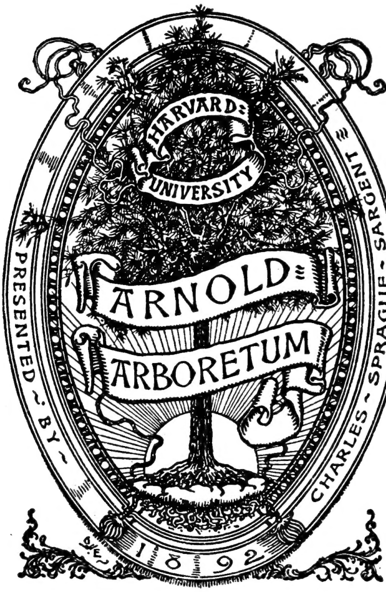
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1892

AGRICULTURAL BULLETIN

OF THE

STRAITS

AND

FEDERATED MALAY STATES

EDITED BY

H. N. RIDLEY, M.A,. F.R.S., F.L.S., F.R.H.S.,

Director of Botanic Gardens, S.S.

Vol. IX.

NEW SERIES.

Singapore:

THE STRAITS TIMES PRESS, LIMITED.

1910

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A PEAT-SOIL NOTE.

We recently received from Pontianak two samples of a peaty soil in which rubber had been planted. The planter reported that the trees at 2½ years averaged 5·59 inches in circumference at 3 feet from the ground, which is decidedly small, but the trees were healthy though under-sized, and a good many seedlings had died.

The soil sent consisted exclusively of decayed wood and leaves; not a particle of sand or stone was visible. I asked Mr. Dent, the Government Analyst, to examine the samples with a view of finding out what amount of mineral matter there was in this class of soil, which resembled exactly that obtained from Johore, and described in previous accounts of the peat-soils.

Of the two samples A was taken from the top of the ground to about 8 inches depth, and B about three feet down. The owner of the land states that the soil seems to be similar to this for 15 to 20 feet depth, and that the whole soil on exposure has sunk a good deal.

In appearance, the two samples were much the same except that the top soil was wetter, and the fragments of wood less decomposed, as might be expected.

Mr. Dent gave the following report:—

Moisture		Ash	Ash Calculated from Dry Sample
A	76.60%	.33%	1.43%
B	56.90%	.94%	2.18%

This ash apparently consisted of the potash, a trace of iron, etc., derived from the decayed wood. There was, in fact, absolutely no mineral matter derived from the soil at all in the earth. To compare this with the soil richest in humus, decayed leaves and sticks in the Botanic Gardens, Singapore, where Para rubber is grown successfully, it may be pointed out that this soil contains upwards of 60 per cent. of mineral matter, while other soils on which Para rubber grows well had up to 70 per cent. and more of mineral matter.

The increase of ash in the lower sample is doubtless due to the greater loss of organic matter in the course of decomposition, giving a higher proportionate return.

The amount of water retained in these soils is rather striking. Warington, in his Physical Properties of Soil, p. 82, gives as examples of the water retention of soils the following:—

"Market garden soil, suitable for growing yellow tobacco used for cigarettes, only 5 to 11 per cent. water, shipping tobacco soil, 12-18 per cent., pasture soil 18-23 per cent." In the soils analyzed from the Botanic Gardens (Bulletin VII 581.) free water amounted to 7.400 per cent., in the wettest to 2.000 per cent. in the driest. These soils were sent for analysis to Ceylon and one may allow perhaps a little loss from evaporation on the way. The Borneo soils, however, were kept some days after their arrival here from Borneo, and perhaps were proportionally wetter, still the difference in the amount of water retained in the lowest, which is the driest, amounted to 56.90. Warington writes: "Of all soils peat has the greatest capacity for retaining water, its porosity supplying an enormous internal surface, the effect of which is heightened by the affinity for water of its colloid constituents." Of course the peat he is refer-

ring to is not what we call peat in this country, it is rather more compact, the stems of the mosses, the heather roots, etc. being finer than the wood fragments of the so-called peat soils here, but, generally speaking, the result appears to be the same, and as decomposition has gone on to a considerable extent as it had in sample B, and the vegetable remains were quite broken up and powdery, there would be little difference between the two. The excess of water in the soil, if the water was saturated with humid acid, would not be advantageous to the growth of Para rubber, as explained in previous papers.—ED.

RUBBER IN LIBERIA.

Mr. E. D. Wildeman gives some notes of the rubber business in Liberia which may be of interest to some of our readers. The republic of Liberia, since it began to be the centre for repatriation of freed slaves and negroes from the United States, has, to a large extent, closed to the commerce of the outer world. However, since 1906, some opening up of the country has taken place, and an act was recently passed permitting firms and foreigners to settle at one of the ports and to trade in the interior. The Liberia Rubber Corporation, founded 1905, took up large concessions, giving it the right to collect rubber in public forests. In the year beginning October, 1907, to November, 1908, 148,826 pounds of rubber were exported by this company and 12,815 pounds by other firms.

The ordinary rate of exportation licence is 12 cents a pound, but the Liberian Corporation pay only 6 cents.

According to a consular report, the hinterland contains great abundance of rubber, good and bad. About 22 different kinds of trees and climbers supply this more or less.

The collection seems to attract the natives more and more. The collectors get on an average 9 pence a day and 3 pence for food. The collection takes place between September and March, as it is not easy to get labour in April, May and June, when the natives are at work on their own crops.

In collecting, the trunk of the tree is cut with a knife and the latex caught in a pot and boiled; as soon as it coagulates it is dried and smoked and is ready for the market.

The chief difficulty in the collection is the disorganised state of the interior, the roads are often impracticable and the collectors are plundered of their rubber.

Until order is established in the interior commercial enterprise will always be difficult.

The population of Liberia consists of 3,000 American Liberians, 5,000 English natives, 100,000 Kroos and about 2,000,000 Aboriginals, who are constantly fighting with each other (from the L'Agronomie Tropicale, October, 1909.)

The Liberian Company is also planting Para rubber on a large scale, the seeds being supplied from the Botanic Gardens, Singapore.

PARA RUBBER IN FRENCH INDO-CHINA.

We take the following notes on the cultivation of Para rubber in the experimental station of Ong Yem from the Bulletin, de la Chambre d'Agriculture, October, 1909, p. 455. The trees were planted in 1898, and thus are nearly eleven years old. The average diameter of ten trees is given as .843 mm. in 1908 and .895 mm. in 1909.

The biggest tree measured 1.26 metre in 1908 (3 ft. 3.71 in. about) and 1.35 next year. This may be considered a good growth. These trees were tapped every day for a year and gave 14 kilos 497, or 1 kilo 449 each, (2 lbs. 3 oz. 4 drs. about), the rubber was not quite dry when weighed and allowing for a further loss of 20 per cent, this gives 1 kilo, 160, per tree of ten years old a year.

One must not generalise too much on this, as only a small number of trees were tapped. Vernet's method of tapping every two days in a special or half spiral gave distinctly inferior results, but comparison is difficult because of the different sizes of the trees experimented with.

The plots at Ong Yem are sandy and poor in fertilizing elements, and the growth in such a soil is very satisfactory. The trees produced very vigorous shoots in the dry season in a soil where water is met with only at a depth of 10 to 12 metres at the end of April.

The plantations in Cochin-China are increasing, the larger ones are established on the red sands. The other planters, with smaller areas, prefer the sandy lands near Saigon.

A NEW RUBBER JOURNAL.

A new and local rubber journal appears in the form of Grenier's Rubber News, published at Kuala Lumpur, fortnightly, at three dollars a year. It is a small work of 9 pages, chiefly consisting of extracts from home papers, and a London letter. The papers from which these extracts appear are not the usual agricultural journals, but such papers as The Financier, The Pall-Mall Gazette, The Financial News, etc.; the kind of notes which are apt to be overlooked by agriculturists. Many are quite interesting and useful, and give an idea of how the great industry strikes the commercial man at home.

GERMINATION OF HARD SEEDS.

A writer in Le Jardin (xxii 155) gives a note as to the best way of germinating hard seeds, such one might instance as Ceara rubber seeds. The seeds are placed in a small sieve or pocket of wire gauze, a few at a time and plunged into boiling water for a period of 10 to 20 seconds, depending on the hardness of the seed. In the case of small seeds, the sieve is plunged into cold water immediately after being taken out of the boiling water. The object of dealing with a few seeds only is to ensure that the boiling water shall have a full effect. By this means seeds were germinated in ten days.

RUBBER NOTES.

Rubber Planting in Zanzibar.

Both Ceara rubber and Para have been tried in Zanzibar, and it is reported that the former gives the best results, as indeed one would expect, and 200,000 trees have been planted. According to a writer in the Bulletin de l'Association des Planteurs de Caoutchouc, Ceara is ready for tapping in three years, Para not till seven or eight years. Presumably he means in Zanzibar, for rather the reverse is nearer the facts in places suited for Para rubber.

Production According to Age.

The report of the Cicely Rubber Estates gives the following account of the production of Para rubber as compared with the age of the trees :—Thus of 6,919 old trees at first the average was 1.32 lb a tree, next year 8,020 trees gave an average of 2.37 lb., the third year 9,000 trees gave 4.85 lbs. a tree, and the fourth year 9,000 trees, of which 3,000 had been rested, and 3,000 had not previously been tapped, gave 6 lbs. per tree.

AGRICULTURAL PROGRESS IN PERAK, F.M.S.

The following notes on the Rubber planting situation are extracted from the Annual Reports of Government District Officers in Perak for 1908.

Mr. E. J. Brewster reports that nothing very exciting took place in the way of planting during the year and says that the growth of Para rubber trees in the Kinta District is not to be compared with that on low country land. This would be expected in most parts of the Kinta valley where the chief industry is Tin Mining in a rather poor sandy soil.

Mr. A. Hale, in his report on the Larut and Krain District, says that the Rice crop was the best which he had known since he had been in charge of the District. The very dry weather, which continued all through July and until the last few days of August, made irrigation of certain parts of the district of Parit Buntar and Bagan Serai rather low and in some cases the people started their semais too soon, and so lost them altogether from want of water. A few others had semais carried away by the floods after heavy rain in September. The result was that a few people who waited until October to plant were unable to procure any semai at all. The area not planted for the above reason was, however, very small.

From September onwards there was a plentiful supply of water everywhere.

Reports from all the Mukims, except Kuala Kurau, agree that there was a prospect of a better crop that season than in either of the preceding two. The yield per acre in the first class Padi lands would be well above the average, and the area of third class land under cultivation had largely increased. A few years more work on the irrigation of Krian will tend to make Padi cultivation less dependent on rain.

Another most important adventure, which would never have been undertaken in Krian except for the impetus given to Rice growing by the irrigation works is the building of a fine Rice Mill at Kuala Kurau by Towkay Heah Swee Lee, Member of Council. This mill is provided with the most recent inventions in milling machinery, chiefly supplied by Scotch firms. Mr. Hale expects that by the time it is ready for work it will represent an outlay of not much less than $200,000. The irrigation works in Krian have cost the Government of the F.M.S. over a million and a half dollars.

It is regretted that there has not been any large areas of fresh land planted with coconuts. The appreciation of rubber has stopped this cultivation to a large extent and native cultivation cannot wait the time required for a crop.

There is a very satisfactory increase in the areas planted with Para rubber and there still continues to be a steady demand for new land. In Larut there were only two estates exporting rubber—namely Yam Seng Estate and Towkay Kwa Chu Seng's Estate at Kamunting. Other estates are reported as having made good progress.

The feature—and it is a very satisfactory matter to have to record, concerning the cultivation of rubber in Krian—is the steady planting up of rubber on old sugar estates worn-out and effete old concerns, which were becoming a curse to the district. In nearly all the large estates the area planted up with rubber has increased. The sugar-cane has disappeared and sugar mills are gradually being closed down. Tapping has begun on Tali Ayer, Gula and Kalumpong Estates. Selinsing Estate is also tapping. It is perhaps the most satisfactory item of progress that these sugar estates, held for the most part by old-fashioned Penang Chinese, should pass into the hands of energetic rubber planters. Young rubber, Mr. Hale says, on well-managed estates in Krian, will, he is sure, compare very

favourably with that on any other estates, situated in the flat alluvial cost lands of the Federation, and in Krian the land has already been well-drained by the old sugar planters and does not therefore require Government assistance in drainage works.

The sub-district of Matang bids fair to hold its own as the most favourable for rubber enterprise. The estates now exporting rubber are Jebong, Regalla, Matang Jambu and Trong. Applications for land are still coming in, so that soon estates will line the road from Simpang to Batu Hampar.

It is expected that the customs returns still show a very considerable increase in the export of Tapioca from Krian. This cultivation is chiefly in the hands of Chinese.

Mr. F. J. Weld, District Officer, Kuala Kangsar, reports that during 1908, agricultural and mining rents show an increase over all previous records, which is very satisfactory. Of the most important new lands alienated during the year for rubber growing purposes was 1,000 acres in Bruas, 400 near Sungei Siput and 600 in the same district for the same purpose. All the rubber estates in this district have made good progress.

The Government Gardens in Kuala Kangsar have been maintained by the lessees in a satisfactory manner, and the planting up of vacant ground has been completed. Very good prices were obtained for the rubber produced. The trees gave an average of about 9 lbs. per tree and some of the oldest as much as 12 lbs. per tree per annum, (many of these old trees are over 30 years old and are some of the original trees introduced to Malaya in the year 1877.)

Mr. Oliver Marks, acting District Officer, Lower Perak, reports that in that district good progress on the whole has been made on the estates during the year. The supply of labour has been plentiful and the health of the coolies good, especially on the estates provided with water from the Changkat Jong supply. Many of the estates employ only Javanese indentured labour, and it is satisfactory to record that the majority of these coolies are continuing to work on the estates after the expiration of their three years' contracts. The majority of the estates are opened on the rich alluvial flats so plenteous throughout Lower Perak. The soil, he says, is similar to that of the Kapar and Klang districts of Selangor, and the growth of *Hevea brasiliensis* age for age compares very favourably with that of any planted elsewhere in the Malay States.

Amongst the planters of the district there are advocates for both clean weeding and for the encouragement of selected weeds as a cover for the ground. The advantage of cheapness, general appearance of the estates and growth of rubber trees would seem to rest, in Lower Perak, with those estates on which clean weeding has been enforced from the commencement of planting operations. Mr. Marks mentions some 23 estates, varying in area from 6,426 acres to 100 acres, as existing in Lower Perak at the end of 1908. During 1908 no applications for estate land in Lower Perak were approved.

There are approximately 30,000 acres under coconuts in this district and each year sees an increased area of trees in bearing, especially in the coast Mukims. The output of native-prepared copra from Rungkup and Bagan Datoh has now increased to over 3,000 pikuls per month.

The area alienated for Padi during the year was inconsiderable. Where *bendangs* already exist no serious attempt was made at Padi cultivation outside the Mukim of Pulau Tiga. In that Mukim, owing to the efforts of Datoh Paduka Raja, the Penghulu, the harvest of the 1908 planting should be good.

A trial was made during the year with the "Kinchow" water wheel as a means of lifting water from the Perak river on to the Padi fields at Kampong Gajah. The experiment was not a success, the river not being swift enough in the dry weather, when irrigation water was required, to admit of the wheel raising sufficient water to be of any practical use.

Mr. C. W. C. Parr, Acting District Officer, Batang Padang reports that there are now 18 rubber estates in the district with a total area of approximately 15,000. Returns show that the area actually under cultivation is now about 7,000, an increase of about 3,000 acres on the area opened in 1907. Citronella grass has been planted both as a catch crop and a weed exterminator on two estates, and an apparatus for the extraction of the oil has been installed on the Sungei Lander Estate.

Wild passion-flower (*Passiflora foetida*) has been introduced on one estate and *Crotalaria* on at least two others, whilst groundnuts are planted between the rubber on one estate.

Javanese indentured labour is employed on several estates and the labour force appears to be sufficient to meet the demand. Small holdings might be alienated on favourable terms to coolies on the expiration of their contracts and they are advised to take advantage of this offer.

Of the large number of Tamils resident in the district for years hardly any have taken up agricultural holdings.

The dam and ditch for the irrigation scheme at Berang in the Hulus Bernam Mukim, was completed at a cost of $1,255,99, and a good supply of water should be assured at all seasons. There has not as yet been a great demand for land in the irrigation area. The water supply should suffice for the irrigation of at least 500 acres and the scheme is probably, for the area affected, one of the cheapest ever sanctioned by Government. Four thousand and twenty-eight acres of agricultural land were alienated during the year. The Padi crop at Slim was much damaged by floods.

Mr. H. Berkley, District Officer, Upper Perak, reports that the 1907-08 crop of Padi was good—not first rate—as many fields ran to straw—but neither rats nor pigs were bad and it probably averaged 300 to 350 gantangs to the acre.

The Kulim irrigation has benefited the district where 110 acres have been planted out of 250 irrigated. The rest will be planted in 1909. There are upwards of 300 acres of Para rubber planted. Quite a number of Malays have planted *Hevea brasiliensis* in small patches and it is doing well. For estates Malay labour is preferred to Chinese or Indian labour whilst it is of the greatest benefit to the neighbouring villages.

(*Supplement to the Perak Government Gazette, November 29, 1909*).

TILLED AND UNTILLED SOIL.

The operation of tillage has, for its primary object, the stirring and loosening of the soil. When soil-particles are massed loosely, as in a tilled field or garden, spaces exist between them, and these spaces permit of free movement of air. If the particles are packed together tightly, as in pasture land where the soil cannot be loosened, there is comparatively little space between the particles, and consequently the amount of air in the soil is but small. All grass land, as compared with that under tillage, is insufficiently aerated, and in most cases the older the sod the less well ventilated it is; for, as time passes, the soil-particles become more closely packed. The ideal soil may be compared to a sponge, not only because of its capacity for holding nutritive solutions, but because of its permeability to air. There can be no question that the high productiveness of well-cultivated soils is due largely to the greater amount of air available for the roots.

The presence of air ensures both oxygen and carbonic acid in the soil. Oxygen is essential to the growth and well-being of the roots of plants, no less than to the aerial parts. Carbonic acid plays an important, though indirect, part in ensuring soil fertility by bringing inorganic materials into solution and thus augmenting the supply of mineral food-substances.

Beneficial micro-organisms are found in greater numbers and are better distributed in a cultivated soil than in compact and uncultivated soils. These lower forms of life, like the higher forms, are profoundly affected, both as to their individual well-being and as to their multiplication, by such conditions as food, air, moisture and temperature, all of which factors are better regulated by cultivation.

One of the object of tillage is to convert the soil into a suitable living place for micro-organisms through the increased humus, good drainage, ventilation and higher temperature. It is not unreasonable, therefore, to assume that the greater number and better condition of the micro-organisms in a tilled orchard contributes to the well-being of the fruit trees.

There is evidence to show that all plants, to a greater or less degree, so change the soil in which they grow as to make it wholly or partially unfit for the succeeding crop of the same kind. Different crops growing in the same soil may injure each other, or the one the other. Two theories are advanced to explain these antagonisms of plants. One is that plants excrete toxins; the other is that the injurious effect is the result of bacterial activity.

Mr. Spencer Pickering, of the Woburn Experimental Fruit Farm, in accounting for the injurious effect of grass upon young Apple trees, attributes the harm done neither to competition between grass and tree for moisture and food, nor to a difference in temperature. He holds that it is due, not to excessive amounts of carbonic acid, but to some "actively malignant" effect on the trees, some action on them akin to direct poisoning. More recently, Mr. Pickering leaves the question open as to whether the harmful action is the effect of a poison (toxin) excreted by the roots of the grass, or whether it is the result of some change in the activity or composition of the micro-flora brought about by the grass sod. Beside these specific experiments with Apple trees and grass there have been recently several investigations with other plants to show that vegetable organisms have interdependences other than those with their physical environment. For example, investigations with Peach trees grown in pots with several plants show that the Peach does not thrive if its roots are in close proximity to those of certain other plants.

The well-being of nearly all plants which minister to the needs of man is improved by tillage. Fruit trees not only respond to high cultivation in the nursery row, but they need good treatment after transplantation to the orchard.

In experiments to determine what are the comparative effects of tillage and grass sod on the Apple tree, it is found that tillage is generally better than sod, but it should not be expected, however, that sod will be deleterious in the same degree under all conditions.

It is reasonable to suppose, for instance, that in a deep soil, where the Apple tree roots can escape from the grass roots, or in one containing a great amount of soil moisture, the harmful effects of the grass will not be so marked as in cases of an opposite nature. Investigations do not show that the Apples cannot be grown in sod. There are many orchards which prove the contrary. It is suggested, however, the Apples thrive in sod, not because of the sod, but in spite of it. The proof that there are many thrifty orchards in grass sod is not proof that these orchards would not do better under tillage.

The statement is often made that trees will become adapted to grass. There is nothing in the experiments conducted in this country or in the Colonies to indicate that such is the case. Trees planted in sod begin to show ill-effects even in the first year in which orchards are laid down to grass, and each succeeding year but adds to the injury. Trees can hardly be expected to become adapted to thirst, starvation, asphyxiation and poisonous excretions.

J. J. Willis Harpenden.

(The Gardeners' Chronicle, November 20, 1909. p. 337.)

PRICKING RUBBER TREES FOR LATEX.

