron and coal fields and several

other mineral products. If all the wealthy classes who say that India is becoming poorer day by day would lay out their money in opening companies for working the gold, iron and coal mines, for how many people would such undertakings provide a living? The natives who accumulate wealth either by hook or crook are natnrally reinctant to lay out any portion of it in any usefnl undertaking, but their sole aim is to save money somehow or other, and yet we find such men sitting in their hungalows and storied houses saying that India is getting poorer.

The natives, through this apathy for snch enterprises, have left this fertile soil in the hands of foreigners, who have formed themselves into many companies, and opened railways, gold mining companies, cotton mills, paper mills, and several other engineering and mechanical works, which give the working classes not only a living, but also leave a sufficient margin of profit and interest on the outlay. If the natives were to open snch institntions, it would not only be a very great boon, but thoy wonld also retain the wealth of the land in their own hands; but nnder the present state of things, the wealth of India finds its way into the hauds of foreigners. The natives, who hoard up wealth withont making any use of it, are clamouring for technical institutions. No donht such institutions would he of immense good to the people in giving them technical education; but those who have received such education would even then have to depend upon the English merchants and companies for their livelihood; agriculture is the backbone of India, but still we see that such an important source of industry is greatly neglected. When nature withholds its gifts, in sufficient abundance, tbe poor ryot is obliged to starve. If the well-to-do people assist the ryots at such critical times, and introduce improved machinery in tilling the soils, how much of the ryots' poverty wonld be avorted. At present India is depending on Europe and other foreign countries for numerous articles such as muslins, matches, nmbrellas, &c. If theso worshippers of Mammon, who daily cry tbat India is becoming impoverished forgetting tbat it is their own apathy which is bringing about this calamity start companies for manufacturing these articles, how much would such enterprises mend the poverty of India. If all the natives would lay out the money that they have laid out on jewels, which is only a profitless investment, in other profitable and useful ways, then the poverty of India would he greatly diminisbed.

India is a poor country bccanse the natives are not an enterprising nation; it is poor, not because its mineral products are less fruitful and profitable hut because they are neglected by tbe natural sons of the soil; it is poor because the well-to-do classes do not wish to lay out their money on any profitable and useful undertaking. From Cashmere to Comorin there are wealthy rajabs, zemindars and other men who fling away a good deal of money on useless nndertakings; if all the money that is so flung away were laid out in the opening of some nseful and paying institution, would India then complain of ber poverty? The proverty of India is mainly due to the lack of commercial enterprise on the part of her sons. The sister presideucies of Calcutta and Bombay are far better than Madras. The Baboos of Calcutta and the Parsees of Bombay are far ahead of the Madassee in commercial pursuits, and hence it is tbat those two presidencies are richer than Madras. Can any one in this City of Madras point out to me one mill or factory which has been opened by a company of Madrasees, besides the cotton mill at Bellary, opened by Mr. Sahapathy Mudelliar, and the rice pounding, and oil mills, opened by a native merchant of Madras on the Tiruvattoor High Road? If the advocates who suggest measures and means for mitigating the evil of India's proverty sitting in their comfortable quarters, were to follow in the footsteps of the men named above I am sure that the proverty of India would be mitigated to a certain extent. The cause of this property is nothing more than the apathy of the people in respect to commercial enterprises.—*Indian Agriculturist.*

TIMBER AND FOREST PRODUCE GENERALLY IMPORTED INTO AND EXPORTED FROM CEYLON.

In the appendix to the interesting report of Col. Clarke on the Forest Department, there are memoranda by the Collector of Customs showing the imports and exports of forest products for 1888 and 1889, details of which, at this juncture, will be interesting to a large class of our readers. In the imports of 1888, the item "ashwood for oars" occurs. This ashwood must have been used by some of our boat clubs, and the import, only 1 package, is not repeated in 1889. Of "cedar wood," described as white cedar wood in Col. Clarke's report, used as staves for oil casks, 141 logs and 128 pieces were imported in 1888 and 290 logs and pieces with 7 packages in 1889. Can this be the produce of the "white toon," the true *Cedrela toona*, grown so largely in the lower hill forests of Southern India? If so there is an additional reason for trying to grow this tree in the lower country of Ceylon, while the red toon receives attention at higher altitudes, where that variety, with coral red branchlets and serrated red leaves, flourishes. Of "planks not described" 324 pieces and 16 packages were entered in 1888 and 1,423 and 6 respectively in 1889. Of pitch pine wood 122 packages are down for 1888. Of sandalwood the imports in 1888 were 4,248 pieces and 7 packages, while in 1889 the imports were 926 pieces and 33 packages. This scented wood is, no doubt worked up into boxes and curios for sale mainly, like tortoiseshell articles to steamer passengers. Of timber and wood not described, 786 pieces and 881 packages were imported in 1888, and 190 tons, 264 logs, 278 pieces and 91 packages in 1889. Of teak planks and teak 2,796 logs, 3,183 pieces in 1888, and 1,217 logs, 2,001 pieces and 531 squares in 1889. Of "boards" 3,032 pieces and 500 packages in 1889. Also "Devadara" (?) wood [cannot be Deodora] 35 packages. "Rough oak planks" 1,200 pieces. The oak timber was probably used for the repair of vessels built of that wood. "Red wood" [? red toon] 13 packages, and actually, 1 package of our own special dye-wood, sapan. The total amount of timber of every description imported in 1888 is given at 2,937 logs, 8,769 pieces and 1,029 packages. In 1889 the figures were,—190 tons, 1,761 logs, 8,960 pieces, 702 packages and 531 squares. There appears, therefore, to have been a considerable increase in the imports of 1889 over those of 1888. In addition to timber we get horns of sorts, 23 cwt and 54 packages in 1888 and cwt 263-2-5 and 41 packages in 1889. Of orchilla weed [for export?] no less than cwt 527-3-22 and 28 packages in 1888 and cwt 210·3 and 20 packages in 1889. Of skins of sorts we imported 11,413 pieces and 74 packages in 1888, and 27,003 pieces and 71 packages in 1889.

Turning now to exports from the island of similar products, we obtain figures which indicate an important branch of our commerce. It is very unfortunate, however, that a more distinct classification of timbers is not adopted, the very largest item being described as "woods of sorts." Of such woods the exports in 1888 were 2,828 packages, 6,909 logs; with 820,247 under "number," which we suppose indicates the contents of the packages added to the logs. In 1889 the exports under the same heading were 1,862 packages; 26,779 logs; 700,536 number. It would certainly be well if the Customs could secure the naming of at least the more important "woods of sorts" sent from the island. We must express the hope that the heading did not include any palmyra timber, which constitutes the next great item. The number of

palmyra laths and rafters exported is given at 286,296 in 1888 and 296,484 in 1889. For the roofs of buildings there can be no better timber than that of well-grown palmyra palms. "Timber, dye wood and root," chiefly sapan, no doubt (although we get cwt. 3,803-2-1 separately for sapan), was cwt. 642·2 in 1888, and cwt. 648-1-22 with 10 pkgs. and separately under the heading of sapan cwt. 1,674-0-16 in 1889. Better classification is required, to enable enquirers to discover whether any important dyewood other than sapan is exported from Ceylon. Ebony, for which Ceylon has been nearly as famous from far back antiquity as for cinnamon and pearls,* was exported in 1888 to the amount of cwt. 12,3-521-21 and in 1889 only cwt. 3,880-3-1. Col. Clarke has, in his report, explained the circumscribed export as due to a glutted market. We need scarcely remind our readers that ebony is the heart-wood of trees the outer shell of which is white, the amount of the valuable heart-wood varying with age and circumstances. Of sandalwood there was a trifling export of 5 under "number" in 1888. This was, of course, part of the sandalwood originally imported, for sandalwood is unknown in Ceylon except in the Botanic Gardens. Of our next most important cabinet wood after to ebony, that is satinwood, the exports for 1888 are given at cwt. 4,143·2-4 and 4,359 logs; in 1889 at cwt. 1,229-3, logs 1,519 and "number" 22. Of "ironwood" (including *palu*, no doubt, as well as the real ironwood, *na*) the exports were 1,475 logs in 1888 and 896 logs and "number" 10 in 1889. Of our fine and useful timber, halmilla, 349 logs were sent away in 1888 and 806 logs in 1889. Teak figures for 1 log in 1888 and "number" 35 in 1889: not likely to have been the produce of Ceylon. Of arekanut laths and rafters we exported 305 in 1888 and 415 in 1889; while coconut rafters figured for 259 and 1,718 in the respective years. Of "laths and rafters" not otherwise defined 8,290 packages and 4,809 in "number" were sent away in 1888, with 8,326 packages and 3,006 "number" in 1889. The large number of packages must surely have included palmyra laths and rafters, in which case the figures are very defective, and now that we have a forest department in full operation, it would surely be well that the customs authorities insisted on more definite information as to the nature and names of the timbers entering into the export trade of the island. Kitul (*Caryota urens*, or jaggery palm) laths and rafters to the number of 179 were exported in 1888 and 1,447 in 1889. The totals of the exports of timber for the two years were:—

	cwt.	packages	logs		
1888	20,941 3.26	11,121	13,093	and number	1,112,100
1889	7,433·0·11	10,288	30,000	„	1,003,674

Of forest produce exported we get for "horns of sorts" in 1888 cwt. 2,341-0-16; in 1889 cwt. 2,203 and 1 package. Hides and skins, in 1888 cwt. 7,598-0-26 and 347 packages; in 1889 cwt. 8,693-2-20 and 458 packages. The value of the skins of domestic cattle in Ceylon is greatly depreciated by the excessive branding of the live animals to which their native owners resort. Of the dye material, orchilla weed the export in 1888 was cwt. 489-1-9 and one package; in 1889 cwt. 502-3-20. Of "tanning bark," not more definitely described, the export in 1888 was cwt. 747-2 and in addition "Velam bark" was sent away to the amount of cwt. 530-2. In 1889 there is no separate mention of Velam bark, only of "tanning bark," of which the export was cwt. 582-3.—There can be little doubt that the tanning bark exported from Ceylon, was mainly the produce of *cassia auriculata* and *Acacia leucophlœa*. In the latest published number of the *Indian Forester* there is a paper on dye stuffs, from which we take the following extracts:—

ACACIA LEUCOPHLŒA.—The bark of *Acacia leucophlœa*—the reru or safed-kikar—attracted attention at the Conference; and the leathers exhibited from various districts in India as prepared by means of this material were considered superior to any others shown.

CASSIA is referred to in the same article and it is stated:—

The leather tanned by the bark of *Cassia auriculata*—the tarwar—was considered at the Conference much superior to what could have been inferred from the examination of the highly coloured bark.

Then we have a paragraph on the *nelli* of our patanas:—

EMBLICA MYROBALAN.—A few of the tanners present were familiar with the Emblic myrobalans—the fruit of *Phyllanthus Emblica*—daula, ámla, aonla—though they had never before seen the leaves. But the same objection exists with regard to these as has already been alluded to under *Anogeissus*. Unless a tanning half-stuff could be profitably prepared for export, it would be hopeless to expect a trade to be done in the leaves. They are doubtless good and useful tans, but have to compete with others that can be landed in the home markets at lower prices. This argument seems perfectly just and applicable to the leaves, but since it pays to export the fruits of the true myrobalans, it would seem as if the question of a future trade in the Emblic myrohalan would turn on the percentage of tannin which it possesses and the colour it imparts to the leather.

We never before heard of the acid and astringent *nelli* fruits and the leaves of the tree being used for tanning purposes.

Gamble writes of *Acacia leucophlœa* (*Mimosa leucophlœa* of Roxb. Fl. Ind.) that it is known to the Tamils as *velvaylam* and *vel-vaghe* and to the Sinhalese as *katu andara*. He describes it as

A moderate-sized or large deciduous tree. Bark ½ inch thick; colour varying with age, grey and smooth when young, dark brown, almost black, and rough when old, exfoliating irregularly in patches and strips. Sapwood large; heartwood reddish brown with lighter and darker streaks, extremely hard. Pores moderate-sized, uniformly distributed in patches or short irregular concentric belts of white tissue which are prominent in, and alternate with, the dark-coloured firm tissue which separates the medullary rays. The latter are white, fine and moderate, and often slightly bent,

The weight of the wood is given at 45 to 59 lb., and it is added that

It seasons well and takes a good polish; is strong and tough, but often eaten by insects. It gives an excellent fuel. The bark is eaten in times of scarcity; it is used in preparing spirits from sugar and palm juice, to precipitate by the tannin it contains the albuminous substances in the juice. It gives a fibre used for nets and coarse cordage. The young pods and seeds are eaten, and the gum is used in native medicine.

Of *assia auriculata* the same authority states that it is a shrub of Central and Southern India and that its bark is used for tanning and dyeing leather and its seeds as an application for opthalmia.—Of *Emblica myrobolan*, the *nelli* of the Sinhalese and Tamils, Gamble tells us, under the title *Phyllanthus Emblica*, that it is

A moderate-sized deciduous tree. Bark somewbat less than ½ inch thick, grey, exfoliating in small irregular patches. inner substance red. Wood red, hard, close-grained, warps and splits in seasoning

* Sir George Birdwood in a paper on the Industrial Arts of India states that the "Periplus of the Erythrean Sea," which belongs to the first century of the Christian era, notices that Omana imported from India ebony. He adds that Schlieman found carved Indian [Ceylon ?] ebony in one of the mounds of the Troad identified by him with the site of the city of Troy.

No heartwood, annual rings not distinct. Pores small and moderate-sized, uniformly distributed, often subdivided or in short radial lines. Medullary rays moderately broad and broad, the distance between two rays generally greater than the transverse diameter of the pores. Medullary rays very prominent on a radial section, giving the wood a handsome mottled appearance.

Mendis gave 49 lb. as the weight of the Ceylon wood but that of Mysore is given at 67. Gamble adds :—

The wood is durable under water, and is used for well-work ; also for agricultural implements, building and furniture.

The bark is used for tanning and in medicine ; chips of the wood are said to clear muddy water. The fruit is the Emblic Myrobolam, and is used as a medicine, for dyeing, tanning, and for food and preserves. It gives a gum, which is not used.

PLANTING IN NETHERLANDS INDIA.

In East Java, this year's coffee crop has turned out poorly but prices rule high. The *Locomotief* mentions a firm at Samarang which last year drew sixty thousand piculs from its estates, but which expects only 112,000 piculs this year. In East Java, the tobacco crop also shows bad signs.

The Batavia *Nieuwsblad* says that the Netherlands India Government has decided upon issuing Java tea to the army there. Similarly, the Government has tried to depend as much as possible on local resources in the supply line, but the Home authorities invariably thwarrt these good intentions by giving preference to articles from the Netherlands. This especally seems to be a failing of the Colonial Office.

The *Locomotief*, in noticing the expansion of planting enterprise in Netherlands East Borneo, wonders why tobacco should be such a favourite in that line of business. It deems that a commercial company with a few handy steamboats and convenient trading stations on the coast could carry on a profitable barter trade in local produce. Pulo Laut, a coal island in the neighbourhood, would prove useful in supplying fuel.—*Straits Times*, Aug. 27th.

THE CHANDPORE TEA COMPANY.

The Chandpore Tea Company, Limited, has just been registered, with a capital of £32,000 in £10 shares. Its object is to acquire, on such terms as may be agreed upon, the Chandpore and Begum Khan Tea Estates, situate respectively in the district of Sylhet and province of Assam, with all lands appertaining thereto, and the goodwill, property, and assets of the business partnerships carried on by the respective proprietors thereof in connection therewith as the same stood on January 1st 1890, as going concerns, and to carry on and work the same estates. The first subscribers, who take one share each, are:—S. Cochrane, 20, Threadneedle Street, E. C.; Major-Gen. W. M. Campbell, Junior United Service Club ; W. Shaw, 16, Exchange Square, Glasgow; J. R. Pedler, 9, Mincing Lane, E.C. ; O. Steel, 34, Old Broad Street, E. C.; J. S. Fraser, 34, Old Broad Street, E. C.; C. Sanderson, 46, Queen Victoria Street, E. C. There shall not be less than two nor more than five directors. The first are William Maxwell Campbell, William Shaw, J. R. Pedler, and Samuel Cochrane. Qualifications, £500. Remuneration, £50, divisible, provided that the fee payable to each director shall not exceed £2 2s. each for each meeting attended.—*H. and C. Mail.*

RAMIE AS FOOD FOR SILKWORMS.

(*Boehmeria nivea*, H. K.)

We were lately surprised to find that silkworms fed on *casuarinas*. Another surprise is the statement, which we quote from the *Kew Bulletin* for August, that the leaves of the rhea plant form suitable food for the silk-yielding insects :—

It now appears that the leaves of the Ramie plant may be used as a food for silkworms, in the same way as those of the mulberry and Osage orango (*Maclura aurantiaca*). All three plants belong to the same natural order *Urticaceæ*, and there should be no reason why they should not be found equally suitable. The following account of the use of Ramie leaves for feeding silkworms in the United States was communicated to the Foreign Office by Mr. A. de G. de Fonblanque, H. B. M.'s Consul at New Orleans :—

"A discovery has been made by a lady in Columbia, S. C., that may have a marked effect upon two great industries. For a number of seasons this lady has amused herself by feeding silkworms and sending a few pounds of cocoons to the Women's Society for the encouragement of the Silk Industry in Philadelphia. The extraordinary warmth of this winter caused the eggs to hatch far in advance of the season, and as the young leaves of the mulberry and the Osage orange had not put forth, our amateur was at a loss what to do. An account adds :

"'Seeing that the foliage of the Ramie in a neighbouring field was putting out, she gathered some and put the worms upon it. They fed ravenously, and she kept up the supply until the Osage orange leaves appeared. Then she divided her worms equally, feeding one set with Ramie, the other with Osage orange. She kept the cocoons separate and sent them to Philadelphia. The experts there were astonished at the size of those spun by the Ramie eaters, and wrote to the lady to know what she had done to secure them. They were not only larger, but the silk was finer.'"

"If further experiments should prove that Ramie leaves can be depended upon for silkworms' food, then a great impetus will be given to the production of this valuable article in the South, while it will add to the profits of those who raise that plant for its fibre."

CEYLON CACAO.

(*Theobroma Cacao*, L.)

The following article is from the *Kew Bulletin* of August. It will be seen that although the production of cacao in Ceylon is limited its quality is of the very highest :—

The cacao industry, until of late years, has been chiefly confined to the tropical parts of America, Mexico, Guatemala, Venezuela, the United States of Colombia, Brazil, and the Guianas, being the chief producers of cacao on the mainland, while Trinidad and Grenada have taken the lead amongst the islands of the West Indian Archipelago. The species of *Theobroma* yielding commercial cacao are natives of Central and South America, and it is but natural to find that the largest areas under cultivation are situated near those regions. Plants of cacao were introduced at an early period to the East Indies, and they are now found under cultivation in most tropical countries. Until quite recently, however, the best qualities (as also the largest quantities) of commercial cacao were obtained from tropical America. The celebrated cacao of Venezuela, known as Caracas Cacao, the choice cacao of Soconusco, in Mexico, and the selected sorts of Trinidad Cacao were believed to be unapproachable for quality and flavour. It appears now, however, that even the best produce of tropical America does not reach the high standard which has been attained by Ceylon Cacao. In a recent letter received from Mr. J. H. Hart, F.L.S., Superintendent of the Botanical Gardens, Trinidad, he states : "For several mails I have noted in the *Public Ledger* the increasing prices obtained for Ceylon Cacao in comparison with that obtained for the best Trinidad Cacao. In the Account Sales dated the 29th March it is shown that Ceylon Cacao is actually worth more by 24s 6d per cwt. than the best Trinidad marks. The difference between the inferior marks is greater still." In view of these facts the planters in Trinidad and elsewhere are keenly discussing the merits of Ceylon cacao, and seeking for the causes which have led to the production of an article so superior to anything produced before. It is true that the quantity of cacao produced in Ceylon is relatively very small. In 1889 Ceylon produced only

17,164 cwt., while the production of Trinidad alone was probably not far short of 125,000 cwt.* The general opinion appears to be that the superior quality of Ceylon cacao is greatly due to the more careful and effective methods adopted for fermenting and curing the beans. The produce is said to be sent into the market in a bright and attractive condition and free from the dirt and mucilage which too often spoils the appearance of West Indian cacao. Again the "soil and climatic conditions" in Ceylon are said to favour the production of cacao with a delicate flavour and good colour. There is, doubtless, some amount of truth underlying all these opinions, but none of them touch upon an important element in the inquiry, and that is the character of the plants yielding the produce.

The cultivated forms of *Theobroma cacao* are broadly divided into two sorts, known in Spanish speaking countries of America as cacao Criollo and cacao Forastero. At one time cacao Criollo was largely, if not exclusively, cultivated in Trinidad, but owing to a disease (described as a "blast") which visited the plantation some time during the last century this sort was discarded in favour of a more robust and hardy sort, to which the name of Forastero (or foreign) cacao was given. The Criollo cacao is said to yield the Caracas cacao of Venezuela, but it is now comparatively rare in Trinidad and Grenada, and only sparsely found in the other West India Islands. The cacao first introduced into Ceylon and the East Indies, probably by the Dutch in the beginning of the century was the criollo sort, and if the bulk of the Ceylon produce now received in this country is derived from criollo trees that would in a great measure account for its superior quality. A Trinidad planter writes: "The Criollo Cacao is much better flavoured than any other, and requires but three days' fermentation." This aspect of the case has already been dealt with by Dr. Trimen, F.R.S., Director of the Botanical Gardens, Ceylon, in his Annual Report for the year 1885:—

"There has been some demand during the year for seed of the Trinidad varieties at Peradeniya, and the belief is general that these large growing kinds are hardier than the old Ceylon sort. Since the date of my last report I have arrived at the conclusion that the various 'pale-fruited' kind (see Report for 1882) sparingly cultivated in Ceylon, as well as all the strains of these new Trinidad plants, are to be referred to the 'Forestero' class of cacao. All of them, whatever the colour of the pods—purple, dark-red, pink yellow, or pale-green—have seeds ('beans'), which are flattish in form, and purple or violet internally, and become very dark after curing. Our old cacao, on the contrary, has the pod nearly always red (occasionally bright yellow), and the seeds are more rounded in shape, and always white or yellowish on section when fresh, becoming red after preparation for the market. As to the proper name of this latter sort, I may quote a portion of a letter which I addressed to the *Observer* newspaper, in November last, upon the subject:—

"'The fruiting of the selected and named varieties sent from Trinidad in 1880 and 1881 has since shown that all these names (Cundeamor, Cayenne, Verdilico, &c.) are applied to forms of what is known there as 'Forastero' cacao, and that none of the purple seeded kinds are of the 'Criollo' or 'Caracas' variety. It will therefore be well to use for the future the name 'Forastero' for them here also.

"'This, being the case the question naturally arises as to the ordinary red cacao of Ceylon. What variety is it; and is there anything like it grown elsewhere? For some time I have been becoming more convinced that it is *this* that is the 'Caracas' or 'Criollo' cacao, and I might have taken stronger ground on the matter than I did in my last report. Mr. Morris of Jamaica, who has had good opportunity of investigation the cacaos, both in a wild and cultivated state tells me that he knows of 'only one kind with the cotlyedons white or whitish, 'and that is what is known as Caracas cacao.' This, it is well known, is now a rare kind in the West Indies, and scarcely to be found on Trinidad estates, having died out, though formerly largely grown there. Evidently Ceylon obtained its plants before this change had occurred. The high quality of "Ceylon cacao" is thus explained, as well as its delicate temperament."

It only remains to point out that the preparation of Ceylon cacao differs in one important point from that generally adopted in Trinidad and other parts of tropical America. In Ceylon, after the beans are fermented the pulp is carefully removed by washing, and the result is the production of a clean, bright looking sample, free from mucilage and discolouration of any kind. In the West Indies, after fermentation, the beans are generally neither washed nor thoroughly rubbed. The mucilage is allowed to dry upon them. On some of the best estates in Trinidad the mucilage is carefully removed by rubbing, and sometimes a red absorbent earth is used to assist the process as well as to give an attractive colour to the beans. The various methods adopted for fermenting and curing cacao in the West Indies are well given in a series of Essays published in the *Agricultural Record* (the Journal of the Central Agricultural Board of Trinidad) for March 1890. The present position of Ceylon cacao in the London Market is discussed in the following letter, for which we are indebted to the courtesy of Messrs. Shand, Haldane & Co., of 24 Rood Lane, E. C.:—

Messrs. Lewis & Noyes to Messrs. Shand, Haldane & Co.

14, Mincing Lane, E. C., July 2nd, 1890.

Dear Sirs,—The following remarks may give some explanation of the peculiar position held by Ceylon cacao as compared with Trinidad.

The consumptive demand during recent years has caused manufacturers generally to give their attention to the making of a cocoa and a chocolate for which Ceylon is especially adapted on account of its bright chocolate-coloured break and mild flavour in preference to the strong flavoured Trinidad sought after a few years ago.

The lightness and easy fracture of the shell through the removal of mucilage renders the loss in weight less to manufacturers and likewise facilitates the working.

To the demand exceeding the supply (the largest output from Ceylon in one year being less than 20,000 cwt), together with the fact that the crop is shipped almost entirely to this port, thus creating keen competition from the markets of all other manufacturing countries, may be attributed the existing high prices.

We may mention that should the output from Ceylon be, say 50,000 to 60,000 bags, of the same weight per bag as those from Trinidad, a range of prices much on a parity with that of good Trinidad would follow.

We have recently noticed a few parcels of Trinidad cacao cured similar to Ceylon, in which the outward appearance has to some extent been obtained but the light break and mild flavour are wanting.

Any further information which you may require we shall be happy to furnish.—Yours, &c.,

(Signed) Lewis and Noyes.

The sample sent herewith is from North Matale estate, the property of the Ceylon Land and Produce Company, Limited.

* In 1885 the actual production was 122,585 cwt.

Oysters in North Borneo.—In a paper on this settlement in the *British North Borneo Herald* it is stated:—Edible oysters are also found on the rocks near the coast; these are collected and dried by the natives and sold to the Chinese traders who export them to China. The same oyster does not object to make its home on the mangrove branches between high and low water, in fact oysters may be said to grow on trees. It would thus appear that growing trees act as substitutes for the fascines used in European oyster culture. It is added Keemah or clams are also collected, dried, and exported in the same way.

BRITISH GUIANA:

THE COLONY OF SUGAR AND GOLD.