A note on a new process of obtaining latex from a tree, by pricking instead of cutting, appears in the Times of Malaya, November 27, 1909, and is given below. Attempts to obtain latex in this manner are by no means new. The idea was that the tree would be less injured than by cutting it. Experiments in this direction were made in the Botanical Gardens in Singapore over ten years ago, but the amount of latex obtained was too small, unless the tree was injured. An ingenious local inventor, without having ever seen a Para rubber tree, came to the Gardens with an invention consisting of a plate of kerosene tin so perforated that small portions of the tin projected like thorns from the back ; at the basal point, the plate was triangular, was fitted like a cup, so that the latex would flow into it. This plate was to be hammered against the tree so that the teeth projected into the trunk, and the latex flowing through the holes ran into the cup. On being applied to the tree, the amount of latex produced was not sufficient to enter the cup, and it ceased flowing almost immediately. Further it was found that the plate which fitted one part of a tree would not fit another, and so that one had to be made for each part of each tree and the ingenious idea had to be abandoned.

In Southern India, experiments were made with the tapping of Ceara rubber, by the use of a pricker. Ceara rubber trees are always troublesome to tap, and the idea was to simplify the business by pricking. It was found however that the pricking, if carried to such excess that a good flow of latex was obtained, was often fatal to the tree from the injury to the bark. We have no information as to the new invention referred to beyond what we give our readers below but realising that close puncturing of the bark of a rubber tree is apt to make a sore, and cause the death of a tree, one would be a little cautious in this form of tapping. One of the advantages pointed out in the process is that three-year-old trees can be tapped by it. But is this an advantage? While the price of rubber of any kind keeps up as it is doing now, one cannot wonder even if seedlings are tapped, but this is by no means good for the trees or for the industry.

NEW RUBBER PROCESS.

" Recently a planter in Ceylon invented a new process for extracting the latex from rubber trees. Instead of employing a knife or of making V-shaped or spiral incisions into the bark, he employs a pointed instrument which pricks the tree without doing it much harm. The new system produces a larger quantity of latex, and has the advantage that it can be used on young trees of three years old. It is interesting to learn that a Colombo firm have undertaken the working of the invention and offered to teach its use to planters for a fee of Rs. 500, the fee to be returnable in case of failure. A large number of planters have already availed themselves of the offer, and it is thought that the production of rubber in Ceylon will this year exceed all expectations. Apparently, it is too early yet to pass any definite judgment on the new process. The advantages claimed for it are simplicity, economy of labour and of cost of production, that it causes less harm to the trees, and ensures larger and quicker profits. But on the other hand, it remains to be seen whether the sap of the young trees mentioned will produce as good a rubber of equal elasticity and resilience as that of the older trees which have arrived at maturity, and whether ultimate injury will not have been caused to these young trees."—ED.

THE REWARD FOR A METHOD OF EXTERMINATING TERMES GESTROI.

A reward of five thousand pounds was offered in April 1909 for the best method of exterminating the destructive pest, Termes Gestroi in plantations. The difficulty lay in reaching the underground nest from the tree attacked with any smoke or liquid which would reach and destroy the insects in the nest.

As committee to examine the applications sent in were elected by the Government, the Director of Gardens, the Director of Agriculture in the Federated Malay States and the Chairman of the Planters Association.

As might be expected a considerable number of applications were sent in from all parts of the world. In many cases, ordinary insecticides were recommended or methods in use for destroying other species of termites were suggested, the applicants having had no acquaintance with the *Termes Gestroi* or its somewhat exceptional habits. In one or two cases even magical processes were advised. A number recommended the use of a machine which had for some time been in use in the Peninsula and had been invented elsewhere, and which is more or less effective, but was of course not a new invention in the sense that was required.

The applications were carefully considered by the Committee and it was decided that none were suitable for the reward, which has now been finally withdrawn.

THE EXHIBITION LECTURES ON RUBBER.

The lectures on rubber delivered at the Conference held in connection with the International Rubber Exhibition in London in September, 1908, have been published in a neat book form by the International Rubber and Allied Trades Exhibition, 75 Chancery Lane, London, for the price of 10s. 6d. Mr. S. D. Spence has edited the publication, which contains all the papers read and the discussions that followed.

The whole forms a most valuable and interesting contribution to the literature of rubber, and is well worth reading by every one interested in rubber, whether planter, manufacturer or shareholder.

A NEST OF TERMES MALAYANUS WITH MANY QUEENS.

It is comparatively seldom that more than one queen occurs in the nest of *Termes Malayanus*. To find two in the queen's chamber is however not of very great rarity. In a nest found in the Botanic Gardens many years ago, five queens were found in one chamber, accompanied by five kings. The latter had obviously been fighting, as all were damaged by the loss of legs, or parts of legs. Recently a nest of the same species was dug up in the Gardens which contained no less than 8 queens. The queens were rather small, and were all enclosed in the same mud-chamber which was as usual larger than is made for one queen. I think this is the largest number ever found in one nest.—ED.

THE WORLD'S FUTURE RUBBER SUPPLY.

Based on the Report of the Malacca Rubber Plantations, Ltd.

The report of the directors of the Malacca Rubber Plantations Ltd., submitted to the third annual meeting of the shareholders on the 26th ult. and adopted unanimously, should provide food for reflection for those interested in the probable supply of rubber in the not far distant future.

In this report the directors inform us that "the time has now arrived when they feel justified in passing on to the shareholders the carefully prepared estimates of future yield made by the local management."

These "carefully prepared estimates" allow for a production of 750,000 lbs. in 1910, increasing steadily to 7,500,000 lbs. in the year 1915: as there are, according to the report, 2,750,000 trees planted on 15,000 acres, this is equivalent to an *average* yield of 2.72 lbs. per tree or 500 lbs. per acre.

It is not my intention to criticise these estimates, but, on the assumption that they are fair and reasonable, to follow the lead which the Malacca directors have given us and to endeavour to deduce from them an approximate estimate of the supply of plantation rubber, say 5-6 years hence.

The estimated output for the whole of Southern Asia has been put by various authorities at from 25,000—35,000 tons by the year 1914 or 1915: occasionally someone has had the temerity to suggest that the probable output will be much more, but even the estimate of 35,000 tons has been questioned by those who should be in a position to form their own opinion. Let us, however, look stern facts in the face, and see how the production works out on the basis allowed by the directors of the Malacca Rubber Estates.

We find in the annual report of the director of agriculture, F. M. S., for 1905, that there were 241,138 acres planted in the Malay Peninsula by December 1908; while the Ceylon Directory gives the area under rubber in that island as 184,000 acres in June 1909—say 182,000 acres by December 1908, as only 4,000 acres were planted during the year ending June 1909. It is not possible to obtain accurate figures of the area planted with rubber in other countries but Sumatra, Java, Borneo, India, Burmah and New Guinea probably account for at least another 150,000 acres. As we are dealing with Asia, we will not take into account Africa and tropical America, although planting is proceeding on a large scale in both countries. Excluding these countries, then, we have a total of 573,138 acres planted by December 1908, an average which has probably been increased to considerably over 600,000 acres during the current year. For the purpose of this estimate, however, we will confine ourselves to the area planted prior to December 31, 1908.

The average age of the trees on the Malacca Rubber Co.'s estates works out at 2.83 years, but owing to lack of data, I am unfortunately unable to state definitely the average age of the whole of the 573,138 acres under cultivation, though, from the data at my disposal, I should put it at just under 3 years at the time of writing. However, as we are not dealing with anything planted during the current year, I think we are certainly justified in assuming that the average age and the average yield of the area under cultivation will compare favourably with that of the Malacca Rubber Co. estates; and it will probably come as a surprise to some to find that on the basis allowed by the directors of this company—viz. 500 lbs. per acre—the production of plantation rubber from Southern Asia alone will amount to no less than 127,932 tons in the year 1915. At one-third the present price this would be worth £38,379,600 sterling.

I offer no comment upon these figures beyond stating that although acquainted with the majority of rubber estates in the Malay Peninsula and Sumatra, I have yet to learn that the Malacca Co.'s estates enjoy any special advantages in the matter of soil, climate, labour supply, transport, or immunity from plant diseases and pests; so allowing that the condition of these estates is neither better nor worse than that of the average rubber plantation, and that the estimates of the management are approximately correct, we are confronted with an estimated *world's* out-put of just under 200,000 tons in the year 1915, assuming the yield from present sources remains stationary at about 70,000 tons.

Amid the glamour of record prices and huge dividends, it is somewhat difficult to see things in their true perspective; but even if we halve these estimates, it is obvious that the days of competition between the wild and the cultivated product are not very far distant. There is undoubtedly a period of severe depression ahead, and it is equally certain that as a result, the wild rubber industry must go to the wall, for it is inconceivable that, with the exceptionally favourable conditions obtaining in the plantation rubber industry, the wild product can possibly withstand the competition for any length of time. It follows, therefore, that rubber planting companies already firmly established have little cause for anxiety, though I am afraid the same cannot be said of some recent flotations, many of which although highly capitalised are not over-burdened with working capital: and herein lies the danger, for the bogey of overproduction will loom very large ahead, when serious competition with the wild product results in a very small margin of profit, and the working capital of the younger estates has reached vanishing point:—

Straits Times, Dec. 4th 1909. STANLEY ARDEN, F.L.S.

REPORT OF THE PENANG AGRI-HORTICULTURAL SHOW.

Held on the 9th, 10th and 11th August, 1909.

President—HON. R. N. BLAND.

General Purposes Committee—C. GUINNESS, GAN QUOH BEE, HON JOHN TURNER, DR. JAMIESON, W. LANGHAM CARTER, F. G. PIGOTT, S. E. A. LINTON, P. A. YEARWOOD, ELTON BELL, W. H. MACARTHUR, B. NUNN, H. MUIR.

Chairman—A. CAVENDISH.

Hony. Treasurer—D. W. GILMOUR.

Hony. General Secretary—WALTER FOX.

The Sixth Annual Agri-Horticultural Show was held in Penang, on the 9th, 10th and 11th of August. The last Show here was held exactly four years ago and by a coincidence on the same dates.

The occurrence of two public holidays in the week fixed for the Show was the primary reason for the selection of these dates, a factor of considerable importance to the officials connected with the management of the Show and also to the public in general.

H. E. The Governor, Sir John Anderson, G.C.M.G., opened the Show in brilliant weather, and spoke at length on Agricultural topics and commented in detail on the advance made since the previous Show.

The statistics given below set forth the advance that has been made, and justify the freely expressed opinion that it was the most successful Show of the series hitherto held.

2. The Prize Schedule was divided as before into the six following Divisions :—

Division	(A)	Agricultural Produce	87 Classes.
„	(B)	Flowers, Plants, Fruits and Vegetables..	103 „
„	(C)	Stock and Dairy Produce	32 „
„	(D)	Horses and Dogs	28 „
„	(E)	Native Arts and Industries of which 13 Classes were confined to Schools ..	59 „
„	(F)	Agricultural Implements & Miscellaneous	30 „

3. The Show attracted 1,935 Exhibitors as against 1,541 in 1905 who came from the following places :—

Penang and Province Wellesley	1,001
Perak	322
Malacca	180
Negri Sembilan	267
Selangor	134
Brunei	14
Singapore	9
Kedah	6
Johore	2
	1,935

4. The following table shows the number of Exhibitors in each Division, the place from which they came and the prizes gained:—

	Agricultural Produce. A	Flowers, Fruits and Vegetables. B	Stock and Dairy Produce. C	Horses and Dogs. D	Native Arts and Industries. E	Agricultural Implements and Miscellaneous. F	Total.	Prizes. $	Cups.	Medals
Penang and Province Wellesley	329	236	147	82	183	24	1,001	1,206	17	41
Perak	130	67	27	2	88	8	322	701	..	4
Malacca ..	79	47	9	..	43	2	180	104	..	..
Negri Sembilan	83	32	13	1	137	1	267	61	..	..
Selangor ..	63	33	3	..	35	..	134	89	5	4
Singapore ..	2	..	..	7	..	..	9	10	4	3
Brunei	2	..	..	..	12	..	14	42	..	..
Johore	2	..	..	..	..	..	2	..	1	..
Kedah	..	..	..	5	1	..	6	..	1	2
Total ..	690	415	199	97	499	35	1,935	$2,204	28	54

5. The figures work out to about the same proportion, as regards the percentage of prizes gained to the number of competitors as was the case at the previous Show, Penang and Province Wellesley, heading the list with 54% of the prizes and 51% of competitors.

6. The Show was patronised to an unprecedented extent as shown by the gate money which amounted to $1,030.69 on the first day, $808.96 on the second day, and $460.65 on the third day. The prices of admission were $2 for the opening ceremony on the first day up till 2 p.m., afterwards 25 cents. The charge of admission on the second day was 25 cents and on the third day 10 cents. The second day presented an unusually animated appearance when school children of all denominations were admitted free.

7. *Housing of Native Exhibitors.*—The Committee were fortunate in being allowed to use the barracks till lately occupied by the F.M.S. Guides overlooking the Show grounds to accommodate Native Exhibitors and their families and thus what at one time seemed to be a difficult problem to solve was rendered comparatively easy. The

thanks of the Committee are due to Messrs. Thomas and Hamilton for the excellent arrangements made for transporting native visitors with their Exhibits to and from the Show grounds.

Mr. Thomas organised and supervised a special tram service from the Jetty to the main entrance to the Residency whilst Mr. Hamilton spent a good deal of time and trouble in meeting and seeing off relays of native visitors.

8. The thanks of the Committee are again due to the Government of the F.M.S. and the Railway authorities for granting free transport to and from Penang over their lines to the numerous Exhibitors and Exhibits. But for this assistance it is doubtful whether half the number of natives who came would otherwise have attended.

The Straits Steam Ship Company were good enough to grant a rebate of 25% off the freight of all *bona fide* Exhibits whilst Messrs. Huttenbach, Liebert and Company kindly offered 50 free deck passages to and from Port Swettenham by the s.s. "Kistna."

9. *Finances.*—The usual contribution of $2,000 each from the Governments of the Colony and F.M.S. were given and a sum of $1,000 was voted from the Penang Municipal funds which together with a balance from the last Penang Show of $748.65 formed a nucleus of $5,748.65. The subscriptions amounted to $5,337.71 and Silver Cups to the value of $600 were generously presented by certain Associations, Firms and private individuals.

At first the subscription came in very slowly but later the total receipts came to $11,086 which was considered sufficient to cover all expenses. The Committee wish to thank the Penang and Province Wellesley public for their generosity and support. It should be added that had the Committee known earlier that such a magnificent sum would have been at their disposal, much improvement in the way of arranging the Exhibits could have been effected, thus the somewhat ugly rectangular sheds for housing Native Industries would have been discarded for a series of sheds for the different states so as to have presented a more realistic view of the life and industries of the natives; perhaps the best shape of sheds for this Division would have been circular or octagonal with radiating avenues. The central building could be reserved for articles of common manufacture in the several states, whilst the avenues could be devoted to each of the different states, or might have been set apart for industries peculiar to any particular State or District, such an arrangement would not only be picturesque but would foster emulation and competition in rival industries.

10. *Buildings.*—The buildings were on a much more extensive scale than before; whereas at the former Show the floor area was 45,427 square feet, the area on this occasion was no less than 71,999 square feet. The arrangement of the buildings were also a great improvement; they were erected around the sides of the Parade Ground in a continuous series, whilst the open space in the centre

served as the ring for competition in the Horse Classes. For information the following table shows the sizes of the sheds for each Division, and the cost for the whole :—

	Square feet
Secretary's Office	450
Ticket Boxes at Entrance	72
Flowers, Fruits and Vegetables	10,665
Trade Section	21,000
Poultry and Birds	1,080
Dogs	1,080
Buffaloes and Cattle	3,072
Sheep	720
Pigs	2,860
Native Industries	15,000
Agricultural Produce	16,000
	71,999
Including cost of above	$4,634.90

The course for exhibiting horses, ponies and carriages measured 145 feet along its parallel sides and the ends were connected by semicircles of 80 feet radius, the total distance round being nearly 550 feet.

Much credit is due to Mr. S. E. A. Linton, of the P. W. D., for the care and trouble he took in drawing the plans and supervising the erection of the buildings.

Nature and Quality of the Exhibits.—Speaking generally the standard of excellence was equal to that of former Shows, and in some cases far exceeded it. Taking the Divisions in their order it will be useful to note the points of interest and improvement shown.

Division A.

12. *Agricultural Produce.*—This Division was in charge of Mr. P. A. Yearwood as Honorary Secretary, and whether looked at from the number of exhibits, or their importance, easily stands out as the back bone of the Show. In the 87 classes no less than 690 competitors took part. For convenience of classification it was divided into the following Sections : I. Paddy, II. Rubber, III. Other Food Products, IV. Spices, V. Oil Cakes, etc., VI. Getah Gums and Resins, VII. Fibres and Miscellaneous. In almost every class the keenest competition took place, and especially in the staple products of rubber, rice, cocoanuts, copra and tapioca. Undoubtedly the most important was the Rubber Section in which magnificent samples were on view.

It is unfortunate, however, that in several instances competitors did not comply with the conditions laid down, and thus two magnificent cups offered for competition were not awarded by the Judges.

It would perhaps be better in arranging the Prize Schedule for future Shows, to offer at least three prizes in each class, and to ask the Judges to specify the number of marks gained by the 1st, 2nd and 3rd prize Exhibits respectively, to indicate the Exhibits in their order of merit. It would certainly be more satisfactory to competitors, and also more interesting for the public, to learn the relative value of the different Exhibits, for instance when only one prize was awarded there was no means of knowing the comparative excellence of the next Exhibit in merit, which might possibly have been only slightly inferior to that gaining the first prize. The method of judging by points would enable one to see how the winning Exhibits in rubber for instance, obtained their marks, whether for strength and resiliency, colour, uniformity, and so on. A most instructive rubber Exhibit was sent by Messrs. Behn, Meyer and Company, as Agents, consisting of a series of long sheets which had been coagulated by the new coagulant called "Purub." The merits claimed for this method of preparation are its rapidity of action (the specimens shown had been rolled up six hours after coagulation) and the fact that it is a better preservative, and does not in any way injure the quality of the rubber. The F.M.S. Agricultural Department are to be congratulated on the excellent and instructive series of Exhibits staged by them, consisting of an Entomological Section, showing the noxious termites in their various forms; specimens of their nests, and sections of trees riddled by them. Adjoining was the Mycological Section showing various plant diseases, especially those which attack rubber. Examples of actual trees showing bad, and good, methods of tapping and the results of each were on view. Close by were collections of fibres, oils, and a small camphor still at work. The next Exhibits in value to the rubber were the cocoanuts. These as usual were sent in vast numbers, 213 Exhibitors showing in one or other of the four classes; Perak carried off most of the Prizes. *Copra*, which has been in such great demand lately, with steadily rising prices, and for which an improved method of preparation has been suggested, was very well represented, and some very good samples were shown. The common fault, however, was noticed that some of the samples had been made from unripe, and others from badly dried, nuts. A small sample sent from Ceylon for comparison was of good quality, but received no award from the Judges. Tapioca was well shown, and contested, the first prize being easily won by the Manager of Malakoff Estate. Cloves and Nutmegs were sent in by the Penang growers in excellent samples, and had no difficulty in excelling those sent from other places. Penang Exhibitors were also successful in another important Section, Paddy, in which they more than held their own. It was disappointing to see the few poor specimens sent from Krian District, where the finest rice in the Peninsula is grown, under an irrigation scheme carried out by Government at great expense. The other Exhibits such as Oils, Pepper, Arrowroot, Dragons-blood, Gambier, Gums, Dammar, Tree Cotton, and Coffee were all more or less good in quality and quantity but call for no special remarks.

Division B.

13. *Flowers, Fruits and Vegetables.*—This Division which held a most prominent position just at the Entrance Gate was in charge of Mr. S. E. A. Linton who must be congratulated on its very neat and effective arrangement. It may be said that so far as the plants and flower sections are concerned it was the best display that has as yet been seen. At the entrance to the buildings (which was in the form of a cross) and on both sides some fine groups of plants sent by the Botanic Gardens, not for competition, were most artistically arranged, whilst central tables filled with flowering plants, such as Dahlias, Cockscombs, Chrysanthemums, Asters, Orchids, etc., made a picturesque vestibule to the competitive groups. The collection of vegetables from the Government Gardens on the Perak Hills was again an attractive feature, occupying the central portion of the building, the various vegetables being all excellently grown. The plants in the competitive classes were numerous and on the whole fairly well-grown-flowers, including table decorations, were good Considering that so far as Penang was concerned the fruit season was practically over, the Fruit Section generally was well filled, the Dukus, Chikus, and Mangoes being the best. Enormous numbers of limes were staged, and Pisangs were also largely shown, one Exhibitor showing no less than 52 varieties. The Section for Preserved Fruits was also good; Mr. Alexander's fine collection of Chutneys, Pickles, and Jellies being far the most prominent Exhibit of this kind.

Division C.

14. *Cattle and Poultry.*—This Division was in charge of Mr. Elton Bell; speaking generally, the cattle were more numerously shown than at the previous Shows. Pigs, Sheep and Goats were about the same in number as on previous occasions. The Section for poultry, however, was the outstanding feature of this Division; no less than 290 Exhibitors entered. The standard of excellence on the whole was not very high, there were few excellent birds, and in many cases, ordinary fowls were sent in that stood no possible chance of gaining a prize.

Division D.

15. *Horses and Dogs.*—This popular Division was in charge of Mr. W. H. MacArthur, and was very well patronised. Mr. Macmillan's fine English horses sent up from Singapore carried away first honours with the utmost ease, but notwithstanding this, competition in several classes was keen. Dogs were well shown and some splendid animals were sent in.

Division E.

16. This is the second largest Division and probably the most interesting, was in charge of Mr. B. Nunn ably assisted by Mr. G. A. Hall; they had to deal with 499 Exhibitors whose Exhibits were more than usually representative. The Exhibits coming from all places, from Brunei on the one hand to Kedah on the other, in most

cases filled the various classes; and the curious and ornate workmanship of some of the Exhibits was fully equalled by their artistic designs. The Silver and Bronze Metal work from Brunei, the tin ware from Seremban, the Rambong baskets, and the delicate lace work from Malacca, and the rattan furniture, and carving from the Schools, went to make up a Show of surpassing interest. The display of weapons, mats, and embroidery generally was very good indeed, and although there were few or no Exhibits of an entirely novel character, still the Division was more than equal either in quantity or quality to anything previously seen.

Division F.

17. *Agricultural Implements and Miscellaneous.*—This Division was under the care of Mr. H. Muir, and covered a wide field of Exhibits from tiny models, to steam ploughs and motors. Some classes had no entries but on the whole the Division was far better represented than formerly. Amongst the most notable Exhibits were the carriages from Messrs. Chin Seng and Company, Penang. The garden furniture consisting of trellis work, chairs, tables, rustic arches and a band stand, manufactured by the Eastern Shipping Company, and the coloured concrete tiles made at Batu Feringgi by Messrs. Huttenbach, Leibert and Company.

18. *The Trade Section.*—This covered a floor area of 21,000 square feet, and extended the whole length of Residency Road. It is difficult to say what articles could not be found among the various firms who exhibited, perhaps the most interesting were the Electrical and Machinery appliances.

19. *Judging.*—27 Judges were appointed by the Committee, they were assisted by Native experts in the difficult matter of judging the Paddy classes; and by Rajah Puteh who kindly gave her valuable advice in the Malay Embroidery Section. The Judges are to be congratulated on their decisions, which appear to have given general satisfaction, and the Committee tender their thanks to them for the great labour involved in carrying out their arduous duties.

20. *Standing Committee.*—The Standing Committee met on the second day of the Show, they decided that the Show be held in Singapore next year. Their attention was also directed to various suggestions for improving the usefulness of future Shows, notably in the matter of having Conferences on Agricultural subjects. It was suggested that Papers should be read on interesting topics, and experts appointed to personally conduct Exhibitors and others round the Show and explain the merits and other characteristics of the winning Exhibits.

21. *Protection.*—Unfortunately the Committee were without the valuable assistance of the F.M.S. Guides, who on a former occasion did such excellent service in guarding the Show by night. The police, however, carried out this difficult task satisfactorily, notwithstanding the few thefts that were reported.

22. *Presentation of Cups and Medals.*—Miss Anderson kindly presented the valuable cups offered for competition; and the 36 Silver and 24 Bronze Medals, at the close on the third day, thus bringing to an end certainly one of the most successful Shows of the series.

In conclusion the Committee take the opportunity of thanking all those ladies and gentlemen, who in their various capacities worked with such energy and good-will, and without whose hearty co-operation the Show would not have been such a great success as it was by general consent pronounced to be.

W. FOX,
Hon. General Secretary.

Statement of Receipts and Expenditure.

RECEIPTS.

1.	BY	S. S. Government Grant	$2,000.00	
2.	„	F. M. S. Government Grant	2,000.00	
3.	„	Municipal Grant	1,000.00	
4.	„	Balance from last Show, Penang ..	748.65	
5.	„	Subscriptions	5,337.71	
6.	„	Gate Money	2,300.30	
7.	„	Charges for Space (Trade Section) ..	663.66	
8.	„	Refund per Bank Account	63.25	
9.	„	Interest to 30th June, 1909	77.54	
				$14,191.11
				$14,191.11

EXPENDITURE.

1.	To	Erection of Show Buildings	$4,634.90	
2.	„	Amount of Prizes	2,204.00	
3.	„	Cost of Medals	379.05	
4.	„	„ Silver Cups	105.78	
5.	„	Printing, Advertisements & Stationery	1,070.68	
6.	„	Transport and Subsistence Money ..	1,457.63	
7.	„	Penang Band	138.00	
8.	„	Exhibitors' Expense and Compensation	583.39	
9.	„	General Charges	231.92	
10.	„	Auditors' Fee	50.00	
				$10,855.35
11.	„	Balance in Chartered Bank ..		3,335.76
				$14.191.11

We have examined the Vouchers and Books connected with the Agricultural Horticultural Show, 1909, and the above is, to the best of our belief, a true and correct account of the same.

DAVID BROWN & CO.,
Auditors.

D. W. GILMOUR,
Hon. Treasurer.

Penang, 19th November, 1909.

MINUTES OF MEETING OF THE PLANTERS' ASSOCIATION OF MALAYA

HELD AT THE MESS HOUSE, SEREMBAN, ON DECEMBER 5th 1909, AT 11-A.M.

PRESENT:

Chairman :—Mr. C. M. Cumming.

Legal Adviser :—Mr. G. H. Day.

Secretary :—Mr. H. C. E. Zacharias.

For Klang District Planters' Association :—Mr. R. W. Harrison, M.F.C. and Mr. A. B. Lake.

For Kuala Langat District Planters' Association :—Mr. C. E. S. Baxendale and Mr. H. L. Carter.

For Taiping District Planters' Association :—Mr. A. B. Milne.

For Negri Sembilan Planters' Association :—Mr. J. le P. Power, Mr. G. L. Hingston, Mr. J. A. Macgregor and Mr. G. B. W. Gray.

For Batu Tiga District Planters' Association :—Mr. P. W. Parkinson.

For Kuala Lumpur District Planters' Association :—Mr. E. B. Skinner, Mr. H. F. Dupuis, Mr. C. Burn-Murdoch, and Mr. H. C. E. Zacharias.

For Malacca Planters' Association :—Mr. F. W. Collins, and Mr. S. Moorhouse.

Visitors :—Messrs. G. Templer, A. Grisar, C. F. Lushington, and W. B. Douglas.

1. The notice, convening the meeting, having been read, the minutes of the previous meeting are taken as read.

Mr. Skinner points out that on p. 5, line 10, the words "not to be represented at all," should read "to be represented by one member only."

With this correction, the minutes, (on the motion of Mr. Harrison, seconded by Mr. Baxendale) are confirmed.

2. INDIAN IMMIGRATION COMMITTEE.

The Secretary reads the following correspondence :

The Federal Secretary, F.M.S.,
Kuala Lumpur. *8th November, 1909.*

SIR,—I have the honor respectfully to draw your attention to my letter on this subject dated July 23rd, 1909, to which I am as yet without a reply.

I have, etc.,
(Sgd.) H. C. E. ZACHARIAS,
Secretary.

No. 1397/1909. *15th November, 1909.*

SIR,—I am directed to acknowledge the receipt of your letter dated the 8th November, 1009, asking for a reply to your former letter of the 23rd July on the subject of the Indian Immigration Committee, and to say that it is not apparent upon what point a reply is required.

I have, etc.,
(Sgd.) R. G. WATSON,
Federal Secretary.

The Federal Secretary, F.M.S.
Kuala Lumpur. *16th November, 1909.*

SIR,—I have the honor to acknowledge receipt of your letter 1397 dated yesterday.

The point, on which my Association would wish to be favoured with a reply, is as to whether His Excellency the High Commissioner has given such directions, as submitted in the last paragraph of my letter of July 23rd.

I have, etc.,
(Sgd.) H. C. E. Zacharias,
Secretary.

No. 1397/1909. *18th November, 1909.*

SIR,—With reference to your letter of the 16th November, 1909, I am directed to inform you that, so far as this office is aware, His Excellency the High Commissioner has not directed the Chairman of the Immigration Committee that no proposal involving a financial change be submitted to the Immigration Committee without two month's notice of such intended change having first been given in writing to the Planting Members of the Committee.

I have, etc.,
(Sgd.) R. G. WATSON,
Federal Secretary.

The Secretary is instructed to write to the Federal Secretary, submitting that His Excellency the High Commissioner do give the directions enquired about by this Association.

Mr. Lake enquires, whether, and if so what notice is given usually to the members of the Indian Immigration Committee.

Mr. C. M. Cumming: A fortnight.

3. TRUCK ENACTMENT.

The Secretary reads the following correspondence:

The Federal Secretary, F.M.S.,
Kuala Lumpur. *8th November, 1909.*

SIR,—I have the honor to enclose for your perusal correspondence on this subject, passed between the Government of Selangor and my Association (11 p.p.)

My Association is of opinion that the attitude taken by Government in letter No. 20 (in 949/1909) is fraught with grave danger for the whole planting industry in these States, and therefore respectfully submits that the Resident General take urgent steps to amend the said Enactment.

I have, etc.,
(Sd.) H. C. E. ZACHARIAS,
Secretary.

No. 5366/1909 *24th November, 1909.*

SIR,—With reference to your letter dated the 8th November, 1909, I am directed to inform you that His Excellency the High Commissioner has called for reports on the working of the Truck Enactment from the Residents and Superintendent of Indian Immigrants.

I have, etc.,
(Sd.) R. G. WATSON,
Federal Secretary.

Resolved to let the matter stand over pending the enquiries being made.

4. MYCOLOGISTS.

Mr. Lake, as a member of the deputation that had waited on the Resident General, reports that the appointment of two more mycologists had been approved of. If more were required, planters would have to engage them privately.

Mr. Cumming thinks they should pass a vote of thanks to the Resident General, as the Association had got part of its programme accepted, and it was possible that there might be further support from the Government in the future.

This is agreed to.

5. RESEARCH CHEMIST.

The Secretary reads the following letter:

The Secretary,
Rubber Growers' Association,
London. *8th November, 1909.*

DEAR SIR,—With further reference to my letter of the 17th of August, the whole question of the insufficiency of the present Government Scientific Staff is now in the hands of a special Sub-Committee, who are treating with our Government on this subject.

I have, etc.,
(Sd.) H. C. E. ZACHARIAS,
Secretary.

Mr. Skinner proposes, Mr. Cumming seconds, and it is carried unanimously, that the R.G.A. be asked to approach the different Estates individually in this matter.

6. RUBBER DEALERS' LICENSES.

The meeting goes into Committee to consider the Federal Rubber Dealers Bill.

Resolved unanimously, to suggest the following amendments:

1. In section 2, para "Cultivated Rubber" to read:

"Cultivated Rubber" includes the leaves, bark, latex and any other produce of any plant or tree on alienated land yielding rubber or gutta percha in any form, but shall not include seeds and stumps:

2. To add in Section 2, after "appoint in that behalf;":

"Licensed Dealer" means a person who has obtained a license under section 4, (ii).

3. In Section 3 to delete the following words:

and that every license to keep a factory or place for the purpose of treating cultivated rubber shall include all rights conveyed by a license to purchase cultivated rubber.

4. To substitute for Section 4:

4. (*i*) *A license may be issued by the Licensing Officer upon application and payment of $1—and shall be substantially in the form of Schedule A with such variations as may be necessary.*

(*ii*) *A license may be issued by the Licensing Officer upon application and payment of a fee of $100—, and shall be substantially in the form of Schedule B, but no license shall be issued until the applicant therefor shall have made a deposit of five hundred dollars, to be returned as hereinafter provided, such deposit shall be either by cash paid into the Treasury or by delivery at the Treasury of a receipt from any Bank in the F.M.S. appointed by the Resident General to receive such deposit evidencing the payment of the said amount to the credit of the Government with such Bank; interest allowed by the Bank on the amount referred to in such receipt shall be payable to depositor.*

(*iii*) *Every license shall expire on the 31st day of December of the year in respect of which it is issued and shall be valid for the place and purpose specified therein; no license shall be transferable.*

5. In Section 6 (i) to substitute "4 (ii)" for "4 (i)".

6. In Section 7, i and 7, iii to add after "licensee" the words "and licensed dealer".

7. In Section 7, ii to substitute "licensed dealer" for "licensee."

8. In Section 8, i to substitute "the production" for "all" and to interpolate "production" between "of" and "purchase," and "produced" between "rubber" and "purchased."

9. To substitute for Section 9:

9. *No licensed dealer shall purchase and no forwarding agent shall receive any cultivated rubber except upon delivery to him by the vendor or consignor of a written authority for the sale or despatch thereef bearing the signature or chop of a licensed dealer or of the person (or of his duly authorized agent) in lawful occupation of the land, giving description and number of title or titles of the land, on which such cultivated rubber was grown or produced.*

10. In Section 10 to substitute "4 (ii)" for "(i)."

11. In Section 13 to substitute "not exceeding" for "of."

12. To substitute for the Schedule the following:

Schedule A.

"License is hereby given to............of............at...............in the District of...................during the year 19....................to keep a factory or place in District of..................for the purpose of treating and storing cultivated rubber according to the provisions of "The Federal Rubber Dealers Enactment 19........"

Description of place.......................................

Fee: $1.

Dated this.........day of..............19.....

....

Licensing Officer.

Schedule B.

"The Federal Rubber Dealers Enactment, 19........"

LICENSE.

License is hereby given to....................of....................at ....in the District of... ....to purchase cultivated rubber, during the year 19.........within the following area.............. that is to say ....and to keep the place hereunder specified for the purpose of purchasing storing and treating therein cultivated rubber according to the provisions of "The Federal Rubber Dealers Enactment, 19.........

Description of place.....................................

Deposit: $500.

Fee: $100.

Dated this..............day of..............19.........

....

Licensing Officer.

The Chairman considers that the thanks of this Association should be expressed to the Resident General for the great trouble he had taken over this Bill and the careful consideration he had given to their representations.

Carried with acclamation.

Mr. Day suggests that an ordinance, similar to the Federal Rubber Dealers' Bill, be passed in the Colony. It is agreed that the Secretary write to the Government putting forward the suggestion accordingly.

7. PRAEDIAL PRODUCE ENACTMENT.

Mr. Day submits the following definition of "latex," which is adopted, viz.:

"Latex is any plant juice which, either with or without the addition of a foreign substance or substances, solidifies to form India Rubber, alone or associated with other compounds."

8. EXCISE ENACTMENT.

Mr. Cumming reports that the constitution of the licensing boards for Selangor had been gazetted only a few days after their last Meeting, before he could take any action. Under the circumstances he thought the only thing for them to do now was to wait and see how the system worked.

Agreed to.

9. RECRUITING ADVANCES.

Mr. Cumming reports that the Sub-Committee appointed at the last Meeting had submitted the following resolution:

"That the Resolution passed at the Indian Immigration Committee Meeting of October 24th is not in the best interests of the Planting Industry, and that advances up to and not exceeding $7 per head made in India to intending emigrants be made recoverable at law in the area controlled by the Indian Immigration Committee."

On the proposal of Mr. Lake, seconded by Mr. Macgregor, it was unanimously agreed to forward this resolution to the Chairman of the Immigration Committee. It was also agreed that Mr. Harrison bring the matter forward at the first meeting of the Federal Council.

10. CONGRESS AT MANAOS.

Mr. Cumming speaks on the importance of British Malaya having delegates attending and volunteers to approach the Resident General on the subject.

This is agreed to unanimously, and also, that, if contributions from the Planting Community are required, same be met by donations from all the different Estates in the Peninsula.

11. WHITE ANTS.

The Secretary reads the following correspondence:

No. 5089/1909. *11th November, 1909.*

SIR,—With reference to your letter of the 9th October, 1908, in which you state that the Planters' Association of Malaya is prepared to guarantee £2,000 as their share of a £5,000 reward to be offered to any person discovering a cheap and effective method of exterminating White Ants, I am directed to inform you that the Director of Agriculture has addressed this office, and has submitted a report on the applications sent in by persons desirous of competing for the prize.

2. Mr. Gallagher has recommended that the prize be withdrawn, and he has stated that the Director, Botanic Gardens, Singapore, and the Chairman of your Association are in agreement with his opinion that none of the applications merit the award, that it is unlikely that the prize will ever be awarded, that the offering of the prize is only giving unnecessary trouble to his Department and that the award should therefore be withdrawn.

3. Mr. Gallagher's recommendations have been submitted to His Excellency the High Commissioner who has approved them and I am to enquire whether your Association agree to the withdrawal of the award.

4. The Honourable the Colonial Secretary, Straits Settlements, is being addressed in similar terms as regards the opinion of the Colonial Government with reference to the proposal of withdrawing the award.

I have, etc.,
(Sgd.) R. G. WATSON,
Federal Secretary.

The Federal Secretary, F.M.S.,
Kuala Lumpur. *13th November, 1909.*

SIR,—I have the honor to acknowledge receipt of your letter 5089 which I will lay before my Association at their next Meeting on the 5th of December, when I have no doubt your suggestion will be adopted.

I have, etc.,
(Sgd.) H. C. E. ZACHARIAS,
Secretary

Agreed unanimously, to withdraw the award, as suggested by the Federal Secretary.

12. BENEVOLENT FUND.

At the Chairman's suggestion, this matter is allowed to stand over until the next Meeting.

The Meeting terminates at 1 p.m.

H. C. E. ZACHARIAS,
Secretary.

KAPAR DISTRICT PLANTERS' ASSOCIATION.

Minutes of a General Meeting held at the Sementa School, on Tuesday December 14th, at 4.30 p.m.

PRESENT.

H. W. Bailey (chairman) P. Howard, E. H. King-Harman, W. R. F. Brock, W. R. G. Hickey, C. F. Stewart and the Honorary Secretary.

Proposed by Mr. Bailey and seconded by Mr. Hickey, the minutes of the previous meeting were taken as read.

The Secretary read the notice calling the meeting.

CORRESPONDENCE.

The Secretary read a letter from the Secretary, R.G.A., relating to the Drainage Assessment.

WATER SCHEME.

The Chairman read the particulars of the water scheme and the plan was handed round for inspection.

Mr. King-Harman wished to know whether the water rate was to be charged by metre or by acre. The Chairman explained that this had not yet been decided on by Government. Mr. King-Harman thought that in the event of rate per acre being fixed upon, only cultivated areas should be charged. The subject being fully discussed the following resolution was proposed by Mr. Bosanquet and seconded by Mr. Hickey:

"That the proposed water scheme as read out by the Chairman shewing the probable rate per acre as 50 cts. is thoroughly satisfactory and be accepted by this association as such." *Carried.*

The Secretary was instructed to write to the District Officer Klang informing him of the above resolution and that the Members of the Association were writing or cabling to their Agents or Proprietors with the object of having the scheme sanctioned.

DRAINAGE ENACTMENT.

The Chairman then made the following resolution: "That Government be approached with the object of having all the road drains and agricultural drains and outlets deepened on the Kapar Road from the 3¼ to 14th mile; also that the foundations of all outlets be deepened sufficiently to carry off all estate water.

"In the event of Government objecting to deepen the road drains that drains of a sufficient size be cut inside the road drain on estate land to answer the same purpose."—*Carried.*

LIQUOR LICENCES.

The Secretary read a letter from Mr. Harrison asking that any requests the District may wish to make with regard to the stopping of licences be sent in before 20th December.

Mr. Bosanquet proposed and Mr. Hickey seconded that "only one toddy shop and only one liquor shop be allowed in Kapar township."

Mr. Bailey thought one liquor shop a mistake as it would mean lack of competition, and proposed as an amendment "that 2 liquor shops and one toddy should be allowed." Seconded by Mr. Brock.

Mr. Bosanquet then withdrew his motion and Mr. Bailey's resolution was carried.

Before the meeting closed, the Chairman said that he felt sure that this Association would wish to express its sympathy with the K.S.D. P.A. on the sad news contained in yesterday's paper on the death of their Secretary Mr. Edgar Smith.

This was carried unanimously and the Secretary was instructed to write to the K.S.D.P.A. expressing the sympathy of the members of the Association.

The meeting closed at 5.50 with a vote of thanks to the chair.

NICOLAS C. S. BOSANQUET,
Hon. Secretary.

STRAITS REPORT.

London, November 12th, 1909.

Beeswax:—A firm market, shipments on the way will sell well.

Camphor: Market has been very quiet, spot value 132/6d to 135/-, and to arrive 132/6d per cwt. c.i.f.

Capsicums:—Supplies have met a steady market, really fine beans have commanded remunerative rates, but common slow of sale.

The Sales this week went off as follows:—63 Bags Nyassa offered and sold, bold dark red Natal character off stalk at 57/-, fair to good bright red at 45/- to 49/-, ditto mixed perished at 40/- to 43/- Coconada:—21 robbins were bought in at 50/-, for fair yellow off-stalk; 12 barrels West India sold at 41/- to 42/- for fair yellow and at 15/- to 30/- for mixed perished.

Copra:—A fair business has been done at firm to dearer prices, but we close on the easy side with tendency in Buyers' favour.

F. M. Straits £21.10.0.; Sundried £22.5.0.; Java £22.10. Manila £21.5.0; Ceylon £24.; Malabar £25,; Southsea £22 c.i.f. delivered weights.

Gum, Benjamin:—Quiet, and in Sales 331 cases offered only 38 sold; Siam, dark glassy block £6 to £7; Sumatra, fair seconds £6.10.0., ordinary third £4.15.0. to £4.17.6.

Copal:—Market unchanged, but rather irregular. In Sales 4,016 packages were offered, only 850 sold; Sambas, fair palish scraped 67/7, Manila, ditto scraped 45/- to 46/-, chips, good pale 34/6d., Macassar, scraped, pale and amber pipey 37/-, small pipey 25/- to 27/6d. Nuts, fair pale 31/- to 32/6d., dark and drossy 18/-, dark blocky sorts and pickings 15/- to 16/- per cwt.

DAMAR:—Market steady. 426 packages offered and 150 sold.

Singapore, pale and amber, unsifted, at 57/6., small ambery sorts 47/6d., dark, dusty, pea size 25/- to 25/6d., black Borneo scraped 16/6d. per cwt.

GAMBOGE:—Market quiet. In Sales 30 packages offered, but retired. We quote Siam pickings to good clean pipey £9.7.6 to £14.15.0. Saigon pickings to fair Ricey pipey £4 to £7 per cwt.