It was natural enough that Sir James Longden should o requently refer to "what we did in Demarara," (the Demerary of many writers), and that Sir Arthur Gordon should praise the fertile soil and magnificent nutmegs and cacao of Trinidad. We have certainly very little in Ceylon to compare with the volcanic soil of the West India Islands and the marvellously fertile swamps (when drained by deep and broad canals) of the flats which form such prominent features in our South American settlements of Demerara and Berbice,—often referred to as "those fine islands in the West Indies" during the debates which preceded the abolition of slavery. With that event the once important cultivation of coffee in British Guiana dwindled to almost nothing, while cacao is but a secondary product. But from the persevering application of science, skill and industry to the staple sugar, Demerara and Berbice have been able to hold a good position both after emancipation and during the recent crisis occasioned by the beet-root sugar bounty policy of the continental nations. But now we learn that sugar cultivation is threatened by the rapid developement of an industry never so much as dreamed of when sugar was almost literally coined into gold, in the old days of slavery and protective duties. Gold is being collected in abundance amidst the alluvials of the great rivers which run up from the British colony into Venezuela and Brazil, and labour has been diverted from the production of sugar and rum to the gold diggings. In this fresh crisis we notice, from the proceedings of the Agricultural and Commercial Society, as reported in the very interesting journal *Timehri* that the colonists are not turning their attention so much to fresh labour drafts on India, as to the neighbouring colonies, especially over-populated Barbados, the Azores and, what is quite a new enterprise, to the Southern States of the American Union, where the possible solution of the problem of harmonious existence, side by side, of the whites and the negroes is in many places giving extreme anxiety. The now free negroes of America and others willing to do good work for fair wages are invited to resort to the British South American colony, scales of wages and other details being published as inducements. From an article in the magazine referred to we quote some interesting details regarding the progress of the gold enterpise in Guiana, to which, it seems to us, public attention has not been directed in a manner adequate to the importance of the results already attained and the promise afforded for the future. We quoted what was stated regarding this enterprise in *Timehri* of June 1887; and now, after the lapse of three years, the report is:—

> With but scant encouragement, and suffering under great disadvantages, the industry may have said to have progressed by leaps and bounds, as indicated by the returns to hand for the different years. In 1885, according to official returns, 939 oz., were exported; in 1886, 6,518 oz.; in 1887, 11,906 oz.; in 1888, 14,670 oz.; in 1889, 29,327 oz.; and in the first six months of the present year about 27,000 oz., valued at nearly $500,000, have been already obtained, an amount not far short of the total output for 1889, which in itself had been more than double that obtained in the previous year.

The industry has become a very considerable source of income to the Government, for the royalty (at 90 cents per oz.) within the six months, has amounted to nearly $25,000; while but the merest nominal expenditure on their part has been entailed.

A very noteworthy feature in the growth of the industry has been the perception of the fact, that gold is to be found in paying quantities over large areas of the colony. First in the Puruni and Cuyuni river districts, then in the river districts of the north-west, and now more recently in the Potaro district, the metal has been obtained in large quantities; and it may almost he regarded as certain that the upper districts of the Mazaruni, Essequibo, Berbice and Corentyne will be similarly productive.

The constant succession of rapids, cataracts and falls along the river courses, and the serious danger of these obstructions in the height of the wet season, render the natural water-way a serious drawback; and the genius of the engineer may he said to be the great hope of the future. Following his tracks through the recesses of the forest, come the pictures of an advanced and prosperous mining industry; of the inland settlements and villages, and possibly even cities, with their farms and clearings, where a wider agricultural development may be attained; and of a trade in timber and other forest products from regions at present untapped; while the easy access to higher lands will furnish health resorts from the coast; and the gradual clearing of the land by lessening the almost continuous extent of forest; will tend to an equalisation of climatic conditions that must have a marked influence in decreasing both the great periodic and constant swamps of the interior.

Already, however, the note of labour-alarm has been sounded, for the rapid development of the gold industry within the last two years, has been the means of drawing away from the sugar estates an appreciable quantity from the staff of labourers; and with the continued advance of the industry, it is but to he expected that the labour supply of the estates will be still further lessened. The question is thus a most important one, fraught with grave issues to the material prosperity of the colony, how best to maintain the staple sugar industry in full and vigorous swing, and, at the same time, to provide for and encourage the fullest development of the mineral wealth within our reach.

The absence of special encouragement from the Government may be due to apprehensions of trouble in two directions:—the disorganization of the labour supply for plantations and the balata rubber and timber enterprises, and the danger of complications with the border countries. Venezuela, indeed, has already been indulging in tall talk of war (!) to vindicate her rights. A cautious and conservative policy may be very good up to a certain point, but there can be no doubt that the ultimate result of the gold discoveries in the British colony and the bordering states will be to connect Georgetown, Demerara, with the capitals and chief towns of the great series of Southern American States, by means of the iron bands of the railway. Besides the sugar industry and the others mentioned, labour is required for extended fruit growing for the American market, considerable enthusiasm being awakened in regard to preserved plantains. Some of our readers may not be aware that our Dutch predecessors in Ceylon were in the habit of splitting ripe plantains longitudinally and drying them in the sun on mats. Of course the great difficulty in this mode of preparation is the necessity of watching against adverse weather and the depredations of crows and other animals. The late Rev. Mr. Thurston, therefore, when at the head of the Government Industrial School, baked the divided plantains and put them up in hermetically soldered tins, in which shape they were highly prized by children sent "Home" from Ceylon for education and by absent or retired colonists. Those who have tasted the

preserved plantains (properly bananas) will agree with us that they are equal if not superior to dried figs. Those dried in the sun are probably superior, but artificial heat gives excellent results. The mode adopted in British Guiana is to provide a bed of heated sand, over which is placed a platform of laths, and on this the slices of plantains are dried in a temperature of about 150°, until they part with the moisture which constitutes 75 per cent of their weight. We have often wondered that no enterprising person has given a full trial to this industry in our colony where "plantains" are so plentiful and so good. The American Fruit Drier does not seem to have given better results with plantains in Demerara than it did in Ceylon, when tried at our suggestion a few years ago. The following extract will show that a full trial of the British market is being made from Demarara :—

The Assistant Secretary laid over further samples of two varieties of dried bananas, as well as a specimen prepared with sugar. He had received an account of the first lot sent to England, which was very much liked and arrived in first-rate condition. The specimens then on the table were moister and retained more of the flavour of the fresh fruit than the first samples. He hoped to be able to prepare them in such a way that they would keep long enough for shipment and still be moist and full-flavoured. A number of sample boxes had been sent to England by the previous Mail, and other samples had been distributed to several persons in the colony, who had all expressed satisfaction with their flavour and appearance. Again :—

Mr. Rodway laid over specimens of a great improvement in dried bananas, a sample from Trinidad, and also a box from Messrs. Finney and Lambert, who were preparing to carry out banana drying as a commercial speculation.

Of course papers on sugar cultivation and manufacture are prominent in the Journal, which opens with a discussion of "Diffusion of sugar cane, compared swith double crushing in mills," by Mr. Neville Lubbock. There is also a paper on defecation by electricity. Unfortunately we in Ceylon ceased to take more than an abstract interest in sugar, long previously to the date when "failure" as regarded sugar on a large scale was repeated in the case of coffee. With abundance of rich manures, we could probably succeed in growing sugar which would properly crystallize, but in order to live planters must grow what will pay. There is a most fascinating collection of gossip about Charles Waterton (whose "Wanderings" are almost as interesting to young people as are the adventures of Robinson Crusoe) and his friend and father-in-law, Charles Edmonstone. Waterton was for six years working as the owner of plantations and slaves in Demerara, and Edmonstone, who was one of the "Keyzers" of the colony, earned the gratitude of his fellow colonists by a series of successful expeditions against runaway slaves and maroons. Waterton married Emondstone's daughter, who was on the mother's side the grand-daughter of an American Indian, thus :—

The Indian chiefs were rather important personages in those times, (in the early years of this century,) as they received the annual presents and distributed them to a considerable extent by favour. It naturally followed, that being commissioned by the government and provided with a silver-headed stick of office, an Arrawack chieftain thought himself a somebody. In the latter half of the last century a daughter of one or these *Owls*, as they were called, who went by the name of "Princess Minda" was married to William Reid, a Scotchman, and one of their children became Mrs. Charles Edmonstone. The gallant Burgher-Captain was therefore connected by marriage with the Arrawacks and no doubt this was one reason why he had such great influence over them. If, therefore, descendants of Charles Waterton exist, they have American Indian blood in their veins. We do not suppose the Scotchman William Reid, who married the Indian "Princess," was connected with the Sir William Reid, Baronet, who, after long residence in Demerara as a planter, came here to engage in the coffee enterprise in 1840, and with whom the writer was associated in pioneering work in Uva in 1840-41,—but the coincidence of name is certainly curious.

In the notice of Edmonstone, we have a glimpse of a reverse of fortune from eccentricity of conduct and instability of purpose such as is not uncommon in colonies, although, in the case before us, addiction to drink does not seem to have been added to moral aberration, the result of reading the rhapsodies of a man who was undoubtedly insane :—

Near the border of the clearing at Warrow's place lived the eccentric Swedenborgian, "Old Glen." His story was a curious one. Coming to Demerara as the mate of a merchant vessel, he received a grant of land, settled down, bought a few negroes, and in seven years gained an assured position, while after twenty years he became a man of some importance. Going on board a Dutch vessel one day he found the Captain reading one of Swedenborg's books, and being taken with the new religion Glen was very pleased when the owner presented him with several works of that mystic author. From this time he became an enthusiast. His estate was neglected, everything went wrong, the negroes ran away or became careless and lazy, and every day Glen became poorer and poorer. Having ordered a large consignment of the books of his beloved author, he was unable to pay for them, and consequently the estate was sold. Being destitute he set up as a preacher to the negroes, but this not being allowed, he went to Berbice and enlisted as a private soldier. Here he fell into disgrace for sleeping on duty and was sentenced to "run the gauntlet." In pity the commanding officer would have remitted the sentence, but Glen refused, and was so determined to receive his punishment that he would not pass his comrades until they gave him the customary blows, even going so far as to chide them if they did not strike hard enough. Returning to Demerara Edmonstone found him destitute and offered him a home at Warrow's Place. Glen would not live in the house but built himself a henah in the forest. He was very gentle and kind to the Indians, many of whom came to him for medical treatment, which he practised by means of some of the forest remedies. Among other kind actions he taught the little Edmonstones their letters, and Mrs. Waterton probably received the rudiments of her education from him.

There is a very interesting paper on the Mollusca of British Guiana, from which we observe that several of the many land shells (slugs and snails) are used as food. The Revd. D. J. Reynolds contributes "Jamaica Proverbial Philosophy," which gives a good idea of the shrewdness of "Quashy." For instance :—

When snake bite you; you see lizard, you run. The burnt child dreads the fire.

Cuss John Crow "peel head" and turkey pee pee bex. Offend one monk, and the lappets of all cowls will flutter as far as Rome. (Spanish.)

Cow tail cut off, God Almighty brush fly for her. God tempers the wind to the shorn lamb.

Quattie (the smallest Jamaica silver coin of the value of 1½d now out of circulation) buy trouble, hundred pound can't pay for it. Mischief comes by the pound, but goes away by the ounce.

The raven cried to the crow, "avaunt Blackamoor." (Spanish). One ass calls another ass long ears. (German.)

Scheming men plotting—'Ceitful fire roast plantain, cuncassa (soft soap) scrape it.

Youth mocking at Age—Man no done grow mustn't laugh after long man.

A man who is so afraid of another man that he cannot say his soul is his own—Cow belongs to butcher, can nebber say, "I berry well."

A boaster in a fix—Trubble ketch bull-dog, monkey breeches fit him.

Dog massa gib him money for buy bench, dog tek it buy bone, and say, Big Massa (the Creator) nebber ben mek him for sit down 'pon bench.

When black man tief, him tief "Quattie" (1½d.), but when Buckra tief, him tief whole a estate.

When fowl drink water, him liftup him hed say "tank God, tank God;" when man drink water, himsay nothing.

There is a comprehensive article on railway extension in South Amsrica, shewing wonderful progress already made in crossing high mountain ranges, from which we wish we had space to quote. But we cannot help quoting a description of labourers at the Diggings :—

We come now to the sinews of the camp, the labourer. He is never so happy as when he is grumbling, and that he is always ready to do. In the morning, the clock is fast; at night he accuses you of shifting the hands and declares that it is slow. He frequently assures you that he is devoted to your service. All he needs is a little encouragement, liberally interpreted, "grog." He is continually assuring you that if you can treat him well, that is, give him more than his allowance of food, he will indeed work for you. He abounds in honied words, commonly known as "sweet mouth" or "rattle," and at such times, beware! he is fooling you.

These remarks are intended to apply only to the creole labourer, who, after all, is the only one suited to this work. As to the others, the coolie and "Bill" are too liable to sickness, and the Chinaman is too smart. "country," *i. e.*, the Barbadian, is too delicate, and the Portuguese and Mulatto population are physically unable to do the work. Above all, in engaging labourers, beware of the "boots man!" On no consideration engage a man who seems at home in his boots, and, generally, look for the barefoot man. "Bill" generally gives out before his time is done. He takes his advance to his uncle, and comes into the bush utterly unprovided with clothing—sometimes without even a hammock. He has to subsist on food entirely different from that to which he has been accustomed, and the poor feeding alone renders him an easy prey to malaria and dysentery.

It is about his food that the ordinary labourer is most troublesome. He is perfectly aware of the amount of his allowance, and never wearies of telling you that he knows that, though you personally have nothing to do with it, the cook is robbing him. When told that under the circumstances it will be advisable to take his raw victuals and cook them, he will find numberless objections to such a course. Many make a regular practice of begging, giving one the disagreeable necessity of refusing. These few drawbacks excepted, they are a happy lot, and generally work well.

At night when their work is done, and particularly when there is a large gang, song after song is sung, and the chorus taken up in perfect harmony and unison. Certainly the songs are frequently mere repetitions and very meaningless, but in the still nights the singing is far from unpleasant, and appears to afford the performers infinite delight. The variety of the instruments is marvellous. Besides concertinas, flageolets, violins, guitars, etc., which they bring with them from town, they invent many more. They will rattle a spoon on a pudding pan very musically, they make use of the familiar comb and piece of thin paper, they whistle very fairly, they construct flutes with old bones, violins with meat cans, and wonderful to relate, they make even violoncellos.

There is a notice of a Carib-French Dictionary, which must be of special interest, as the race has almost disappeared. There is an interesting description of the Upper Demerara river in which we see it stated that a report on this region was made, a few years ago, by Mr. C. Barrington Brown. The snakes, fireflies and birds of this region seem to be equally beautiful and one bird the HOATZIN,—*Opisthocomus cristatus*, is so singular in its formation that it is called the reptilebird, just as the Australian kangaroo is regarded, from its structure, as the reptile animal.

BLIGHT ON TEA.

Tea has not hitherto, as far as we are aware, suffered from blight, which has been the destruction of coffee, but from all accounts it appears that it is liable to it. Messrs Jardine, Skinner & Co., of Calcutta, recently forwarded to the Agricultural Society of India some samples of tea leaves, concerning which the Manager of that Company's Gardens in Assam wrote :—"By sample post I send you a tin containing samples of tea leaves which are blighted by a sort of fungus. It seems to be spreading all over the gardens, and is not peculiar to low or high land. The leaves after a time get quite brown and black and fall off, leaving nothing but the stalks. It seems to be a new kind of blight. Could you find out from the Horticultural or Agricultural Societies what it is and what remedy would be of use?" The Company therefore asked the Society to examine the leaves, and give what information it could as to the species of blight from which the leaves were suffering. The samples, owing to their being packed in tin, arrived unfortunately quite spoilt for examination, but the Society stated that the disease appeared to be one which had recently been observed in more than one garden in Assam, and seemed to be very destructive. As the blight, or fungus, seems to be new to tea, it might be possible, it remarks, by collecting and collating all the existing information about it, to learn where and when it originated, and whether it appears to be associated with any particular surroundings, soil, age of plant, or other conditions; and the information might also afford some clue to the proper method of combatting it. Another correspondent wrote to the Society stating that the blight, or something like it, had long existed in some gardens in Assam without doing any appreciable injury. The proposed enquiry and analysis of the soils, &c. of tea plants might, in the opinion of the Society, throw some light on the subject, and we are glad to learn that steps have been taken to secure the services of a competent chemist to analyse tea plants, tea soils and manures and search generally into the cultivation and manufacture of tea. The inquiry once started will, says the Society, be the means of collecting and assigning to its proper place much of the information which different planters have acquired by experience, but which is not available to the rest of the community. The new tea blight referred to is a case in point. There has hitherto been no organised inquiry respecting tea cultivation and manufacture, and the departure now taken can hardly fail to benefit the industry.—*Madras Mail*, Aug. 27th.

BRICK TEA.

A curious and interesting feature of the Chinese tea trade in recent years is the extraordinary growth of the brick tea industry. Formerly the "Bods" of Thibet were the only customers for the compressed and sourish slabs that found their way across the frontiers to the Chinese dependency, but now the Tartars of Central Asia, the Siberians, and the peoples of Eastern Russia all demand their raw tea in the shape of slabs, tablets, or bricks. Consul Allen, in a report to the Foreign Office on the commerce of Hankow, recently stated that the trade in brick tea "seems to increase by leaps and bounds," so highly is the leaf in this form appreciated by the Russian and Siberian connoisseurs. The bricks are prepared by machinery latterly, and "the brick tea factories, with their tall chimneys, are the most striking buildings in the European settlement" at Hankow now. The museum at Kew Gardens received a couple of samples of this tablet tea early in the present year, and the number of the Kew *Bulletin* last issued, contains an interesting, though in some respects incomplete, reference to the subject of brick tea generally. There are two kinds of tablet tea manufactured for the Siberian and Russian markets at Hankow, the large and the small, but they differ both in manner of preparation and in the quality of the leaf used. The large bricks are made in a very simple way. A quantity of common tea dust is placed in a sort of pudding cloth or

bag, steamed for a few moments so as to cause it to adhere; it is then turned into wooden moulds, where it is beaten to the required consistency by means of wooden mallets.

In the modern steam manufactories of Hankow, the dry dust is poured into iron moulds and there subjected to "steaming" and pressure. This gives a better shaped and firmer brick, and as the Siberians set great value on the appearance of their tea-blocks, looking especially to the sharp cut of the corners and sides, the modern-made article is preferred to the old-fashioned hand-moulded slab. When ready, the bricks are placed on one side to cool, stored in drying rooms for a week, carefully wrapped in separate papers and packed in bamboo baskets, each containing 64. Each brick must weigh one catty—1⅓ lb. that is—and great care must be exercised to secure the desired weight, or the Siberians and Tartars will refuse them. Hence, a brick, if underweight, is rejected and afterwards remade. Green tea is prepared in exactly the same way, only that the prejudices of the buyers require it to be made up into 2½ lb. tablets, to be made of the whole leaf and not the dust, and to be packed 36 in a basket. The cost of preparation, carriage, duty, and packing is about 30s per "picul" of 133 lb., or about 2½d per lb. Hence it can be sold at a very low price in the Siberian and Russian markets for which it is manufactured. The makers being practical business men, have due regard for the prejudices of their customers in favour of a brick of nice appearance, so they take care to reserve the finer and best quality dust for the outside facing, keeping the coarser and inferior leaf for the inside core. Some years ago this kind of brick tea was shipped to London in large quantities for despatch to Russia. At pre sent it all goes direct from China overland via Kiakhta and Maimachin.

The better class of Siberians and Mongols require a superior article, and to supply their wants a smaller brick or tablet of a good quality leaf is prepared. It is manufactured from the finest tea dust procurable from Ning-chow in Kiang-si, and Tsung-yang and Yanglutung in Hu-peh. The selection is carefully made, only the product of the early pickings or first crop being chosen. The fine leaf is not steamed for steaming has a serious drawback, inasmuch as it robs the tea of all its fragrance, and would therefore ill adapt the bricks for connoisseurs. The dust is poured into steel moulds, quite dry, and subjected to hydraulic pressure of about two tons on the square inch. In this way the tea is found to preserve for an indefinite period all its aroma and freshness. But not alone is the leaf used for the small tablets rather expensive, but the cost of manufacture is high owing to the care requisite for the proper preparation of the slabs. The original cost to the manufacturer at Hankow is over 84s per picul. Duty, carriage, packing, and so forth, will amount to at least as much in addition, so that the tablets can hardly be sold at a profit to the wholesale dealer and retailed at much under 4s per lb. With the best steam machinery the "failures" are over 5 per cent., where the old-fashioned hand moulds are used 25 per cent. of the bricks turned out are imperfect and have to be remade. It is claimed for the compressed tablets and bricks that the fragrant constituents of the leaf are better preserved than in the ordinary loose state, that the cells are broken by the heavy hydraulic pressure to which they are subjected, hence the use of the bricks is more economical, a given weight yielding a stronger infusion than the same quantity of loose tea. But though the small tablets have been introduced in this country, they have not taken with English tea drinkers.

The true brick tea of China, the unsophisticated native article, is, however, nothing like the tablets and slabs above mentioned which find their way to Russia and Siberia. The genuine brick tea of the Chinese manufacturers is that which is intended for the Thibetan market and for the Eastern Mongols. It is made of the whole leaf, stalk, flower, and all, as it is picked from the tea shrub, and is in shape and appearance not unlike a rather dirty ordinary brick. The correspondent writing in the *Kew Gardens Bulletin* states that he has never seen this kind of brick tea manufactured, but knows "it is made by Chinese in a very simple way." Simple is hardly the word to apply to the process of brick tea making adopted by the natives. Primitive is, perhaps, nearer the mark. The leaves are chewed, and when well saturated with saliva are laid out to ferment and partially dry. They are then rolled up into little balls, with the help of some additional moisture, and afterwards moulded by hand into oblong blocks or bricks about 10 in. long, 10 in. broad, and about 4 in. thick. The leaves thus prepared acquire a slightly sour taste, due to the fermentation induced by the saliva, which the Thibetans appear to like. The trade in these bricks is a most important one, and it is the fear of interference with it on the part of the tea-growers of Assam that is at the bottom of a good deal of the hostility manifested by the Chinese and Thibetans to an attempt to enter into closer commercial relations with the Trans-Himalayan State. The trade in brick tea is a strict monopoly of the Lamas or priestly caste of Thibet, and they are very jealous of any interference with what is to them a highly profitable business. The ordinary Thibetan must have tea; it is the one thing he considers indispensable, and cannot live without, and for this commodity he depends entirely upon the Lamas. The latter know that if intercourse between Darjeeling and Thibet were encouraged, the Assam planters could, and would, supply the natives with tea at a much lower rate than the priests charge. So what with the Lamas on the one hand, who fear to lose the monopoly they now enjoy, and the Chinese planters on the other side, who are afraid of losing the Thibetan market, it is not altogether surprising that the attempt to foster commercial intercourse between India and Bodyul is not viewed with favour on the other side of the Indo-Chinese frontier. Brick tea is also used as currency in Thibet, prices being quoted in equivalents of the compressed leaf. The beverage prepared from the sourish tablets is hardly likely to tempt the Western palate. The Thibetan teapot is a sort of wooden churn into which a boiling infusion of the tea-leaves is poured through a strainer; a little salt is added, and some 20 or 30 strokes are applied with a wooden dasher pierced with a number of holes. A lump or two of butter is then thrown in, and the mixture churned with 100 or 150 strokes "administered with much precision." But this is a good deal more palatable to Europeans than the brew concocted of the bricks by the neighbouring Mongols. Meal, as well as a bountiful supply of butter, is added to the decoction, and with a fat sheep's tail or two swimming about in the liquid, a dish of tea is served out which, in flavour and appearance, it is difficult to distinguish from well-thickened pea-soup.—*Morning Post.*

PERAK AS A FIELD FOR PLANTING ENTERPRIZE.

We have pleasure in giving publicity to the following extracts from a letter addressed by the Superintendent. Government Plantations, Perak, to a European firm in Penang:—

"A short report on the soil and climate of Perak, and on the suitablity of the country for tea and other tropical products, is the best answer I can make to the last para of your letter.

...A glance at the map of the Malay Peninsula and Archipelago will show, better than words of mine can describe, how admirably Perak is situated. It is practically in the same latitude with, and may be said to be the centre of, the richest Spanish, Dutch, and English Colonies, which have been famous for centuries.

In most parts of the country—more particularly the Perak Valley (a magnificent tract of land of vast extent), the Kinta and Batang Padang Valleys, the Valley of the Slim and the country stretching from the British Province Wellesley to Taipeng, embracing the Krian and Selama districts—the soil is a deep rich loam, and in places where limestone mountains crop up, is truly unrivalled for productiveness.

Rainfall and Temperature.—Official returns give the *mean* rainfall at seven stations, occupying cent

positions in the valleys and districts mentioned, as 111·8 inches for the year 1888. Highest rainfall 171·89 inches, lowest rainfall 82·18 inches. The mean temperature at six stations for 1888 is 81°·3.

To practical men comment on these returns is superfluous. The rainfall, varying as it does, leaves the choice open to them of fields suitable to the various products: tobacco, coffee, cocoa, tea, or the different spices—nutmegs, cloves, cardamoms, pepper, &c.; while the temperature forces a growth which will tax the best soil and utmost skill of the planter to keep up with.

Labor.—It is not necessary to proclaim the virtues of the Tamil cooly as a laborer. Suffice it to say the lowest wages fixed by law are 14 and 16 cents for a male laborer, 12 and 10 cents for a female laborer, rates for food being fixed likewise. The loss on recruiting is trifling compared to what other countries less favourably situated have to suffer.

Facilities for Transport.—Perak is roughly estimated as 120 miles long by 90 miles broad. Steamers call daily at Port Weld and Telick Anson the Northern and Southern ports of this limited area. The rivers Krian and Bernama, at the extreme North and South of the country, has been, and is being, traversed by railways, canals, macadamised cart-roads, and six foot bridle tracks, in a way which would be marvellous in a less progressive age, and under a less able and energetic administeration, guided as it is by a far-seeing policy.

All that is necessary for the rapid development of the agricultural wealth of this State is that Perak should be known to Capitalists at home."—Local "Times."

THE TOBACCO PLANT.

The London *Journal of the Society of Arts*, January 3, noting that the tobacco plant "is grown and employed as a narcotic in almost every country in the world," and that about "one-fourth of the human family use it," adds:

"It is somewhat difficult to obtain trustworthy information regarding the world's trade in tobacco, because so much is used up locally in different countries. It is probable that the total area under tobacco is not far short of 6,000,000 acres. For the year 1886 certain official returns are available, which show that the United States, India and Hungary are the largest producers. The area under tobacco in acres was in

United States	752,520	Algeria	20,478
India	641,000	Italy	12,061
Hungary and Austria	149,468	Holland	3,218
Germany	49,312		
France	37,156	Total acres	2,106,213

"The consumption of tobacco in the United Kingdom is large and progressive, and the revenue derived from it last year was nearly £8,750,000. The average consumption is largest in Holland—nearly 7 pounds per head; in the United States about 4½ pounds; in Hungary, Denmark, Belgium and Germany from 3 to 3¾ pounds. In the Australian colonies it is also high—3½ pounds; in France it is about 2 pounds, and in the United Kingdom under 1½ pounds.

The yearly production of tobacco in Cuba is about 300,000 bales, and 181,000,000 cigars are also exported. The Spaniards have hitherto monopolized the trade in cigars, alleging that parts of the soil of Cuba were alone suited to the production of Havana tobacco. This assertion is now disproved, for with good choice of seed, soil and leaf, and skilled manufacture, Jamaica is said now to send into the market as excellent a cigar as was ever shipped from Havana, and at a far cheaper rate. In the Philippines 100,000 cwt. of tobacco are produced. The Dutch possessions in the Eastern Archipelago ship a large quantity of excellent tobacco, which is held in high repute in Europe. The imports of Sumatra tobacco in Holland now average 140,000 bales, and of Java tobacco 130,000 bales.

"Although there are about fifty species of the genus *Nicotiana* known, only three or four are much cultivated for the leaf. The two principal commercial forms are by some botanists treated as varieties, and not as distinct species * * * Madras, where the climate is admirably suited for the growth of tobacco, stands first with regard to the development of this industry in India. Dinnigul is the great tobacco district, and cheroots are manufactured at Trichinopoli. The islands in the delta of the Godavery also yield what is called lunk tobacco, the climate being suitable, and the plants are raised in rather poor light soil, highly manured and well watered. No better evidence could be afforded of the universal use of this plant than the extensive display which was made of it in every section of the Paris Exhibition."—*Bradstreet's.*

AMHERSTIA NOBILIS.

It is now fifty years since this magnificent plant was introduced from India into England. Its fame had become known from a description by Dr. Wallich, who found it in 1827 in Martaban, growing along with *Jonesia Asoca*, another splendid-flowered leguminous tree. Writing of the Amherstia, Wallich said: "The largest of the two trees I found was forty feet high, with a girth of six feet near the base. Both were profusely ornamented with pendulous racemes of large vermilion-colored blossoms forming superb objects, unequaled in the flora of the East Indies, and I presume, not surpassed in magnificence and elegance in any part of the world." Many futile attempts had been made to introduce this plant into English gardens before the Duke of Devonshire sent a collector specially for it, and succeeded in importing and establishing a plant in the famous Chatsworth Gardens. This plant is still alive. But the Duke was not the first to flower the Amherstia, a small plant in the collection of Lady Lawrence, at Ealing, flowering first in 1884. The first raceme that developed was sent to the Queen, and the second to Kew for figuring in the *Botanical Magazine*. A plant now in the Kew collection—originally, I believe, a cutting from the Ealing specimen—has produced a few flowers on several occasions within the last ten years, and it is in bloom now. The racemes, five in number, are pendulous, two to three feet long, and bearing from fifteen to thirty flowers, each of which has a drooping pedicel six inches long, bearing a pair of large wing-like bracts four inches from its base, the flower being four inches across, and composed of four spreading sepals, five unequal petals, three of them large, and in the position usually occupied by the standard in the flower of an ordinary Legume. The stamens are united at the base, and form a long curved tube. The color of the whole flower, bracts, pedicel and all is the richest vermilion or vivid scarlet, with blotches of rich lemon-yellow and a faint bluish tinge on the standard-like petals. In habit and foliage the plant resembles Brownea or Jonesia. The temperature supposed to be essential to this plant is from seventy to eighty degrees, with a bottom heat of ninety degrees, but the Kew plant is growing in a house devoted principally to Aroids and Tree-ferns, along with the largest of which it is planted out in an unheated but well-drained bed of soil. The temperature maintained in this house in winter is sixty-five degrees in severe weather, whilst in summer it ranges from seventy to eighty-five degrees. This is precisely what one keeps an ordinary stove at. Evidently, therefore, Amherstia may be grown and flowered in any house devoted to tropical plants. The Kew specimen is about ten feet high.—*Garden and Forest.*

MINOR PRODUCTS IN CHINA.

As an illustration of the value of some of the so-called "Minor products" in tropical countries, I may point to the fact that ground nut cakes—that is the residue or maco after the expression of the oil from the seeds of Arachis hypogæa—is exported from Kiungchow in China, to the extent of over 1,000 tons annually. In 1888, there was exported from this port

1,301 tons, of the value of £7,205, but in 1889 the quantity fell to 1,044 tons, valued at £5,780. In commenting on this, the British Consul says that the crop has been bad all over the island, so that a considerable amount has been imported for consumption from the mainland, whereas a surplus for exportation is generally looked for. The cultivation of this crop has given way considerably of late years to sugar, and whereas the oil expressed was formerly sufficient both for the cooking and lighting purposes of the district, it is not now sufficient for cooking alone, and the price which was formerly about 5c. per lb. is now three times that sum. Sesamum (Sesamum indicum), is also largely grown, but the seeds showed a decrease in value of nearly £7,000 during 1889. The crop was an unusually good one owing to dry weather, and the diminished export of the seeds is due to the fact that they have been used for expressing oil to make up for the deficiency in ground nut oil.

Betel-nuts (Areca catechu), seem to be another important article of export from Kiungchow, the quantity exported in 1889, amounting to 648 tons of the value of 18,333. Betel-nuts are stated to be an article both for export and import, there being a considerable demand for Betel-nuts grown in this island, as they are of superior quality, and fetch double, or more than double, the price of those imported from the Straits. These letter are, it is said, imported to be mixed with the native product, and fraudulently passed off as the genuine article.—J. R. J.—*Gardeners' Chronicle.*

PERAK SUGAR CULTIVATION COMPANY, LIMITED.

The fifth annual general meeting of shareholders in the Perak Sugar Cultivation Co., Limited, was held on Wednesday, 26th March, 1890, at the Shanghai Club. There were present:—Messrs. R. Francis (Chairman), C. J. Dudgeon (Secretary), G. H. Wheeler, A. J. How, Douglas Jones, J. Buchanan, E. Hey, S. Walker and Pow Kee, representing in all 1,303 shares and 380 votes.

The CHAIRMAN, after stating that he presided in the absence of the Chairman of the Company, said:—For reasons stated in the report it will be proposed, at the conclusion of the few remarks which I have to make, that this meeting stand adjourned until June. It is probable also that in 1890 June will be found a convenient date for the meeting but as the area of canes to be cropped in the early part of the year increases, so will the date of the meeting have to be thrown back, until, with the estate in full cultivation, it will probably be August to September before a full report of the campaign can be presented. With regard to the crop for 1889, full particulars are given in the report. The weight of sugar produced per orlong, and the proportion of No. 1 sugar have both been better than in any previous year of the Company's working. It has been somewhat unfortunate that, owing to short supply of labour, the area cropped in the twelve months has fallen short of the estimate, and consequently the accounts as made up to 31st Dec. show a less favourable result than was anticipated; it is, however, of course to be remembered that the 130 orlongs short cropped in 1889 merely fall into the area to be cropped in the early months of 1890, and thus shorten the non-productive period of the present year, so that the estate suffers little or nothing at all. Labour has been a matter of considerable anxiety to the manager and directors. The increasing industries of the Straits, and the large demand for Indian labour in Ceylon, have caused a demand for labour in excess of the supply. The directors can only say that the matter is one which engages the most careful attention both of themselves, their manager and the agents in Penang. The crop for the season 1890-91 is described by the manager as the "best and largest we have had"; the crop is looking excellently well, and the only anxiety regarding it is the matter of labour already referred to. With regard to the accounts, if the proposal for adjournment is agreed to, these will be supplemented for the meeting to be held in June, and, though at the present time there is considerable extraordinary expenditure in manuring for the coming crop, there seems no reason to fear that the estimate of a profit of Tls. 14,000 on the campaign will be disappointed. In addition to this sum it is to be remembered that the company will have paid over Tls. 10,000 in interest on borrowed capital. The Tls. 14,000 that we anticipate, and the Tls. 10,000 amounting to Tls. 24,000, will give about 8 per cent. interest on the capital, and as this is for 16 months, that will be 6 per cent for the year.

Mr. How asked if the shareholders were to understand that they might look for a dividend of 6 per cent.

Mr. Dudgeon said they were not allowed to pay a dividend of more than 4 per cent. until the debentures were paid off.

Mr. How thought the sugar account was a somewhat bald statement, and he suggested that the number of orlongs cropped should be given as also particulars of the different grades of sugar and average prices. It would be of interest to the shareholders to be enabled to follow the prsoperity of the Company by means of such particulars. He asked if the contemplated expenditure on a new boiler was for an entirely new one in addition to the plant in use at the present time, or was it to take the place of one which was out of order.

Mr. Dudgeon said a new boiler might be required to take the place of one of the present ones, which had recently suffered some damage; and it was considered necessary to have a second one on the spot. The rapid deterioration of the boilers was due to the impurity of water used. The expense of a new boiler and mill roller was estimated at £500. The area cropped and averages of No. 1 and No. 2 sugar were given in the report.

Mr. How said the report only gave the gross amounts. The average prices of each grade should be given, so as to form a guide in future years.

The Chairman said Mr. How's suggestion would be brought before the Board of Directors. He (the Chairman) saw no reason why it should not be carried out.

Mr. Douglas Jones—I suppose the Board do not like to prophesy as to the length of time it will take before the shareholders are likely to get anything out of the company?

The Chairman—I think it desirable not to prophesy.

Mr. How—Unless you know.

The Chairman—If our anticipation of a net return of Tls. 14,000 is carried out, it would enable a small dividend to be paid. It must be remembered that the whole estate is not being worked; but next year or the year after, it may be expected to be in full cultivation

It was then moved by the Chairman, seconded by Mr. Wheeler, and agreed to, "That this meeting stand adjourned until Wednesday, 25th June." The proceedings then closed with the usual compliment to the Chairman.

REPORT.

The directors, as required by the articles of association, submit their report for the year 1889. The working of the Company, however, shows that the holding of the annual meeting in March, with accounts made up to 31st December (a date almost in the middle of the crop) is entirely inconvenient, and renders it almost impossible to lay before the shareholders a proper statement of the Company's position. It will therefore be proposed at the forthcoming meeting to adjourn until June, when, the crop having been cleared off, it will be possible to submit a report with accounts, closed to 30th April, showing the actual results of the previous campaign. It will also be proposed to fix a date for the meeting in the following year which will cover the campaign of 1890-91.

Crop.—The area cropped during 1889 has given most satisfactory results both as to weight of sugar produced per orlong and as to quality. The production per orlong averages piculs 38 as against piculs 31 in the previous year, and the proportion of No. 1 sugar is 76 per cent. against 65 per cent. In price, too

the estate has been fortunate, the average obtained being $5.75 per picul as against $4.80 in 1888. Owing however, to a great scarcity in the supply of labour it has been found impossible within the 12 months to take a crop from the whole area of 615 orlongs, which it was stated in last report represented the crop for 1889; in addition to this the manager considered it advisable, in the future interests of the estate, to throw back the autumn cropping a month, so as to bring the cultivation more in accordance with the recognised rules of sugar planting in the Straits. Owing to these causes the area cropped has only been 484 orlongs, the short fall of 130 orlongs being left over to be cropped during the early part of the present year.

Estate Extension.—Owing to the labour difficulties already alluded to, it has only been found possible to add 35 orlongs to the cultivation during 1889. The area in cultivation is now 694 orlongs, of which it is estimated that 650 to 675 orlongs will be planted with cane for the 1890-91 crop.

Capital Works.—With the exception of the small addition to the estate above-mentioned, and some necessary additions to the coolie lines, there has been no important expenditure under this heading. It is however in contemplation to replace the present launch and sugar boat, with a larger launch which will combine the work of both. The estate is even now too large for the existing transport arrangements.

Plant.—The mill has done its work well during the year. The boilers need repair, and this will be attended to when the present crop is worked off; it has been necessary to work the boilers at reduced pressure for the past three months, which forms another reason for the short cropping in 1889. It may be necessary to supply a new boiler and a spare mill roller during the year, the estimated cost of which is $3,500. Otherwise the whole of the plant is in good order. The additions to plant during the year have it will be seen been written off, for the most part, to depreciation

Accounts.—These, to 31st December, show a profit of Tls. 7,113.10, in addition to which it is to be noted the Company has paid Tls. 7,512.07, in interest, a charge principally made up by the 15 per cent interest payable on debentures. These two amounts together make a total of Tls. 14,625.17, which represents the actual earnings during the year over and above the expenditure necessary for the working of the property or say nearly 6 per cent on the present capital. If the sums borrowed are added to capital, as they probably will be hereafter, the percentage of earnings is over 4½ per cent, which it is to be remembered is from a crop of only 484 orlongs. These figures, however, do not convey an accurate impression of the actual position, for on the closing of the campaign, with a crop taken from further 252 orlongs, it may confidently be anticipated that the present apparent profit on working account will be at least doubled. For the adjourned meeting a complete statement of accounts will be prepared and issued to shareholders which will show the actual results of the campaign. With regard to the debentures it is be noted that the first batch falls due in December 1891, when it is hoped that they may be replaced by a new issue of capital, or by a loan on very much easier terms.

Director.—Mr. E. G. Low retires in rotation as required by the articles of association but offers himself for re-election.

Auditor.—The re-election of Mr. G. R. Wingrove as the Company's auditor requires the shareholder's confirmation.

W. V. DRUMMOND, *Chairman.*
CHAS. J. DUDGEON, *Secretary.*

—*N. C. Herald.*

BETEL LEAVES OIL, A POWERFUL BACTERIA POISON.

Such is the purport of a paragraph in the American *Grocer*:—

At the Naturforscher meeting in 1888, says the *Pharmaceutical Journal*, Professor Eykman reported that among the constituents of the essential oil distilled from fresh betel leaves he had found a characteristic compound, having the odor of the leaves and the constitution of parallyl-phenol, which he designated "chavicol." About the same time Messrs. Schimmel announced that the phenol present in the higher boiling fractions of the oil distilled from air dried betel leaves corresponded completely with eugenol, though subsequently they made the modified statement that the phenol obtained by them was not eugenol but an isomer. With a view to clearing up the apparent contradiction, Professor Eykman has re-examined the oil distilled by himself from the fresh leaves and some distilled from dry leaves by Messrs. Schimmel, with the result of confirming the presence in the former of chavicol, boiling at 236° to 238° C., and in the latter of the isomer of eugenol, boiling at 254° to 255°, which proved to be orthomethoxy-chavicol (*Berichte*). It would seem probable, therefore, that both phenols occur in the leaves, and that chavicol being the more volatile had practically disappeared from the dried leaves, while the method of distillation adopted by Messrs. Schimmel favored the more complete removal of the higher boiling compound. Some experiments made with chavicol are said to have shown it to be a powerful antiseptic, it being five times stronger as a bacteria poison than carbolic acid and twice as strong as eugenol.—*Oil. Paint and Drug Reporter.*

TEA DUST.

To the Editor of the "Home and Colonial Mail"

Sir,—May I ask space in your paper to draw attention to a considerable source of annoyance and expense which tea dealers experience when dealing in tea dust. Whether it is that the ancient art of making tea chests has been lost, or that the material of which they are fashioned is now of a more brittle nature than formerly, the fact remains that scarcely any carrier will take delivery of a chest of dust unless the package is cased in canvas to prevent leakage. The reason assigned by the carrier is that the packages will not hold in their contents, and hence a claim for loss in transit is a certainty unless the aforesaid precaution is taken. The cost of casing and cording is very nearly ¼d per lb., and as the country buyer, in almost every instance, refuses to bear it, contending that the seller should deliver his goods in merchantable condition, the loss falls on the wholesale dealer, and it is out of his power to recover it from the importer. It may be contended that the dock company is paid by the importer a consolidated rate, which is supposed to cover everything, and hence to deliver the packages in good condition. But the warehouse keepers are also accustomed to canvas tea for the dealers, and as they make a profit on the operation they are interested in the system which renders casing necessary. The carriers are also engaged in the same business, and the consequence is that when a carman appears at the tea warehouse to take delivery of a lot of tea, and the delivery foreman calls out "It is dust," there is an immediate halt in the proceedings. The carman drives off without the tea, and sends to the wholesale dealer the following notice of "stop." "We find these packages contain dust, so we cannot take delivery unless they are cased." The dealer may insist on delivering the tea as it is, but in that case the carrier declines to give a binding receipt, and thus secures himself against claims for loss in transit. This state of affairs has been on the increase for years past, and makes it impossible to deal in tea dust without constant annoyance and expense. The wholesale dealers naturally admit the force of the country buyers' contention that it is incumbent on the seller to provide a merchantable package for his goods. It is now time that planters would look to this matter. It is no part of my present design to advocate the use of anybody's patent metal cistern or *papier mâché* casket, although I decidedly think those packages will answer the purpose of holding dusty tea far better than the ordinary lead lined wooden chest. All I wish to say is that the package in which tea dust is sold ought to be fit to hold it in till it reaches its destination. Planters

might easily ensure this by a little more care in selecting strong chests for their dust teas. If, however, they continue to neglect it, they may, perhaps, find that buyers in this market will give dust teas less attention in the days to come.—I am, &c. D. F. SHILLINGTON.

[If, as we have seen it stated, 150 lb of dust are sometimes crammed into a single chest, we cannot wonder if such chest gives way.—ED. *T. A.*]

THE JAVA COFFEE CROP.—The Amsterdam correspondent of the *London and China Express* writes under date Aug. 13th:—The reports regarding the Java coffee crop for this year continue to be very unsatisfactory, for the Government as well as for the private planters. There are districts in which the crop will not be more than 10 per cent. of the quantity harvested in the past year.

PEPPER &C. IN PERAK.—A report from Kuala Kangsa district states:—

The cultivation of pepper is not making so much progress as might be wished, owing to the want of capital, and the difficulty in procuring plants. There are still a number of applicants, principally Achinese, for pepper land, but the majority of these people are only able to take up from one to three acres each, and they are very often unable to bring even one acre under cultivation, unless they can obtain advances. Kong Lin, however, is making good progress with his estate. He has cleared thirty acres of land in addition to the original clearing of ten acres, which is now almost planted up; but he, also, has experienced difficulty in obtaining pepper cuttings, and informs me that about 50 per cent of those sent over from Penang are not worth planting. He is now clearing ten acres of land near his pepper estate, which he intends planting with orange trees from Kelantan. The fruit of these trees, he informs me, is superior to any produced in the Straits, and commands a ready sale. I have not lately been able to visit the pepper estate at Pasir Panjang, but Syed Musa informs me that it is progressing favourably, and is now partly in bearing. He has about 20,000 dedap cuttings for sale, and can also supply a few pepper plants.—*Perak Government Gazette.*

THE PEARL FISHERIES of Mexico are about to be prosecuted with greater energy, and the Government has just granted a concession for fifteen years to Senor Quaglia for the exclusive right to fish for pearls in the Gulf of California and off the coasts of Lower California. Hitherto the average annual value of Mexican pearls sent to Europe has been about 80,000 piastres, and of mother-of-pearl about 25,000 piastres. The divers (mostly Sonora Indians) are remunerated according to results, and there is a wide margin between the prices fetched on the spot and those obtained in Europe; for instance, a pearl which is bought in La Paz for 500 dollars will fetch about 25,000 francs in Paris. Mother-of-pearl shells, again, which may be bought in La Paz at from 8 to 12 centavos per pound, are worth three times as much in Europe. Mexican pearls take the next place after the Indian for beauty; they are mostly small and irregular in shape, but very hard, and of exceptional brilliancy. In the year 1881 a pearl was found weighing 28 carats, and this fetched 90,000 francs in Paris in 1883, again one of the divers brought up two pearls weighing together 76 carats. Mexican pearls are mostly white, and these are of less value than the brown, black, or pink the latter being the rarest. The finest specimen has been set in the Spanish Royal crown; it weighs 100 carats, and although it dates from the 17th century, it still preserves its ancient brilliancy. The pearl fishery is a very lucrative business in Mexico; the oyster shells brought up sell at the rate of 10 to 12 piastres per 100 kilogrammes, which of itself is sufficient to cover all expenses, everything else being clear profit.—*Times of India*, Aug. 15th.

THE MONGOOSE IN JAMAICA, introduced to destroy rats on sugar estates, has largely effected this object, but unfortunately "this strange bird" as Mr. Whymper called it, did not confine his attention to rats, but has been so destructive in the fowl yards and otherwise that a commission has been appointed to decide the question whether these Indian representatives of the ferret and weazel are not more mischievous than useful and whether they ought not to be exterminated and how.

"CARAVAN TEA."—"Miss Mantalini," writing in the *Pall Mall Budget* of 31st July on various delicacies to be had at Morel's in Regent Street, London, says:—

"Talking about tea, Morel's manager told me he had many customers for 12s 6d tea. This tea isn't packed, and its qualities are that it is weak and scented. The taste for this tea is acquired; it wouldn't suit the general English palate, which likes something rough. It is well known that Russians take all the best of the China teas."

No doubt the wealthy idiots who pay 12s 6d a lb. for "weak and scented" Chinese trash consider good wholesome Ceylon and Indian tea far too vulgar for their delicate palates. We hope that their number is not large.

USES OF THE COTTON PLANT.—Two more have recently been added to the many uses of the cotton plant. A report comes from Germany that a process has been discovered by which sugar is extracted from cotton seed meal. It is said to be very much sweeter than cane sugar but having a peculiar fermenting quality cannot be so generally used. For some purposes however it will be greatly preferred to the ordinary product. The other use is that of making felt from the lint which clings to the seed after it has gone through the "gin." This cloth, it is claimed, will come into wide use for hats, etc, as the process is inexpensive and the material has hitherto been counted waste! What a feature of these modern days is this utilization of so called "waste!" Material that like the cotton seed were but yesterday considered a nuisance and some that were a menace to public health are today by the touch of chemistry and mechanical ingenuity transformed to articles of use and beauty. It surely looks as though those were right who claim that there need be no waste and there will be none when men come to understand nature's forces better. —*Indian Agriculturist*, Aug. 16th.

A NEW INDIAN INDUSTRY.—The Pioneer Glass Manufacturing Co., Limited, has recently been formed in Calcutta to munufacture glassware from indigenous materials, which, it has been found exist in abundance in Bengal and with which experiments on a large scale have already been made by a leading London glass factory. The first experiments were made in the presence of Mr. James Watson (well-known in Calcutta as the inventer of the hydraulic press now in use here) and Mr. Malcolm, of Messrs. May Malcolm & Co., of London, and these, as well as subsequent trials of the Indian materials, proved their suitability for the making of all classes of glassware in use in this country, including window glass. The Company has for the present been formed on a comparatively small scale, but it is intended that the work should be extended in due course. The cost of manufacturing glass articles here is estimated at from forty to sixty per cent, less than in Europe. The Company has secured the services of a highly qualified English expert as manager, and suitable land and buildings have been secured in the neighbourhood of Calcutta.—*Indian Agriculturist.*

THE FUEL QUESTION IN CEYLON.

With reference to the very natural desire of the Uva planters to see the planting of patanas with timber trees on a large scale, reference may be made to Col. Clarke's remarks on the heavy expense of afforesting or re-afforesting processes. We can speak from personal experience of the cost of obtaining seeds which perhaps do not germinate or when they germinate are destroyed by insect or fungoid pests. Plants put out are also too often killed by unfavourable weather, and then, when the planting is successful, there is the long waiting for returns. Nevertheless, tea planters ought to plant trees. One who deserves to be listened to writes to us:—"This is a most important question for the Forest Officers who have to keep up the railway supply, and are looked to to meet the wants of the planting community. The Government will doubtless do all it can, but the planters must look to their own resources. I know an estate on which the other day I strongly advised the planting of the available patana and waste spaces with teas, but the gentleman charged with looking after the interests of the estate *opened the remainder in tea.* I suppose to get a little money for the present, Planters upcountry ought to keep at least 25 per cent of their land in forest if they desire to making their own tea. Damba, the tree you mention as being liked on high estates, belongs to a family very numerous in this country,* almost all of which yield excellent building timber. Wa, as you say, is esteemed by the railway; but, I apprehend, it was only mentioned by Mr. Strong owing to its foliage and flowers standing out so prominently on the land bordering the Railway. There are *many many* other woods equally good for fuel with *wa*, which, indeed, is too good for fuel, being quite a cabinet wood." This agrees with what we heard about beautiful articles of furniture being made from an old *wa* tree (*Cassia siamea*, or *C. florida*) at Negombo. The timber is hard and beautifully mottled.

A VISIT TO THE COLOMBO CIGAR FACTORY.

(From a Correspondent.)

I recently paid a short visit to the Ceylon Tobacco Manufacturing Company's premises at Messrs. Cumberbatch & Co.'s mills in Vauxhall Street, and was much interested in what I saw. The cigar factory is an upstair building, formerly a coffee store. Upon reaching the top of the stairs a busy scene was observed, men, women and children all actively engaged, each one at his or her own special task in the making of a cigar. First were a number of men stripping the ribs out of the tobacco, all seated in line on the floor. Then came a lot of women cutting it up and piling it in heaps ready for the packers. These were mostly boys, who are very expert in gathering up a handful, arranging it and quickly seizing a leaf rough wrapper, he places one end between his toes (not a very agreeable sight for those who smoke the cigars), stretches the leaf, and holding it by his right hand he rolls it into a sort of ship shape, which concludes his work. It is then passed to another who places it in a mould, which is put under a screw press. The mould holds about 15 cigars, and they are pressed in shape, and have to remain in the mould till partly dry. They are then taken out and another wrapper of the finest tobacco, which is imported in boxes and bales from Sumatra and Borneo, is put on. The cigars, after passing through all the hands who have to do with manufacturing them, are passed on to another part of the room where they are packed into boxes, after having been tied into bundles with a pretty yellow silk ribbon.

The boxes are all labeled "The Ceylon Tobacco Manufacturing Company, Limited," and passed downstairs into the drying-room, which is built airtight, with an iron hot-air tube about 18 inches wide running through the centre of it. The thermometer usually registers more than 100 degrees in the room, so that the cigars are soon dry, and ready to be exported. The market usually chosen is Australia, where there is a ready and profitable sale for them. In the drying-room a lot of bricks are used to place on the top of the boxes to keep them from warping. There is also a room where the tobacco is steeped in vats, and placed on a sloping cement platform to drain off the water. This must be done before it can be worked with.

The manager of the factory, Mr. Boyd, has great trouble with the coolies, who are very much addicted to chucking up their billets after they have been taught the art of manufacturing cigars, so that he has to teach fresh hands almost daily. There are about 60 hands in the factory at present, but they sometimes exceed 100.

There is plenty of coarse tobacco in the country to be got cheap, which would do very well for manufacturing cavendish, and I don't see why it should not be tried; there is plenty of sale locally for good black cavendish. The manager says that the ribs taken out of the leaves are all wasted here, whereas they are used up at home for snuff-making, but the heavy duty on tobacco at home prevents its being sent to the London market. Why not start a snuff factory as well? I am sure the natives here are large consumers of snuff, which is all imported, I presume, at present. I love a good cigar, and I must say I have smoked some of the finest to be had in the East, and they were turned out of the Ceylon Tobacco Manufacturing Company, Limited.

COFFEE IN GUATEMALA.