India Rubber:—The market since our last report advanced prices to 9/-2d., since when an easier tendency has been seen.

Business in Plantation grown Para privately has since been somewhat in Buyers' favour. Fine Crepe is worth 9/- per lb., fair Biscuits and Sheets 8/11d. In Sales everything sold, Crepe, pale at 9/0¾d. to 9/3½d., palish 8/11d. to 9/0½d., fair to good mottled 7/6½d. to 8/10¼d., fair to good mottled 7/6½d. to 8/10¼d., fair to good brown 7/5½d. to 8/7½d., barky 6/8½d. to 7/6d.; Biscuits and Sheets 9/0¼d. to 9/1d., scrap 6/4d. to 6/10½d. per lb.

Isinglass:—The Sales which have taken place during the past month marked a steady demand. The offerings of Penang were firm. Of 68 packages about 50 sold, fine pale stout at 4/9d., fair to good pale 4/3d. to 4/4d., middling 3/3d. to 3/5d., part thin and rough 2/4d. to 3/1d., pickings 1/3d. to 1/9d., Tongue, fair pale 4/-, small pale and reddish 3/1d. floats 1/3d. to 1/4d., Purse, ordinary to good pale 7d. to 1/1d. per lb.

Mace:—Market quiet. 30 cases of Java offered, 3 cases sold, good pale reddish at 1/11d. per lb.

The value of Penang, pale reddish to fine is 1/11d. to 2/4d., ordinary to fair 1/8d. to 1/10d.

Nutmegs:—A quiet market. 8 cases Java sold; 80's limed at 6½d., 110's limed at 4½d. 7 cases Penang, 40 boxes of Singapore were bought in.

Pepper, Black Singapore:—After a brisk business speculators retired since when sales have been restricted October to December at $4\frac{1}{16}$d. to 4d., December to January $4\frac{1}{8}$d. to $4\frac{1}{16}$d., January to March $4\frac{3}{16}$d. to $4\frac{5}{32}$d.

WHITE PEPPER:—has come under the same influence; Singapore October to December selling at 7d. to $6\frac{15}{16}$d., November to January 7d. to $6\frac{15}{16}$d., January to March $7\frac{1}{8}$d. to $7\frac{1}{16}$d., Siam $7\frac{1}{1}$d. to 7d., Penang $6\frac{1}{8}$d. to 6d. per lb.

Shell, M. O. P:—The fifth sales of the year held on the 7th and 8th September contained moderate supplies, and with good competition nearly everything sold at firm to dearer prices. The next Sales take place on November 16th.

Tortoise:— Supplies were only moderate, but everything was lower, the fall being 2/- to 3/- per lb, with the exception of good quality with colour. Singapore, Chicken sold at 8/- to 9/6d per lb.

Sago, Market dearer—In Sales small sold at 12/- to 12/6d per cwt. for fair, but Sellers now ask more money. We quote Pearl, large, at 15/- to 16/6d, medium 14/- to 15/-, small 12/- to 13/6d. Flour, good pinky to white 9/- to 10/- per cwt.

Tapioca, Market very firm:—There has been a firm business in fair Singapore; Flake at $1\frac{1}{16}$d. to $1\frac{1}{2}$d. Nov., Jan., $1\frac{15}{32}$d. to $1\frac{9}{16}$d. for Jan./March, medium Pearl 12/3d. to 13/- for near, and 12/6d to 13/9d for Jan./March shipment: Seeds 11/3d. to 11/9d.

Vanilloes:—There has been a good demand, and everything has sold with good competition at fully 2/- per lb. advance on good qualities.

Foxy splits and pickings being 1/- to 1/6d. per lb. dearer firsts, good crystalised $3\frac{1}{2}$d. to $8\frac{1}{4}''$ 11/6d. to 18/- seconds foxy and reddish $3\frac{1}{2}$ to $8'$ 10/6d. to 14-, third, lean and inferior 1/6d. to 11/-per lb.

All descriptions of Produce sold to the best possible advantage.

JOHN HADDON & Co.
Salisbury Square, E. C.

EXPORTS TELEGRAM TO EUROPE AND AMERICA.

December, 1909.

					Tons.
Tin	Str.	Singapore & Penang	to U. Kingdom &/or		1,496
Do.	,,	do.	U.S.A.		885
Do.	,,	do.	Continent		125
Gambier	,,	Singapore	Glasgow		—
Do.	,,	do.	London		75
Do.	,,	do.	Liverpool		175
Do.	,,	do.	U K. &/or Continent		50
Cube Gambier	,,	do.	United Kingdom		65
Black Pepper	,,	do.	do.		—
Do.	,,	Penang	do.		10
White Pepper	,,	Singapore	do.		25
Do.	,,	Penang	do.		—
Pearl Sago	,,	Singapore	do.		—
Sago Flour	,,	do.	London		275
Do.	,,	do.	Liverpool		1,200
Do.	,,	do.	Glasgow		25
Tapioca Flake	,,	Singapore	United Kingdom		55
T. Pearl & Bullet	,,	do.	do.		95
Tapioca Flour	,,	Penang	do.		525
Gutta Percha	,,	Singapore	do.		30
Buffalo hides	,,	do.	do.		60
Pineapples	,,	do.	do.	cases	3,500
Gambier	,,	do.	U.S.A.		500
Cube Gambier	,,	do.	do.		—
Black Pepper	,,	do.	do.		40
Do.	,,	Penang	do.		15
White Pepper	,,	Singapore	do.		15
Do.	,,	Penang	do.		20
Tapioca Pearl	,,	Singapore	do.		125
Nutmegs	,,	Singapore & Penang	do.		5
Sago Flour	,,	Singapore	do.		50
Pineapples	,,	do.	do.	cases	1,750
Do.	,,	do.	Continent	,,	—
Gambier	,,	do.	S. Continent		150
Do.	,,	do.	N. Continent		125
Cube Gambier	,,	do.	Continent		20
Black Pepper	,,	do.	S. Continent		50
Do.	,,	do.	N. Continent		—
Do.	,,	Penang	S. Continent		—
Do.	,,	do.	N. Continent		—
White Pepper	,,	Singapore	S. Continent		—
Do.	,,	do.	N. Continent		—
Do.	,,	Penang	S. Continent		10
Do.	,,	do.	N. Continent		20
Copra	,,	Singapore & Penang	Marseilles		100
Do.	,,	do.	Odessa		—
Do.	,,	do.	Other S. Continent		340
Do.	,,	do.	N. Continent		240
Sago Flour	,,	Singapore	Continent		975
Tapioca Flake	,,	do.	do.		10
Do. Pearl	,,	do.	do.		20
Do. Flake	,,	do.	U.S.A.		50
Do. do.	,,	Penang	U.K.		10
Do. Pearl & Bullet	,,	do.	do.		120
Do. Flake	,,	do.	U.S.A.		—

				Tons.
Tapioca. Pearl	Str.	Penang	U.S.A.	120
Do. Flake	,,	do.	Continent	25
Do. Pearl	,,	do.	do.	90
Copra	,,	Singapore & Penang	England	700
Gutta Percha	,,	Singapore	Continent	40
Cube Gambier	,,	do.	U.S.A.	
T. Flake & Pearl	,,	do.	do.	
Sago Flour	,,	do.	do.	
Gambier	,,	do.	S. Continent	
Copra	,,	do.	Marseilles	
Black Pepper	,,	do.	S. Continent	
White Pepper	,,	do.	do.	
Do.	,,	do.	U.S.A.	
Pineapples	,,	do.	do.	
Nutmegs	,,	do.	do.	
Black Pepper	,,	do.	do.	
Do.	,,	Penang	do.	
White Pepper	,,	do.	do.	
T. Flake & Pearl	,,	do.	do.	
Nutmegs	,,	do.	do.	
Tons Gambier				850
Do. Black Pepper				525

EXPORTS TELEGRAM TO EUROPE AND AMERICA.

November, 1909.

				Tons.
Tin	Str.	Singapore & Penang	to U. Kingdom &/or	1,496
Do.	,,	do.	U.S.A.	1,085
Do.	,,	do.	Continent	410
Gambier	,,	Singapore	Glasgow	—
Do.	,,	do.	London	15
Do.	,,	do.	Liverpool	50
Do.	,,	do.	U.K. &/or Continent	—
Cube Gambier	,,	do.	United Kingdom	100
Black Pepper	,,	do.	do.	—
Do.	,,	Penang	do.	60
White Pepper	,,	Singapore	do.	180
Do.	,,	Penang	do.	15
Pearl Sago	,,	Singapore	do.	15
Sago Flour	,,	do.	London	200
Do.	,,	do.	Liverpool	1,400
Do.	,,	do.	Glasgow	—
Tapioca Flake	,,	Singapore	United Kingdom	170
T. Pearl & Bullet	,,	do.	do.	340
Tapioca Flour	,,	Penang	do.	200
Gutta Percha	,,	Singapore	do.	50
Buffalo hides	,,	do.	do.	140
Pineapples	,,	do.	do. cases	5,750
Gambier	,,	do.	U.S.A.	50
Cube Gambier	,,	do.	do.	25
Black Pepper	,,	do.	do.	—
Do.	,,	Penang	do.	40
White Pepper	,,	Singapore	do.	—
Do.	,,	Penang	do.	20
Tapioca Pearl	,,	Singapore	do.	85
Nutmegs	,,	Singapore & Penang	do.	28

				Tons.
Sago Flour	Str.	Singapore	U.S.A.	150
Pineapples	,,	do.	do. cases	900
Do.	,,	do.	Continent ,,	1,250
Gambier	,,	do.	S. Continent	170
Do.	,,	do.	N. Continent	275
Cube Gambier	,,	do.	Continent	60
Black Pepper	,,	do.	S. Continent	70
Do.	,,	do.	N Continent	130
Do.	,,	Penang	S. Continent	—
Do.	,,	do.	N. Continent	—
White Pepper	,,	Singapore	S. Continent	5
Do.	,,	do.	N. Continent	30
Do.	,,	Penang	S. Continent	5
Do.	,,	do.	N. Continent	5
Copra	,,	Singapore & Penang	Marseilles	780
Do.	,,	do.	Odessa	—
Do.	,,	do.	Other S. Continent	700
Do.	,,	do.	N. Continent	2,650
Sago Flour	,,	Singapore	Continent	2,000
Tapioca Flake	,,	do.	do.	150
Do. Pearl	,,	do.	do.	30
Do. Flake	,,	do.	U.S.A.	175
Do. do.	,,	Penang	U.K.	85
Do. Pearl & Bullet	,,	do.	do.	50
Do. Flake	,,	do.	U.S.A.	—
Do. Pearl	,,	do.	do.	525
Do. Flake	,,	do.	Continent	45
Do. Pearl	,,	do.	do.	375
Copra	,,	Singapore & Penang	England	420
Gutta Percha	,,	Singapore	Continent	30
Cube Gambier	,,	do.	U.S.A.	
T. Flake & Pearl	,,	do.	do.	
Sago Flour	,,	do.	do.	
Gambier	,,	do.	S. Continent	
Copra	,,	do.	Marseilles	
Black Pepper	,,	do.	S. Continent	
White Pepper	,,	do.	do.	
Do.	,,	do.	U.S.A.	
Pineapples	,,	do.	do.	
Nutmegs	,,	do.	do.	
Black Pepper	,,	do.	do.	
Do.	,,	Penang	do.	
White Pepper	,,	do.	do.	
T. Flake & Pearl	,,	do.	do.	
Nutmegs	,,	do.	do.	
Tons Gambier				750
Do. Black Pepper				550

SINGAPORE MARKET REPORT.

November, 1909.

Articles.	Quantity. sold.	Highest price.		Lowest price.	
	Tons.	$	c.	$	c.
Coffee—Palembang	...	...		...	
Bali	3		28	...	
Liberian	54		25	24	25
Copra	3,690	9	70	8	75
Gambier Bale	1,460	11	30	10	65
Cube No. 1 and 2 ...	305	15	00	13	87½
Gutta Percha, 1st quality	..	300	00	240	00
Medium	...	240	00	120	00
Lower	...	80	00	12	00
Gutta Jelutong	...	9	50	7	50
Nutmegs, 110 s.	...	21	00	19	00
80	...	26	50	25	00
Mace, Banda	...	71	00	68	00
Amboina	...	68	00	64	00
Black Pepper	876	15	75	15	25
White Pepper	435	28	37½	27	50
Pearl Sago, Small	...	4	80	...	
Sago Flour, No. 1	3,920	4	45	3	50
2	210	1	20	1	05
Tapioca Flake, Small	735	5	50	4	90
Pearl, Small	386	6	25	4	85
Medium	440	5	42½	4	90
Bullet	...	6	75	...	
Tin	2,660	72	52½	69	67½

SEREMBAN.

Table showing the Daily Results of the Reading of Meteorological Observation taken at the General Hospital, Seremban, for the month of November, 1909.

Date.	Temperature of Radiation.						Temp. of Radiation.		Wind Direction.		Temp. of Evaporation.			Computed Vapour Tension			Relative Humidity.			Clouds 0 to 10			Cloud and Weather Initials.			Rain.
	9 H.	15 H.	Mean.	Maximum.	Minimum.	Range.	Sun.	Difference Sun & Shade.	9 H.	15 H.	9 H.	15 H.	Mean.	9 H.	15 H.	Mean.	9 H.	15 H.	Mean.	9 H.	15 H.	21 H.	9 H.	15 H.	21 H.	Inches.
1	77	86	81.5	90	71	19	141	51	NW	NW	73.6	67.9	71	.829	.681	.755	89	55	72	1	2	0	S	S	S	
2	75	87	81	90	70	20	135	45	NW	NW	73.3	68.9	71.1	.820	.708	.764	94	55	74.5	7	0	0	N	S	S	.05
3	77	83	80	84	71	13	100	16	NW	NW	73.6	76.3	74.9	.829	.905	.867	89	80	84.5	6	5	4	C	C	C	.04
4	76	86	81	89	71	17	137	48	NW	NW	72.6	76.3	74.4	.801	.808	.804	89	64	76.5	2	4	10	S	C	N	
5	77	87	82	89	71	17	130	41	NW	NW	73.6	77.1	75.3	.829	.933	.881	89	73	81	1	0	6	S	S	C	1.51
6	76	88	82	90	71	19	152	62	NW	NW	72.6	78.2	75.4	.801	.964	.882	89	73	81	4	2	5	C	S	C	.27
7	78	84	81	90	71	19	128	38	NW	NW	72.9	74	73.4	.810	.840	.895	84	72	78	1	10	10	S	N	N	
8	77	88	82.5	91	70	21	146	55	NW	NW	73.6	74.9	73.9	.829	.865	.847	89	65	77	2	0	4	S	S	C	.75
9	79	87	83	91	72	19	148	57	NW	NW	73.9	75.5	74.7	.839	.884	.861	85	69	77	3	4	0	S	C	S	
10	78	88	83	92	73	19	148	56	W	W	74.6	74.9	73.8	.887	.865	.861	89	65	77	0	5	0	S	C	S	
11	77	87	82	89	72	17	149	60	NW	NW	73.6	73.9	73.7	.829	.837	.833	89	65	77	1	0	0	S	S	S	
12	78	83	80.5	88	72	16	146	58	NW	NW	72.9	73	73	.810	.810	.810	84	72	76	0	8	6	S	N	C	
13	77	84	80.5	89	70	19	147	58	NW	NW	73.6	74.2	73.8	.829	.840	.834	89	72	80.5	0	0	0	S	S	S	.04
14	77	85	81	88	72	16	146	58	NW	NW	71.9	71.8	71.8	.783	.781	.782	84	64	74	0	3	6	S	S	C	
15	75	84	79.5	90	70	20	142	52	NW	NW	73.3	72.4	72.8	.820	.794	.807	94	68	81	7	1	4	N	S	C	
16	76	83	79.5	88	70	18	137	49	NW	NW	72.6	70.1	71.3	.801	.766	.783	89	68	78.5	2	4	7	S	C	N	
17	75	84	79.5	86	70	16	128	42	NW	NW	73.3	74.7	74	.820	.751	.785	94	64	79	5	10	8	C	N	N	1.23
18	78	83	80.5	86	70	16	142	56	W	NW	72.9	69.7	71.3	.810	.724	.767	84	64	74	6	10	8	C	N	N	.15
19	74	80	77	82	70	12	126	44	NW	NW	72.3	69.9	71.1	.793	.732	.762	94	71	82.5	10	10	0	N	N	S	.45
20	77	82	79.5	84	69	15	132	48	NW	NW	71.9	68.6	70.2	.783	.701	.742	84	64	74	5	3	0	C	S	S	.18
21	78	82	80	84	70	14	135	51	NW	NW	72.9	68.6	70.7	.810	.701	.756	84	64	74	5	2	5	C	S	C	.22
22	79	80	79.5	82	70	12	143	61	NW	W	72.3	69.9	71.1	.793	.732	.763	80	71	75.5	0	5	0	S	C	S	.26
23	79	80	79.5	86	69	17	140	54	NW	NW	73.9	69.9	71.9	.839	.732	.835	85	71	78	0	5	10	S	C	N	.47
24	77	77	77	84	69	15	126	42	NW	NW	73.6	73.6	73.6	.829	.829	.829	89	89	89	2	5	10	S	C	N	.30
25	75	77	76	78	66	12	130	52	NW	NW	69.8	73.6	71.7	.731	.829	.780	84	89	86.5	8	5	6	N	C	C	
26	75	83	79	78	65	13	128	50	NW	NW	71.6	72.3	71.4	.774	.776	.775	89	68	75.5	4	3	7	C	S	N	.38
27	76	84	80	84	72	12	140	56	NW	W	72.6	72.4	72.5	.801	.794	.797	89	68	78.5	3	7	5	S	N	C	.39
28	78	85	81.5	85	65	20	132	47	W	NW	72.9	71.8	72.3	.810	.781	.795	86	69	74	0	2	0	S	S	S	
29	81	87	84	87	66	21	104	17	N	NE	74.3	73.9	74.1	.849	.837	.843	80	65	72.5	1	5	3	S	C	S	.20
30	75	88	81.5	89	65	24	128	39	N	NW	71.6	71.6	71.6	.774	.775	.774	89	58	73.5	6	6	10	C	C	N	
Mean.	76.9	84.1	80.5	86.8	69.8	17	135.5	48.7	NW	NW	72.9	72.6	72.7	.812	.799	.805	87.5	68.3	77.9							6.89

Highest Temperature 92
Lowest ,, 65

Greatest Rainfall in 24 hours 1.51

J. LUCY,
Medical Officer in Charge.

PERAK.

Abstract of Meteorological Readings in Perak for the month of November. 1909.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Taiping	...	152	81.13	92	72	20	76.79	866	...	81	...	9.80	2.00
Kuala Kangsar	...	...	79.54	92	70	22	75.42	827	...	82	...	3.39	1·30
Batu Gajah	...	155	79.86	91	72	19	75.66	832	...	81	...	5 64	1.58
Gopeng	...	...	78.95	91	62	29	74.23	784	...	79	...	8.67	2 34
Ipoh	...	...	80.04	91	70	21	76.89	884	...	86	...	4.63	.81
Kampar	...	...	79.61	91	68	23	76.17	860	...	85	...	7.00	2.54
Teluk Anson	...	...	81.14	92	70	22	76.81	866	...	81	...	4.06	1.03
Tapah	...	...	79.29	92	68	24	75.64	839	...	83	...	12.97	4.51
Parit Buntar	...	...	80.75	89	71	18	76.69	865	...	82	...	10.95	2.52
Bagan Serai	...	...	81 08	90	70	20	76.76	863	...	81	...	8.08	2.38
Selama	...	...	80.87	92	73	19	76.86	869	...	82	...	10.77	2 68

State Surgeon's Office,

Taiping, December 15. 1909.

M. J. WRIGHT.

State Surgeon, Perak.

PENANG.

Abstract of Meteorological Readings in the Prison Observatory, Penang, for the month of November, 1909.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Mean Maximum.	Temperature. Mean Minimum.	Temperature. Mean Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Mean Vapour Tension.	Hygrometer. Mean Dew Point.	Hygrometer. Mean Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
	Ins.	°	°	°	°	°	°	%	°	°		Ins.	Ins.
Penang Prison Observatory ...	29·875	141·9	80·8	88·7	70·6	18·1	77·1	·886	74·6	84	N.-W.	15·68	7·03

Surgeon's Office,
Penang, December 9, 1909

M. E. SCRIVEN,
Assistant Surgeon.

A. H. KUN,
Medical Officer.

NEGRI SEMBILAN.

Abstract of Meteorological Readings in Negri Sembilan for the month of November, 1909.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Seremban		135 5	80.4	86 8	69 8	17	75 7	.805	72 7	77.9	N W.	6.89	1.51
Tampin												8 42	1.95
Jelebu												7.41	1.90
Kuala Pilah												7.64	1 45
Port Dickson Town												7.92	1.49
Do. Beri-Beri Hospital												8.89	1.50
Mantin												12.23	2.26

S. M. O's Office,
11th November, 1909.

J. HUNT,
S. M. O.

PAHANG.

Abstract of Meteorological Readings in the various Districts of the State for the month of October, 1909.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
Kuala Lipis	...	...	81	93	69	18.3	75	...	...	...	...	10 58	1 94
Raub	...	...	80	91	69	18.7	74	...	...	...	..	6.87	3.02
Bukit Fraser	...	...	...	...	59	...	...	...	...	...	...	7.64	2.12
Bentong	...	...	81	92	69	18.4	76	...	...	...	...	8.80	2.40
Temerloh	...	...	...	95	72	17.4	...	...	...	...	...	10.17	2.30
Pekan	...	...	82	93	71	16.3	77	...	...	...	...	8.74	2.33
Kuantan	...	...	85	94	70	12.4	78	...	...	...	...	9.31	2.25
Sungei Lembing	...	...	...	84	69	...	...	...	...	...	...	13.74	4.55

Office of the Senior Medical Officer,
Kuala Lipis, 14th December, 1909.