Coffee is the principal staple commodity of the Republic of Guatemala, and its chief article of export. The topographical features of the country are such that climatic influences are favourable to the growth of the berry, varying only according to altitude and care in cultivation, or as the degree of tropical heat may be tempered by copious rainfall, and precautions as to shade during the early age of the tree. The United States Consul at Guatemala says that in cultivating coffee, a nursery is formed by the choice of a level piece of virgin ground, in proximity to water, where the earth is rich. The land must be thoroughly cleared, and the soil dug to the depth of at least nine inches, and made as friable as possible. It is then divided into beds, with narrow paths between. The seed, carefully selected from the soundest grains, either in parchment or with their outer husk, should be sown, row by row, about ten to twelve inches apart. A rope, the length of the beds, stretched from one end of the same to the other, is used for this purpose. The seed, if sown in suitable weather (April being the best month,) makes its appearance in the tender blade above the surface after thirty-five to forty days; so that a nursery formed during the month of April of one year has plants sufficiently matured to be set out during May or June of the following year. Preliminary to the all-important progressive step in coffee culture, that of transplanting, is "holing." The field is prepared in advance for the reception of the nursery trees by digging holes (five yards apart when above 3,000 feet above the sea,

* The *Eugenias* are referred to.—Ed. *T. A.*

and three yards when at the lower level of from 2,000 to 1,000 feet above the sea) to depths of about twelve inches by twelve inches in width. It has been demonstrated, by frequent experiment, that leaving the holes open for three or four months is chemically beneficial to the soil. In the matter of transplanting, the actual placing of the infant trees into the holes prepared for their reception is one that requires the most care and attention of all the operations in the formation of a coffee plantation. Early planting, during the month of May, June, and July, is desirable because the tree have the benefit of the entire rainy season, and are sure to give a larger maiden crop. Coffee trees usually bear abundantly one year and lightly the next. Judicious pruning helps to increase the crops, although no definite rule can be given for pruning old trees further than that no branch should be allowed to yield more than three crops. The average product per acre in Guatemala of coffee cultivation is 1,800 lb. In the preparation for market, the berries are always picked by hand and carried to the ouring house, where the pulp is removed by machinery and placed in a water-tank, where the bean is never allowed to remain beyond a period of twenty-four hours. After the saccharine scum which covers the bean is washed off, the contents of the tank are turned out upon large drying grounds of cement, called *patios*, upon which the coffee beans are thinly spread. It is important that the coffee shall be constantly turned until all the surface is dry, and the beans cease to adhere to each other, while care is taken not to break the parchment whilst exposed to wind or sun, as every hour's exposure to the atmosphere, after removal of the parchment husk, takes away both the colour and aroma of the bean. When the beans are thoroughly dried and hulled, the sorting operation commences. Generally "firsts," "seconds," and "thirds" are prepared for packing into Dundee or Calcutta sacks of 130 to 135 lb. net each, and upon its completion the coffee is ready for transportation on the backs of Indians or mules, or in carts drawn by oxen, to the nearest railway station for the most convenient port of shipment. The largest bulk of the "firsts" finds its way to London, the "seconds" to Germany and France, and the "thirds" to the United States. The labour on the coffee plantations is performed by the Indians of the country, whose remuneration varies from 19 to 25 cents in Guatemalan currency. The Indians subsit on *tortillas*, a corn cake and *frijoles*, the bean of the country, both corn and bean being grown by their own labour on patches of ground on the squatter system, which belong to either the owners of the estates where they are employed, or are unsold Government lands which are thus gratuitously appropriated.—*Journal of the Society of Arts.*

SCIENTIFIC GOSSIP

on the kola and areka nuts, on tea, camphor and other substances, as given in the Melbourne *Leader* is interesting. It is specially important to learn that tea grown under shade, so as to be partially blanched, possesses nearly one-third more theine than tea grown in the open. It is, however, startling to learn that theine is a poison! We quote as follows:—

The Kola nut of South America and the areca, better known as the betel, nut of India have had much attention paid to them of late, because there is a disposition on the part of Europeans to give thom a trial on the supposition that the South Americans and Indians must have really derived advantage from the virtues they are supposed to possess. The Germans have resolved to give the Kola nut to their soldiers when on service in a campaign, because it is at once a food and a stimulant, containing within a small space more nutriment and more capacity for maintaining strength than any other condiment. The consumption of this nut may have its drawbacks, but they have yet to be found out, and the experiment is at least worthy of being made. The nut contains a large proportion of theine and of theobromine, so that it is at least probable that it has some sustaining properties, although these are probably exaggerated. The chocolates sold as sweetmeats may have similar properties, and we may hear of their being added to the commissariat of the French army, so that the virtues of the two stimulants may be tested in future warlike encounters. The Indian areca nut is regularly eaten every day in the year by 100,000,000 of the population. There is an annual importation of upwards of 30,000,000 lb. from Ceylon, the Straits Settlements and Sumatra, and they are exported in considerable quantities for the use of Indians living in Zanzibar, Mauritius, Aden, China and other countries. The fresh nuts have intoxicating properties and produce giddiness. These objectionable properties are much diminished by heat and by drying, and many cautious people decline to use any except those nuts which have undergone a process of cooking and are known by their color. The original wild nut was intoxicating, but the only nuts now used are from cultivated trees, and these are milder. They are only intoxicating when unripe, and then but slightly. The nuts are eaten with the betel leaf, the praise of which is sung in the ancient books of the Hindoos, which attribute to it no less than 13 valuable properties which are duly enumerated. Modern medical men vouch for the fact that the essential oils of betel leaves are highly beneficial in catarrhal affections and throat inflammations. Further researches into the properties of the nut and leaves are evidently called for, because their preparation by native methods are a good deal regulated by superstitions. The betel leaves are mixed with other spices and with lime to form *pan*, with which the nuts are eaten. An organic poison can be extracted from the nut, and when this is injected under the skin of rabbits and cats they die in a few minutes: but the same may be said of a great many other vegetable productions, the Kola nut inclusive, which are usually regarded as harmless. Even the lettuce contains such a poison. The arecanut grows on a palm which is supposed to have been indigenous in the Malayan Peninsula and Islands, but is not now found in a wild state. The Indians no doubt indulge too freely in the use of the arecanut and betel leaves but for exceptional use they may be found to be medicinally beneficial. If the reverse be the case, further investigation is demanded on behalf of the 100,000,000 betel eaters.

The finest tea, in oriental estimation, is gathered from shrubs which have been kept shaded for three weeks, so that the leaves are partly etiolated or blanched. It is called "flat tea," because the leaves are not rolled; they are merely steamed, and are never touched by the hand but turned over by the aid of a bamboo stick. After steaming they are merely dried. There is nothing in this process to justify the high price demanded for the tea. A Japanese chemist, Y. Kozai, assistant in the Agricultural Chemical Laboratory, has analysed this tea and found that it contains 30 per cent. more theine than the tea made from leaves grown in the sun. The work done by the chemist appears to be reliable. He analysed the natural leaf and the same manufactured into black and green tea. The chief difference he found was in the quantity of tannin, which was large in the natural leaf and in the green tea, but very much smaller in the black tea. He maintains that there is nothing injurious in faced tea, the Prussian blue being only 1000th part of the weight; but he is severe in his condemnation of the practice of mixing with the tea the leaves of other plants which

contain tannin but no theine, although he admits that none of them are injurious to health. He supplies some hints about the making of tea which have at least novelty to recommend them. The very fine teas are ground to powder, and this is infused in water not much more than lukewarm, the temperature ranging from 120 to 150 Fahrenheit. Medium quality tea is infused for one minute only in water at the boiling point, while inferior black tea requires to be absolutely boiled. What tea drinkers want is a combination of quality with cheapness, and this should not be unattainable.

Theine is a rank poison, but it does not follow that tea, coffee, cocoa, maté, and many other kinds of foliage and fruit are fatal to life or even in any marked degree injurious to health. In like manner prussic acid kills instantaneously, and yet bitter almonds and apple-pips may be eaten with impunity. Vegetable poisons may, as a rule, be taken in small doses, not only without much risk, but medicinally, with advantage. It need not, therefore, be looked upon as surprising that the Americans have made the discovery that strychnine lozenges may be taken without any immediate lethal consequences. It is contended that a lozenge containing the 13th of a grain of the alkaloid serves as a tonic, bracing the system and banishing languor. But who says so? Any eminent physician? No. Somebody has said so, and rumor keeps up the fallacy. The practice is dangerous, and should be discountenanced. The habit of taking strychnine lozenges may become confirmed, and may lead to a craving for larger doses, as opium eating does. Not only is strychnine poisonous, but so also is the plant from which it is extracted. Daturin is an allied alkaloid, and medical men not infrequently advise patients suffering from asthma to smoke the stalks of the thorn apple or datura stramonium, but it may be questioned whether the alkaloid is not destroyed during the combustion. The strychnine lozenge is a more serious affair, and its consumption has its analogue in tobacco chewing, although no one has yet taken to the use of nicotine lozenges. Those who take drugs of this kind, in any form, unless in obedience to the orders of their medical advisers, are not deserving of sympathy when their indiscretion leads to suffering.

There is a scarcity of camphor in Europe, and it has gone up enormously in price, which has advanced from 1s to 3s 6d per lb. The explanation given is that camphor is used in large quantities in the manufacture of smokeless gunpowder. It is just as likely that a camphor ring has been formed, and that large quantities of the drug may be stored somewhere awaiting a further rise. In the meantime a Paris physician recommends it as a specific in cholera—a very old idea which may have little but its age to recommend it. —Melbourne *Leader*, Aug. 2nd.

SELLING QUININE FOR FUTURE DELIVERY.

For some weeks past there has been a revival, on a rather modest scale, of the speculation in quinine, which at irregular intervals lends a temporary flicker of excitement to the dealings in that unfortunate product. In spite of the oftrepeated lessons of former years, it seems that there are still persons sanguine enough to believe that a good thing is to be made by investing money in quinine. There are never wanting intermediaries who with an eye to brokerage, are ready to prove with the aid of statistics that the market *must* soon take a turn for the better, and that if facts hitherto have unfortunately failed to agree with their predictions, so much the worse is it for the facts. Any spasmodic revival of speculation brings grist to the mill of the brokers who are manipulating the purchases on behalf of investors, and the kernel of whose philosophy may be considered to lie in the axiom *après moi le déluge*. Outsiders have been drawn into the stream by relying on the slender knowledge displayed in certain "financial" jonrnal which have permitted the columns to be used for the furtherance of some operators' veiws. The communication which we print on another page of this issue from an Amsterdam cinchona broker of standing may be studied to some advantage by people who are always ready to allow themselves to be drawn by the infallible statistic system. Our correspondent propounds the theory that the quinine price cannot permanently advance so long as one or two "speculative" manufacturers are able to depress it to their own immediate advantage, and with complete impunity so far as they themselves are concerned, by a simple but efficient system of contracting with the Java planters to supply them direct with their bark at a price to be dependent on the basis of the quinine unit existing at the time when the bark shall be delivered. The planter thereby saves auction expenses, brokerage and warehouse charges; he knows that, come what may, he is sure to be able to dispose of the whole of his produce at the market price of the day; and preferring modest certainty to capricious chance, he delivers himself into the hands of the speculative manufacturer. Now what is the position of the latter? He has to face a keen competition, and can only keep his head above water by either forming a "combination" with his rivals, or elbowing them out. "Combination" has been tried and found wanting, and the other alternative is therefore being pursued with vigour. The manufacturers' mode of procedure is sketched as follows: Having made his contract with the planter, and knowing that he can depend with certainty upon a supply of bark equal to, say 300,000 oz. of quinine in the course of the season, he proceeds to attract buyers by offering quinine at an exceptionally low figure, to be delivered, say in four or five months' time. Being the lowest in price, he secures orders, and his rivals, who have to buy their material mostly at the public sales, are bound either to follow suit, handicapped by the want of a certain cheap supply of cinchona in the future, or to give up the competition and trust to the established reputation of their brands for the preservation of certain channels of consumption. When delivery of the quinine is due, the "speculative" manufacturer is in possession of the cinchona from his Java planters, and as he pays them upon the basis of the quinine unit ruling at tho time of delivery—which, in a period of abundant supply, he is able to influence towards depression by underselling his competitors in advance—he is sure to make a profit, small may be, but absolutely certain, the Java man paying the piper. The names of the clever operators referred to will occur at once to anyone familiar with the London drug market. As a matter of fact there are and have been for a long period, only two or three so-called "speculative" quinine makers. The others have ceased to "compete" seriously in the "future delivery" business, and are waiting for the time when the system, which must natutally be a hazardous one, shall be relinquished. In confirmation of our correspondent's theory, for which we disclaim any responsibility ourselves, but which is certainly an ingenious one, we may point to two items which were published in our journal about a year ago. At a meeting of the Soekahoemi Agricultural Association of Java (to which most of the cinchona planters of the island belong) held early last year, a letter was read from Messrs. Zimmer & Co., of Frankfort-on-the-Main, expressing a desire to enter into negotiations with Java cinchona growers for the *purchase* of their entire production of bark outright, to save charges. At the annual meeting of shareholders in the Soekanegara Company held in Amsterdam last June, it was announced that the whole of the cinchona produced on that company's plantations had been consigned to the Brunswick Quinine Works at an average price (for 1888) of about 10¼d per oz. for its equivalent of quinine sul-

phate. The Soekanegara plantations produced in 1888 104,000 kilos. bark, equal to 4,680 kilos. quinine; in 1889 132,000 kilos. bark, equal to 5,610 kilos. quinine; and their estimated crop or 1890 is 100,000 kilos. bark, expected to yield 4,500 kilos. quinine. They rank among the three or four largest private plantations in Java.—*Chemist and Druggist*, Aug. 16th.

GOLD IN MADAGASCAR.

The discovery of gold in large quantities in the great African island of Madagascar just at the moment when Europe is turning for fresh fields of enterprise to the dark continent, is an event of more than local importance. Silver has long been known to be a pretty whispered mineral in the island. But hitherto the Hovas Government has discountenanced any attempt on the part of adventurers from Europe to exploit the island inquest of precious metals. With the establishment of the French protectorate a few years ago the country has been to some extent opened up to foreigners. Already a "gold rush" on a small scale has commenced to the island, the adventurers hailing from the French West Indian Colonies and the Hovas are beginning to see that it is impossible to keep white men out of the country, once the existence of the fatal metal becomes known. Possibly the Malagasies will share the fate of the Australian aborigines and the Maoris within our time and the output of gold from the once most exclusive island will begin to exercise an appreciable effort upon the world's store of the precious metals. But the climate of Madagascar, which is not favourable to Europeans may save it for a time. The country is one eminently adapted for mining industries, labour is cheap, and the gold-bearing reefs are not far from the coast. Indeed the metal appears to be pretty generally distributed all over the island though it is found in greater quantities along the west coast. Already a good many speculators are buying up likely land in the island and an influx of miners from America, Australia and South Africa is expected to commence.—*Indian Agriculturist*, Aug. 23rd.

TEA IN JAPAN.—The *Japan Weekly Mail* of Aug. 16th says:—"Nothing new in tea; sales and prices about the same as for the last few weeks, though fully five and a half million pounds more have been shipped this season than last year at same date." The *Mail* in its issue of Aug. 22nd says:—"The tea trade is steady, and values are unaltered. The receipts of leaf here are already 5,000 piculs more than the total last season, and there is doubtless a good deal more to come in if present rates are maintained."

ODESSA is doing a large and increasing trade in China tea. In the month ending the 15th July, seven tea-freighted steamers were timed to arrive at the Russian port, five of which belong to the Volunteer Fleet, the other two being specially chartered English vessels. The tea freight is chiefly destined for Moscow and St. Petersburg houses, the consignors in those cities having engaged three hundred waggons on the South-Western Railway for transport. A correspondent thinks, however, that the prospect of the Chinese tea trade is on the whole anything but encouraging for the Chinese themselves. "For some time to come Russia will probably continue to be a chief buyer of Chinese teas, but the amount of her purchases will gradually diminish with the rapid propagation and development of the new tea plantations in Russian Central Asia." The writer adds that undoubted preference is now being manifested alike in England, the British colonies, and the United States for Indian and Ceylon teas.—*Indian Agriculturist*, Aug. 23rd.

THE WORDS FOR SUGAR IN DIFFERENT LANGUAGES are quoted by the *Sugar Cane*, in a review of an elaborate work on sugar by a Dr. Lippmann. We quote the curious paragraph:—

In the next section, that entitled "Sugar at the time of the Crusades," is an interesting dissertation, founded on the studies of Littré, Diez, Grimm and others, on the word sugar in various European tongues.

From the original Indian form *çarkara*, which in Prakrit became *sukkara* (the habit being to drop the letter r before a consonant, and replace t by reduplication of the following consonant) was formed the Arabic *sukkar*. This word naturally became the parent of all the different forms such as—azucar (Spanish, from alsukkar, pronounced assukkar), assukar (Portuguese), zucchero (Italian), chuchre (Proveucal), chucre (old French), sucre (French), zukura (old German) zucker (German), zocker (Flemish), suyker (Dutch) sokkar (Swedish), syker (old Norse), sukker (Danish) sachar (Russian), cukier (Polish), cukorus (Lithuanian), cukra (Bohemian), czukor (Hungarian), shicker (Mongol), shakara (Tibetan), shakar (Persian), shachara and shukar (Armenian) sheker (Turkish). The middle Latin contained as many as 28 forms, varying from chuchra to sachara, zockra, zaccarum, and zukurum, the last agreeing most nearly with the usual Latin form saccharum.

ELEPHANTS AND IVORY IN AFRICA.—From reminiscences of Equatorial Africa, which are appearing in the *Pioneer*, we quote a sad passage:—

We also came across traces of the wild elephant during this march, the spoor being quite fresh, and the broad track they had made for themselves proved the herd to have been a very large one. There was a freshly beaten path through the jungle, with the saplings bent and twisted down, branches of trees torn off and denuded of their foliage, and an occasional uprooted bush lying about the track, looking as though a battery of heavy guns had been forcibly dragged through the place, cutting up the soil into deep ruts and damaging the trees by its transit. That the herd could only have passed but a very short time before was evident; but we followed up the path for some distance we failed to get a glimpse of them. The natives have a very barbarous method of killing these huge animals which they described to us with great gusto, evidently considering it to be very ingenious and not seeing anything cruel in it. They did not dare to face them in the open, but used to carefully mark out the spots near the river where the elephants were accustomed to come to drink. Selecting some tall tree overhanging the path, they would conceal themselves among its thick foliage for days together in the hope of seeing the huge beasts pass underneath their hiding place. The weapons they employed were very heavy barbed spears, having long pliant shafts attached to them, and these they hurled with great force upon the elephant below. The animal immediately dashed off at a tremendous pace through the jungle as soon as he felt the wound of the spear. The long handle kept striking against boughs or catching in thickets, making the terrified animal still more mad with pain and fright, and causing the iron barb to inflict a wider gash. The cruelty of this plan was not merely in the self-inflicted agony of the moving barb, but in the length of time that generally elapsed before the poor beast would slowly sink from exhaustion and loss of blood. They told us that they had followed up the track for as many as four days before coming up with the wounded elephant; and the horrors of its death seem (as they vividly described it to us), with a circle of tormentors hurling their spears from a respectful distance until its carcase resembled a huge pincushion, were enough to make one look on ivory with mingled feelings ever afterwards. Yet one could not blame those savage hunters, for, as they themselves said: "We have no big guns such as you possess, and one would much rather kill them quickly than slowly." It is to be hoped for the poor elephants' sake that they may soon possess the needed rifles, for as the competition among the East African Companies will increase the demand for tusks, and for every other saleable commodity those forests can produce, the probabilities are that the native hunters will have a busier time of it than ever. How long the ivory will hold out is another question.

LUPINS AS BINDERS AND REGENERATORS OF SANDY SOIL.—There is an interesting paragraph on this subject quoted from the *Madras Mail*. The only question is would lupins thrive at sea level in the tropics. Von Mueller describes the white lupin as common to countries on the Mediterranean Sea, *also in the orient*. Of *Lupinus arboreus*, which is referred to California, he writes :—

This has been used there for reclamation of sand, on account of its long tap-roots, the latter having been traced to a depth of 25 feet, while the stems were only 3 feet high. The germination is easy and the growth rapid on the sand-downs. For aiding the young lupines during the first two months, to get hold of the sand, barley is sown with them, as the latter sprouts in a few days and holds the sand in the second week; the lupine subsequently covers the sand with a dense vegetation in less than a year.

And of the lupin specially referred to, *Lupinus luteus*,

The Scented Yellow Lupine. Countries in the vicinity of the Mediterranean Sea. Can be grown in Norway to lat. 70° (Schnebeler). This annual species is predominantly in use as green manure through Middle Europe; to improve sandy soil, it is the best of all yet tested, and will do even on coast-drifts. It can also be employed like some other lupines as a fodder-herb, green as well as for hay; some lupines are also very valuable as pasture-herbs. Lupine-seeds are very fattening, when used as an addition to ordinary fodder, and are in this respect quite equal to oil-cake, while the foliage is said to be not inferior to that of clover and more bulky. Nevertheless some lupines have proved poisonous to sheep. About 90 lb. of seeds are required for an acre. Langethal observes: "What the Sainfoin does for the poorest-limestone or marly soil, that the Yellow Lupine carries out for sand-land" Lupines are not adapted for wet or moory ground, nor for limestone formations, where most other leguminous fodderplants do well. Mr. Joseph Augustin speaks of a yellow-flowering lupine, which sometimes in the Azores attains a height of 12 feet in three months. Plants native to California ought to succeed fairly in Ceylon.

AGRICULTURE IN JAVA is thus noticed by a writer in the *Pioneer*:—"The hamlets look like green islets in a sea of golden rice. Immediately outside the ring fence which has been described commences the rice or other cultivation. Not a square yard of ground seems to be wasted, and the care and evident labour with which each bit of slope is terraced and supported, the greatest area thus being obtained for the rice crop, is most admirable. These terraces are carried up the sides of the highest mountains, the mighty volcanoes themselves allowing the cultivation to creep up within what looks a dangerous distance from their craters. The water for irrigating the crops is brought from the hillsides and is unfailing. This enables the cultivator to get two rice crops off the same field, and this staple appears on the village lands in the month of April, in all stages of growth from sowing to harvest. The main crops are rice, Indian corn, beans, sugarcane (eight kinds), coffee, pepper, indigo and tobacco. During the past three years a blight has affected the sugarcane, stunting the growth and seriously diminishing the outturn. This has been a severe blow to the factories. Rice is still an article of export, so that, in spite of the enormous increase of the population, which now is said to reach twenty millions as against five millions in Raffles' time, the island more than feeds itself. The cocoa tree, with its beautiful blossoms and fruit, both on the tree at the same time, is to be found in many of the peasants' gardens, and the coconut and the sugar palms abound. All the Indian fruits are to be seen in the bazaars, together with the durian and the mangosteen."

TREES IN WESTERN AUSTRALIA.—The following is from a "Naturalist." Mr. A. J. Campbell, F.L.S., writing about Western Australia in the *Australasian*:—

Leaving Perth midday on the 30th December—a sultry day—we proceed through open timber and scrubby country. Christmas trees, in golden bloom arrayed, lift their heads above the "stinkwood" scrub. There are Banksias great and small and healthy patches where she-oaks and grass trees give figures to the landscape. I never look at a she-oak (but why "she" when half the trees are males?) without thinking of its far-fetched, although euphonious, botanical name. *Casuarina*. *Casuarius* (Cassowary) signifies the cassowary, a large bird, whose hair-like plumage is the equivalent of the more perfect feathers in other birds; and it has been thought that the wiry foliage of the she-oak stands in like relation to the better-formed leaves of other trees.* The general nature of the soil is sandy, but dark and loamy, especially where twisted white-bark ti-tree stems stand out in bold relief. Passing Guildford, eight miles from the capital, some fine orchards are seen in the stiffer reddish soil. Figs almost grow wild here, judging by the large trees bearing prolific crops. Now we are winding among the ironstone spurs of the Darling Ranges. Having crossed that natural barrier and descended into the level country, we leave the rough-barked jarrah and smooth silvery barrels of the wandoo in the rear, and York gums with rough dark-grey stems, commence to asser themselves. The cultivated soil grows good wheat; not strange to say, although the population of Western Australia is only 48,000—exactly one-tenth that of Melbourne—energy is lacking to raise sufficient grain for local wants. At 8 a. m. we leave Beverley, and are soon speeding south over the West Australian Land Company's section—242 miles of railway, with its 3,000,000 acres. This is undoubtedly the largest land syndicate in Australia. There is plenty of open acacia scrub around. "The land of the acacia" would in fact fitly apply to Western Australia, because out of 300 Australian species about two-thirds have been recorded for this territory. The most conspicuous is *Acacia acuminata*, vulgarly called raspberry jam wood, for when its dark-brown timber is worked a scent is given off exactly like that of the well-known preserve. One of these trees at a distance resembles a balloon without a car, having a crown of narrow light-coloured leaves, supported by numerous long stems branching from near the ground. At a wayside station, I examine one of the stems and find it a perfect conservatory for lichens. One piece of bark only 6in × 2in., which I subsequently submitted to a lichenologist, supported no less than eight varieties. Many of the jam-wood trees, which are about 10ft to 20 ft. high, bear the mistletoes. On reliable authority I learn that the sweet little swallow Dicæum feeds on the mistletoe berries when they are in season, as this bird does in every other part of Australia. From the jam-wood, which is very durable, blackfellows manufacture their wommoras and boomerangs, while a dwarf tough mallee, which they call "marluck," is suitable for slender spears. Now and again we get a glimpse of the pendulent foliage of a small sandalwood tree (*Santalum cygnorum*) All the marketable specimens seem to have been cut except on the back block from whence they are carted to the different railway stations where their wood of delightful fragrance may be seen in great heaps. It is valued at about £8 per ton. During 1888 £33,595 worth was exported to China, where it is used solely to burn as incense before idols. I understand a company is about to distil oil from the wood, as sandal oil is frequently used for medicinal purposes as well as for blending in the manufacture of perfumes. The sandal-wood tree closely resembles the quandongs of Victoria.

* Absurd as "sheoak" is (the grevillea is called silk oak), the term "beef wood" is still worse. In driving Mr. Hennikes Heaton and a party of friends along the fine avenue of casuarinas which leads to the Lunatic Asylum, that was the term we heard applied by the Australian colonists to this graceful pine-like tree.—ED. *T. A.*

PETROLEUM AND OTHER LIQUID FUELS FOR USE IN THE WORKING OF STEAM ENGINES.