S. C. G. FOX.
Senior Medical Officer, Pahang.

KELANTAN.

Abstract of Meteorological Readings in Kelantan for the month of November, 1909.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
				Mean	Mean	Mean							
Kuala Lebir	...	...	...	85.37	72.07	13.37	...	...	...	...	...	9.98	2.95
Kuala Kelantan	..	...	...	84.27	72.87	11.47	...	...	...	...	...	23.87	5.51
Kuala Pergau	...	...	...	...	...	...	...	...	...	...	...	...	...
Taku Plantation	...	...	...	...	...	...	...	...	...	...	...	9.90	3.36
Pasir Besar	...	...	...	...	...	...	...	...	...	...	...	12.60	2.47

Surgeon's Office,
December, 1909.

A. B. H. Stuart,
Surgeon.

KUALA TRENGGANU.

Meteorological return of Kuala Trengganu District for the month of November, 1909.

Date.	Thermometer. 9 A.M. Maximum.	Thermometer. 9 A.M. Minimum.	Thermometer. 9 A.M. Range.	Rainfall. 9 A.M. Inches.	General Weather Observations.
1	89	78	11	...	
2	86	77	9	...	
3	86	76½	9½	...	
4	84½	76	8½	...	
5	84½	77½	7	...	
6	85	77	8½	0.28	
7	83	76	7	0.23	
8	82	77	5	0.16	
9	85	77	8	...	
10	85	75	10	...	
11	87	78	9	0.26	
12	84½	76½	8	0.16	
13	83	76	7	1.25	
14	83	76	7	0.09	
15	82	76	6	0 12	
16	83	75	8	...	
17	82	75½	6½	...	
18	82	78	4	0.46	
19	83	78	5	0.24	
20	83	73	10	...	
21	81½	74	7½	...	
22	82	77	5	1.92	
23	81	75	6	11.02	
24	81	73½	7½	2.71	
25	80½	73	7½	4 03	
26	75	72	3	0.28	
27	78	74	4	0 68	
28	79	74	5	8.07	
29	82	75	7	11 01	
30	79	72	7	...	
31	...	...	...	...	18 rainy days.
Means.	82½	75½	7.11	42.97	
			Total ...	42 97	

Highest Temperature 89
Lowest do. 72
Greatest rainfall in 24 hours 11.02

W. L. CONLAY.
British Agent, Trengganu.

No. 2.] FEBRUARY, 1910. Vol. IX.

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AGRICULTURAL BULLETIN

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No. 2.] FEBRUARY, 1910. [Vol. IX

ON THE EFFECT OF ARSENICAL AND SULPHUR FUMES ON VEGETATION, WITH PARTICULAR REFERENCE TO THE PARA RUBBER TREE (HEVEA BRASILIENSIS) AND RAMBONG (FICUS ELASTICA.)

In 1906–07 the question of the supposed deleterious effect of the fumes from the Chinese furnaces, in which low grade tin ores containing varying percentages of mispickel (arsenical iron pyrites) were roasted, was acute in one or two planting districts in Selangor, in the Federated Malay States, and numerous complaints were rife as to the injurious effects of the fumes not only on the Para rubber tree but on other forest vegetation, particularly at a certain elevation or height of tree.

In my agricultural-chemical report for 1906 (vide Agricultural Bulletin, S. S. and F. M. S., Vol. VI., No. 9, of September, 1907), brief mention was made of experiments then in contemplation to ascertain whether the complaints with reference to the injurious effects of the fumes on the Para rubber trees and on Rambong were justified, and also to ascertain whether such effects, if any, should be attributed to the arsenical or to the sulphurous fumes from these furnaces, since both are produced.

Method of Roasting.

A brief description of the method used by the Chinese for roasting these ores might be of interest.

The furnace consists of a low brick structure, with a fire at one end, the flames from which pass over the ore, which is laid on the bed of the furnace (a reverberatory furnace) and the fumes are carried from thence into a long stack at the other end. The time occupied in roasting a batch of ore depends on the amount of pyrites present. The charge is rabbled over periodically to allow all the ore to undergo thorough oxidation.

In this way much of the arsenic is carried off as arsenious acid or oxide commonly known as white arsenic, while the sulphur is carried off as sulphur dioxide in the fumes. Some of the arsenic and sulphur is left behind in combination with the iron as sulphate and arsenate and can be removed by lixiviation with water. A portion of the arsenic and sulphur is probably also carried off in the fumes as arsenic sulphide. As might be expected much of the white arsenic is deposited in the stacks and has to be removed at intervals to avoid choking up the stack. In several instances this material (in a very pure state) has been found near the roadside in the vicinity of the furnaces, remaining a source of danger to cattle grazing near.

Experimental.

To investigate the influence of the fumes on Hevea Brasiliensis and Ficus Elastica in particular, a small furnace was erected in the grounds of the Institute for Medical Research—the furnace being one-quarter of the size of the ordinary furnace used by the Chinese ore roasters.

A long attap roof shed was erected on long poles, one end being adjacent to the furnace stack, the floor being on a level with the top of the stack.

In this shed was placed a number of ordinary unglazed earthenware pots containing young plants of the Para and Rambong rubber trees and of the Rain tree (Pithecolobium Saman); the latter plant was added as it was known to be particularly sensitive to the fumes. The plants were placed in the pots some time previous to the experiment, and were also placed in the shed some days before the first batch of ore was roasted, being watered regularly. All the plants were strong and in vigorous growth prior to the experiment.

A count of the leaves and observations on their general appearance was also carried out.

Method of Roasting.

In the experiment a charge of 80 lbs. of a low grade arsenical—pyritical tin ore—was placed in the furnace, forming a layer about 2 inches deep on the furnace bed. The fuel used was wood. The roasting was commenced at 7 a.m., and by 9 a.m. the whole mass of ore had become a cherry red colour. The roasting was continued for twelve hours, the ore being periodically "rabbled" over to expose fresh surfaces to oxidation.

Position of Plants in Shed.

The pots containing the plants were placed in two rows in the long shed as shown below.

Stack C.	F1.	P2.	I3.	P4.		P6.	P7.	F8.	F9.	P10.	P11.
	P1a.	P2a.	P3a.	P4a.	I5a.	P6a.	F7a.	P8a.	P9a	P10a.	F11a.

F. Ficus Elastica (Rambong)
P. Hevea brasiliensis (Para)
I. Inga Saman or Pithecolobium Saman (Rain tree).

The length of the shed was about 12 yards, the first two plants nearest the stack being 3 yards from the stack, and the others being placed approximately equidistant from each other along the whole length of the shed.

Results of Investigation.

The first results of the experiment on the plants was observed two days after the experiment was completed, no effects being observed prior to this.

The following observations were made on the respective plants:—

(1) Observations on third day.

F1. One leaf stiff and of a dull green colour.

F1a. Several leaves yellow and brown in colour and one dropped on touching. Two twigs had also dropped off. Eight leaves dropped off and nine left intact.

P2. Two leaves yellow.

P2a. Three leaves easily detached on touching. A large number had become yellow in colour.

I. 3. A number of branches and leaves quite dry and broke off on touching.

P3a. Many leaves brown and unhealthy in appearance.

P4. This was a small plant with only eight leaves. All were badly affected and had a yellowish white colour.

P4a. Half of the leaves (15) had turned a yellowish white colour.
I. 5a. One branch dropped off on touching. Remainder healthy.
P6. Six leaves dry and of an unhealthy appearance.
P6a. All leaves healthy.
P7. Four leaves had turned yellowish in colour.
F7a. No apparent effect.
F8. " " "

F8a. Three leaves had dropped and seven were yellow and unhealthy.

F9. No apparent effect.
P9a. „ „ „
P10. Three leaves affected.
P10a. No apparent effect.
P11. „ „ „
F11a. „ „ „

Observations on 4th day.

No further effects were observed.

Observations on 5th day.

P1a. All leaves had dropped off.
P2. Two leaves quite yellow.
P2a. Most of the leaves dying. Many had dropped off.
I3. Many leaves dropping.
P3a. Most of the leaves dying.
P4. Leaves dying. All affected—yellowish white colour. Two had dropped and only six (all dying) remained.
P4a. A number of leaves dying.
F8. One leaf had dropped.

Observations on 6th day.

P2a. Only three leaves remaining. These were yellow in colour and broke off on touching.
P3a. A number of leaves quite yellow.
P4. The remaining four leaves dropped off on touching.

Observations on 7th day.

P2. The two yellow leaves and a twig dropped off on touching.

No further harmful effects were observed and no observations were made again till the 15th day.

Observations on 15th day.

P1. Plant recovering. Young leaves sprouting.
P2. Quite healthy.
P2a. Plant recovering.
I. 3. Recovered.
P3a. Quite recovered.
P4. Quite recovered. Three new leaves.
P4a. Recovering well.
I. 5a. Quite healthy.
F7a. This plant had lost no less than six leaves, which had dropped off, the remaining five were unhealthy.

All the remaining plants were healthy and new leaves were shooting.

No further observations were made on these plants as they all made a normal recovery.

Further Experiments.

Subsequently three condensing chambers, built of bricks, were erected; these consisted of brick boxes connected to each other by iron pipes, the last box being connected to the stack.

In this way it was anticipated that most, if not all, of the arsenic in the fumes might be condensed and observations made to prove what was believed to be the chief cause of the injurious effects of the fumes, viz., the effect of the sulphurous oxide.

The condensing chambers unfortunately interfered seriously with the draught, and before suitable alterations could be effected, further experiments had to be abandoned owing to lack of time.

The necessity for further experiments has now ceased as the Chinese roasting furnaces have since been stopped by order and a large plant has been erected by the Straits Trading Company for the special treatment of these low grade arsenical ores—in order to retain both the sulphur and arsenic.

These observations are published in this incomplete form as it is unlikely that the investigation will be continued.

Conclusions.

1. The results of this experiment prove conclusively the harmful effect of these fumes, particularly on the Para rubber tree and the Rambong tree, although it does not prove whether these effects are due entirely to one or the other or to both of the principal constituents of the fumes, viz., arsenious acid or sulphur dioxide.

2. In the writer's opinion the sulphur dioxide is the more harmful to vegetation—especially at long distances from the furnaces as the sulphur fumes would be carried considerable distances by the prevailing winds whereas the arsenic would be condensed in the immediate vicinity of the furnaces.

A large amount of the arsenic undoubtedly condenses in the stack itself as mentioned before.

3. The first noticeable effect is a spotting of the leaves, yellowish white spots being found on the surface, which gradually spread over the whole surface of the leaves, the latter eventually dropping off. The plants thus become quite defoliated. The leaves naturally grow again if the fumes are stopped, but if the fumes from the furnaces are continuous, as is the case in practice, then complete defoliation would occur, and the plant would subsequently die.

4. The effect on vegetation of a number of isolated roastings of arsenical ore will depend on the concentration of the fumes, and the period between the roastings, but even if the vegetation is not completedly killed, growth will naturally be retarded.

In confirmation of these results it might be of interest to quote the following extract from "Nature," February 20th, 1908, page 376:

"It has been found that not only are the trees and grass in the vicinity of the works injured by the sulphur dioxide and sulphuric acid of the smoke (Note: from a copper smelting works in America which is stated to produce 11½ per cent. of the world's supply of copper), but the gass is rendered poisonous by arsenic (Note by B. J. E.—Cattle would feed on such grass as the arsenic would be tasteless; grass sprayed with Sodium Arsenite in the F. M. S. some time ago was the cause of poisoning of a number of cows on an estate.)

Large settling chambers were found to be much less effective than long flues for the arsenic—the loss of animals became much greater with the former.

In the above works, arsenic escaped in considerable quantities from flues 300 feet high and caused considerable damage to forests and crops. Sulphuric acid was also found in the flues and near the furnace.

The article continues:—"To this sulphuric acid, together with the arsenic with which it is associated, is probably due much of the spotting of the leaves which is so common in the vicinity of the works.

N. B.—The action of the flue dust is of far less importance than that of the sulphur dioxide in affecting the growth of plants but the arsenic may affect to a greater degree the value of the grass, since it renders it poisonous."

B. J. EATON,
Government Chemist, F.M.S.

ANALYTICAL NOTES.

OF RUBBER PLANTS IN THE BOTANICAL GARDENS, SINGAPORE.

Hevea brasiliensis.

The latex was obtained from one 32 year old tree, tapped at 6-30 a.m. No water was added to the latex, and the formalin added was carefully measured, so that the amount of pure latex is known. In the figures given below this formalin has been corrected for so that they refer to pure latex.

The total yield from this tree at one tapping was 27 fluid ounces of latex. It was thick, white, and of very agreeable odour.

The coagulum obtained by use of acetic acid was analyzed and the amounts of several of the other constituents determined. The dry rubber has the following composition.

Rubber	98.14%
Resin	1.86%
	100.

Albumens were not determined (as they should be for strictly accurate results.) Their amount is small compared to the total, and the usual acetone extraction gives figures that are near enough to the truth for all ordinary purposes.

The analysis of the latex is :—

Coagulum	36.29%	..	Rubber	35.55%
			Resin	0.67%
			Ash	0.07%
Serum Solids	2.63%	..	Organic Matter	2.30%
			Ash	0.33%
Water	61.08%	..	Water	61.08%
	100.			100.

The solids soluble in water, (tannins, colouring matters, pentoses, gums, sugars of the inosite group, etc.,) form a brown sweet smelling mass of extremely hygroscopic nature.

The strength and appearance of the rubber were very fine.

The percentage of 36% coagulable matter in the latex is very high for Para and is in accordance with the rule that the percentage of rubber in a latex increases as the tree gets older.

Willughbeia firma.

The specimen was a vine about twelve years old, in the Botanical Gardens, growing in the jungle part of the same. Greatest diameter of stems about 2½ inches. The latex was found to flow most readily from transverse cuts, but coagulated so easily that collection as latex was difficult. Some of the latex was collected as such and added to the clots picked out of the cuts. The rubber was dried in the air and analyzed. The results are :

Rubber	86.82%
Resin	13.18%
	100.

It was a very fine tough rubber, turning very dark coloured in a short time. Except for the high resin content it is a first class rubber.

Chilocarpus enervis.

This latex was obtained from a creeper in the Botanical Gardens. It consisted of a mass of twisted stems around a large cinnamon tree, the largest circumference of any one stem being about five inches. The latex ran quite freely, without coagulating, from transverse cuts on the thickest stems.

The reaction was neutral to litmus.

Coagulating agents did not act readily, and the whole was evaporated. It then was a white brittle mass, very soft when hot.

The latex contained 42% solid matter.

Analysis Dry.

Rubber	25.60%
Resin	74.40%
	100.

The extracted rubber was a light coloured mass of little strength or elasticity, although not tacky. It seemed to be rubber, but if really such, is very poor. The resin is a pretty white substance crystallizing well from organic solvents.

Landolphia Heudelotii. (Africa.)

The specimen examined was a bush in the Botanical Gardens, growing in an inferior clay soil. Only a few feet in height with a diameter of about two inches on some of the branches, the basal stem being larger.

The latex ran very slowly from transverse cuts and coagulated rapidly. The rubber was obtained by picking the clots from the cuts, and was handsome and strong. The analysis of the dry rubber is :

Rubber	89.50%
Resin	10.50%
	100.

The dry rubber is of a clear light brown colour, not tacky, and very strong and elastic. Compared to Willughbeia rubber, it has a better colour, and the resin content is less. It is, therefore, a better rubber, as far as can be judged without vulcanization tests.

Tabernaemontana dichotoma. (India.)

The specimens examined in the Botanical Gardens were trees about fifteen feet high, of a girth near the base of about eighteen inches, and were growing in a very exposed place in poor soil.

Two of these trees were tapped on successive mornings. The latex ran slowly. It coagulated in a few hours in the bottle in spite of added formalin. On rubbing between the fingers and thumb it leaves them sticky as a good rubber latex should not do.

The solid mass was extracted. The figures on the dry weight are ;

Gutta	25.95%
Resin	74.05%
	100.

The latex contained 40.25% of solid material.

The extracted gutta seems to be of very good quality, very tough and of a light yellowish colour. It is very hard when cold and softens readily on warming.

The resin appears not to contain cinnamic acid esters, although further work would be necessary to decide this point.

It would seem as if the extracted gutta might be a very useful substance.

Leuconotis eugeniifolius.

The specimen examined was a low bush in the Botanical Gardens, a mixture of Leuconotis, Willughbeia and Urceola. Great care had to be taken to trace each stem to its proper leaf. The thickest stems procurable were tapped transversely, and a small amount of thin latex was obtained.

Acetic acid coagulates this latex readily, but on analysis it was found to contain no rubber. The main constituent, comprising 26.19% of the whole latex, is a sticky resin soluble in acetone.

Artocarpus integrifolia.

The specimens examined were common Jack trees. The latex ran very well from herring-bone tappings. It was thin and very sticky, neutral in reaction to litmus.

Attempts to coagulate it were unsuccessful, but it was found the agglutinated solid matter could be separated from the serum by filtration on paper.

A small percentage only was found to be insoluble in acetone, and this was found to be a white powder, neither rubber nor gutta percha.

Analysis of the latex gave:

Coagulum	26.79%	Solid insoluble in acetone	2.37%
		Resin soluble	24.42%
Serum solids Gums, pectins, albumens, etc.	8.85%		8.85%
Water	64.36%		64.36%
	100.		100.

The resin is a beautiful clear yellow, semi-solid mass, and is extremely sticky. This and a powder of unknown nature are the chief components of this latex, it containing no rubber whatever.

Alstonia "Pulai."

The specimen examined was a large *Alstonia angustiloba* tree in the Botanical Gardens.

The tree was tapped by the herring-bone system, and the latex ran well at first but speedily thickened in the cuts as does Dyera latex. It was kept going as well as possible by scraping it down the

cuts, and a total of two fluid ounces were obtained. Addition of a measured amount of ammonia caused the latex to become much more fluid and turn a bright yellow in colour. It was filtered through a very fine mesh silk gauze to remove dirt, and acidified with acetic acid. It does not coagulate as easily as true Jelotong latex with any of the ordinary coagulating agents.

Analysis of the dry coagulum is:

Rubber	22.28%
Resin	77.72%
	100.

Analysis of the pure latex gave:

Coagulum	35.74%	Rubber	7.83%
		Resin	27.78%
		Ash	0.13%
Serum Solids	4.43%	Organic matter	3.78%
		Ash	0.65%
Water	59.83%	Water	59.83%
	100.		100.

The latex thus strongly resembles that of the allied Dyera tree. The coagulum, which is rather stiff and brittle when the first excessive amount of water has been removed, contains exactly the same proportions of rubber and resin as in the Dyera Jelotong. The serum solids and the resin are very similar, they may possibly be identical. The resins have all the appearance of belonging to the amyrin group of resin alcohols as do the true Jelotong resins. Some of the chief differences between the two latices are:

(*a*) The inferiority of the Alstonia rubber. The extracted rubber, although it seems to be caoutchvouc, is much inferior in strength and colour to Jelotong rubber.

(*b*) Inferiority of Alstonia latex as regards ease of coagulation.

(*c*) Tendency to turn bright yellow of the Alstonia latex. If Jelotong rubber is adulterated with pieces of "pulai" it often is possible to detect the same by the yellow colour. On the other hand if a small quantity of the "pulai" latex is added to the Dyera latex it would be quite impossible to detect it as the dry material of both latices has exactly the same percentages of rubber and resin.

"PURUB" JELOTONG.

A specimen of Jelotong coagulated by means of "Purub" was examined. This was a large hard ball, yellow outside and slightly so on the inside. It was very hard and brittle and looked very unpromising. The age was said to be about three months. It probably contained some "Pulai."

An extraction showed that the rubber had entirely degenerated to a very sticky gum. In confirmation, a second extraction of a large quantity was made with the same result. The product is, therefore, absolutely worthless.

MANIHOT GLAZIOVII.

The specimen examined was taken from a large tree in the Botanical Gardens, Singapore. The bark was quite unlike that of most rubber plants, having a very thin outer bark. This came away from the tree very readily when the knife was used and a large surface of the same was stripped back. On this exposed place, a herring-bone tap was made, retapped again on the following day, and again two days later. The latex tubes are very near the outer surface of the inner bark, and these few successive tappings did not increase the flow of latex to any appreciable extent.

Unlike Hevea brasiliensis, the latex coagulated quickly in the cut, so that the flow ceased almost immediately; in fact, it was quite impossible to collect it in cups for this reason. The rubber collected was obtained by stripping it from the cuts. It had a very disagreeable herb-like odour. Analysis gave the following figures calculated to dry weight:

Rubber	90.44%
Resin	6.83%
Ash	2.73%
	100.

The rubber is fine and tough, tougher than Plantation Para, and very light straw yellow in colour. The ash could, of course, be reduced to a negligible amount by washing.

CHONEOMORPHA MACROPHYLLA.

The specimen examined was taken from a large vine in the Botanical Gardens, Singapore. The stems were about 3½ inches in diameter, and the base much thicker. It was tapped by a sort of herring bone system, rather diagonally, and the latex seemed to be quite abundant. It coagulated in the cuts very readily, with about the same ease as Willughbeia firma. As part had coagulated, it seemed impossible to keep the latex in a liquid condition for the time necessary, and it was all coagulated by rubbing up with the fingers. The rubber was tough and almost odourless.

The analysis, calculated to dry weight, is:

Rubber	88.63%
Resin	9.19%
Ash	2.18%
	100.

I should say it is a better rubber than either *Willughbeia firma* or *Landolphia heudelotii*, although the raw rubber is not as tough as either of these two. It has slightly less resin, and a real comparison would require vulcanization tests.

R. B. E.

RUBBER IN JAMAICA A FAILURE.

The cultivation of any kind of rubber plant known is, according to the Director of Agriculture in Jamaica, a failure. He writes in the Report of the Work of the Department of Agriculture for 1909 (Supplement to Jamaica Gazette, September 2, 1909), as follows:—

"I regret to report that I am unable, after careful study of the matter, to recommend the planters in Jamaica to spend money in the cultivation of any rubber producing tree yet tested in this island. The Para rubber is quite unsuitable. It flourishes in hot, moist climate, and on stiff clay soil. Lack of rain for ten days is a serious set-back to Hevea braziliensis, where it is grown on modern lines for rubber production.

It is significant that though the department has been distributing this tree for the past 25 years, there are no trees of any size to be found in the island. The largest is at Castleton Gardens, and this tree, although nearly thirty years of age, yields latex with great reluctance. The department spent over £500 two years ago in importing Para rubber seeds from Singapore, in response to the glowing reports from the East.

There is serious reason to believe that this enterprise is doomed to failure in Jamaica, and that planters have been ill-advised to spend money thereon."

Mr. Robert Craig, who kindly sends a copy of this report, does not intend, it appears, from his letter, to give up entirely all attempts, but sticks to his attempts, experimentally at least, with a thoroughly English perseverance. He says that his plants, though they stood the long draught wonderfully, have made no wood, many, twenty feet high, being no thicker than a fishing-rod. This method of growth one has not rarely seen here, but then our trees pick up after that and become stouter.

It would be very interesting to discover exactly what was the cause of the failure of this plant in Jamaica. A careful physiological and anatomical examination of the trees, and an account of their environment, soil, rainfall, temperature, sunshine and general meteorological conditions, would probably solve the problem as to why this plant, which grows so easily under all sorts of conditions here, is a failure in the West Indies. Our knowledge of the circumstances which in the tropics makes a tree a success or a failure, is at present far too scanty. It is one of the subjects which could only be discovered by a good staff of scientific men in a well-equipped Botanical Laboratory, a thing which does not exist in any of the Botanical Gardens of the Empire.

Here "a stiff clay soil" which the Director quotes as a factor in its success, is by no means a necessity. The tree grows well in low-lying swampy soil if drained, and on rocky laterite-hills as well,

if not better, than in our stiff clay soils. A ten days' lack of rain does not affect it at all. It stands a much longer drought in French Indo-China.

Some other factor than these must be the cause of the failure, and this can only be determined on the spot by careful and thorough investigation.

The Director of Agriculture takes an equally gloomy view of all the other rubber producing trees.

"*Castilloa Elastica* is more at home in Jamaica though sadly liable to scale and apt to die if tapped at all severely. The cost of collection of this rubber in the West Indies is found to be about 2/9d. a pound (Why? Ed.), while as a shade for Cocoa it has proved most pernicious. It has yet to be shown that the cultivation of Castilloa is profitable in any part of the world." (All the same the Mexican planters think highly of this cultivation, and talk at least of big profits). The Funtumia is a hardy tree, but of very doubtful utility as a cultivated plant.

The Manihot rubber is again of poor promise in Jamaica. A large tree of *M. Glaziovii,* growing in the Economic section at Hope, has just been cut down, and found to be almost devoid of rubber.

The virgin rubber (Sapium sp.) of Colombia proved to be very difficult to raise from seed, and great losses of expensive seeds occurred. A few hundred plants have been distributed to planters in the Hills and good growth is reported. I have no faith in this tree for cultivation, as a commercial source of rubber, from such information as I have been able to gather."

This part of the report finishes by adding Cotton to the Index Expurgatorius of Jamaica cultivations and a warning against the cultivation of vanilla.

Possibly, this depressing state of affairs is due in some measure to what is described as the guiding policy, which was laid down that the department should pursue the obvious agricultural needs of the Colony and concern itself with staple industries rather than dally with interesting novelties and curiosities of doubtful industrial value and that *the aims and interests of the scientist and experimentalist should be made entirely subservient to those of the planter and producer in the island.* Knowledge is power and science is merely the latinized form of the word, and matters can hardly be expected to improve if the man who knows and the man who tries to find out are pushed aside for the old out-of-date empiric system. Of course the scientist and experimentalist are employed at Botanic Gardens to help the Planter and Producer, but it is especially in a country where things fail that they are wanted to find out why, and to show that there is a good reason for the failure, and whether it is possible to turn it into a success or not. Such researches into the cause of the failure of rubber cultivation would be invaluable.—ED.

CORTICIUM JAVANICUM IN BORNEO.

A correspondent sends some specimens and a letter on an attack of *Corticium javanicum*, the pink bark fungus, on the rubber trees in an estate in Sarawak.

He writes: "In the first instance drops of latex may be observed exuding from the tree just as if a prick had been made with a needle. By degrees these punctures increase in number and the latex buckles down the stem freely.

The above phase in the initial stages of this disease is a prelude to the formation of black patches on the bark, which gradually increase in area. On removing the dead bark with a pen-knife pads of evil smelling rubber are found within and the rot has penetrated right through to the wood.

Subsequently to this "buboks" (*Xylotrupes* probably) make their entrance and together with a pinkish fungus seem to complete the destruction. I cannot accurately time this fungus, but have known the tops of five year old trees to be completely reduced by it in a week, so the destruction element appears to be fairly rapid. We suffered heavily last year during the monsoon, but got rid of the disease by tapping, burning and tarring and at the same period as a preventive measure all scars on trees throughout. It seemed as if old wounds and rough place on the bark afforded an easy entrance to the fungus we were trying to stamp out.

One peculiar feature I must remark is that our trees have been attacked anywhere either from the collar upwards or from the topmost branches downwards.

In both cases, if attended to promptly, the tree does not generally die, but its growth is seriously retarded especially when pollarding old trees has to be resorted to.

I have often noticed trees recover by themselves without attention viz (a) a 1½ year old tree died off from the top about 5 feet and then shot up again below the affected part, (b) a 5 year old tree (measuring 30 inches at 3 feet above ground) suffered from the fungus round the collar and upwards for about four inches. There were three distinct dead patches round the trunk, but the disease was suddenly checked and new bark began to make its appearance. The above instances are only two out of many. The fungus apparently does not confine itself to Para rubber trees as I have just noticed two young trees in my garden known locally as Saga (*Adenanthera pavonina* L) attacked by identically the same thing."

The specimens sent consisted of boughs and portions of the trunks of young trees bearing large patches of the pink *Corticium javanicum*. As commonly happens the patches of the fruiting fungus were only on one side of the stem and there seemed to be a strong tendency for it to appear on the under side of the smaller branches.

The branches appear first to be covered with small raised spots of cork scattered more or less thickly about, which eventually split and become small black sores. When these have become numerous, it can be seen that the whole of the cambium layer and all but the outer bark layer is dark brown or nearly black and rotten and the characteristic pink "writing" fungus appears. The damage is however done before this appearance of the pink fungus. It is quite possible that, as Mr. Bean suggests above, the fungus is a wound parasite as other species of *Corticium* are.

It seems also clear that it is more prevalent in wet weather than in dry, and in damp wet spots, that is to say, where the air is over-damp, and there is not a sufficient free current of air. It often appears in rainy weather in thick clumps of ramie or *Strobilanthes* bushes or other twiggy plants when too dense.

The exudation of latex from the damaged portion is not unusual in the case of death of the bark from fungus, but it is not easy to see why it should exude. In the specimens it appeared at first often in small-pear shaped globules, which being black from exudation looked very much like a small fungus.

The irregular exudation of latex from bark of a rubber tree is always a sign of some injury beneath the bark and usually the occurrence of a fungus.—Ed.

STRANGE GROWTH OF A PARA RUBBER TREE CUTTING.

Mr. Bean sends the following curious note on the behaviour of a Para tree:—"Eighteen months ago on our estate (Puak, Borneo) a 3½ year old tree was blown down and the trunk having been cut in two pieces by the Javanese was used as corner posts for a rough fence. One of these posts had been rammed in the ground upside down and after a month began to grow.

In three months there were two shoots eighteen inches long which flowered heavily. No fruit resulted but that was hardly surprising; however, the cutting is still growing but very slowly."

It is not of course an uncommon occurrence for a piece of living wood of almost any tree especially soft wood trees to put out branches or shoots for some time after the cutting is made, using up in so doing all the food which happens to be stored at the time in the bit. After which unless by that time the stick has been able to emit roots and feed itself normally, shoots and stick dies. It is, however, unusual for it to grow wrong way up, or to produce flowers.

I have seen, however, a low fence of crossed sticks made of cuttings of branches of Ceara rubber, *Manihot glaziovii* flowering and fruiting quite heavily.—Ed.

CORRESPONDENCE.

To the Editor of the Agricultural Bulletin, S. S. and F.M.S.

DEAR SIR,

I note in your issue of December, Vol. IX., No. 12, page 564, an article on the Aynsome Laboratories, Lancashire.

Without wishing to reflect in any way on the institution in question—about which I know nothing—might I suggest that before planters and others are advised to send agricultural products, etc., to such an institution for investigation, some information be obtained as to the working of the said institution?

Several colleges and scientific institutions at home at present undertake analyses for farmers and others for purely nominal fees or even for nothing. When such work is done in the interest of science only nothing can be said against it.

On the other hand, when such work is carried on by students who are paying fees for their own instruction—and the results of investigations are supplied to the public—these institutions are encroaching on the work of professional analysts and others who have to support themselves by means of their professions. Such work is to be deprecated not only from the analyst's point of view, but from the fact that such institutions may be, and are, using public money which was never intended for such purposes, as students are always able to obtain materials for analysis from other sources.

Yours faithfully,
B. J. EATON.

[As Mr. Eaton says in his letter, there are various kinds of laboratories undertaking the work of examining products, either for fees or for scientific investigation. The value of such a laboratory as the Aynsome one really lies in the fact that the firm with which it is connected manufactures certain articles, and products likely to be of use in such manufactures would probably get better attention than they would from an ordinary analyst who is not in touch with the trade. Thus one gets better information as to say the value of an oil seed from a soap manufacturer, than from any ordinary general analyst, though his information may be of great value too. One of the great values of the Imperial Institute is due to its being well in communication with the commerce of the world.

Frequently, too, it is of value to get opinions from various workers in laboratories as to the value of any product that may have a future. If one cannot find any use for it another may. The story of lalang as a paper material, and its various analyst's opinions, too long to recapitulate, but scattered through the Bulletin, is an instructive example. The manufactures conducted by the laboratory in question are clearly laid down, in the short article, and there is nothing to show that the analyses or investigations are carried on by the students, but by the staff:—Ed.]

NEW LITERATURE IN RUBBER.

A New Rubber-Tester.

Mr. Clayton Beadle sends a pamphlet reprinted from the ournal of the Society of Chemical Industry, giving an account and diagrams of a new machine for the mechanical testing of India-rubber designed by himself and Mr. H. J. Sterear.

The authors point out that some four or five years ago, in attempting to test the tensile strength of India-rubber goods, no machine was found to be suitable. The difficulty lay in the irregularity of shape and often of the smallness of the size of the rubber samples, so that it was difficult to cut stripes of uniform size and thickness, and also that in samples containing a small proportion of mineral matter they are liable to be crushed in the jaws and to tear just inside one or other of the grips. Eventually it was found that this tearing could be overcome by cutting test pieces in the form of rings and stretching them between smooth hooks.

The machine, of which a diagram is given, is made by Messrs. Baird and Tatlock, and seems to be a suitable one and not very expensive. Appliances for cutting samples into rings for testing are also described.

The India Rubber Quarter Century Number.

This is a finely illustrated series of articles by well-known authorities on India-rubber and its industry. Mr. Terry begins after an introduction by the Editor, with a retrospect of the industry for 25 years, showing how immense are the changes which have taken place, and especially in the botanical, chemical and physical aspects of the industry. The manufacture is dealt with by Messrs. Torrey, Stevens, Frost, Schidrowitz, Spence, A. Foster, and Elvery. The cultivation in the East is described by Messrs. Rutherford, Ridley, Parkin, John Turner, Bryce, Pears, Galledge, Malcolm Cumming, Arden, Fraser, Ferguson, in Brazil by A. Russan, Africa by Johnson, German New Guinea by Preuss, Castilloa in Tobago by Captain Short, West Indies Sir D. Morris, and Mr. Hart, the Guayule industry by C. A. Fox, Dutch Indies by "Senex," and Southern India by Mr. Windle.

Professor Labray gives some account and good photographs of the manicobas. *M. Piauhyensis* seems to be a curious stunted plant which is tapped on the main roots.

There are a good many unsigned articles also chiefly on the subject of the industry. The illustrations are excellent and interesting, and there are portraits of almost everyone connected largely in the trade and planting.

The whole work is of interest to those who have any connection with the rubber trade or cultivation.—Ed.

THE EFFECT OF GRASS ON TREES.

The effect of grass on trees is probably intimately connected with that fundamental question in agriculture to which no comprehensive answer has yet been obtained, namely, the fertility of the soil. The casual observer may dismiss the subject by stating that it is simply due to the grass robbing the tree of its nourishment or its moisture, but such a statement can only be based on ignorance of the facts, and of all the work which has been done in the matter. The subject has been under investigation at the Woburn Experimental Fruit Farm for the last 15 years: one report (the third) dealing with it was published in 1903, and it is hoped that another will be issued before very long.

Although no final solution of the problem has yet been obtained, considerable progress has been made in the matter, and various possible explanations have been definitely negatived. Foremost amongst these is the theory that the action is due to the grass absorbing all the food and water from the soil. The original experiments are, perhaps, the most striking, though not the most precise, on this point. A large number of Apple trees were planted in rows, 11 feet apart, in 1904: the ground in one row was kept tilled, and that in the other row laid down to grass; the grass, when cut, is left to rot on the ground, and the same amount of manure is given to both rows of trees. Those in the tilled soil are now such large trees that half of them have had to be removed, their spread being some 15 to 16 feet; those in grass did not grow at all for several years, and only began to make growth when their roots extended beyond the grassed area; they are still miserable specimens of trees, about one-sixth the size of the others, and the crops borne by them have only been about one-tenth of that of their neighbours. Yet the grassed soil is actually richer than the tilled soil. In the 15 years it has had removed from it only one crop of grass (that actually growing at any given moment) and the small amount of material required for the stunted growth of the trees; whereas from the tilled soil there has been removed material for an annual crop of fruit, and also for the vigorous growth of the trees. Analysis also shows that the grassed soil is the richer of the two, and it also shows that, in this particular case, there is practically no difference between the water contents of the grassed and open plots.

Of the many other experiments on these points, the most conclusive are, perhaps, those made with Apple trees grown in pots. In some of these the grass roots were separated from the tree roots by very fine wire gauze, through which the former could not penetrate; the pots were weighed and watered every two days, so as to keep the water contents the same, and such water and food as was added, was introduced from below, so that the tree should have the first pull at it. Yet the trees still suffered badly from the grass, although the soil was actually moister and richer than in the case of

similar trees without grass. Corresponding experiments have been made with trees planted in the open. Though increase of moisture up to a certain point, and increase of food in certain cases, may benefit the trees, the benefit is much too small to do more than very slightly diminish the deleterious effect of the grass.

The behaviour of a tree in grass is clearly a case of starvation in a land of plenty, and this cannot be explained by supposing (untenable as such a supposition is for other reasons) that the grass roots suck up whatever nourishing solution there is in the soil, leaving none for the tree roots. The pot experiments, just quoted, effectively negative this. Nor can we explain the matter by supposing that the tree was only temporarily affected by the grass, but being in a weak state after transplanting this check resulted in its becoming permanently stunted; for a precisely similar, and even more marked effect has been proved to be produced by grassing over trees which have been established, in one case for four years, and in another case for 12 years; the effect, indeed, was so great that, in the first instance, many of the trees have been killed, and, in the second instance, a similar result appears imminent.

Other explanations which suggested themselves have been investigated, and found equally unacceptable: these were differences in soil temperature, differences in aeration or proportion or carbon dioxide, and difference in the physical condition of the soil. The only other explanation which appears to be possible is that the growth of the grass results in the formation of some substance which is poisonous to the tree. This may be an active poison—a toxin—or the poisonous action may result from an alteration in the proportion of various substances present in the soil. An active poison may be produced in various ways, such as by the decomposition of the debris of the grass, actual excretion from the grass roots, or as a product of the bacteria present in the soil. As to the origin of the toxin no definite evidence has yet been obtained, but it has been found that toxins may be formed in soils by heat, and other means, producing effects which are analogous in many respects with those produced by grass on trees. Thus, on heating soil, substances are produced which are toxic towards the germination of seeds, and these have been found to be toxic towards plant growth also. That established plants grow better in heated than in unheated soil, is due to the fact that heating causes a considerable increase in the soluble nitrogen present in the soil, and also in the composition of the bacterial flora of the soil. Moreover, the toxin formed as the result of heating the soil soon becomes oxidised and destroyed, allowing the favourable conditions to assert themselves. If, however, the toxin is present in sufficient quantity, it is not all destroyed before the plant grows, and its deleterious effect becomes apparent. It is noticeable that this effect varies greatly in different cases, and is very much less in the case of grasses than in that of the other plants which have been examined. Earth from grassed ground behaves in the same way as earth which has been slightly heated and which contains only a limited amount of toxic matter, for trees planted in it (the grass being removed) do better than in soil taken from tilled ground, such toxic matter as there was present in it having evidently become destroyed before the tree started into growth: whether its presence originally in soil can be estabished by its effect on germinating seeds, still remains to be seen.

If the formation of a toxic substance is the explanation of the grass effect, we might naturally expect great variations in this effect in different soils: and this is certainly the case. At Ridgmont the effect is, perhaps, greater than in any other instance which has come under the writer's observation, but cases of very nearly the same intensity have been found in various parts of the kingdom, whilst only one instance has been noticed where the grass, apparently, had no effect. This variation in intensity with the nature of the soil is, probably, the chief reason why the action is not more widely recognised; but two other causes contribute to an under-estimation of the grass effect, the one that it is very rare for a plantation to be partly grassed in such a way as to give satisfactory evidence as to the bad effect of this grassing; the other, that the grassing is generally effected gradually, extending throughout several seasons, and in that case, it has been found, the effects are far less marked than they otherwise are, the trees, apparently, becoming gradually adapted to the altered conditions.

No definite connection has yet been found between the nature of the soil and the intensity of the action, but it does not appear to be governed by the richness of the soil. The case, alluded to above, in which the action has been nil, cannot be explained by any greater depth of soil into which the tree roots penetrate, thus getting away from the grass roots, for many of the trees have been lifted, and all have been found to have their roots near the surface. *Spencer Pickering.* (Gardener's Chronicle Dec. 18. 1909 p. 409.)

STRAITS REPORT.

London, December 10th, 1909.

Beeswax:—Supplies during the past month have met a good demand at full rates.

Camphor:—A quiet market. Sales of fair China at 135/- to 136/6d. per cwt.

Capsicums:—East Indian rather quiet. Red, light and long value 25/- to 30/-, yellow 32/6d. to 35/- per cwt.

Cardamoms:—Have been in good request at firm to dearer rates; good to fine bold 2/6d. to 3/- per lb.

Cloves:—Market has been very quiet, closing January to March at 4¾d, March to May, 4$\frac{13}{16}$d.

Copra:—The market has been very firm during the last month and prices have shown an advance of about £2 per ton. The present value—F. M. Straits £23.10.

Dragons Blood:—Market quiet. Singapore reeds, dull to fine bright £9 to £9.10.0, per ton. Lump, ordinary to fine bright £6 to £6.10.0, per cwt.

Gums Benjamin:—Market has been very quiet. Sumatra, good seconds sold at £7 to £7.5.0., ordinary £6.10.0., Broken £6 per cwt.

COPAL :—Market steady. Pontianac, good clean amber scraped sold at 68/-, dark 63/-. Nuts, fair clean 57/6. Macassar, Nuts, fair to good pale 30/- to 32/6d.. amber, dark and drossy 17/-, dark and drossy blocky sorts 15/6d. Chips, small palish specky 20/ to 20/6d., dark 16/- per cwt.

DAMAR :—A small trade, but at rather better prices. Singapore, palish pea size selling at 32/6d., siftings 27/6d. to 28/-, amber pickings at 33/- per cwt.

India Rubber :—The month has been a decline, Fine Para has dropped to 7/5d.

In Sales Plantation grown Para, Crepe sold at 9/3½d. to 7/11d., palish 9/0½d. to 7/7¼d., fair to good mottled 8/10¼d. to 6/4d., fair to good brown 8/7½d. to 6/1d., barky 7/6d. to 5/2¼d., Biscuits and Sheets 9/1d. to 7/6d., scrab 6/10½d. to 5/6d., smoked sheets 8/3½d. to 8/8d.. closing dull at the lower rates.

Isinglass :—The Sales have gone well, Saigon, long leaf advancing 2d. to 3d., other qualities steady. Long, fair to good selling at 6/- to 6/3d., middling 5/5d. to 5/9d., small reddish 4/7d., dark 4/2d., small thin 3/2d. to 3/4d., round, fair to good pale 4/- to 4/3d., middling 3/5d., to 3/8d., part thin and rough 2/4d. to 2/10d., per lb.

PENANG :—Market firm. Roung leaf, fine pale stout 4/9d., fair to good pale 3/10d. to 4/5d., middling 3/3d. to 3/9d., part thin and rough 2/3d. to 3/1d., pickings 1/2d. to 1/6d. Long Leaf, small thin to fair pale 3/7d. to 5/6d. Tongue, long palish 2/8d., dark 2/2d. Floats, fair 1/5d. Purse small thin to good pale 8½d. to 1/5d., per lb.