We have always taken a great interest in the question of utilizing petroleum as a source of steam production in engines and, also, if that should be found possible by the repression of the odour as fuel for drying furnaces in tea factories. We have written often and quoted largely on the subject, and latterly we have been waiting for more light on the question before noticing some important papers with which we have been furnished, in order that we might deal with them. We are disappointed that a reliable authority to whom we sent a paper on the Priestman oil engine should return it with the statement that he had not seen a Priestman's oil engine or heard any definite particulars about its working; but he has promised to make inquiries and communicate the result. Meantime he writes —"If what the makers say about it is correct, it is just the thing we want for estates with no fire-wood left." As our readers are aware, this is the only oil engine which has yet been put to the test of actual trial in Ceylon, and it has been favourably reported on. The serious questions here in Ceylon of course, will be the cost of the oil and the quantity required per horse-power. We have always felt that the prospect of a large use of petroleum in Ceylon, for engines or furnaces, depended on the possibility of using the waste or refuse product resulting from the refining of the crude oils. To admit of the import of such waste substance, we suppose the Ordinance No. 6 of 1887 would require to be amended, for by that Ordinance petroleum is held to be dangerous when the flashing point is below 76 of Fahrenheit's thermometer. We cannot doubt that means could be devised, by chemical treatment or mixture with other substances, whereby waste petroleum could be rendered safe (the danger of explosion and contaminating odour being equally obviated), and the prospect is that we need not be dependent on America or Russia for this class of engine fuel. It has been found and is being constantly discovered in various parts of India and Burma and is used in locomotives on the Indian State railways. Meantime, with reference to our Ceylon standard of safety, it is curious to find in the description of the Priestman engine the statement that there can be no danger, because "oil can be used, having 800 specific gravity and upwards, with flashing point from 75deg. (1deg. below our safe point) to 150deg." But we suppose 75deg. as flashing point is safe enough, because our Petroleum Ordinance provides

"That when all or any of the petroleum on board a ship or in the possession of a dealer is declared by the master of the ship or the consignee of the cargo, or by the dealer, as the case may be, to be of one uniform quality, the petroleum shall not be deemed to be dangerous if the samples selected from the petroleum have their flashing points, on an average, at not less than seventy-six degrees of Fahrenheit's thermometer, and if no one sample has its flashing point below seventy-three degrees of that thermometer."

As to cost of petroleum and kinds of oil or fuel which can be used, the paper on Priestman's engine states:

"Oil used is about 1.25 pints per actual h.p. per hour for the larger, and about 1.6 pints for the smaller engines with full load. Mineral oil can be purchased in England at about 6½d per gallon, costing from 1d to 1¼d per actual h.p. per hour. Any ordinary mineral oil suitable. Royal Daylight, Russian, Orient, Tearose, King's County, Water White, White Camelia, Pipe Line, Scotch Paraffin, Prime White, American Fuel, &c."

We suppose that the quotation "1d. to 1¼d per actual horse power per hour" for petroleum oil would have to be increased by at least 50 per cent for Ceylon, say 1½d to 1¾d, or say to 2d per h. p. per hour. If crude oil or waste product could be used, the cost would, of course, be less. It is claimed for the engine that it is perfectly safe, because "Oil and not spirit is used." Amongst the merits claimed for this engine are:—"No gas, *no steam*, (?) no danger, no chimney, few working parts, no extra insurance, piston self lubricating, quickly started, no coal, no boiler, no fire, *no driver*, (?) no water consumed, repairs very small, little space required, works anywhere." And then as to mode of working:—

"The working of the Priestman Oil Engine is so simple that an unskilled person can give all the attention it requires. The motive power is obtained from Mineral oil, one or two days' supply being placed in a closed iron vessel inside the foundation of the engine. The oil having been mixed with air under pressure, is drawn into the cylinder and ignited by an electric spark from a small ordinary battery supplied with the engine. To start the engine, after heating the vaporizer a few minutes, it is only necessary to admit a small quantity of oil into the cylinder by taking a turn or two of the fly-wheel. Little or no attention is required in working the engine, and there is no risk in leaving it unattended, as, should the oil become exhausted, the engine will then only cease to run. Detailed working instructions are sent with every engine."

There are certificates from such scientists as Sir Wm. Thomson, and testimonials from persons who have used the engines for widely differing purposes, one gentleman stating "In a place like mine where water is scarce, and a high pressure engine unsuitable, your engine is indispensable." The prices seem fairly moderate, but these the local agent can supply. We may, however, quote a note to the effect that

"These prices include, besides the engine, all the plant required for creating oil vapour, making the user entirely independent of boiler or gas works. There is little or no expense in fixing these engines, as they are self-contained."

So far in regard to Priestman's engine, in which oil only is used. But we have also before us a paper on

"Holden's Patent System" of using liquid fuel as auxiliary to solid fuel in the fireboxes of locomotives or boilers of similar type.

The advantages here are that a mixture of fuels, or a particular fuel alone, can be used according to circumstances, the calorific value of coal or wood being apparently greatly increased by a mixture of "green oil," (?) or coal gas tar. We quote as follows:—

"By this system, liquid fuel and air are introduced into the firebox above a thin layer of solid incandescent fuel by means of a special injector, and burnt in combination with the solid fuel, without any alteration of the firebox, other than the insertion of one or more tubes through the casings, the boiler so fitted being equally suitable for the use of ordinary fuel. The use of this method results in effectual combustion, entire absence of smoke, intense and regular heat, and great economy of fuel. Slack, inferior coal, lignite, cinders, wood, peat, or sawdust may with equally good results be used as solid fuel. The air necessary for combustion, not having to be introduced through the fire, a very small amount of draught is required, and in the case of locomotives the orifice of the blast pipe may advantageously be enlarged from 50 to 60 per cent, reducing the wear and tear of the firebox, tubes, smokebox, and chimney, preventing the emission of sparks and ashes, and conducing to economic and efficient working by the diminution of back pressure.

From a description of the patent in *Engineering*, we learn that

"The first experiments of Mr. Holden on liquid fuel burning were made at the Stratford works of the Great Eastern Railway Company on a boiler in the

department where oil gas is manufactured for lighting trains. At these gas works one of the products is a tar which it is difficult to dispose of at any price, but this is now burnt under the boiler, which was fitted with the liquid fuel apparatus early in 1886. The boiler is a small one of the Cornish multitubular type, 10 ft long by 4ft. in diameter, with a furnace 7 ft. long by 3 ft. in diameter, from which 122 iron tubes 1¾ in. in diameter by 3 ft. long extend to the back of the boiler. The boiler is worked at 60 lb. pressure, and when coal was used the consumption per week (79 hours in steam) averaged 68 cwt. 1 qr. 16 lb. or 97.1 lb. per hour. With the liquid fuel apparatus the consumption per week, with 69 hours in steam has averaged 454½ gallons of tar and 2 cwt. of coal, or an average per hour of 65.9 lb. of tar and 3.3 lb of coal."

The question is whether the tar referred to, as "difficult to dispose of at any price," could not be imported and used here more economically than petroleum, or coal, or coke? In the case of a printing office boiler

A comparison of the cost of working with coal only in 1887, and with coal and liquid fuel during the present year [1888] (the comparison being made for a week in each case), gives the following result:

Coal only Used.

1887. Consumption during one week from August 15th to 20th (inclusive), 74½ hours' work, including lighting up=80½cwt.=121·3 lb. per hour.

Cost for 100 hours=12,130 lb. of coal at 11s per ton =2*l.* 19s 7½d.

Coal, Coke, and Tar—"Holden's System."

1888. Consumption during one week from June 25th to 30th (inclusive), 87¾ hours' working including lighting up

=coal 15 cwt.	=19·2 lb.	per hour
=coke 11½ ,,	=14·7 ,,	,,
Gas tar 280 galls.	=35·1 ,,	,,
Total	69·0 ,,	,,

Cost for 100 hours

				s.	d.
=1920 lb. of coal at	11s 0d	per ton	=	9	5¼
=1470 ,, ,, coke ,,	9s 6d	,,	=	6	1½
=3510 ,, ,, tar ,,	12s 6d	,,	=	19	7¼
Total			..£1	15	2

Again:—

Various kinds of liquid fuel have been used, and the apparatus appears capable of dealing with any of the ordinary marketable qualities. On the occasion of our making a trip on the engine there was being burnt a mixture of one-third "green" oil with two-thirds tar, and this was burnt entirely without smoke or trouble of any kind. Roughly speaking the consumption of fuel on the engine above referred to is one gallon (or 11 lb.) of liquid fuel (a mixture of two-thirds ordinary gas tar and one-third creosote or furnace oil) to about 14 lb. of coal per mile.

Engineering, in summing up, states:—

"It will be seen from the facts we have stated above, that Mr. Holden's system of using liquid fuel is one of very great promise, and it appears to us of especial value for use in cases where it is of importance to be able to at once revert to burning coal alone, as may occur in consequence of fluctuations in the market price of oil or other circumstances."

Whether the Priestman engine is adopted or not, our readers will see that great benefits can be derived from a mixture of liquid with solid fuel in furnaces.

As might have been anticipated, Messrs. Marshall of Gainsborough, so well known as the manufacturers of tea machinery, have not failed to lay themselves out to meet the demand for appliances wherewith to burn petroleum as engine fuel. In papers with which we have been furnished we find the following notice:—

"Petroleum as fuel in locomotive and Vertical steam boilers. In many parts of Ceylon, India, &c., where coal and wood are scarce or costly, we beg to draw the attention of Planters and others to Petroleum and other mineral oils for use as fuel in the Boilers of our Steam Engines. We can supply the necessary Apparatus and Fittings, which can readily be attached to our Locomotive and Vertical Boilers, for using this class of fuel, and they can quickly be removed and the Furnace used for burning wood or coal if required. The apparatus is simple and efficient, and we shall be happy to furnish full particulars and prices on application."

In reply to a Firm who had written to them on the subject, it was stated:—

"In reply to the last paragraph of your letter *re* Petroleum burning we have supplied an arrangement for this purpose to a number of Locomotive Boilers from time to time, and we see no difficulty in its application to Boilers of the Vertical type also. We give you at foot, prices of the necessary plant in connection with existing Boilers.

"This would consist of a tank to hold the oil-coil to heat the same from the exhaust steam—the necessary injector and pipe—and also the firebrick material for the inside of the firebox. The refractory material for the grate we do not supply, as of course anything of an imperishable nature would suffice for this, road material or any kind of clinker that is available would do very well for this purpose.

"With regard to the quantity of oil consumed so much depends upon the kind of oil used, but we may explain that in our experiments at the works we used about 3 pounds (3 pounds) of oil per indicated horse-power per hour, that is about one-third of a gallon.

"From the above explanation your Managers will readily be able to ascertain the quantity used per day, as each will have an idea what indicated power his engine is giving off, and will then readily be able to calculate from the above what quantity of oil it would consume. Our experiments here were conducted with what is called "Refuse Oil" but if the oil is of better quality the consumption would be less.

"Cost of Petroleum Burning apparatus to existing Boilers including oil tank and coil, injector and piping, firebrick lining for firebox.

6 H-p. £20 10 H-p. £24
8 H-p. £22 12 H-p. £26. Subject to usual terms."

Our readers will thus see that they can, if destitute of an engine and requiring one, obtain a Priestman engine for the consumption of oil alone; or engines in use can be supplied with the needful apparatus for the consumption of petroleum; or finally they can get increased heat with increased economy by using as fuel a mixture of liquid and solid substances having calorific properties. The curious point in the whole matter is that even Messrs. Marshall, who ought to know much about the delicate character of tea and its absorbing qualities, express no apprehension and suggest no caution as to prevention of petroleum odour coming in contact with the tea in the store. We suppose the danger has been calculated and thoroughly provided against.

PLANTING IN WYNAAD.

Aug. 27th.

After two months, during which hardly a single day passed without a considerable rainfall, we are now enjoying a delightful break in the weather. This was very greatly needed, as the constant damp not only checked growth, but it did an infinity of mischief to the coffee by rotting the leaves and, worse still, the berries. This is really a case of adding insult to injury, for surely our crops need no diminishing and it is cruel work to see the very little we have falling from the trees. I am sorry to have but a bad report to give you anent leaf disease and borer, both of which are simply ravaging the estates all round. The appearance of some of our finest properties is shocking, and so severe an outbreak of both these terrible epidemics, must seriously affect the trees. Possibly under such circumstances, the fact of little or no crop may be an advantage, as the coffee has one less drain on its enfeebled constitu-

tion. But I believe a discouraging view is held generally of the future of Arabica, and this is sufficiently proved by the large and steadily increasing demand for Liberian seed. In fact, the time has evidently come for planters to depend no longer on the old broken reed. Arabica will give crops in perfectly new clearings, if heavily manured, for a few years, just long enough to allow its sturdier relative to come into bearing, but we can never hope to see those clearings healthy fields fifteen years hence, as we should have done in the good old times. The species is so thoroughly and hopelessly impregnated with leaf disease, that it is impossible for it ever to be eradicated, so nothing apparently remains for us but to bury our old friend, and regard him only as a fragrant memory. It is thought that Liberian has a fair chance, and this, as I said before, is being largely planted throughout our district. Pepper is the next hope. So far, this gives every promise of growing well, and we are assured that though at present, the prices are depressed, there is a prospect of a good rise before long. This year the vines do not appear to be fruiting as well as usual; this is probably due to the weather. But the plants themselves look exceedingly healthy, and are growing very fast. There can be no doubt about the suitability of our climate for tea. That which has already been planted grows splendidly, and at considerable profit. The great difficulty—and this a serious one, is the labour. A tea—unlike a coffee plantation, must have labour all the year round and it is especially needed during those months when our coolies are accustomed to return to their country. It is a decidedly unhealthy time in Wynaad and this being well known, makes another difficulty in procuring permanent labour. The labour question, even with regard to ordinary cultivation, is becoming a worrying one to us all. This year having no crops to pick, it will not so much affect us. But should next blossoming season be successful, and our labour be as failing as it has been this year, I don't know what will have to be done. Considerable losses have been incurred by the vile and apparently unalterable system of advances. The coolies do not now take the trouble to invent excuses for their absence; and they even in some cases send out scouts to view the land, and if the report is, "plenty of weeds,—bad crops and no chance of present at the end of the season," they remain at home happy in their minds that they have secured a good advance, and need not fash themselves to work it off. Cinchona is another trouble. We know quite as well as anyone can tell us, that at this elevation, high cultivation is absolutely necessary for the well-being of cinchona. Where we have planted it with coffee thereby enabling it to benefit by the manure, our fields look healthy enough. The hitch is that it is impossible for us in these exceptionally hard times, to cultivate cinchona *by itself*, as it requires. A rise in the price of bark would enable us to go in for high cultivation, but at the present market rates, it is barely remunerative without any cultivation at all.

Verily, "these be parlous times," the planters' burdens are pretty heavy all round. The rise in exchange which makes so many fathers of families rejoice, is to us as dust and ashes, and means a woeful decrease in our already attenuated incomes. And here, comes in another pinch. The subject being our taxation.

By the old arrangement planters were called on to pay R2 per acre on all coffee or cinchona which was of ago to give a roturn—*i. e*—3 years old; and if at any time a field or coffee was found unremunerative it could be abandoned; and Government claimed no more of it. Unfortunately, for all who have middle aged or old properties, the case is quite different; since the settlement introduced by Mr. Castle Stuart, two years ago. Our assessment was then fixed, once and for all; and whether the coffee is since dead or not our dues must be paid, or the whole property will be sold up. An owner of 300 acres, let us say, of old coffee, may find now that only fifty acres of this can pay its expenses, and let the other 250 go back into jungle. But he will have to pay R600, a year in tax on his 50 acres, or failing that lose his little all. Government will put his whole property up to auction, if he does not pay sharp, and probably buy it in itself for a few rupees. In fact, the greater part of Wynaad is being so bought up by Government; on account of arrears of taxes owed by natives and I am told on good authority, that batches of 60 and 70 holdings, are sold off every month, Government in most cases buying them in. Needless to say, this is causing much suffering amongst the small cultivators, whose little all, and sole means of maintenance depended upon their minature estates.

It is all very well gaining *kudos*, for raising an enormous apparent revenue, out of a poor country like this, but the end of it will be, that the cultivators, European as well as native, will soon be driven forth, and Government itself will have no revenue; let us hope that this will be compensated when it finds itself the proud possessor, as far as eye can reach, of limitless fields of lantana, and ruined bungalows, once the pleasant homes of hard working Planters. It is a kind of vicarious suffering, which amidst our other troubles we find it rather difficult to bear with equanimity.

The best proof that coffee is not quite defunct and that some yet live who believe in it, is that there have been some extensive robberies of nurseries, and in one case, an entire new clearing, just planted was systematically cleared of every plant itcontained.—*Madras Times.*

ADVERTING to the speedy growth of bamboos, which formed a subject of discussion some time ago in the papers, Mr. W. J. Addis, C.E., now in Burma, writes to say that he measured bamboos near the Western coast of India and in the Annamallay forest, and found them grow at the rate rate of 15 to 16 inches in 24 hours. A great deal, he says, depends on the soil and species of bamboos; and the growth is slower after they attain the height of 10 or 12 feet.—*S. F. Press*, Aug. 28th.

SUBSTITUTE FOR COFFEE.—We hear that natives who have become accustomed to coffee from having served as domestic servants with Europeans, make use of the beans of the yellow wattle, called by the Tamil "thumba chedi," as a substitute for the coffee berries. Treated in the same way as coffee berries, the thumba bean makes a beverage closely resembling coffee in taste and smell—only slightly more bitter. The pariahs mix it with burnt rice and say it is quite as palatable as coffee.—*Bangalore Spectator.*

WATER-RAISING APPLIANCES.—In a Madras Government Resolution on a recent agricultural show in the district of Salem, occurs the following passage:—

The results of the water-lift trials in competition for the prize offered under G. O., No. 650, dated 12th September 1888, were recorded in G. O., No. 2,263, dated 10th April 1890, and the present report confirms His Excellency the Governor in Council in the opinion that for moderate heights the superiority of later inventions over the common picottah has not been demonstrated. For greater lifts the leather bag worked by bullocks is very effective, and the practical difficulties involved in using iron, viz., its weight, expense, and the absence of facilities for its repair, detract from the utility of nearly all Western improvements. These objections apply with equal force to most implements of improved types, with the exception of sugar-cane mills: of these there was a fair show, and the Collector points out that the fact of a very large number of Massey's mills having been sold proves that the ryot is fully alive to the advantages of using a modern machine.

The "picottah" is the lever beam working between two uprights, the working of which is occasionally helped and accelerated by men or boys running up and down the beam. Its use in raising water from wells is common in Ceylon, especially in Jaffna where hundreds may seen in operation raising the water impregnated with fertilizing salts, for the garden culture of onions, chillies, brinjals, tobacco, &c.

Correspondence.

To the Editor.

HOW TO INTRODUCE CEYLON TEA INTO RUSSIA.

Dear Sir,—Your newspaper containing letter from an Anglo-Indian Major respecting the chances of introducing Ceylon tea into Russia through St. Petersburg I hove read with great interest.

I think the Major writes a good deal sense and agree with him that it is possible to introduce Indian tea not only into the capital of the great tea drinking people but also into the other towns of the Russian empire. The first step toward attaining this object is to remove the prejudice existing in the minds of the Russian grocers and tea dealers who are under the impression that Ceylon tea is scented by artificial means and is unfit for Russian consumers. Secondly, the planters should only send those qualities which would suit the Russian market either in that pure state or mixed with the weaker brands of Chinese tea. The writer has found from experience that the Russian public will not drink Ceylon tea in its pure state on account of its being too aromatic and strong in flavour. A Russian grocer to whom I sold several chests in Moscow made a handsome profit by mixing the superior brands of Ceylon tea with the inferior qualities from China. The best plan for the Ceylon planters is to be independent of the Russian grocers and the Russian tea merchants and open a *small* shop on their own account in St. Petersburg on the Nevski Prospect. They can then sell the tea in its pure and natural state as mixed with the Chinese brands and let their article stand or fall on its own merits. The writer is convinced that the only obstacle that prevents the Russian public from drinking Ceylon tea are ignorance and prejudice, and also because they have not yet accustomed their palates to the taste. Tea drinking, like many other things in this world, is a great deal a matter of imagination, especially among a people whose palates have not yet been educated by the questionable benefits of civilization. The Russian peasant who pays Roubles 2 a lb. for rubbishy tea has not much idea of aroma or qualities. So long as he is told it is "tehai" (tea) by the grocers, he believes them, and drinks the rubbish which they supply him with in blissful ignorance of what it is composed. It may be tea or it may be kapree grass for little he knows. It would not be difficult for the Ceylon planters to give him the genuine article at the same price as he is now paying for adulterated and rubbishy mixtures.

In case the writer, who has himself sacrificed money and time on this object, can be of any use to to the Ceylon planters by means of his influence with the Russian press, the merchants, or with the authorities, he is willing to offer them his services, provided that he is fairly remunerated for his exertions on their behalf.

If Indian tea is to be introduced into Russia there is no time to be lost, for the Russian merchants in China have already opened large shops in Moscow and St. Petersburg where the genuine tea is now being sold at a fair and just price. One of the principal shops was only opened this spring. It is fitted up in the Chinese style, and the assistants are Celestials. I hear they are doing a good business and I do not see why the Ceylon merchants and planters should not follow their example.—Yours respectfully,

WM. BARNES STEVENI,
St. Petersburg Correspondent for the *Daily Chronicle*.

PLANTS AND PESTS.

Franklands, Wattegama, Aug. 4th.

Dear Sir,—I have sent you by this train some cotton seed with numbers of red poochies taken out of an open box standing in an open shed near the store of this estate, also a branch of a tree called by the Sinhalese *godakirilla* growing on this estate. Wherever this tree grows you will find numbers of these red poochies swarming around and crawling all over the young branches living on the sap of the young shoots and flowers; the tree is nearly always in flower more or less. I have found by experience that whenever these poochies scent any of my cotton plants having flower and young pods they leave the godakirilla tree and at once attack the cotton flower and young pods. To test it further I placed some cotton seed sent to me by Mr. Joseph of Matale in a box as above described, and within a week the seed and box were covered by these poochies and only a few remained on the godakirilla tree. The distance from tree to the box is ½ mile. The Revd. S. Lindsay calling here yesterday: I showed him the box with cotton seed; the box and seed were covered with poochies. Though we have this enemy to destroy more or less our cotton crop, yet at times we will be able to secure a good crop, but we must not plant again the same land or land near it for a few years. It is only yesterday I met a planter who secured one good crop and obtained 40 cents per lb. from the Company, cleared some forty rupees per acre and in this year planting again in another district among cacao, and I have heard of others who could not clear their expenses. Cotton wants a good rich soil and good rains up to crop time. Insect pests will come and go; the home of the black bug was originally the mililla and rukattana trees, it afterwards took to our coffee; the croton bug and caterpillar had its home on the keppeti tree, afterwards destroyed the croton oil plant. Even the rats sometimes come by hundreds. I remember once, in a week about twenty acres fine coffee was destroyed by them on an estate I had charge of. We must ever be on the watch, and when we find an insect pest coming we must at once do our utmost to eradicate it before it gets too large a hold on us. The godakirilla tree on this estate is about 15 ft. high with a great spread of branches leaf oblong shape. I understand from natives they grow much larger in the jungle.—Yours truly, J. HOLLOWAY.

[The tree of which Mr. Holloway sends us a specimen is the *Holoptelea integrifolia* of botanists, and the Tamil name is *ail*, *aiyilli*, or *kanchá*. There does not seem to be any affinity between it and cotton. The little red bugs or beetles, which, on the box being opened, ran about after a very lively fashion, are amongst the most common and most annoying pests of the cotton plant. We remember seeing them in multitudes on cotton cultivated in the Jaffna Peninsula in 1842 by the Messrs. Whitehouse brothers (who came to Ceylon from Demerara, by the way) and Mr. Hardy, and which cultivation was apparently not a success, for it was not persevered in.—Ed. *T. A.*]

KINO.

Nuwara Eliya, Aug. 18th.

Sir,—Will you kindly inform me, what is kino? How is it prepared? What is it used for &c.?

I have repeatedly been asked these questions.—Yours faithfully, T. P.

[Kino is a general name used in the drug market for the astringent gums or inspissated juice of several trees, such as *Eucalyptus resinifera*, *Butea frondosa*,

and *Pterocarpus marsupium*. It is used medicinally, and also in the arts, especially in dyeing. The London market rate for gum kino is given each month in our *Tropical Agriculturist*.—ED. *T. A.*]

CACAO IN CEYLON.

Kandy, Aug. 18th.

DEAR SIR,—Your Uva correspondent "102s 6d," does not seem convinced of the accuracy of my statistics that, up to the season 1883-84, cacao went on increasing its yield to 5 cwt. an acre, but he admits that the best returns he knows of from cacao last year, are crops of 2 at 3½ cwt.

I suppose he did not understand my table, which for that period is as follows:—

235 acres	1876-77	@ 5 cwt.	1,175 cwt.
191 „	1878	„ 4 „	76$_4$ „
1,953 „	1879	„ 3 „	5,8$_{59}$ „
2,065 „	1880	„ 1 „	2,0^{6}5 „
4,444 „	in clearing gave the crop		9,863 „

The computation of this acreage can hardly be contested in the face of yours, that, in March 1881, 5,460 acres were in cultivation; for it assumes that only about 1,000 acres have been planted in the season 1880-81, which is rather below the mark, as the general very successful results were then giving an increasing impetus to this cultivation which, but for the mysterious root disease that made its appearance in 1884, would have been an ELDORADO.

THE PACKING OF TEA DUST IN CHESTS.

Colombo, Aug. 25th.

DEAR SIR,—I wish to caution planters through the medium of your columns against packing tea dust in chests.

Some short time ago I purchased in local sale a break of dust the packages of which each contained 150 lb. of tea. Although they were doubly hooped before shipment they were landed in very bad order at the port to which they were shipped, some 6 lb. per package having run out in transit.

The maximum weight for dust should be about 70 lb., the greatest possible care being taken to see that the packages are not slack packed, lead linings free from holes and the lead of the thickest quality. The nails used by some planters are unnecessarily long: nothing is gained in strength by using nails longer than 1½ inch, the probability being that if they are longer than this that they puncture the lead in being driven in.

I would warn planters against using planks of a less thickness than ½ inch, anything under this being insufficiently strong to stand the numerous movings the packages get between the estate and the retailer.—Yours faithfully, F. F. STREET.

NEW PRODUCTS IN CEYLON:—THE NEED FOR CULTIVATING A GREATER VARIETY OF PLANTS:

ARECAS—NUTMEGS—CLOVES.