Pepper :—Business has been fairly steady, the demand has been quiet, values have ranged for Black Singapore, December to January, 4 $\frac{1}{16}$d. to 4d., January to March, $\frac{3}{32}$d. to 4 $\frac{1}{32}$d., March to May, 4 $\frac{3}{16}$d. to 4⅛d. White Singapore, December to January, 7d. to 6 $\frac{15}{16}$d., January to March, 7 $\frac{1}{16}$d. to 7d.

Siam, 6 $\frac{15}{16}$d., Penang 6d. to 6⅛d. per lb.

Sago :—In better demand at dearer prices. To arrive a small business has been done in medium at 12/9d. to 13/3d., c. i. f. On the spot Pearl at 15/- to 16/6d., medium 14/- to 15/-, small 12/- to 13/6d.

FLOUR :—Gook pinky to white 9/- to 10/- per cwt.

Shell:—M. O. P. In Sales 70 packages of Macassar offered and sold at good prices. Bold and medium at £11. 17. 6. to £14, medium and good chicken at £11. 2. 6. to £12. 17. 6., pickings £7. 15. 0. to £11. 12. 6., pieces £7. 12. 6. per cwt.

SNAIL:—Mergui, small to bold 34/- to 57/6d., defective 34/- per cwt.

TORTOISE:—In good demand at dearer prices. Singapore, small to bold 19/- to 20/-, small to medium 14/6d. to 17/- Chicken 8/- to 11/-, pickings 7/- to 15/6d., per lb.

Tapioca:—A quiet market. Only a small trade in Flake from 3½d. to 1⅜d. For December to January and January to March, medium Pearl at 13/9d. to 12/3d., and Seed at 11/9d. per cwt.

Spot value:—Penang, Flake 1½d. to 2d.; Singapore 1½d. to 2d.; Java 1¼d. to 1¾d. Flour fair to fine 9/- to 11/-. Peral, Bullet 19/-, medium 12/- to 17/-. Seed, fair to fine 11/6d. to 15/- per cwt.

Vanilloes:—Market barely steady for Fine Beans which are about 6d to 1/- down. Firsts, good crystalized 3½" to 8½" 11/6d to 18/-. Seconds, foxy reddish 3½" to 8½" 10/6 to 14/-, lean and inferior 10/6d. to 11/- per lb.

All descriptions of Produce sold to the best possible advantage.

JOHN HADDON & Co.
Salisbury Square, E. C.

EXPORTS TELEGRAM TO EUROPE AND AMERICA.

16th December, 1909.

				Tons.
Tin	Str.	Singapore & Penang to	U. Kingdom &/or	1,746
Do.	,,	do.	U.S.A.	821
Do.	,,	do.	Continent	305
Gambier	,,	Singapore	Glasgow	—
Do.	,,	do.	London	25
Do.	,,	do.	Liverpool	125
Do.	,,	do.	U.K. &/or Continent	225
Cube Gambier	,,	do.	United Kingdom	55
Black Pepper	,,	do.	do.	—
Do.	,,	Penang	do.	—
White Pepper	,,	Singapore	do.	100
Do.	,,	Penang	do.	25
Pearl Sago	,,	Singapore	do.	—
Sago Flour	,,	do.	London	625
Do.	,,	do.	Liverpool	700
Do.	,,	do.	Glasgow	—
Tapioca Flake	,,	Singapore	United Kingdom	175
T. Pearl & Bullet	,,	do.	do.	230
Tapioca Flour	,,	Penang	do.	150
Gutta Percha	,,	Singapore	do.	45
Buffalo hides	,,	do.	do.	140
Pineapples	,,	do.	do.	12,750
Gambier	,,	do.	U.S.A.	190
Cube Gambier	,,	do.	do.	30
Black Pepper	,,	do.	do.	35
Do.	,,	Penang	do.	—
White Pepper	,,	Singapore	do.	—
Do.	,,	Penang	do.	—
Tapioca Pearl	,,	Singapore	do.	50
Nutmegs	,,	Singapore & Penang	do.	1
Sago Flour	,,	Singapore	do.	50
Pineapples	,,	do.	do.	800
Do.	,,	do.	Continent	3,000
Gambier	,,	do.	S. Continent	50
Do.	,,	do.	N. Continent	440
Cube Gambier	,,	do.	Continent	100
Black Pepper	,,	do.	S. Continent	80
Do.	,,	do.	N. Continent	40
Do.	,,	Penang	S. Continent	30
Do.	,,	do.	N. Continent	—
White Pepper	,,	Singapore	S. Continent	20
Do.	,,	do.	N. Continent	25
Do.	,,	Penang	S. Continent	5
Do.	,,	do.	N. Continent	5
Copra	,,	Singapore & Penang	Marseilles	780
Do.	,,	do.	Odessa	1,300
Do.	,,	do.	Other S. Continent	540
Do.	,,	do.	N. Continent	2,250
Sago Flour	,,	Singapore	Continent	1,050
Tapioca Flake	,,	do.	do.	45
Do. Pearl	,,	do.	do.	70
Do. Flake	,,	do.	U.S.A.	25
Do. do.	,,	Penang	U.K.	25
Do. Pearl & Bullet	,,	do.	do.	100
Do. Flake	,,	do.	U.S.A.	—

				Tons.
Tapioca. Pearl	Str.	Penang	U.S.A.	—
Do. Flake	,,	do.	Continent	45
Do. Pearl	,,	do.	do.	170
Copra	,,	Singapore & Penang	England	340
Gutta Percha	,,	Singapore	Continent	30
Cube Gambier	,,	do.	U.S.A.	
T. Flake & Pearl	,,	do.	do.	
Sago Flour	,,	do.	do.	
Gambier	,,	do	S. Continent	
Copra	,,	do.	Marseilles	
Black Pepper	,,	do.	S. Continent	
White Pepper	,,	do.	do.	
Do.	,,	do.	U.S.A.	
Pineapples	,,	do.	do.	
Nutmegs	,,	do.	do.	
Black Pepper	,,	do.	do.	
Do.	,,	Penang	do.	
White Pepper	,,	do.	do.	
T. Flake & Pearl	,,	do.	do.	
Nutmegs	,,	do.	do.	
Tons Gambier				1200
Do. Black Pepper				775

EXPORTS TELEGRAM TO EUROPE AND AMERICA.

3rd January 1910.

				Tons.
Tin	Str.	Singapore & Penang	to U. Kingdom &/or	1551
Do.	,,	do.	U.S.A.	1320
Do.	,,	do.	Continent	95
Gambier	,,	Singapore	Glasgow	—
Do.	,,	do.	London	20
Do.	,,	do.	Liverpool	—
Do.	,,	do.	U.K. &/or Continent	50
Cube Gambier	,,	do.	United Kingdom	15
Black Pepper	,,	do.	do.	—
Do.	,,	Penang	do.	60
White Pepper	,,	Singapore	do.	50
Do.	,,	Penang	do.	–
Pearl Sago	,,	Singapore	do.	—
Sago Flour	,,	do.	London	160
Do.	,,	do.	Liverpool	—
Do.	,,	do.	Glasgow	—
Tapioca Flake	,,	Singapore	United Kingdom	—
T. Pearl & Bullet	,,	do.	do.	15
Tapioca Flour	,,	Penang	do.	225
Gutta Percha	,,	Singapore	do.	30
Buffalo hides	,,	do.	do.	5
Pineapples	,,	do.	do.	3,750
Gambier	,,	do.	U.S.A.	190
Cube Gambier	,,	do.	do.	75
Black Pepper	,,	do.	do.	40
Do.	,,	Penang	do.	—
White Pepper	,,	Singapore	do.	50
Do.	,,	Penang	do.	—
Tapioca Pearl	,,	Singapore	do.	30
Nutmegs	,	Singapore & Penang	do.	28

				Tons.
Sago Flour	tr.	Singapore	U.S.A.	220
Pineapples	,,	do.	do.	12,50
Do.	,,	do.	Continent	900
Gambier	,,	do.	S. Continent	—
Do.	,,	do.	N. Continent	175
Cube Gambier	,,	do.	Continent	40
Black Pepper	,,	do.	S. Continent	200
Do.	,,	do.	N. Continent	—
Do.	,,	Penang	S. Continent	45
Do.	,,	do.	N. Continent	—
White Pepper	,,	Singapore	S. Continent	—
Do.	,,	do.	N. Continent	—
Do.	,,	Penang	S. Continent	—
Do.	,,	do.	N. Continent	—
Copra	,,	Singapore & Penang	Marseilles	100
Do.	,,	do.	Odessa	540
Do.	,,	do.	Other S. Continent	100
Do.	,,	do.	N. Continent	700
Sago Flour	,,	Singapore	Continent	550
Tapioca Flake	,,	do.	do.	—
Do. Pearl	,,	do.	do.	—
Do. Flake	,,	do.	U.S.A.	25
Do. do.	,,	Penang	U.K.	35
Do. Pearl & Bullet	,,	do.	do.	50
Do. Flake	,,	do.	U.S.A.	20
Do. Pearl	,,	do.	do.	180
Do. Flake	,,	do.	Continent	30
Do. Pearl	,,	do.	do.	125
Copra	,,	Singapore & Penang	England	260
Gutta Percha	,,	Singapore	Continent	70
Cube Gambier	,,	do.	U.S.A.	
T. Flake & Pearl	,,	do.	do.	
Sago Flour	,,	do.	do.	
Gambier	,,	do.	S. Continent	
Copra	,,	do.	Marseilles	
Black Pepper	,,	do.	S. Continent	
White Pepper	,,	do.	do.	
Do.	,,	do.	U.S.A.	
Pineapples	,,	do.	do.	
Nutmegs	,,	do.	do.	
Black Pepper	,,	do.	do.	
Do.	,,	Penang	do.	
White Pepper	,,	do.	do.	
T. Flake & Pearl	,,	do.	do.	
Nutmegs	,,	do.	do.	
Tons Gambier				1,200
Do. Black Pepper				460

SINGAPORE MARKET REPORT.

December, 1909.

Articles.	Quantity sold.	Highest price.		Lowest price.	
	Tons.	$	c.	$	c.
Coffee—Palembang	...	...		...	
Bali	...	...		...	
Liberian	44	26	50	24	75
Copra	6,255	10	70	9	40
Gambier Bale	2,462	11	35	10	70
Cube No. 1 and 2 ...	180	15	00	14	12½
Gutta Percha, 1st quality	..	300	00	240	00
Medium	...	240	00	120	00
Lower	...	80	00	12	00
Gutta Jelotong	...	12	00	9	25
Nutmegs, 110 s.	...	18	50	18	00
80 s.	...	24	50	24	00
Mace, Banda	...	110	00	72	00
Amboina	...	95	00	65	00
Black Pepper	1,526	15	75	15	00
White Pepper	266	27	75	27	00
Pearl Sago, small	...	...		...	
Sago Flour, No. 1	3,315	3	75	3	02½
2	405	1	20	1	10
Tapioca Flake, small	536	4	75	4	50
Pearl, small	188	6	00	4	60
Medium	457	4	75	4	65
Bullet	...	...		...	
Tin	2,855	77	60	71	12½

SEREMBAN.

Table showing the Daily Results of the Reading of Meteorological Observation taken at the General Hospital, Seremban, for the month of December, 1909.

Date.	Temperature of Radiation. 9 H.	15 H.	Mean.	Maximum.	Minimum.	Range.	Temp. of Radiation. Sun.	Difference Sun & Shade.	Wind Direction. 9 H.	15 H.	Temp. of Evaporation. 9 H.	15 H.	Mean.	Computed Vapour Tension. 9 H.	15 H.	Mean.	Relative Humidity. 9 H.	15 H.	Mean.	Clouds 0 to 10. 9 H.	15 H.	21 H.	Cloud and Weather Initials. 9 H.	15 H.	21 H.	Rain. Inches.
1	79	80	79.5	88	66	22	124	36	NW	NW	72.3	72.4	72.3	.793	.794	.793	80	68	74	5	2	6	C	S	C	
2	78	83	80.5	89	65	24	99	10	NW	NW	72.9	68	70.4	.810	.684	.747	84	60	72	0	8	10	S	N	N	.89
3	75	79	77	86	66	20	100	14	N	N	73.3	72.3	72.8	.820	.793	.806	94	80	87	7	4	1	N	C	S	
4	74	77	75.5	81	66	15	101	20	N	N	72.3	73.6	72.9	.793	.829	.811	94	89	91.5	6	9	8	C	N	N	
5	73	79	76	80	63	17	103	23	N	N	71.3	73.9	72.6	.766	.839	.802	94	85	89.5	3	6	6	S	C	C	
6	76	77	76.5	81	65	16	100	19	NW	NW	74.3	73.6	73.9	.848	.829	.838	94	89	91.5	0	8	8	S	N	N	
7	73	81	77	85	64	21	107	22	NW	NW	71.3	74.3	72.8	.766	.849	.807	94	80	87	10	5	4	N	C	C	.29
8	74	81	77.5	83	66	17	108	25	NW	NW	74	74.3	74.1	.840	.849	.844	100	80	90	1	0	7	S	S	N	.20
9	76	79	77.5	86	66	20	109	23	NW	NW	72.6	73.9	73.2	.801	.839	.820	89	85	87	0	3	6	S	S	C	.64
10	75	84	79.5	85	65	20	114	29	NW	NE	73.3	72.4	72.8	820	.794	.807	94	68	81	0	0	0	S	S	S	.33
11	73	84	78.5	85	65	20	112	27	NW	NW	73	72.4	72.7	.812	.794	.803	100	68	84	10	10	10	N	N	N	.29
12	75	85	80	85	66	19	118	33	NW	NW	73.3	68.5	70.9	.820	.698	.759	94	58	76	9	8	4	N	N	C	.02
13	77	74	75.5	86	64	22	100	14	NW	NW	70.2	72.3	71.2	.739	.793	.766	79	94	86.5	7	10	8	N	N	N	.18
14	76	84	80	87	64	23	122	35	NW	NW	72.6	72.4	72.5	.801	.794	.797	89	68	78.5	0	5	10	S	C	N	
15	77	82	79.5	86	64	22	112	26	N	W	71.9	73.6	72.7	.783	.830	.806	84	76	80	0	2	6	S	S	C	
16	75	85	80	88	66	22	104	16	W	SW	73.3	75.1	74.2	.820	.873	.846	94	72	83	3	7	10	S	N	N	
17	80	83	81.5	84	66	18	119	35	W	W	71.6	74.7	73.1	.775	.856	.815	75	76	75.5	4	2	8	C	S	N	
18	74	88	81	90	62	28	131	41	NW	NW	70.5	74.9	72.7	.748	.865	.806	89	65	77	0	0	0	S	S	S	
19	75	87	81	89	64	25	145	56	NW	NW	73.3	75.5	74.4	.820	.884	.852	94	69	81.5	0	2	1	S	S	S	
20	77	79	78	87	66	21	120	33	NW	NW	73.6	73.9	73.7	.829	.839	.834	89	85	87	0	4	3	S	C	S	
21	78	82	80	88	67	21	112	24	N	N	67.8	72	69.9	.681	.785	.733	71	72	71.5	5	7	0	C	N	S	
22	75	85	80	87	67	20	148	61	N	N	71.6	71.8	71.7	.774	.781	.777	89	64	76.5	0	6	0	S	C	S	
23	76	84	80	89	64	25	143	54	N	N	72.6	70.7	71.6	.801	.751	.776	89	64	76.5	0	0	0	S	S	S	
24	78	85	81.5	86	65	21	145	59	N	NW	72.9	81.7	77.3	.810	1.082	.946	84	90	87	0	2	3	S	S	S	1.39
25	74	85	79.5	86	65	21	123	37	NW	NW	70.5	80	75.2	.748	1.026	.882	89	85	87	1	6	0	S	C	S	
26	81	86	83.5	88	65	23	141	53	NW	N	77.7	77.8	77.7	.947	.955	.951	90	76	83	0	4	4	S	C	C	
27	79	84	81.5	85	64	21	142	57	N	N	73.9	77.4	75.6	.839	.938	.888	85	80	82.5	2	7	1	S	N	S	
28	76	86	81	87	64	23	126	39	N	N	72.6	74.5	73.5	.801	.855	.828	89	68	78.5	5	6	3	C	C	S	
29	76	78	77	84	67	17	120	36	N	N	72.6	72.9	72.7	.801	.810	.805	89	84	86.5	7	8	5	N	N	C	.28
30	77	80	78.5	87	65	22	101	14	NW	SW	71.9	78.3	75.1	.783	.968	.875	84	95	89.5	4	10	6	C	N	C	.80
31	77	81	79	85	66	19	100	15	SW	SW	73.6	74.3	73.9	.829	.849	.839	89	80	84.5	3	9	7	S	N	N	
Mean.	76.1	82.1	79.1	85.9	65.1	20.8	117.4	31.8	NW	NW	72.5	74.	73.2	.700	842	.820	88.7	76.5	82.6							5.31

Highest Temperature 90
Lowest ,, 62

Greatest Rainfall in 24 hours 1.39

J. LUCY,
Medical Officer in Charge.

PENANG.

Abstract of Meteorological Readings in the Prison Observatory, Penang, for the month of December, 1909.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°	°	°	°	°	°	%	°	°		Ins.	Ins.
Penang Prison Observatory ...	29·892	140·5	81·2	89·1	70·1	19·0	76·4	·846	73·2	79	N.-W.	2·38	1·08

Surgeon's Office,
Penang, January 10, 1910.

M. E. SCRIVEN,
Assistant Surgeon.

A. H. KUN,
Medical Officer.

NEGRI SEMBILAN.

Abstract of Meteorological Readings in Negri Sembilan for the month of December, 1909.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Seremban		117.4	79.1	85.9	65.1	20.8	75.6	820	73.2	82.6	N.W.	5 31	1.39
Mantin												3.04	.58
Jelebu												3.42	1 60
Kuala Pilah												6.39	1 12
Tampin												7.96	2.90
Port Dickson Town												5.32	2 50
Do. Beri-Beri Hospital												5.63	1.62

S. M. O's Office,
December, 1909.

J. HUNT.
S. M. O.

PAHANG.

Abstract of Meteorological Readings in the various Districts of the State for the month of November, 1909.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Mean Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point	Humidity.			
Kuala Lipis	...	...	77	92	66	18.7	74	...	...	...	...	12 98	2 27
Raub	...	...	80	92	68	17.9	74	...	...	...	...	5.56	1.30
Bukit Fraser	...	...	...	...	58	...	...	...	...	...	...	7.65	.88
Bentong	...	...	80	92	68	17.8	76	...	...	...	...	4.88	1.51
Temerloh	...	...	...	92	71	16.9	...	...	...	...	...	7.42	2.52
Pekan	...	...	80	93	70	14.4	76	...	...	...	...	16.14	4.09
Kuantan	...	...	82	93	70	15.7	76	...	...	...	...	10.58	1.24
Sungei Lembing	...	...	...	88	67	...	...	...	...	...	...	17 82	2.68

S. C. G. FOX.
Senior Medical Officer, Pahang.

Office of the Senior Medical Officer,
Kuala Lipis, 30th December, 1909.

KELANTAN.

Abstract of Meteorological Readings in Kelantan for the month of December, 1909.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
				Mean	Mean								
Kuala Lebir	...	...	...	83.1F	71.4F	11.7	...	...	...	...	...	7.06	1.16
Kuala Kelantan	..	...	...	82.4F	71.9F	10.5	...	...	...	...	...	12.30	4.63
Kuala Pergau	...	...	...	...	...	...	...	...	...	...	...	8.47	1.93
Taku Plantation	...	...	...	...	...	...	...	...	...	...	...	7.51	1.48
Pasir Besar	...	...	...	...	...	...	...	...	...	...	...	11.13	2.44

Medical Dept., Kuala Lebir,
January, 1910.

A. E. H. Stuart,
Surgeon.

KELANTAN.

Abstract of Meteorological Readings in Kelantan for the Month of November and December, 1909.

DISTRICT.	Mean Barometricel Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
				Mean	Mean	Mean						Ins.	Ins.
Kota Bharu, (November, 1909).	..	...	...	83.6	73.5	10,1	...	...	...	...	...	18.96	4 58
Do (December, 1909).	...	...	...	83.4	73.7	10.7	...	...	...	...	...	11.36	4.43

Kota Bharu,
10th January, 1910.

John D. Gimlette,
Residency Surgeon, Kelantan.

The Mean Maximum Temperature at Kota Bharu for 1909, was—85.3° Fah.
,, Minimum ,, ,, ,, ,, ,, —74.2° Fah.
,, Range ,, ,, ,, ,, ,, —11.1° Fah.
The Total Rainfall for the Year 1909—90.09 inches, with 191 Raining days.

SELANGOR.

Abstract of Meteorological Readings in the various Districts of the State for the month of November, 1909.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
General Hospital, Kuala Lumpur ...	29.873	148.9	81.4	88.1	71.4	16.7	76 2	0.818	73.0	76	Calm.	6.41	1.50
Pudoh Gaol ,, ,, ...	...	...	...	...	...	...	...	...	...	...	...	8.89	2 08
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	10.52	2.20
,, Klang	...	...	...	87.8	70.8	16.9	...	...	...	...	...	10.62	2.68
,, Kuala Langat ...	...	...	...	85.9	73.2	12.7	...	...	...	...	...	14.65	1.75
,, Kajang	...	...	...	84.5	75.0	9.5	...	...	...	...	...	8.13	1.65
,, Kuala Selangor ...	...	...	...	88.3	74.9	13 4	...	...	...	...	...	9.54	1.88
,, Kuala Kubu	...	...	...	88.1	70.7	17.4	...	...	...	...	...	14.31	1.95
,, Serendah	...	...	...	92.2	70.6	21.6	...	...	...	...	...	7.31	1.40
,, Rawang	...	...	...	88.8	70.7	18 1	...	...	...	...	...	11.88	2.10
Sabak Bernam	...	...	...	...	...	...	...	...	...	...	...	5.85	1.30

Office of the Senior Medical Officer,
Kuala Lumpur, 28th December, 1909.