DEAR SIR,—It is a matter of surprise to me that the cultivation of products other than tea is so much neglected by my brother planters. No doubt tea must be our main staple, but there is no reason why we should not derive auxiliary help from the cultivation of products suitable to the various climates and altitudes of our tea estates. Seeing, for instance, that land in the low-country, which has been proved by results to be well adapted to the successful growth of tea, will, in the majority of cases, be found suitable also for the development of other important industries, surely more might have been done in the direction of supplementary cultivations, especially by the large companies which have associated themselves with tropical agriculture in Ceylon of recent years. With the exception, however, of a few arecanuts alongside roads and boundaries the tea bush still enjoys an undisturbed possession of the soil on nearly every estate, and if a solitary nutmeg or clove tree encroaches upon the otherwise well-established monopoly it is more likely to be the result of accident than design. And yet there are few things that pay better than nutmegs if properly cultivated, and they can be combined with tea in moderate numbers (say 1,000 for every 100 acres) without fear of their ever materially affecting the yield of the tea. At present prices the annual return from a well-nourished nutmeg tree ranges from R20 to R50, and there is no early prospect of the cultivation of this valuable spice being overdone; for the reason, probably, that the trees take some considerable time to reach maturity, and planters in the West Indies as well as in the East look to quick returns first and permanent ones afterwards. In the district of Udagama some years ago a number of nutmegs were planted, but the conditions under which the cultivation appears to have been carried on would account for the disappointing result which followed. More recently, and under circumstances which justify the hope of a successful issue, the enterprising proprietor of an estate in the near neighbourhood of Awisawella has succeeded in establishing a large number of these trees, nor is it the first time that this gentleman has taken the lead in planting matters, though his professional duties give him but little time to follow up the experiments he initiates. On an estate in Matale where the climate, one would have thought, was rather too dry for nutmeg cultivation, the growth of several hundred five and six year old trees is excellent, and a maiden crop is now being gathered, which gives every promise of being followed by an abundant yield next season. In the Kelani Valley there should be little or no difficulty in establishing this very valuable tree, but I would advise wide planting, not more than 10 or 12 trees to the acre, or thinned out, at any rate, to this number after the sexes are determined, and all sickly trees should be promptly removed. For further particulars of this interesting cultivation permit me to refer my brother planters to the excellent work compiled by yourself "All About Spices," which should have a place in the library of every planter.—Yours faithfully, NUTMEG.

NEW PRODUCTS IN CEYLON—THE NEED FOR CULTIVATING A GREATER VARIETY OF PLANTS—NUTMEGS &c.

DEAR SIR,—Your correspondent "Nutmeg" in your issue of September 2nd, will be doing good service if he elicits any further information from planters of experience in the lowcountry and who may have more to say on the subject.

Despite the Udagama failure, it would appear that the Matale and Awisawella trials afford grounds for a good deal of expectation, though I much doubt the accuracy of the statement that so much as R50 annual return could be got out of a single tree,—and one of a species which in the Straits thrives in moist climates, yet in Matale, which is a dry climate, can, he says, be brought into bearing in 5 years!

The professional gentleman who is proprietor of the Awisawella estate may be congratulated upon his foresight, for if he has but 3,000 of such productive trees as your correspondent names, he has R15,000 as an annual return. So let us hope he is a lawyer and that nutmegs will win him from the pursuit of that baneful following.

Your correspondent "Peppercorn" once referred to nutmegs on a place not very far from the town of Kandy. Can you rouse him to tell us the age and powers and profits of the trees?—not however such profits as are derived as seed-bearers, but counting the profits at the ordinary market rates of nutmegs?

MOSCHATA.

LOCAL TEA SALES AVERAGES.

Sept. 3rd.

SIR,—After a very strange fashion the editor of the "Times of Ceylon" under the above heading seeks to console local sellers by telling them that in getting 41 cents per lb. for their tea at the local sales on the 27th ulto. they were very fortunate inasmuch that, compared with the local sale held on Jan. 8th, they were taking all things into consideration better off by 11 cents!

The view thus given to his readers is an altogether distorted one—what are the true facts of the case?

On Jan. 8th sellers locally instead of receiving as they did 45 cents only ought to have received 58 cents (a difference of 13 cents), this rate being the equivalent of the position of tea at that time, viz.:

Reuter's London average ..	1s
Demand rate of exchange ..	1s 5 5-32d

(These are the figures given by the local "Times!")

In the same way sellers locally on the 27th ult. instead of receiving 41 cents should have received but 40 cents or the equivalent of

Reuter's London average ..	10¼d
Demand rate of exchange ..	1s 8 7-16d

(Figures given by "T. of C.")

so at this latter sale the sellers *actually got* 1 *cent per lb. more than the quotations then current sanctioned* as a "set off" against the clear loss of 13 cents on 8th Jan. sale.

The difference between the true value of Ceylon tea on the dates mentioned is no less than 18 cents and not 4 cents as has been *insinuated*, for, on 8th Jan. local sellers were *unfortunate* by 13 cents
27th Aug. local sellers were fortunate by 1 „
and this, and in no other way, can the difference ("the little difference") referred to by the editor of "T. of C." between the two sales be truly accounted for, viz. only.. 4 „

18 cents

In your issue of the 21st Aug., you give Messrs. Watson, Sibthorp & Co.'s report of the 12th idem, on the Calcutta local tea sales—we find there that at the sale held on 8th Aug., annas 6 and 8 pies was the average price obtained for 16,267 packages—six annas and eight pies equal 80 pies—and as there are in a rupee 192 pies against Ceylon cents 100—it follows that if we half the 80 pies we get very close on the Ceylon valuation of sales in Calcutta. In the case referred to about 41½ cents in the true equivalent, for in every 4 annas in the Calcutta price an additional Ceylon cent must be added after the half has been arrived at, to make up for the difference between 192 pies and 200 half cents = 1 rupee.

These Calcutta reports (they should appear regularly) are MOST INTERESTING, giving as they do the prices current locally and at the same period for the previous two years—thus your readers can compare the Calcutta local market with their own and draw *their own inferences*—true ones—not

DISTORTED.

P. S.—I have not a file of the *Observer* to refer to. May I therefore ask what the Calcutta average price was about the 8th Jan. last, and also, if you have got the report, on 27th Aug. last, I have seen no report since 12th Aug.

[The average price given in Messrs. Watson, Sibthorp & Co.'s report of 7th Jan., for the sales of 2nd Jan., was As. 7-1, or about 9¾d per lb. The average given in their report of 26th Aug., for the sales of the 21st, was 6 as., or about 10d per lb.—ED. *T. A.*]

CEYLON TEA IN RUSSIA.
LETTER FROM THE COMMISSIONER.

Kandy, Sept. 4th.

To the Editor, *Tropical Agriculturist*, Colombo.

Sir,—I beg to enclose copy of a letter received from Mr. Maurice Rogivue, Ceylon Tea Fund Commissioner to Russia giving interesting particulars regarding his mission.—I am, sir, yours faithfully, A. PHILIP, Secretary.

St. Petersburg, 23rd July to 14th Aug. 1890.

A. Philip, Esq., Secretary of the Ceylon Planters Association, Kandy.

TEA FUND.

Dear Sir,—I wrote you last from London on the 14th July, and arrived here safely on the 11th and 23rd same month.

BERLIN.—Passing through that place, where I remained two days, I visited Messrs. ——— a first class firm, who are willing to take up my agency for the sale of Ceylon Teas *exclusively in Berlin*, and with them I visited the two most important tea merchants of the place, viz. Messrs. ——— who are both prepared to *taste* and *try* our teas. Messrs. ——— my agents in London, have therefore been instructed by me to send, as soon as possible, to Messrs. ——— an assortment of tea samples, in small tin boxes, with prices of the different sorts and qualities, c. i. f. Hamburg and f. o. b. London.

They will also do the same for Mr. ——— in Konigsberg (Prussia), a good and active man, with whom I have also arranged to act as my agent there.

Both firms might be able to secure large orders for Ceylon Teas on their respective fields, and it is most important that they should receive samples with full particulars as regards quality, flavour and prices. Samples should be selected in all grades, from the commonest *pekoe souchong* to the best *broken* and *orange pekoe*.

ST. PETERSBURG.—From all the information I have been able to collect since my arrival here, I come already to the conclusion that there is a *great future* for Ceylon tea in Russia, where it is already pretty well-known, to a *very small extent* it is true, but still *appreciated* for its *purity* and *cleanliness* of *manufacture*, and it is not quite true what I have heard in London, that our teas are found too *strong* and *too dark in infusion*, the generality of Russians like a somewhat strong tea and do not at all object to a dark reddish colour, but, what they do not like, at least in St. Petersburg, is the sweet raspberry taste given to Ceylon teas by the water of the Neva!

I have already visited all the most important tea warehouses of this place, who'esale and retail—such as ——— &c. all very large tea houses, I have been very well received everywhere and every one of them have told me the same thing as above, but they are all desirous of seeing and tasting my samples, which unfortunately have not been cleared yet at the Customs.

The steamer "Viaka" bringing them over from London arrived here only last Tuesday the 17/29th

July and with all the difficulties, formalities and *bother* of Russian Customhouse, I have been yet unable to clear them, but hope to get them tomorrow when I shall store them in a small warehouse got by me for the purpose and pack them in ¼ and ⅛ lb. packets, label these packets with labels, *as per enclosed patterns*, and distribute them to the several tea merchants, dealers, &c., here in Moscow, Nijni-Novgorod or otherwise, along with a short circular printed in English, German, French and Russian languages, of which I herewith hand you a facsimile.

Moscow and Nijni-Novgorod, I would like to visit shortly as soon as I can get away from this place to be in time for the large fair of the latter place.

Please note that I have to pay for *duty alone* of these tea, *roubles* 650 or a little over £70! other charges for warehouses, packing, petties &c., will amount to over £10. I should like to have the teas analysed by the Government Police analyst, another 50 or 100 roubles—advertised in the Press &c, or otherwise &c., &c., all most important matters, which cost a lot of money. I must live and this is very expensive in Russia, a voyage to Moscow and Nijni and stay there for a couple of months is another expense of at least 1,000 roubles? In Russia, the most autocratic country of the world, everything is done "a coupe de roubles" by "réclame" favors and tips and you can do nothing without tips; to get the key of everything, of every door, of success in business or otherwise, you must tip everybody from the lowest "mougique" to the most influential swell, and it is only in doing so that we shall introduce our Ceylon teas in this country. I have been told that a Chinaman last year has spent likewise over 30,000 roubles in opening a large Tea Retail Warehouse on the Nevskie Prospeckte (the largest and most central street here); he has now made his fortune; the Brazil Coffee Company has spent 3 years ago roubles 50,000 to introduce their coffee here and are now doing all over Russia a very considerable paying business as their coffee is now to end [*sic* ?] and drunk by almost everybody.

Another coffee company of some kind, who would not spend the necessary currency in tips or otherwise and tried to do without it, did nothing at all and failed. This is Russia, and it is the same for everything and everybody!

Everyone I have seen here, with my numerous letters of introductions, tells me the same thing. Ceylon teas, with their superiority over Chinese teas, have here a *great* future, but it is no use of thinking introducing them in Russia if your Association is not prepared to spend money largely for the purpose.

His Excellency ——————, Director of the Mining Department, with whom I had a few days ago a long conversation on the subject, and who gave the same valuable introductions for Nijni Novgorod, viz: His Excellency, &c. told me that it is most important that I should go there where *everything* connected with business and trade in *general* is done every year. There I must get my teas tasted and *compared* with Chinese teas, beat the big drum, and from my visit there will mostly depend our success. Captain ——————, the Hon'ble Inspector of the Russian Volunteer Fleet, and Mr. ——————, Government Engineer (brother of the former), whom I also visited, told me the same thing and gave me also some valuable letters for Moscow and Nijni. The fair has already opened officially a few days ago, but it is only about a fortnight, that all the "haut commerce" will be assembled there and treat real business. My idea would be to leave St. Petersburg in a few days, after I have done here all the necessary; stay a few days in Moscow and then go to Nijni for a few weeks, coming afterwards back to Moscow, but this, after all my expenditure here, will necessitate a new grant of funds! All this is to show you that the work and undertaking are very difficult and that the success of my mission in Russia depends entirely on the amount of money "The Ceylon Tea Fund" is prepared to spend for the purpose, and I should like their committee to hear in mind that unless they are willing to make a real sacrifice of money to do the advertising properly and on a large scale, it would be of no use to do it at all, to throw away any more money, and I had better clear out of this country and return at once to *less expensive shores*. I have spent already in travelling expenses from London, duty of tea samples, hotel, carriage hire, &c. a great deal over £100 (of which I received only £66 up to the present time, from the Association and you can easily understand that with the £100 granted to me, I cannot go very far. It is not £100 which will be required, but *several one hundred pounds sterling*! Then I can almost guarantee the success.

All the foregoing remarks and reflections induced me to send the other day, on the 20th July-1st August, to Messrs. Malcolm, Kearton & Co., London, the following telegram:—"Beginning encouraging, large orders sure to follow, success depends entirely, large expenditure and voyage (to) Moscow (and) Nijni, duty paid (on) samples, Tea 60 pounds funds required immediate communicate Leake (to) open credit (with) credit.

M. R., Hotel Europe,"

which has been no doubt communicated to you by Mr. Leake, and I trust you have been good enough to place the matter before the Committee of the "Tea Fund" for their *immediate* consideration as there is no time to lose in order to be *in time* for the Nijni fair.

I shall at any rate require *at once* the balance of £33 due to me on the £100 granted, as I do not like the idea to be left here without money.

1. CUSTOMS DUTY AND WEIGHT OF TEA PACKAGES. Customs as a ready mentioned is most bothersome in Russia. The amount of papers, formalities of any kind, and time lost is simply *awful*, and here again you must tip every one from A to Z otherwise you can do *nothing*.

2. DUTY ON TEA is 21 *Gold Roubles* per pood or 40 Russian Pounds of which 124 equal 112 English Pounds (1 cwt). Payments at the customs must be made in *Gold Roubles* or Government *Coupons*.

The exchange at present is, about Roubles (silver or paper) 83, 75 to 84 for £10, 100 gold Roubles = 135¼ to 135¾ silver or paper roubles.

3. WEIGHT OF PACKAGES.—It is most important in making up an Invoice for Russia that the *gross*, *tare*, and *net* weights of *each package* are given *exactly* and *separately* for each Invoice. There are two ways of passing an invoice at the customs for duty, viz.,

a. As per Invoice sent by the shippers showing *gross*, *tare* and *nett* weights which are taken with an addition of 3 per cent on the *net*.

b. With 2 per cent allowance for *tare* on the *gross verified weight*; so that it is important that the tare should be less than 2 per cent of the gross weight.

The former entry is somewhat more favourable but requires a great correctness in weights, and would lead to serious difficulties and trouble, if the weights were found here, on verification, not quite accurate.

This is all what I have to report for the present, and I remain, dear sir, yours faithfully,

(Signed) M. ROGIVUE.

LETTER FROM THE COMMISSIONER TO MR. W. MARTIN LEAKE.

We have received for publication the following letter which has just reached the Secretary of the Planters' Association through Mr. W. Martin Leake:—

St. Petersburg, 1st—13th Aug. 1890.

Wm. Martin Leake, Esq.,

Secretary, Ceylon-London Association,

4, Mincing Lane, London, E. C.

Dear Sir,—Confirming my last letter of the 24th July 5th instant, I herewith beg to draw again your serious attention on the very important question of the "*Nijni Nogorovd Fair*" on which, as already mentioned, will chiefly depend the success of my mission to introdnce Ceylon Tea in Russia. The fair will last only till the 20th instant (1st Sept.), and, as it takes 3 to 4 days to go there, it is now ample time to decide whether I have to go there or not, and in the affirmative whether the Tea Fund is prepared to defray my expenses for the purpose. I shall therefore thank you to send me soon, on receipt of this letter,

a telegram on the subject with positive instructions regarding "Funds" as I shall not leave St. Petersburg at any rate, before the 6th-18th instant. The Nijni Fair is the place where *every year* all the Russian merchants from St. Petersburg, Moscow, Odessa, in fact from every place in Russia, from Finland, Caucasus, Siberia &c., go to make their yearly purchases, *fix the prices* of produce, goods, *Tea*, &c., and transact all kind of business, and it is only after the fair that a merchant would be persuaded to give an order for any kind of goods. Everyone tells me and it is also my firm belief, that *there* is to be made our *first Réclame*. *There* our tea must be tasted and compared with Chinese tea; a capital idea would have been to open there a Kiosk for the sale &c. or gratis distribution of tea in cup and in packets, it is still feasible in the shape of a small shop or a tent (easy to be got there) but we ought to start *at once*. The advertisement would be splendid.

Going there I would take with me a first rate man, well recommended to me by the Swiss Consul. A man (Swiss) of 25 years' business experienced in Russia, speaking Russian fluently, who has been already several times in Nijni during the fair.

I estimate my expenses to go there with a stay of about 12 days, at about 30 Roubles a day, with the *most strict* economy, or say about 400 Roubles roughly speaking £50st for the trip, all charges of advertising, rent of a local [?] travelling and hotel expenses for two, included, and I think, for this amount, we ought not to lose our chance there.

Kindly consider the question with the committee of your Association, send a wire to Ceylon if you think it necessary and let me have a wire reply without delay.

My samples tea have been landed and cleared at the customs. I had to pay 668 Roubles or nearly £80st for duty and other charges. I have packed it in ½, ¼ and ⅛ lb. packets as per enclosed label in Russian language which I have found more suitable than the one adopted previously; and have already distributed them to a large number of merchants, hotels, restaurants, public bars and private people. The tea has been tasted now by many and, I am glad to say, that the general report and opinion is in favor of its *good quality*, wanting however more *strength* and *delicacy* in flavor and somewhat *too dear* to compete with Chinese tea. Contrary to what I have been told in London, Russians do not object to a *strong* and rather reddish *dark coloured tea*. They make it in the usual way, fill half of the glass or glasses (very seldom they use cups) with made tea, and, with the Samovar (hot-water bottle) always at hand, they fill up the glasses with hot-water, thus making a rather real [?] beverage of very little taste and flavor. The tea pot is again re-filled 3 or 4 times with hot-water until the infusion is quite exhausted and contains no more of aromatic particles. I really cannot say they drink good tea in Russia. What they look for here is more the *appearance* of the tea *before the infusion* and most of the people who have tasted my samples complained that they are *too dark* and have too little of that fine and sweet aroma, the smell before the infusion, which the Chinese Teas have even in the very inferior qualities. Strong, not too dark, high flavoured aromatic and coloured Teas, will I believe, always sell better here than others.

They also complained of our Ceylon packing in ½ and full chests which they qualify as being *rough*, *rustic*, *coarse* and *defective*, packages without appearance and neatness, most of them broken and made up with old pieces of all kind of wood, as it was the case with my 10 chests samples. This is a most important question and I think a little more care and attention could be paid in Ceylon as regards packing, there is no doubt that the generality of our chests are made *too roughly*, with all kind of bad wood, and are not strong enough to bear a long voyage and sometimes several transhipments. Would it not be possible and preferable—at least for Russia—to adopt a somewhat similar packing as in China, mat, &c., well made chests of about 25 to 50 pounds nett, *not larger* of tea with a *sliding lid* (the top plank cover instead of a nailed one and the whole chest wrapped in some kind of coloured paper, with printings of some kind (common) representing Ceylon views and or native subjects characters and prints, and again a light gunny wrapper to cover the whole chests. Appearance and neatness for a produce of this kind is a great thing for Russia, and there is no doubt that a well made, neat and well presented package will improve its contents at the eyes of the buyers. It will be, I know, a little more [?] experience for the Ceylon planters, but would greatly facilitate the introduction and sale in Russia, at least for the beginning when all kind of sacrifice has to be made, later on, it will be easy to revert to the old system.

In a long conversation I had again the other day with Captain Vachtine, Director of the Russian Volunteer Fleet, he told me that another good plan for our success would be to have in Odessa a stock of tea of some importance ready to be cleared at the Customs in small quantities proportionally to our sales, there and or in the interior of Russia, and he offered and [?] if these teas were sent direct from Colombo to Odessa by their Volunteer Fleet steamers to place at the disposal of Tea Fund and [?] of their loaded warehouses and to store the tea there *in bond free of rent*, for any length of time, until they are sold by me. This would be of great advantage considering the heavy duty and exorbitant charges of any kind of a Russian Customhouse. This question has to be seriously considered.

FUNDS.—Messrs. ———, my agents in London, have remitted and [?] a cheque for roubles 166·95 equivalent of £st20 being the balance of £33 6s 8d for the last instalment of the £100 *grant* and I am much surprised to see that they have deducted from that balance (33 6/8) the excess over £30 *grant of tea* of their invoice for samples, although you had positively told me in London that you would take it upon your own responsibility to settle this difference on account of the Tea Fund.

It is useless to think that I can *sell* my tea samples, thus my *costs* allowance is reduced to £90 or rather £86 only, viz.:—

£33 6s 8d received in Colombo
£33 6s 8d received from you in London
and £20 received from Messrs. M. K. & Co.

who are even out of pocket for £2 10s 4d *to my debit*.

My expenses up to the present time amounts now to over £150 of which at least £140 are on account of the *Tea Fund* as per enclosed extract, leaving over £54 *out of my own pocket* and it is easy to understand that I am spending more and more daily.

I therefore leave you and your Committee judges of the situation which is to become *very critical* for me, as well as for my mission, if I am not placed immediately in funds. If I had known before all what I know now and what a country Russia is for expenditure, I would have never started on such condition as I did.

I shall be very thankful to you if you would kindly weigh very carefully the foregoing questions and place them *without delay* before the committee of the London Association for an *immediate decision* in all the matters. I repeat it, there is no time to lose and I shall wait *here* your wire reply up to the 6-18th instant, on that date I hope leaving for Moscow where my address will be

"*Hotel Dussan, Moscow.*"

You may communicate this letter to Ceylon, having no copying press I am unable to take more than one good copy of my letters.

It may interest you to hear that two Volunteer Fleet steamers have arrived the other day at Odessa from Vladivostok, with 800,000 pouts equal to about 29,000,000 English pounds, of Chinese tea, of which 40,000 pouts remained in Odessa and the rest is to go into the interior of Russia. Hoping to hear soon from you,—I remain, dear sir, yours faithfully,

(Signed) M. ROGIVUE.

EXTRACT OF EXPENDITURE.

	£	s.
From Lausanne to London with luggage	6	00
A fortnight stay in London, hotel, carriages hire	12	00
Second class book ticket from London to St.		

Petersburg, luggage &c.	14	00
Stay in Berlin and Königsberg, carriages &c.	4	00
Album for Ceylon photographs and box	1	10
Printing of circulars, labels, cards, paper for packing tea samples &c.	5	00
Duty on tea and customs and other charges	80	00
Rent of a small godown for tea	2	00
Expenses in St. Petersburg, three weeks parterprete [?] hotel, carriages &c., much over	12	00
	36	1

St. Petersburg, 1/13th Aug. 1890.

M. R.

EXPORT OF COFFEE AND PEPPER FROM THE MALABAR COAST.

Tellicherry, Sept. 8th.

DEAR SIR,—Accompanying this we have the pleasure to hand you our annual statement of exports of coffee and pepper from the west coast for the year e nding June 30th last.

Coffee.—Although from the figures given it wil be seen that the total exports of coffee for the past season exceeded those of the previous year, the result taken all round was disappointing and it was a fortunate thing for all concerned that such excellent prices were obtained. Mangalor still continues to receive an appreciable quantity of coffee from North Coorg and Mysore. Tellicherry on the other hand, which may be said to be the central market for coffee on the west coast, drawing a considerable quantity from other ports, is falling off considerably in its actual receipts from upcountry owing to the almost complete extinction of estates in North Wynaad and decreasing crops in South Coorg. Calicut and Beypore both show an improved export as compared with the previous year.

Prospects for the coming crop are decidedly gloomy, and it is very evident that whether owing to want of labour, abnormal seasons, or leaf-disease, it is a recognised fact that crops generally even in the most favored districts are gradually decreasing and this in spite of a larger acreage coming under cultivation, and we anticipate that we shall see a very considerable falling-off in exports for the coming season as compared even with the past.

Pepper.—It will be seen that last year's exports exceeded those for the six years shown in our statement, and we may add that a very considerable quantity of last year's crop is still being held. Prices fell very considerably, and with the reported increase in Singapore, Penang and Java yields and a rising exchange, growers will have to accept still lower prices if business is to result.

The coming crop is reported to be an average one.—We are, dear sir, yours faithfully,

RALPH TATHAM.

p. pro ALSTON, LOW & CO.,

To	Mangalore. Coffee. Plan.	Nat.	Total.	Pepper cwt.	Cannanore. Coffee cwt.	Pepper cwt.	Tellicherry. Coffee. Plan.	Nat.	Total.	Pepper cwt.	Badagherry Pepper.	Calicut. Coffee. Plan.	Nat.	Total.	Pep per.	Beypore. Coffee. Plan.	Nat.	Total.	Pep per.	Cochin. Coffee. Pa n	Nat.	Total.	Pep per.	Quilon. Coffee	Pep per.	Alleppey. Coffee	Pep per.	Total. Coffee. cwt.	Pepper cwt.
London Cwt.	37,627	...	37,627	64	...	...	17,461	3,996	21,457	9,033	...	24,536	...	24,536	846	22,431	...	22,431	...	...	54	54	800	2,644	15	721	472	109,470	11,230
Marseilles ,,	...	7,614	7,614	...	...	...	142	24,384	24,526	7,787	...	270	680	950	301	...	...	...	...	...	...	...	...	...	...	...	325	93,090	8,513
Havre ,,	...	1,733	1,733	...	249	...	...	47,964	47,964	32,191	...	402	3,032	3,434	2,450	...	...	...	...	500	...	500	1,724	...	...	...	...	53,631	36,604
Genoa ,,	...	...	...	...	...	...	...	2	2	1,363	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1,363
Trieste ,,	950	...	950	...	...	...	2,334	3,042	5,376	510	...	3,740	...	3,740	...	799	...	799	...	...	...	...	...	...	...	...	...	10,865	5 0
Naples ,,	...	...	...	...	...	...	...	...	...	1,425	...	...	...	...	451	...	...	...	...	...	1	1	...	...	...	...	...	...	1,876
Antwerp ,,	...	...	...	...	...	...	...	2,026	2,026	312	...	...	...	...	300	...	...	...	...	...	...	...	...	...	...	...	...	2,027	612
Melbourne ,,	...	...	...	...	...	...	...	...	...	...	...	351	...	351	...	...	...	...	...	...	...	...	...	...	...	...	...	351	...
New York ,,	...	...	...	...	...	...	...	...	...	400	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	400
Sydney ,,	...	...	...	...	...	...	...	...	...	...	...	165	...	165	...	...	...	...	...	...	...	...	...	...	...	...	...	165	...
Suez ,,	...	...	...	...	...	...	...	387	387	1,030	...	...	124	124	92	...	...	...	...	...	...	...	...	...	...	...	...	511	1,194
Turkish, African & Arab ,,	...	5,379	5,379	255	...	978	...	1,515	1,515	720	...	...	370	370	720	...	...	...	...	...	...	...	...	476	124	...	...	7,740	2,806
Ceylon [Ports	...	...	...	3	...	...	11	...	...	109	...	...	1	1	...	...	...	...	...	...	...	...	62	...	10	...	...	18	517
Bombay and other Indian [Ports	1179	43,853	45,032	570	12	29095	278	10,875	11,153	22,975	985	6,919	15,132	6,967	258	...	258	...	...	271	271	6,770	...	150	16,345	...	...	72,008	83,707
Less Imports						30394	12,475	52,541	65,016	68,206	985	38,815	11,344	50,159	13,800	23,488	...	23,488	...	826	...	826	9,356	3,120	149	871	17,478	293,384	156,512
1889-90 cwt.	,750	58,579	98,338	884	12		7,385	43,619	51,564	15,255		35,447	23,236	58,683	11,514	15,998	1,423	17,421	500	959	...	1,636	22,432	2,483	36	1,916	4,858	219,955	101,177
1888-89 ,,	81,900	36,896	68,796	1242	...	21022	15,986	53,084	69,020	37,408	1165	29,224	21,243	50,467	14,511	38,059	57	38,116	641	2,948	...	5,305	16,486	4,174	112	1,293	14,965	335,759	136,605
1887-88 ,,	67,445	67,505	134,910	855	129	23120	36,329	65,036	101,365	66,692	...	42,836	11,442	54,278	10,668	36,109	...	38,620	...	1,834	2,357	9,667	24,217	2,922	18	208	11,678	256,255	106,976
1886-87 ,,	29,3-3	30,610	59,993	913	...	...	24,981	65,526	90,507	59,482	...	49,641	15,475	65,116	14,174	...	...	36,790	...	2,511	7,833	8,745	10,166	7,732	115	1,510	18,437	325,475	100,804
1885-86 ,,	49,084	64,774	113,858	968	...	...	42,836	48,888	91,724	56,944	...	...	...	...	10,723	...	...	34,562	...	...	7, 80	965	14,219	5,528	14,042	1,912	11,842	280,756	91,516
1884-85 ,,	41,339	45,122	86,461	1232	...	...	24,601	52,837	77,498	53,344	...	...	...	60,753	...	...	...	...	...	...	4,46	1,062	...	...	156	...	...	...	...

*. Including the following:—For Ancona, 1,000 cw Tellicherry Pepper, and 100 cwt. Calicut Pepper. For Veni

A Prolific Tuber.—Some time ago a Montrose gentleman received from a friend in Minnesota, United States, a potato which, for curiosity, he planted whole. On being dug up it was found to have yielded no fewer than forty-six potatoes.—*Inverness Courier.* [The other day at Albion estate, New Galway, we saw between 20 and 30 potatoes gathered from one stem.—Ed. *T. A.*]

MINOR AILMENTS AND THEIR CURES.

I

Ague.—Ague, or intermittent fever, is a common ailment and results from the decomposition of vegetable matter. It is what is called a periodical complaint, the attacks coming on at stated intervals, the patient meanwhile being to all appearances perfectly well. An attack of ague is usually divided into three stages: the "cold" stage, during which the sufferer shivers violently; the "hot" stage, in which he or she complains of a burning heat; and the "sweating" stage, in which the patient perspires profusely.

This complaint untreated, shows no tendency to get well. Its medicinal treatment is perfectly simple, and in acute cases there is no difficulty in obtaining relief. An excellent remedy is quinine, which is best administered in the form of Tabloids of Bisulphate of Quinine, each containing five grains. It is customary to administer three of these Tabloids between two successive attacks of the disease.

Anæmia.—This is the medical term for poorness of the blood, a condition which occurs most frequently in young and badly nourished females. There is always more or less pallor of the face and lips. The appetite is poor; the patient has great difficulty in doing her work; has puffiness about the face, legs, and ankles; the circulation is weak; and not infrequently palpitation of the heart is a common symptom.

This condition goes on progressively increasing unless remedial treatment is resorted to. A most useful preparation of iron, which is the best remedy in these cases, is the Wyeth Dialysed Iron, ten drops of which are usually administered on a lump of sugar five times daily. It has a great advantage over most other preparations of iron from the fact that it does not tend to constipate. A course of this treatment, extending over three or four weeks, will usually effect a cure.

To prevent a return of this complaint Elixoid of Calisaya Bark will be found useful, a tablespoonful or more being taken three times a day. The patient should take plenty of exercise in the fresh air and should be well fed, a little stimulant in the form of stout being taken at meal times only.

Burns and Scalds.—One of the best remedies for a burn is Carron Oil, a mixture of equal parts of linseed or olive oil with lime water. Another admirable remedy is bicarbonate of soda (cooking soda), a small box of which should always be kept at hand for immediate use. Cover the burn with it, and bind up with a dry and soft pocket-handkerchief. Hazeline may be applied to the part to allay pain; it also promotes the healing of the injured surface.—"*Health*," London.

The Timber Trees of New Zealand are mostly pines, and very slow of growth, especially the kauri pine, which only grows in the extreme north of the North Island. I saw a kauri sapling (in a government garden in Wellington) which is thirty years old and which is not more than twelve feet high.—*Dunedin Cor.*

According to a note in the June issue of the *Revue de l' Horticulture Belge et Etrangère*, there is in the gardens of the palace at Versailles an orange tree more than 450 years old. It is said to have been the first introduced into France, and is known as the "Grand Connetable." The seeds from which it grew were sown at Pampelune about 1416 by Elenor of Castile, wife of Charles the Third, King in Navaare. Later the tree was brought to Chantilly, then to Fontainebleau, and finally, in 1864, was added to the collection of Versailles. The handsomest Orange-trees, grown in tubs in France, are those in this collection and in those of the gardens of the Tuileries, and of the Luxembourg Palace in Paris. The gardens of the Palace of Compiegne still contains fifty large specimens, brought there during the reign of Napoleon I. There are also collections of these curious old Orange-trees supposed to be several centuries old in a number of private gardens belonging to various French chateaus. They are always carefully tended, and produce year after year surprising crops of flowers and a good deal of fruit, considering how long their roots have been cramped within narrow quarters.—*Garden and Forest.*

CEYLON EXPORTS AND DISTRIBUTION 1890.

COUNTRIES.		Coffee cwt.			Cinchona	Tea.	Cocoa	Cardamoms.	Cinnamon.		Coconut Oil.		Plumbago.
		Plantation	Native	Total.	1890 B'anch & Trunkl.	1890 lb.	cwt.	lb.	Bales lb.	Chips lb.	1890 cwt.	1889 cwt.	1890 cwt.
To United Kingdom		47754	100	47854	5977390	32827266	8161	117178	795497	166828	40034	80259	110228
" Marseilles		157	...	157	12500	612	80	...	63100	2800	3000	...	...
" Barcelona		...	...	...	...	...	...	...	32500	...	...	...	...
" Genoa		...	12	12	...	1714	...	...	41425	22624	2061	2477	...
" Venice		...	232	303	70412	1815	...	...	9000	11200	...	...	...
" Trieste		7825	97	7922	262	1370	...	...	3900	5848	10895	6730	...
" Odessa		32	...	32	...	215	...	...	...	...	700	3416	29421
" Hamburg		296	...	296	...	30819	814	1131	213800	52772	10459	7464	13697
" Antwerp		17	20	37	730	1600	...	...	19500	5600	1161	1492	5068
" Bremen		18	...	18	128991	13427	151	...	20606	...	...	...	...
" Havre		...	100	100	...	4761	...	...	10000	...	2007	4578	1616
" Rotterdam & Amsterdam		...	3	3	21384	...	55	...	...	11200	10	10	...
" Africa		16	...	16	...	35972	...	...	5000	...	8	...	...
" Mauritius and Eastward		223	316	539	...	49282	498	...	7500	...	40010	1807	210
" India		828	718	1546	...	96732	...	114191	5020	...	66870	31194	342
" Australia & New Zealand		7138	960	8098	...	1564877	9	40	7960	...	1213	1944	115469
" America		1924	...	1924	317658	134023	1389	4956	69226	...	38322	77744	...
" Stockholm		...	...	...	...	1703	...	...	...	...	...	...	...
Total Exports from 1st Jan. to 25th Sept.	1890	66314	2543	68857	6529317	34768299	11157	237496	1304036	281872	216750		276051
Do	1889	56564	4024	60706	7151076	24517539	11713	206614	1777473	365993	219105		309302
Do	1888	108890	4435	113325	8899948	16355864	16377	203724	1236240	384959	278656		185514
Do	1887	144998	6112	151158	9491856	9265124	13862	226893	1072753	213588	182322		155530

231 cwt. Tellicherry Pepper and 201 cwt. Calicut Native Coffee. For Hamburg, 1,615 cwt. Tellicherry Native Coffee and 2,785 cwt. Pepper; 1,117 cwt. Calicut Plantation Coffee and 1,100 cwt. Pepper. For Rotterdam, 200 cwt. Tellicherry Pepper. For Bremen, 250 cwt. Tellicherry Native Coffee, and 200 cwt. Pepper; 21 cwt. Calicut Plantation Coffee, 12 cwt. Native Coffee and 464 cwt. Pepper. For Hongkong 5 cwt. Calicut Native Coffee. For Odessa, 184 cwt. Tellicherry Plantation Coffee, 101 cwt. Native Coffee and 1,100 cwt. Pepper.

Constantinople 2122 lb. Tea.

MARKET RATES FOR OLD AND NEW PRODUCTS.

(From Lewis & Peat's London Price Current, September, 11th 1890.)

FROM MALABAR COAST, COCHIN, CEYLON, MADRAS, &c.	QUALITY.	QUOTATIONS.
BEES' WAX, White	Slightly softish to good hard bright	£5 10s a £7 10
Yellow	Do. drossy & dark ditto	95s a 110s
CINCHONA BARK--Crown per lb.	Renewed	3d a 1s
	Medium to fine Quill	4d a 9d
	Spoke shavings	2d a 9d
	Branch	1d a 3d
Red	Renewed	2d a 1s
	Medium to good Quill	4d a 9d
	Spoke shavings	2d a 5d
	Branch	1d a 3d
	Twig	1d a 1½d
CARDAMOMS Malabar	Clipped, bold, bright, fine	1s 8d a 3s 6d
and Ceylon	Middling, stalky & lean	10d a 1s 6d
Alleppee	Fair to fine plump clipped	1s 4d a 3s 4d
Tellicherry	Good to fine	1s 3d a 2s 3d
	Brownish	9d a 1s 3d
Mangalore	Good & fine, washed, bgt.	1s 6d a 2s 8d
Long Ceylon	Middling to good	6d a 2s
CINNAMON 1sts	Ord. to fine pale quill	7½d a 1s 7d
2nds	,, ,, ,, ,,	7d a 1s 4d
3rds	,, ,, ,, ,,	6d a 1s 2d
4ths	Woody and hard	5½d a 11d
Chips	Fair to fine plaut	2½d a 7½d
COCOA, Ceylon	Bold to fine bold	89s a 95s
	Medium	78s a 85s
	Triage to ordinary	60s a 70s
COFFEE Ceylon Plantation	Bold to fine bold colory	10-s a 113s
	Middling to fine mid.	105s a 107s 6d
	Low mid. and Low grown	100s a 104s 6d
	Smalls	100s a 104s
Native	Good ordinary	92s a 98s
Liberian	Small to bold	90s a 96s
East Indian	Bold to fine bold	105s a 115s
	Medium to fine	100s a 105s
	Small	93s a 98s
Native	Good to fine ordinary	92s a 98s
COIR ROPE, Ceylon & Cochin	Mid. coarse to fine straight	£14 a £20 15s
FIBRE, Brush	Ord. to fine long straight	£15 5s a £28
Stuffing	Coarse to fine	£5 a £18
COIR YARN, Ceylon	Ordinary to superior	£13 a £30
Cochin	Ordinary to fine	£12 a £36
Do	Roping fair to good	£12 a £15 10s
COLOMBO ROOT, sifted	Middling wormy to fine	18s a 27s 6d
CROTON SEEDS, sifted	Fair to fine fresh	10s a 15s
GINGER, Cochin, Cut	Good to fine bold	50s a 65s
,, Rough	Small and medium	26s a 39s
	Fair to fine bold	20s a 25s
	Small	14s a 18s 6d
GUM ARABIC, Madras	Dark to fine pale	15s a 55s
NUX VOMICA	Fair to fine bold fresh	10s a 12s
	Small ordinary and fair	6s a 8s 6d
MYRABOLANES Pale,	Good to fine picked	10s a 10s 9d
	Common to middliug	8s a 8s 9d
Pickings	Fair Coast	8s 9d a 9s
OIL, CINNAMON	Burnt and defective	4s 9d a 6s 3d
CITRONELLE	Fair to fine heavy	1s a 2s 6d
LEMON GRASS	Bright & good flavour	¾d
ORCHELLA WEED	,, ,, ,, ,,	1½d a 1¾d
PEPPER, Malabar, blk. sifted	Mid. to fine, not woody	20s a 33s
Alleppee & Cochin ,,	Fair to bold heavy	4⅞d a 5¼d
Tellicherry, White	,, good ,,	
PLUMBAGO Lump	,, ,, ,,	1s 1½d a 1s 2½d
	Fair to fine bright bold	15s a 19s
	Middling to good small	11s a 14s
Chips	Slight foul to fine bright	9s a 12s
dust	Ordinary to fine bright	5s a 9s
RED WOOD	Fair and fine bold	£4 10s a £4 15s
SAPAN WOOD	Middling coated to good	£5 a £8
SANDAL WOOD, logs	Fair to good flavor	£30 a £58
Do. chips	Inferior to fine	£9 a £30
SENNA, Tinnevelly	Good to fine bold green	5d a 8d
	Fair middling medium	2d a 4d
	Common dark and small	1d a 2d
TURMERIC, Madras	Finger fair to fine bold	15s a 17s
Do.	Mixed middling [bright	14s a 15s
Do.	Bulbs	10s a 12s
Cochin	Finger	10s a 11s
VANILLOES, Mauritius & Bourbon, 1sts	Fine crystalised 6 a 9inch	16s a 23s
2nds	Foxy & reddish 5 a 8 ,,	13s a 18s
3rds	Lean & dry to middling under 6 inches	8s a 11s
4tbs	Low, foxy, inferior and [pickings	3s a 7s

FROM BOMBAY AND ZANZIBAR.		
ALOES, Socco trine	Good and fine dry	£4 a £7
Zanzibar & Hepatic	Common and good	40s a £5 5s
CHILLIES, Zanzibar	Fair to fine bright	32s a 3
	Ordinary and middling	28s a 31s

FROM BOMBAY AND ZANZIBAR.	QUALITY.	QUOTATION
CLOVES, Zanzibar and Pemba, per lb	Good and fine bright	5½d a 5¾d
Stems	Common dull to fair	4½d a 5⅛d
COCULUS INDICUS	Common to good	1⅛d a 1½d
GALLS, Bussorah & Turkey ₱ cwt.	Fair	10s a 11s
[cwt.	Fair to fine dark blue	52s 6d a 57s 6
GUM AMMONIACUM per	Good white and green	40s a 50s
ANIMI, washed, ₱ cwt.	Blocky to fine clean	20s a 50s
	Picked fine pale in sorts,	£13 a £15s
	part yellow and mixed	£10 a £13
	Bean & Pea size ditto	£5 a £8 10s
	amber and red bold	£10 a £12
scraped	Medium & bold sorts	£5 a £8
ARABIC E.I. & Aden per cwt.	Sorts	32s a 75s
Ghatti	Sorts to fine pale	20s a 65s
Amrad cha	Good and fine pale	50s a 65s
	Reddish to pale brown	25s a 45s
ASSAFŒTIDA, per cwt.	Clean fair to fine	26s a 38s
	Slightly stony and foul	16s a 25s
KINO, per cwt.	Fair to fine bright	25s a 30s
MYRRH, picked ,,	Fair to fine pale	£5 a £7 10s
Aden sorts	Middling to good	72s 6d a 80s
OLIBANUM, 1rop per cwt. ,,	Fair to fine white	35s a 55s
pickings	Reddish to middling	25s a 34s
siftings	Middling to good pale	12s a 20s
INDIA RUBBER Mozambi	Slightly foul to fine	10s a 15s
que, red hard		2s a 2s 6½d
age white softish		1s 5d a 2s
per lb. Ball & Saus	unripe root	1s a 1s 11d
	liver	1s 3d a 2s 3d

FROM CALCUTTA AND CAPE OF GOOD HOPE.		
CASTOR OIL, 1sts per lb.	Nearly water white	4d a 4¼d
2nds ,,	Fair and good pale	3⅝d a 3¾d
3rds ,,	Brown and brownish	3½d a 3⅝d
INDIA RUBBER Assam, per lb.	Good to fine	2s a 2s 6d
	Common foul and mixed	9d a 1s 10d
Rangoon	Fair to good clean	2s a 2s 4d
Madagascar	Good to fine pinky & white	2s 9d a 3s 2d
	Fair to good black	2s a 2s 6d
SAFFLOWER	Good to fine pinky	60s a 70s
	Middling to fair	40s a 60s
	Inferior and pickings	15s a 25s
TAMARINDS	Mid. to fine *black* not stony	10s a 12s 6d
	Stony and inferior	4s a 6s

FROM CAPE OF GOOD HOPE.		
	Fair dry to fine bright	22s 6d a 24s
ALOES, Cape, per cwt.	Common & middling soft	12s a 21s
,,	Fair to fine	none here
Natal	Middling to fine	2d a 3¼d
ARROWROOT Natal per lb.		

FROM CHINA, JAPAN & THE EASTERN ISLANDS.		
	Good, pure, & dry white	107s a 160
CAMPHOR, China, ₱ cwt.	,, ,, pink	
Japan	Ordinary to fine free	33s a 40s
GAMBIER, Cubes, cwt.	Pressed	nomin
	Good	25s 6d a 25s
Block [per lb.	Fine clean Banj & Maca-	3s 6d a 5s
GUTTA PERCHA, genuine	Barky to fair [sar	2s a 3s 9d
Sumatra	Common to fine clean	4d a 2s
Reboiled	Good to fine clean	2s a 3s
White Borneo	Inferior and barky	1s 4d a 2s
	57's a 80's, garbled	2s 10d a 4s
NUTMEGS, large, per lb.	83's a 95's	2s 8d a 2s 9
Medium	100's a 160's	1s 6d a 2s 7½
Small	Pale reddish to fine pale	2s 6d a 2s 10
MACE, per lb.	Ordinary to fair	2s 1d a 2s 4d
	Chips and dark	1s 6d a 2s
	Good to fine sound	1s 3d a 3s 3
RHUBARB, Suu dried, per lb.	Dark ordinary & middling	8d a 1s 3d
	Good to fine	9d a 1s 2d
High dried	Dark, rough & middling	3d a 7d
	Fair to fine	17s a 18s
SAGO, Pearl, large, ₱ cwt.	,, ,, ,,	15s a 17s 6d
medium	,, ,, ,,	10s 6d a 13s
small	Good pinky to white	8s a 12s
Flour [per lb.	Fair to fine	2d a 2½d
TAPIOCA, Penang Flake	,, ,,	2d a 2½d
Singapore	,, ,,	1⅞d a 2⅛d
Flour	,, ,,	10s a 15s
Pearl	Bullet, per cwt.	21s a 21s 6d
	Medium ,,	16s a 17 6d
	Seed ,,	17s a 18

THE MAGAZINE

OF

THE SCHOOL OF AGRICULTURE,

COLOMBO.

Added as a Supplement monthly to the "TROPICAL AGRICULTURIST."

The following pages include the contents of the *Magazine of the School of Agriculture* for October :—

LIQUID MANURES.

"WHAT would you say," remarked a well-known agriculturist, speaking to a body of farmers, "if, instead of serving up the liquid portion of your morning beverage of tea, the good wife poured it into the sink, and set in front of you nothing but the tea leaves with a little pepper and salt to aid digestion? Go where you will, you will see running to waste the very essence of what would, if properly stored and utilized, turn a loss account into a profit account at the end of a financial year." The simile quoted above, though it helps to impress one with the ignorance displayed in the ordinary treatment of the excreta of farm animals, is, however, not quite correct; for while the value of tea leaves after the essence has been soaked out of them is practically *nil* to the tea drinker, the solid excreta of stock not only possess, if properly handled, a high fertilizing value, but also serve to improve, in a marked degree, the mechanical condition of the soil. But the fact remains that the urine of animals is really the richest part of their voidance. The urine not only contains a large proportion of nitrogen, phosphoric acid, and potash resulting from the disintegration of animal tissues, but these most valuable ingredients are held in solution, and are most readily assimilable by plants. And yet in this country it is the rule to find the liquid manure from cattle sheds and the dark-coloured drainings from the dung heap allowed to drain off or be washed off, so that it is lost to the cultivator altogether. On the other hand, scientific agriculturists and a few who perhaps know very little of science, are showing a just appreciation of the great value of liquid manure. Some years ago the Highland Agricultural Society of Scotland offered a prize of £400 for the best scheme of utilizing the urine of house-fed animals. It is evident, however, that the best method of utilizing liquid manure will depend on the different circumstances of each individual cultivator. Where cattle are fed in covered sheds, and where litter is plentiful, the urine is best secured by being absorbed by the litter, so that both liquid and solid excreta are carried off together. Again where urine can be conveniently stored in a tank, soil, leaves, sawdust and various forms of refuse matter should be put in the tank, for in the course of filtering through these substances the liquid deposits a large proportion of the valuable materials it holds in solution, and the contents of the reservoir become a useful manure. Again, there is the option, where convenient, of distributing the manure in the liquid form without using any absorbents, but care must be taken in adopting this method. Fresh and undiluted urine, as is well known, has a caustic and injurious effect on vegetation, but when diluted to any appreciable extent, its application never fails to cause a great increase in the crop. Of course, the diluting of the liquid increases the labour and cost of application, but the undiluted liquid cannot be safely applied until it has fermented and decomposed, which will cost a loss of its ammonia unless care be taken to prevent that. The best way of fixing the ammonia in the case of either solid or liquid manure is to add a little gypsum, a very cheap fertilizer, which converts the volatile ammonia into non-volatile sulphate of ammonia.

The most inexpensive method, and that best suited for small landowners, is perhaps the using of absorbents to soak up all the liquid part of the excreta. The urine might be led off into a pit containing these absorbents, or what is still easier the cattle sheds should be strewn with them. Cattle belonging to natives seldom have any form of litter given them, and are generally allowed

to lie on the ground, cold and wet owing to absorption of liquid. Thus the use of litter will not only secure the urine for manurial purposes, but will also benefit the cattle. Straw, sawdust, wood-shavings, coir fibre and coir dust are admirably suited both as bedding and absorbents but where none of these can be conveniently used, even dry leaves, or dry powdery earth should be made use of, so that at least some of the valuable ingredients of liquid manure may be secured instead of being wantonly allowed to run to waste. Care should be taken that whatever absorbents are used, they should not be allowed to lie and decompose in the cattle-sheds, but should be regularly swept away, and new stuff laid on.

Even where cattle are indiscriminately herded together for the night, provision should be made for absorbing the liquid manure. If some such means are adopted by small cultivators, the result will not only be beneficial to the health of cattle as giving more comfort and warmth and securing better sanitation, but also when the refuse with the absorbed liquid is applied to the land, will prove to be of material advantage to their sadly-neglected soils. Those who own cattle but no land to speak of, should also be encouraged to adopt the methods indicated so as to dispose of the resulting manure to some advantage, for undoubtedly it will possess some money value.

OCCASIONAL NOTES.

We are in receipt of the first annual report of the School of Industry, Haputale. It is needless to dwell on the good work done by this institution, the success of which is secured under the superintendence of so able and energetic a worker as Mr. Langdon. "For the farm-work and agricultural teaching," says the report, "the Government has kindly granted us a large reserve of land surrounding the school, on which we hope, by and bye, as the institution developes to cultivate some paddy, potatoes, perhaps cotton, and possibly do some pasturing." According to the Government Inspector's report, dhall, tobacco, cotton, tea and coffee are being cultivated. The students above 9 years of age are instructed in theoretical and practical agriculture by Mr. E. T. Hoole, the enthusiastic Agricultural Instructor, who is an old boy of the Colombo School of Agriculture. We wish this worthy institution all success, and earnestly hope it will receive the support which it deserves.

A visit to the Colombo Lunatic Asylum lately, impressed us with the idea of how much could be done with the mentally-afflicted by tact. It is only one who has made a long and careful study of the insane that can superintend an asylum for this class of unfortunates with any success. One has to study carefully the peculiar traits of the inmates and the inclination and aptability of each individual, before he can utilize the manual power which lay in them, so that labour may at the same time be a source of pleasure to the workers, and, secondarily, a source of income to the establishment which does so much for their support and comfort. The labour of man has been divided by some into (1) purely mental labour, (2) labour with reason, and (3) purely manual labour. The labour got out of the insane would of course come under the third heading of purely manual labour, or labour which calls for no exercise of the reason. It is this kind of labour which is generally allotted to those whose intellects are dull and undeveloped, with a tendency to a minimum of sound reasoning. In the insane, on the other hand, the tendency is (in addition to a minimum of sound reasoning) a maximum of false and eccentric reasoning, which of all conditions associated with manual labour must assuredly be the most difficult to deal with. It is, therefore, very pleasing to note that at the Colombo Lunatic Asylum about half the vegetables required for the dieting of over 300 patients is supplied by the labours of the inmates, while a handsome return is got as a result of the various forms of industrial work which the different classes of lunatics effect.

The *Evening Despatch*, the evening edition of the *Scotsman*, gives the following racy account of the latest product of Yankee inventiveness:—One of its singular features is that it has cost only 2,000 dols., the amount of an appropriation by Congress to the Forestry Division of the Department of Agriculture "for experiments in the production of rainfall." By means of this sum, it has been ascertained that nature's method of raining on the just and unjust is antiquated, and can be vastly improved upon. In future, all that will be required of the agriculturist will be to set his rain apparatus in order, and go and enjoy himself. There are certain preliminaries, of course, but the Forestry Department of the United States thinks they are of comparatively little consequence, and may be left to the hired boy or orra lad. The first essential thing is to get the clouds together over the dry spot and then blow them up. The precise method is still left in some little doubt, but that is of no great consequence,—the result's the thing. Anyhow, it is accomplished by means of a rain-gun, and an arrangement of electric wires which catch and 'locate' the cloud. The advantages of this will be apparent to the meanest capacity. All agricultural grumbling and writing to the papers will cease, farming will become chiefly a thing of cloud catching, and a new and intensely interesting sport will be devised. After the necessary operations of the day the thrifty farmer will open a gentle rain in the necessary quarter for the night (having previously fired some Paris green into the cloud, for the benefit of the bugs or other insects). The hearts of rural ministers will rejoice at this news. There will be no longer any necessity for their praying for rain, which, when it comes, may prove the salvation of one farmer and the ruin of another. The rain-gun and cloud-catcher will leave nothing to chance, and the ministerial rain doctors will no longer be called upon to address perplexing appeals to Providence.

The medical celebrities assembled at Berlin last August had before them some particulars respecting two alleged discoveries, which, if they stand the test of experiment, may prove to be of inestimable value. One of these is the alleged discovery, by the eminent bacteriologist, Dr

Koch, of a germicide which can destroy the bacillus of tuberculosis. If this discovery prove to be genuine it may well be hailed with feelings similar to those with which the blind man hails the surgical operation which restores him his sight. Tubercular consumption in the human subject has always been regarded as an incurable disease, which condemns thousands every year to a lingering death; and nothing but a change to a very dry climate, in a foreign country, has ever been known to check, even for a time, the progress of this fell disease. Among cattle and poultry, tuberculosis is a deeply-rooted and widely-ramified disease, which slays its tens of thousands every year. The feeling of fear that haunted the public mind on account of the prevalence of this disease was intensified by the confessed impotence of veterinary and medical science to ward off that danger, or even to form an accurate estimate of the extent of that danger. It was known that the disease was hereditary; that it was communicable from man to animals and from animals to man; and that was about all that was known about it. Our "expert" friends were always wrangling with each other as to whether the milk or meat from a tuberculous beast could be safely used as an article of diet; and while the meat inspector tried to guard the public against eating of the tuberculous flesh, no one could ever be sure that the milk he was drinking was not loaded with the germs of this deadly disease. But if Dr. Koch's discovery proves genuine, all this waste of human health and life, and all this loss to dairy farmers and stock breeders in general, will be saved for the time to come. The other discovery is that by M. Roux, and is to the effect that broth made of brewers' grain kills the microbe of Asiatic cholera. Should this discovery also stand the crucial test, it will certainly prove a valuable one too. Medical Science has made vast progress during the last half-century, but these most recent discoveries, if genuine, will prove equal in value to any discoveries that this science has made in the whole course of the Victorian era.

INDIGENOUS FOOD PRODUCTS: CULTIVATED AND WILD.

By W. A. De Silva.

Leguminosae.

28. *Adenanthera Pavomiana*, L.; Sin. Madetya.

This is a tree growing in the warmer parts of the Island. It attains to large dimensions and has few branches. The bark appears to be of a scaly nature with indentations all throughout. The leaves are compound (pinnate) and are of a light green colour. Like most other leguminaceous trees, the leaves close towards sunset and return to their natural position at daybreak. The flowers are borne in clusters and they are of a whitish colour, especially the stamens, while the calyces are green. The pods are from 3 to 4 inches long and curved to a slight extent. Five to six seeds are found embedded in a somewhat leathery pulp. The seeds are round, convex on both sides, and of a bright red colour. When fresh they are soft, but the dry seeds are hard with a glazed appearance.

This plant is, correctly speaking, not a food-producing one, except in so far as the seeds are sometimes roasted and eaten. The roasted seeds are sometimes sold in the market, but are considered to be heating, producing, as is popularly believed, a defect in the hearing powers of those who eat them.

In India it is said that the dry seeds are worn as ornaments, made into necklets and bracelets. Locally these seeds are used for weighing precious metals and medicines. It is the weight known as a *manchadiya*, and 20 manchadiyas form a *kalan*, the weight of a 1-cent piece; a hundred of these go to form a pound. The almost uniform weight of these seeds makes them suitable for this purpose.

The *Adenanthera* yields a good light-grained timber used for building purposes.

The leaves and bark are locally used for external application in cases of swellings and sprains, and the leaves are said to possess a peculiar property of extracting poison caused by snake bites.

29. *Tamarindus Indicus*, L.; Sin. Siyambala.

This is a large tree growing to a great extent in the warmer parts of Ceylon. The tree attains to very large dimensions, sometimes 20 feet in circumference and nearly 80 feet in height. The stem is erect and much branched towards the top. The leaves are compound (pinnate) with small oblong leaflets arranged in pairs. The flowers which are borne in clusters have white petals dotted purple. The fruits are somewhat cylindrical from three to twelve inches in length, and contain from two to six seeds. The pericarp of the fruits, when ripe, is of a greyish colour, thin and brittle. Previous to ripening they contain a white coloured acid substance, which, when ripe, turns into a brown-coloured soft pulp, which is of a sweetish acid taste.

The seeds are flattish and smooth, and the brown red outer coating is hard and has a glazed appearance.

The young leaves of the tamarind are made into a curry of a rather acid taste, reputed to be a very cooling food.

The pulp of the fruit is used as a condiment generally among the Tamils, and hence it is collected and sold in the bazaars. It is also made into a jam by the addition of a large quantity of sugar.

The ripe pulp mixed with sugar has slightly purgative properties. The kernel of the seed is also sometimes roasted and eaten. As a medicinal plant the tamarind is in high repute among native medical practitioners. The tender leaves are used to reduce inflammation in sore eyes and as a poultice in boils, &c. The seed is employed in toothache and diarrhœa. The timber is used for cabinet work.

30. *Dialeum Ovideum*. L.; Sin. Gal Siyambala.

This is a tree growing in districts north of Kandy at no great elevation. It has lanceolate smooth leaves, and bears panicles of flowers. The epicarp of the fruit has a pretty velvet appearance. The fruit is of an agreeable acid flavour and is sold in bazaars. The timber is strong and handsome, and is used in making ornamental furniture.

LIFE HISTORIES OF INSECTS INJURIOUS TO VEGETATION IN CEYLON. VII.

By Aba.

THE WIREWORM—(Continued.)

Prevention and Remedies.—The only good thing in connection with chena cultivation is that it prevents to a great extent the increase of noxious insects, for in the act of burning a clearing not only are the insects that found harbourage in the trees and shrubs of the jungle, but also the eggs and larvæ of those that are found in the soil are destroyed. To this fact may be attributed the immunity our chena crops have always enjoyed from the attacks of the wireworm and other such insects.

In England it is said that the wireworm does great damage to corn, hops, and other crops, and there is every reason to believe that when we give up chena cultivation and grow our crops on ploughed and manured land, the wireworm will be as troublesome here in Ceylon as in England.

When grass land is newly broken up for cultivation, it is always advisable to adopt some means beforehand to diminish the number of insects and prevent their further increase. This is effected by an application of lime, ashes or any other substance obnoxious to insects. Paring and burning should be practised not only for destroying the grub, but also as a means of getting rid of the weeds and roots of grass that might feed such grubs. The burning of all rubbish on the ground is also recommended. Strips of grass should not be left growing in or at the sides of fields, lest the wireworms feeding in these spread and damage the growing crops.

It is said that wireworms injure and weaken a great deal more than they actually destroy. Therefore it is necessary that such methods of cultivation as will ensure a vigorous growth be adopted, so that the plants may be in a fit condition to use all the available plant food and push forward and get over the attack, without sinking under it as in the case of weak plants.

In England drilling manure with the seed has been found useful. A mixture of guano with superphosphate of lime, drilled with the seed says Miss Ormerod "brought a good crop, whilst the rest of the plants on the field perished by wireworm: in this case wireworm was found between the drills, which seems to point to the safety of the crop being from the dislike of the grubs to the manure, as well as to the increased strength of growth. Dissolved bones drilled with the seed also do good."

Soot applied during rain, so that it may be washed down into the soil, has been found to be useful both in driving away some of the wireworm and stimulating the vigorous growth of the crop. Nitrate of soda and common salt mixed in the proportion of one hundredweight of the former to two of the latter have proved useful.

The following is taken from Miss Ormerod's "Manual of Injurious Insects:"—

"With regard to *mechanical* applications, one of the common remedies used among corn crops is, rolling with a heavy roller so as to solidify the surface and thus prevent the grubs from travelling through the ground. The remedies used amongst root-crops are drill-hoeing and horse-hoeing twice in a place, hand-hoeing close to the rows, and chopping out to stop the progress of the wireworm along the drills; here the object of the treatment is by stirring the soil, to encourage the growth of the plants, and to harass and disturb the wireworm.

"In attack of wireworm on young beds of year-old seedlings of forest-trees, it has been found of use to scrape the earth back from the collars of the young plants to a distance of about six inches, so as to lay bare the larger roots, and hand-pick and destroy the grubs. The roots were then dusted freely with equal parts of lime and fresh dry soot, and fresh soil used to cover them: the old soil being removed and charred, to kill any wireworm that might remain in it."

(To be continued.)

THE LAWS OF CEYLON RELATING TO AGRICULTURE.

(1.) Cattle Trespass, No. 9 of 1876.

I. The word "cattle" when used in this Ordinance means bulls, cows, oxen, heifers, calves and buffaloes.

The word "animal" means except when it is otherwise expressed: cattle, sheep, goats and swine.

The expression "irrigation works" means tanks, bunds, anicuts, sluices, channels and other works used for irrigation purposes.

The expression "duly authorized person" means any person specially or generally authorized to act under the provisions of this Ordinance by the Government Agent for the Province or the Assistant Government Agent of the District wherein such person resides.

II. Any proprietor or occupier of land (or any other person by his direction) may seize, tie up and detain animals trespassing thereon. Such land shall be fenced according to local custom, or may be unfenced if, by the established custom, no fence is required. The detention of such animals shall be until the damage, if any, and the fair expense of their keep (assessed in manner hereinafter stated) shall be paid or recovered.

III. Animals found trespassing on irrigation works may be seized or pursued off the works and seized by any person duly authorized.

IV. The owners of any stray cattle shall in the case of trespass on private lands be liable to pay to the proprietor or occupier, and in the case of trespass on irrigation works to the Government Agent or the Assistant Government Agent the full amount of damages arising by reason of such trespass; and if such trespass was committed in the night time, he shall be further liable to pay to the Crown a fine equal to the amount of the damages awarded.

V. *Procedure.*

(1.) Notice of seizure or trespass shall, with as little delay as possible, be given to some Police Constable or local Headman having jurisdiction in the District. All rights under this Ordinance shall be forfeited if such notice be not duly given.

(2.) Such Constables or Headmen shall thereupon inspect the land and animals, and with three or more respectable persons of the neighbourhood, if available, (otherwise alone) shall (*a*) Ascertain

the owner or owners; (*b*) Assess the amount of damages; (*c*) Furnish a report stating (1), the particulars relating to the nature of the trespass; (2), the names of the owners (if ascertained); (3), the amount of damages; (4), the names of the assessors.

(3.) The Police Constable or Headman shall take charge of the animals if the amount of assessment be not immediately paid.

(4.) Forty-eight hours shall be allowed for such payment of damages and expenses of keep.

(5.) On failure of payment within such time, the proprietor or occupier of the land so trespassed upon shall produce before the Police Court or Village Tribunal the report which, if verified by oath or affirmation in open Court of the Constable or Headman who furnished it, shall be received in evidence.

(6.) Notice shall issue to the owner, which notice, when the owner has been ascertained, shall be served on him or left at his last known place of abode.

(7.) The Court shall then summarily make inquiry and take such evidence as it thinks fit, and if it thinks fit, award the aforesaid damages, charges for keep and penalty to the Crown. Such summary inquiry may be made even without such notice as aforesaid, provided after reasonable inquiry the owner has not been ascertained.

(8.) Twenty-four hours shall be allowed for the payment of such awarded damages, charges and penalty.

(9.) On failure of payment within such time it shall be levied by sale of the animal, and if necessary by distress on the other property of the owner of the animal.

VI. In any case when any trespass shall be proved, whether any damage shall be proved to have been sustained or not, the Court may award a fine not exceeding Five Rupees for each animal. And in case of trespass on private land, the Court may, at its discretion, order a share of such fine, not exceeding one-half, to go to the owner or occupier of the land, the remainder to the Crown.

VII. Even if animals be not seized, yet on proof of trespass, and on notice and procedure as above indicated, the owner shall be liable.

VIII. (1.) All cattle over eighteen months old shall be branded, and the owners shall in the month of January every year furnish the Chief Headman with a correct description of the brand marks.

(2.) Each Headman shall make a return to Government on or before the 1st March every year.

(3.) On default of branding and furnishing such report, the owner shall be liable to a penalty not exceeding twenty-five cents for every head of cattle not branded, and to a penalty not exceeding Two Rupees for every omission to furnish such description.

(4.) The moiety of any penalty shall go to the informer.

(5.) Nothing herein contained shall extend to any Chief Headman's division, which shall be within the operation of the Village Communities Ordinance, 1871.

IX. Any person unlawfully removing cattle detained for trespass, or causing animals to trespass upon the land of others, or driving the animals of others, or conniving at such animals being so driven, upon his own land with intent to take proceedings for cattle trespass, shall be punished by such punishment as a Police Court has jurisdiction to award.

X. (1.) When cattle committing trespass cannot be seized or identified, so that the owners may be ascertained and proceeded against, the Government Agent or Police Magistrate of the District may grant a license to shoot.

(2.) He may also on granting such license appoint a fit person to endeavour to seize or identify the cattle, so that they may be shot only on failure of seizure.

(3.) They may be shot even when driven off the land or irrigation works in the endeavour to seize.

(4.) The license shall be in force only for one month from the date thereof.

(5.) Pigs trespassing may be shot without license, so also elephants and wild buffaloes trespassing on irrigation works.

XI. The carcase of any stray animal shot shall be the property of the owner of such animal, but if the owner cannot be found nor any claim made therefor, it shall be sold by the local Headman, and the proceeds paid to the Kachcheri.

XII. A Police Court or Village Tribunal may impose the full amount of damages or penalty under this Ordinance, notwithstanding that such amount might otherwise be beyond the jurisdiction of such Court or Tribunal.

XIII. This Ordinance shall not affect any common law right in respect of damage sustained by trespass of animals.

H. A. J.

BASIC CINDER.

Basic cinder or slag, known chiefly as Thomas-slag (after the name of one of its inventors) on the Continent, and sold under the name of slag-phosphate-meal, is a manure, the merits of which have been much discussed of late, and one that is gradually coming into favour. Thomas-slag is a substance formed as a bye-product in the manufacture of steel from pig-iron by the "basic" or "Thomas-Gilchrist" process. Steel is a compound chiefly of iron and carbon. It may be made from pig-iron, which is also a compound of iron and carbon, but containing a larger proportion of the latter element than exists in steel. Hence in order to convert pig-iron into steel, a part of the carbon must be oxidized. Besides carbon there are other impurities in pig-iron which must be got rid of, and one of these is phosphorus. A great many iron ores contain phosphorus to an extent which makes them unfit for the manufacture of steel of good quality, and owing to the difficulty which was experienced in ridding the pig-iron of phosphorus, only the purer varieties were used, and steel was a dear commodity. But in 1879 Messrs. Thomas and Gilchrist discovered a method by which the phosphorus could be removed from pig-iron, the result of which was a revolution in the steel trade, and steel came to be much more widely used than it had been before. The new process consisted chiefly in adding lime to the pig-iron, and lining the "converter," in which the iron is heated, with lime instead of bricks composed largely of silica. That is, lime which is a base was used instead of silica—an

anhydrous acid—hence the name "basic" cinder. A blast of air is sent through the iron in the converter, which is raised to a very high temperature for the purpose of oxidizing part of the carbon and other metallic and non-metallic impurities. Among the latter is phosphorus which is oxidized into phosphoric acid. This unites with the lime and forms a kind of phosphate of lime. When the blast ceases, the oxidized impurities together with the phosphate of lime rises as a scum to the top of the converter, and constitutes what is known as basic or Thomas-slag. The slag is tilted into boxes and left to cool, and for some time was cast aside as a refuse material. Many attempts were made to extract the phosphoric acid, but though some succeeded, it was found that the processes could not be worked at a profit. Sometime later it was ground to a fine powder and applied as a manure with much advantage. The phosphate of lime in basic cinder was found to be not the ordinary tri-basic phosphate of lime found in bone and natural mineral phosphates, but a tetra-basic phosphate which contained 224 instead of 168 parts of lime. This compound has an advantage over the normal phosphate to the agriculturist, for owing to the phosphate being supersaturated with lime, the lime and phosphoric acid are in a somewhat feeble state of combination, so that the compound can easily be decomposed by the carbonic acid in the soil, and by the acid juices in the roots of plants. Therefore crops can without difficulty extract the phosphoric acid from the manure. The amount of phosphoric acid will, of course, vary with the amount of phosphorus in the pig-iron,—from 14 to 20 per cent, equal to from 30 to 40 per cent phosphate of lime. Basic slag must be used in the form of an exceedingly fine powder for appreciable effect. It has been found suitable for leguminous crops, turnips, clover, and grass, secondly for cereals; and is well adapted for application to marshy land, stiff clays, and wet land generally, owing to the caustic lime which it supplies. It should be well incorporated with the soil and applied early for effect. No harm is said to result even when applied in large quantities, but 4 to 10 cwt. per acre, according to circumstances, is a fair dose. There is an abundant supply of the substance, which is a valuable manure with a future in store for it if it could be purchased for about R22—R25 per ton ground to an exceedingly fine powder. It should have a guarantee both of fineness and percentage of phosphate.

CRUDE THEORIES REGARDING THE ORIGIN OF CERTAIN PLANTS. III.

By W. A. De Silva.

My subject in this paper is the sweet-potato, *Batatas Edulis* (Sin. Batala). This yam is a common food-product in villages, and ranks perhaps next to rice and kurrakkan in the extent to which it is eaten. The poorer inhabitants of the rural districts live on nothing but this at times, and truly they need have no cause of complaint against the force of circumstances. The original home of the plant is supposed to be America, whence it was evidently introduced at a very early date, as apart from the plant being quite naturalized here, the natives look upon it as an indigenous product. There is, moreover, no such affix as *Rata*, signifying foreign, which characterises a comparatively modern importation, while the fact of its being a subject of folk-lore is sufficient to prove that it has existed for a very long period in the island.

Our story starts with a widow and two daughters who lived together in comfortable circumstances, till the marriage of the two latter, one to a man of wealth, the other to a husband of moderate means. Bad times coming upon the widow, she paid a visit to her rich daughter, hoping to get help from her, but though she arrived faint and hungry, her ungrateful child offered her no refreshment; and even when a request for food was made, the answer was that there was nothing in the house to eat. At first the old woman was inclined to pity her daughter who, she thought, must have become poor like herself, but again she became suspicious of her child's ingratitude, and when the latter left the house for a while, she looked about and discovered that a pot full of rice had been hidden away. Full of sorrow at the thought of her daughter's ingratitude, she wept bitterly, with the result that some of her tears fell into the pot of rice. Then she left, and sought her other child who received her with all hospitality. The ungrateful daughter was pleased on her return to find her mother gone, and proceeded to partake of her meal alone, when, to her astonishment, she found the rice reeking with blood. Such was her punishment for her want of filial affection. But the strange sequel is the important part of this account, for when the bloody meal was thrown away, an unknown plant sprung up from the place whereon it fell, which in course of time developed a tuber to which was given the name Batala, derived from *Bata* rice, and *la* blood—an unpleasant enough etymology for so estimable a food.

BUILDING MATERIALS.

Section 1. Stone.

By a Factory Apprentice.

The names of the various sorts of stones are derived either from the places where they are quarried, or from the substances which principally enter into their composition. The term "Freestone" is, as its name implies, that sort which can be wrought with the mallet and chisel or cut with the saw, an operation which cannot be performed on granite, whose hardness requires it to be dressed with pointed tools of different weights and sizes. It includes the two great divisions of Limestone and Sandstone.

Hardness, tenacity and compactness are the three chief qualities requisite for a building stone. It is not the hardest stone which has got the greatest tenacity or toughness, for limestone, though much softer, is not so easily broken as glass.

Nearly the same causes, which destroy the rocks on the surface of the globe, accelerate the *decay and destruction* of stone. Such causes are of two kinds, those of decomposition, and those of disintegration. The former effects a chemical change in the stone itself, the later a mechanical

division and separation of the parts. The effects of the chemical and mechanical causes of the decomposition of stone in buildings are according to their situation, as in the town or country. In populous and smoky towns the state of the atmosphere accelerates decomposition more than in those placed in the open country.

A great advantage which a country building appears to possess over a building situated in a populous and smoky town, is owing to lichens, with which the country building is almost invariably covered, and which seem to exercise a protective influence against the ordinary causes of the decomposition of the stone upon which they grow.

Mineralogists and Geologists enumerate a great variety of stones, but the Architect and Engineer recognise but three great divisions, known as "Freestone, Slabstone, and Rubblestone."

Freestone.—The name of this stone is derived from the freedom with which it is worked, one of its leading characteristics is, that though durable against weather, it is yet soft enough to be worked with the mallet and chisel. It is therefore particularly valuable for purposes, such as columns and their capitals, cornice, frieze and mouldings, or for the building of walls, where external surfaces are desired. The following are the different varieties of Freestones:—

1. *Marble* is one of the primitive limestones, being a carbonate of lime, and when pure is perfectly white. On account of its durability, its non-absorption of water, the ease with which it is worked and the high polish it takes, it ranks first amongst the freestones.

2. *Alabaster* is a fine white stone resembling statuary marble; it is a sulphate instead of a carbonate of lime, therefore not a marble, being very brittle and not durable in the open air is used for interior ornamental purposes.

3. *White Sandstone*, next to marble in point of grain and durability, is the fine white sandstone, which is composed of a fine silicious sand held together by a peculiar natural cement, so fine that it cannot be perceived between the grains. It bears fine carving, is strong and durable, and not affected by the weather.

4. The *Oolite*, so called from its resemblance to the roe of a fish, is of a yellowish white colour, its grains vary from the fineness of sand to the size of peas, united by a natural cement quite visible to the naked eye, it is very soft at first but hardens from exposure. It is used for building purposes solely on account of its fine grains.

5. The *Ferruginous or Red Sandstone* consists of a coarse silicious sand, cemented by an oxide of iron. This stone likewise acquires hardness by exposure to the open air; it is well adapted for bridge building, especially in arches of large span.

6. *Soapstone* will stand great heat, and is therefore applicable for fire places and chimney pieces, &c., but is too soft for building with.

7. *Granite* ranks amongst the most hard and durable stones. It bids defiance to the saw and almost to the chisel, but still it can be worked, with expense, to any form, to a fair but not a smooth surface.

Slabstone is of a character which splits into parallel plates; it possesses great strength in the direction of its laminæ. This stone must always be used with its natural joints in a horizontal position. It is especially used for flooring and covering of roofs, or in the foundation of extensive buildings, as being flat and affording equal pressure on a large surface of ground.

Rubblestone is of a character which splits into from their hardness cannot be sawn, and from their brittleness and irregularity of grain resist all attempts to reduce them to regular shapes, save by very expensive processes. These stones are only used for rough work in foundations, or filling in walls of more than ordinary thickness, backing and strengthening them in parts not exposed to view.

(To be continued).

THE GARDEN SPIDER.

The Spider belongs to the class Arachnida of the sub-kingdom Annulosa. The true spiders (Araneida) is distinguishable as having no true antennæ, and the head and thorax amalgamated into a "cephalothorax." The spider after birth undergoes no transformation, and merely increases in size, though it changes its skin repeatedly before attaining maturity.

The web of the Garden Spider, though very wonderful in construction, is so familiar that a description of it would be superfluous. The material of which the web is made is the secretion of a special gland, and it is moulded to its proper shape by being passed through certain conical little organs which are placed at the extremity of the abdomen, and are termed the "spinnerets." The apex of each spinneret is perforated by a large number of little holes. The silk is at first fluid, but hardens rapidly on exposure to air. A single filament of silk is thus produced by each of the perforations in the spinneret, so that what is called a single "thread" in a spider's web is really a cable, composed of a great number of the most delicate fibres agglutinated together. The webs of the Garden Spider are almost always spun between the leaves of a plant or in the space between two or three plants situated in close proximity. The elasticity and strength of the material of the web is proved by the fact that it is uninjured by a strong breeze. Should a thread be broken by a violent gust of wind or some other unlooked-for accident, the spider effects the necessary repair almost immediately. By a singular instinct the spider prevents the web from being unduly stretched with the chance of snapping, by hanging pieces of wood or pebble to give it weight. The spaces in the web contains a sticky substance which is intended to entrap insects by their legs or wings. The spider kills its prey not by a sting like that of the scorpion, but by a pair of strong hooked jaws (poison jaws) which have their points perforated for the escape of a poisonous fluid secreted by special glands. As is generally known all spiders are carnivorous, but the point of interest about the Garden Spider is that the flies and insects it captures and kills are nearly all injurious to vegetation. Langsdorf goes the length of saying that *Mygale avicularia*, a Garden Spider, only eats insects injurious to vegetation! At any rate there seems sufficient reason for

believing that the Garden Spider is a friend rather than an enemy to the agriculturist, and as such should be treated with due mercy.

V. KUMARAVELU.

GENERAL ITEMS.

The strawsonizer, apart from its value as a distributor of manure and seed, has proved a most effectual means of keeping off insects from certain crops by the perfect way in which it distributes insecticides. Already it has been found that paraffin oil, as sprayed by this machine, is a specific for the turnip fly pest, and now it is coming to be recognised that the strawsonizer may be effectually used for combatting the potato disease fungus. This latter use of the machine opens up a field of the widest possibilities.

Great distress must be anticipated if, as is reported from Cairo, 9,000 acres of rice and cotton have been entirely destroyed, in the province of Garbieh, by an inflow of salt water.

The *Indian Agriculturist* notes that of the eleven Indian students who have since 1880 studied agriculture in England, only two have adopted an independent line of employment, and one is engaged on enquiries on sericulture, the rest holding appointments in no way connected with agriculture; and suggests that these men should be utilized by the Government for taking charge of Crown lands which are in the hands of those who have no special knowledge of agriculture, so that the interests of the Government may be better looked after than they are.

The taste for agricultural education is evidently spreading. We lately referred to the forming of an agricultural department in Egypt, and now the news reaches us that the Government of Monte Video have resolved to found a Superior School of Agriculture and National Stock Farm, and with that view have set apart a large tract of land at Toledo. In the school theoretical and practical education to qualify students for the title of agricultural expert *(perito agronomo)* will be given.

The Kandesh Experimental Farm in India is said to have given most satisfactory results during 1889-90. Full details of the cost of cultivation have been published, and the following (in Ceylon currency) shows the profit per acre in the case of some of the crops cultivated: Cotton, R12·86; Wheat, R14·80; Sesamum, R5·52: Linseed, R4·85: Rice, R7·00 and Sugar-cane R32·82. The profit per acre on all crops cultivated amounts to R10·66.

According to the British Vice-Consul, at Athens, the Greeks do not show any great aptitude for agriculture, though they are eminently adapted for trade and speculation. The rural districts are thinly populated—cultivation being mainly confined to fruits and vegetables.

Some of the natives of India are said to use, as a substitute for coffee, the beans of the yellow wattle (Tamil *Thumba Chedi*) after roasting them, and in some cases mixing with roasted rice.

A flower is reported to have been discovered in the Isthmus of Tehuantepec which in the morning is white, at noon red, and in the evening blue, and only gives out a perfume at mid-day.

The following subjects were treated of and discussed at meetings of the Agricultural Improvement Society held at the School of Agriculture during the past month. "The Relation of Geology to Agriculture," "The Improvement of Dairying in Ceylon," and "The Need of Technical Education in Ceylon."

The August number of the "Agricultural Gazette" of New South Wales to hand consists of an exhaustive report on the Pylenchus worm. The Minister of Agriculture lately announced that he has completed a scheme of education and has secured qualified men to instruct students in the various branches of agriculture. A library and museum are also being formed for the instruction of the students.

The International Congress of Forestry and Agriculture in Vienna was opened on September 1st. The members of the Congress numbered nearly 900, delegates being present from Great Britain, France, Belgium, Denmark, Italy, Germany, the Netherlands, Norway, Russia, Roumania, Servia, Sweden, Switzerland, Australia, India, Brazil, and Japan.