W. D. FREER,
Senior Medical Officer, Selangor.

KUALA TRENGGANU.

Meteorological return of Kuala Trengganu District for the month of December, 1909.

Date.	Thermometer. 9 A.M. Maximum.	Minimum.	Range.	Rainfall. 6 A.M. Inches.	General Weather Observations.
1	78	72	6	2.27	
2	76	73	3	1 63	
3	78	73	5	1.22	
4	81	77	4	0.26	
5	81	75½	5½	0.90	
6	79½	74½	5	0.65	
7	78	73½	4½	0.66	
8	79	74	5	...	
9	79½	74½	5	...	
10	80	74½	5½	0.06	
11	80	73	7	2.72	
12	78	72	6	...	
13	80	73½	6½	...	
14	81	75	6	...	
15	81½	74½	7	0.13	
16	81	75	6	0.08	
17	83	73	10	...	
18	83½	75	8½	...	
19	83	75	8	0.44	
20	82½	75½	7	1.23	
21	78	75	3	6 42	
22	79	76	3	...	
23	80½	75	5½	0.06	
24	80½	75½	5	...	
25	80½	74	6½	...	
26	80	74	6	...	
27	81	74½	6½	...	
28	80	75	5	0.56	
29	81	77	4	...	
30	81½	77½	4	...	
31	82	76½	5½	...	16 rainy days.
Means.	80 2	74.6	5.6	19.29	
		Total	...	19 29	

Highest Temperature 83.5
Lowest do. 72
Greatest rainfall in 24 hours 6.42

W. L. CONLAY,
British Agent, Trengganu.

No. 3.] MARCH, 1910. VOL. IX.

Agricultural Bulletin

OF THE

STRAITS

AND

FEDERATED MALAY STATES.

EDITED BY

H. N. RIDLEY, M.A., F.R.S., F.L.S., F.R.H.S.

Director of Botanic Gardens, S.S.

From the first of January, 1910

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TILLAGE OF SOIL.

In our last two numbers we published two articles on Tilled and Untilled Soils, which may be taken as the case for clean weeding. The authors show the action of the grass toxins upon trees, and the injury caused by them.

There is, however, the other side of the question to be considered, that is to say, the actual loss of the ground and risk to the trees due to the excessive denudation by rain on bare slopes.

It must be remembered that the articles reprinted deal only with the conditions that obtained in England, and that the meteorological conditions there are entirely different from those of the tropical rain forest region where we have our plantations.

The amount of denudation, except in a few exceptional spots, in England is comparatively small. That in the tropics excessively great, especially on cleared slopes.

I have seen pineapple plants in the Singapore pinefields, planted originally on ground level not more than three years previously standing on pillars of earth a foot above the ground level as it then was, showing that the soil level had been cut down a foot all over this ground. Though this was perhaps an exceptional amount of denudation, observations on bare ground after a heavy rain will show that under better circumstances the loss of soil is extremely heavy on paths even if flat or nearly so, stones are seen pushed up so to say above the level, and roots of trees are constantly coming to the surface, all of which were buried previously some inches below the soil. On steep slopes it is worse. Near Balik Pulau, in Penang, and again on Bukit Mertajam, native planters were allowed to clear the forest for planting nutmegs and betel-nuts so high, on the hills that the denudation not only brought down so much soil on the fields at the base of the hills that they were put out of cultivation, but all the remaining trees, forest or cultivated, on the upper part of the slopes were falling down the hills. Nothing of the kind had occurred of course till the lower part of the slope was cleared for cultivation as the steepest hills in the peninsula have always been covered with a dense forest of high trees where the ground has been cleared and planted on a steep slope. In these places, the Malays and Chinese terrace the hill so as to prevent the loss of their nutmegs and clove trees by the denuding away of the hill. I have not seen this done in any rubber estate yet, though I have seen a good many in which it will be necessary, soon or later, to do so in order to save the trees.

In more level places, if the ground is covered with turf the denudation is reduced to a minimum, the formation of humus overlying the stiff yellow clay on which the turf has been placed shows this very clearly in a few years. Indeed, the colour of the water running off a turf slope in a rainstorm compared with that of a water rush off exposed ground shows this very clearly. In the former case, the water is nearly transparent, in the latter opaque, yellow or red. In covered ground, after a heavy rain, the springs in the hill become overfull and the water perfectly clear and pure is poured out at various points. All this water which has fallen upon the covered ground has soaked in and has not run off the surface denuding it.

The regular fall of leaves from the trees should form the humus of the soil and as they decay go back to form food for the trees, but the light fragments and the soluble salts produced by the decay of the leaves and twigs are naturally the first to be carried away by a rainstorm, causing a considerable loss to the plantation. In the case of ground covered with herbage, the loss in this way is trivial, for in the first place the creeping stems and leaves of the grasses hold the fragments of half-decayed leaves and sticks and secondly the soluble portions are mainly carried out into the ground by the water soaking through the turf and applied to the tree roots.

In England, on the other hand, in ordinary flat ground the soil gradually rises under turf or herbage as has been shown in Darwin's "Vegetable mould and earthworms," and this is mainly affected by earthworms, which, as has been shown, are valuable tillers of the soil. Earthworms, however, in the Malay Peninsula are rare, and only can be found in damp lowlying spots to where termites cannot live. They cannot indeed compete with the termites for the decomposing twigs and leaves which form the food of both animals. The termites do not form a good substitute here for earthworms. They do not turn over the soil at all except by occasionally throwing up a mound of clay shortly before they assume the winged stage. On the other hand, they appear to destroy the vegetable debris without converting them into humus (See Bulletin, old Series p. 77).

DENUDATION.

The rainfall in the Malay Peninsula is very heavy, and in exposed situations and on slopes the loss of soil in a heavy shower is very large as has been already stated. Where the rain runs over these slopes, in a very few minutes it is seen to be quite opaque from the soil washed off. With this soil goes all exposed humus, decayed leaves and sticks. The rain, however, does not run off equally over the ground, it soon runs in channels formed first by some inequalities in the ground and then by deepening these. Between these the ground of the ordinary yellow clay, become covered with a thin crust of an alga. In dry open spots in the Botanic Gardens, I find this to be of a dark red colour, and it appears to be gelatinous alga allied to *Nostic*. In damp shady spots the alga is green.

There are probably several species which form these thin crusts. These prevent denudation to a large extent, the water simply running over the alga, and not touching the soil. If left, mosses and hepatics grow over the alga and eventually higher forms of plants. Should the water rush be too strong in any part of the ground, denudation takes place at a very rapid rate. When grass grows over the stiff clay soil it prevents denudation to a very much larger extent, and in a few years produces a layer of humus which fact itself shows that denudation has been stopped, the roots also break up the stiff clay soil for some depth, and render it possible for other roots to penetrate.

In examining, the rubber plantations in the Botanic Garden a very strong contrast is to be noticed where a path through the trees has been opened and kept free of grass. The ground is covered with roots of Para rubber trees, the tops of which are an inch and a half or more above the soil. Examining the ground on the other side of the tree, which is not weeded I find the corresponding roots as much or more below ground, so that the opened path (not opened many years, and well shaded so that the rainfall is broken up by the foliage above and does not fall so heavily on the ground) has lost four or five inches of soil since it was opened.

In the case of anothor lot of trees seen in Perak, where the ground was bare, sloping and of stiff clay, roots as thick as the wrist were completely exposed and dead, the ends being gone. These roots must have been originally some distance under ground. The roots of the Para rubber lie usually very high, but this doubtless depends to a large extent on the depth of the water, in the soil. In the damper parts of the Botanic Gardens the rootlets of the Para rubber come quite to tbe surface wherever there are any decayed leaves and even sometimes rise up between scraps of detached bark on the trunk of the tree itself. Dead wood, old stumps are quickly invested and permeated by them. This I think shows that Para rubber demands good humus and is ready to utilize all it can find.

The fallen leaves are kept on the ground in all estates to decay but a very large portion of the resulting humus must be swept away by the heavy storms of rain as there is nothing to prevent this in a clean weeded estate especially on the slopes.

In sandy ground cleared and weeded in rubber estates I do not find the alga referred to above so that the wash here must be even worse than on the stiff clay soils where it protects the surface to some extent.

ACTION OF SUNHEAT

The action of the heat of the sun in cleared ground is another factor which has to be considered. It is not at all uncommon to see the ground beneath the rubber trees deeply cracked after hot weather. As Para Rubber roots high, and frequently the rootlets come very near the surface, under such circumstances a considerable number of the small growing roots must be broken across by the cracking of the soil, and further the great heat on the exposed earth will probably injure the roots lying near the surface even if the soil in not cracked. Injuries caused by excessive heat, however, should only affect young trees, where the ground is insufficiently shaded by the trees themselves. A grass covering of the soil prevents cracking and also the excessive heating of the soil. More experiments are required to decide how far sun heat on the bare soil is injurious to the young roots. It has been the custom in the Botanic Gardens to clear the soil round the palms of herbacious plants, grass, and other weeds, leaving a circle of bare soil round each plant. This was done for convenience in manuring. On one occasion however, the ground round the palms was turfed up to the stem with the result that they made quite a surprising growth, now the greater part of the roots of the palms were really under the grass, and the only ones affected were those close to the base of the trees. The only conceivable cause of improvement from turfing up the circles is that these roots were protected from sunheat, and consequent excessive drying. Palms do not give much shade with their leaves, and the roots close to the stem are practically exposed to the full sun all day.

Another little observation illustrating the action of the sun in drying exposed soil, is this. Walking along the main road in the late afteroon I noticed that the road was marked by darker lines corresponding to the shadows of the roadside trees from the south-west. The trunks of the branches being marked out on the road. It had been somewhat cloudy most of the day and the sun was not then shining. On examining the dark shadowy patches I found that they were due to the greater dampness of the ground where the trees had protected it from the full rays of the afternoon sun which had thoroughly dried the rest of the road. There had been no rain during the day, and the dampness was probably caused by the dew of the previous night. In the case of young trees planted far apart in clean-weeded ground the loss of water from the upper layers of soil on a

really hot day must be very considerable. This, again, is obviated by a grassy covering which prevents excessive loss of water although the grass itself is transpiring freely.

GRASS TOXINS.

Now there comes the question of root toxins, about which we may say that as yet really very little is known. We know that in the case of herbaceous plants rotation of crops is essential, that plants of the same kind cannot be grown successfully on the same soil continuously, and we also know that seedlings of a big tree do not thrive beneath the shade, or perhaps within the root-area of the mother tree, whence nearly all trees climbers and other such plants have special modifications of fruit or seed to disperse the seed from the parent. These facts are accounted for by the theory that plants excrete from their roots a poison or toxin.

The most important contribution to our knowledge on this subject is the paper by F. Fletcher in the memoirs of the department of agriculture in India, Vol. II. No. 3, "note on a toxic substance excreted by the roots of plants." He worked exclusively with herbaceous plants, cotton, sorghum, wheat, etc. His experiments tend to show that the toxins of different plants are identical, and that solutions made of them differed in toxic effect only from their strength and not from their kind.

If then all plants produce through their roots a toxin poisonous to other plants, this toxin being the same for all plants it is impossible to see how a grass plot or forest can exist for more than a few years. As soon as a forest tree had produced a certain amount of toxin everything in the neighbourhood of its roots should die. If each plant had its own toxin which was poisonous to its own species only, it is not clear how one tree forests, such as the pine forests of Europe, or coconut tree estate could exist at all, nor does the suggestion that in the case of sorghum and cotton grown on the same soil the roots of cotton godown below the sorghum root area and the toxin is retained by the roots of the sorghum when decaying and thus the cotton is not affected after the death of the sorghum.

In a grassplot and in a forest the roots of the different plants are intimately mixed in the same layer of soil, and yet the plants grow healthily together and the chief struggle between them seems to be for light, and soil food.

The whole subject is very puzzling and difficult to understand, and it is clear that much more research is required to clear up these points.

What is really wanted is some system by which we can, while avoiding all injury caused by toxins of grass or other herbs, to prevent the excessive loss of soil and plant food by denudation, and loss of water and root injury by the great heat of the sun striking on the bare soil.—ED.

THE BLACK BRAZIL CHERRY, EUGENIA BRASILIENSIS.

A good many years ago, about 1897 or 1898, Mr. Robert Little presented the Botanic Gardens with two small trees sent from Brazil as some kind of orange. These were planted in a somewhat sandy part of the economic gardens in the vegetable ground. One of them grew into a fairly large bushy tree with deep green leaves, and flowered and fruited for the first time in 1903 and has continued to fruit ever since. The tree is now about 20 feet tall and very bushy, the branches reaching to near the ground. It has numerous stems, 6 inches through, and flaky reddish bark. The leaves are small obovate to oblanceolate, deep green glossy, lighter green, beneath with very inconspicuous nerves, three to six inches long 1½ inch to 3 inches across on a petiole half-an inch long. The flowers are small and white on rather long stalks. The fruit in appearance resembles a black currant, but is rather larger, and certainly suggests a small black heart cherry, crowned at the top with the green sepals. It contains a single rather soft oblong greenish seed but frequently the seed is absent. The flesh is juicy and sweet and somewhat of the consistence of that of a currant. The tree fruits abundantly in January and its fruits are very pleasant to eat, It is readily raised from seeds and should fruit well in five or six years.—ED.

LALLANG GRASS *Imperata Cylindrica, Beau* USED IN PAPERMAKING.

(*To Robert Little, Esq., Singapore.*)

DEAR SIR,

I have pleasure in enclosing you my further report on the samples of Lallang Grass received from you in March last, and I trust you will find the same of interest. I also send you some specimens of the paper made from this grass in conjunction with other fibres. From the report you will see that we have come to the conclusion that Lallang alone is not a very suitable material for paper-making purposes, but, if used with Flax, Hemp or Megasst which is waste sugar-cane fibre, from sugar refining factories, and of which I think you should be able to obtain a ready supply, it in capable of producing a very satisfactory paper, and one worthy of your serious consideration.

If you are desirous of developing this work, and taking up the manufacture of this paper, I shall be pleased to assist you in any way possible as regards the fitting up of a mill, or in any other direction

whatsoever. Also, I am in a position to send out a representative to the mill, to start the working of the same, and to advise you on any points of which you may not be quite sure.

I would like to point out to you that the report enclosed is my candid opinion on the capabilities of this grass for paper-making purposes, and is not couched in rosy terms, as it is at all times my practice to look rather at the dark side of things of this nature, which is, I think the proper attitude to adopt with regard to any business venture.

Awaiting the favour of your reply,

Believe me,
Yours faithfully,
J. STEWART REMINGTON.

LALLANG.

The original paper on this work, published in October 1908, was the result of a preliminary examination undertaken with the view of producing from Lallang grass a useful and marketable pulp. To carry out this object more fully, a larger supply of the grass was obtained, and the present treatise is intended to supply in a concise and convenient form the chief results of recent research and experiments on the nature, properties and value of pulp derived from this source.

Since some previous publications on the subject have contained more favourable accounts of the value of this grass as a source of raw material, it was evident, that in order to deal successfully with such an enquiry, a careful study of the various existing means of investigating the processes by which this material may be utilized to the best advantage would be necessary, therefore, the results of the work done in connection with this investigation have been discussed more in detail than is usual in technical treatises.

The first step in the preparation of the pulp consists of the cutting and soaking of the grass in water: The next stage, which is of the greatest importance, is the boiling, and in consequence of some unusual variations in the quality, yield and condition of the pulp obtained during the process, the following table of results was accordingly prepared :—

REACTIONS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Caustic Soda (per cent. NaOH)	10	10	11	12	15	16	15½	15	15	..	..	..	..	14
Sulphite Liquor Soda, Salt equivalent (Na_2SO_3 per cent) ..	..	..	..	..	..	..	..	..	..	16	..	..	13½	..
Sodium Sulphite and Caustic Soda (total per cent) ..	..	..	..	..	..	..	..	..	..	..	12	16	..	..
Pressure in "atmospheres" ..	2½	2½–5	3	3	5	2	2–12	2½	7	2½	2½	2½	2	2½
Time in "hours" ..	8	12	10	12	6½	7	6	7	9	8½	7	7½	12	8

OBSERVATIONS,

No. 1. Under-boiled.
„ 2. Over-boiled.
„ 3. „ „
„ 4. Unsatisfactory yield of pulp.
„ 5. Fair conditions.
„ 6. „ Readily bleached.
„ 7. Good conditions and yield.
„ 8. Best general results.
„ 9. Good pulp. Considerable loss in yield.
„ 10. Fair condition. Imperfectly resolved.
„ 11. Improved strength of fibre.
„ 12.
„ 13. Fair pulp, not readily bleached.
„ 14. Good results.

The conversion of the grass into pulp in the digester in the case of boils exceeding 9 hours, duration was usually accompanied by a considerable loss in the ultimate yield, and many difficulties presented themselves in the course of the first experiments.

From the above series of trials upon a practical scale the proportions of caustic soda and general conditions as employed during the boil "No. 14" were considered the most desirable for the purpose of producing good average fibre, at a reasonable expenditure o chemicals.

The boiling process was conducted in a stationary spherical boiler, and after due treatment, the ley was in most cases rapidly drawn off, and the fibre thoroughly washed in the pan with fresh hot water, and finally the coloured matter completely removed by rinsing in a washer.

Any use of high pressure involved in the soda process affects the pulp injuriously, the quality of the cellulose, as far as strength is concerned being much inferior to that obtained by digestion at a lower temperature and pressure. It was also noticed that in the latter method of treatment a smaller quantity of bleaching salts were required in order to ultimately attain a fair white colour, and moreover, if this method is adopted the action of the bleaching solution is altogether more rapid.

At the outset, emphasis is laid upon the fact that the ordinary methods of bleaching are not very successful, at least, when the results are worked out and viewed from a commercial stand-point. This is an unfortunate matter, as any future development must be dependant upon the establishment of a cheap bleaching process, which is, more especially in this case, an essential feature, in order to counterbalance the characteristic want of "Natural strength" and felting power of the pulp, which incidentally, bars its use for the production of a strong paper.

In describing more fully the process of bleaching in connection with this pulp, a curious and interesting fact was noticed, *i.e.*, that the acid treatment in bleaching, which is the usual method of promoting the action of the bleaching solution, tended to spoil the colour of the half-stuff, so that in order to obtain the best possible results any operation involving the use of acid must be altogether avoided.

The natural tint of the fully-bleached pulp is of a faint greenish white, and the employment of a very small quantity of aniline dye is found necessary to impart a good colour to the finished paper.

The application of some improved methods for bleaching the crude pulp resulted in the production of a much superior material, but with no great saving in chemicals or working expenses; and, it appears certain from a large number of experiments that this fibre cannot be effectually bleached at a consumption of less than 8%–10% of chlorine. Therefore, instead of attempting to bleach to a full-white, the paper was invariably run after the expenditure of a reasonable amount of bleaching agents on the pulp, with due consideration for the proportions of other chemicals already used on the amount of fibre under treatment. It is safe to say, however, that although Lallang when run quite alone is not very promising as regards colour, it makes some papers of particularly good quality and finish, when mixed with various other kinds of furnish. A number of the most

representative samples have been selected, chemically examined and tested. The results of these investigations are given in the following table:—

PHYSICAL AND CHEMICAL CONSTANTS.

Furnish and Description.	Thickness per sheet decimals of an inch.	Breaking Strength lbs.	Stretch per cent.	Folding Test.	Moisture per cent.	Rosin per cent.	Loading per cent.
		Way of Machine.					
1. Lallang Bleached, sized, loaded. "Ordinary boil Caustic Soda." ..	.0067	10.45	1.46	30	9.60	1.12	2.50
2. Lallang Bleached, sized, loaded. "High Pressure boil Caustic Soda."	.0086	8.55	0.70	2.4	10.01	4.85	1.62
3. Lallang Bleached, sized, loaded, dyed. "Sulphite boil." ..	.0075	10.00	1.10	16	8.82	4.07	8.80
4. Lallang 70% Linen Rags 30% Bleached, sized, loaded, tinted, "Ordinary boil, Caustic Soda."	.0045	9.00	1.50	47	8.41	1.60	2.44
5. Lallang 75% Best Linen Rags 25% Bleached, sized, dyed. "Ordinary boil, Caustic Soda."	.005	14.96	1.34	125	10.00	3.53	Nil.
6. Lallang 60% Chemical Wood 40% Bleached, sized. "Ordinary boil, Caustic Soda." ..	.0079	13.54	0.48	23	9.76	3.52	Nil.
7. Lallang 70% Megass 30% Bleached, sized. "Ordinary boil, Caustic Soda."	.005	12.98	1.04	51	13.02	2.75	Nil.

In some instances, paper was prepared from mixtures of hemp, cotton and Lallang, and dyed with aniline colours. "No. 5" shews the effect of treating the pulp with dianil black in ad-mixture with bleached linens, whilst "No. 3" serves to illustrate the results obtained by the use of indanthrene blue.

From the foregoing figures, together with a close study of the the samples obtained during the course of manufacture, it will be noticed that although it is possible to produce paper from Lallang Grass having a satisfactory surface and finish, all efforts made with the object of improving its resistance to folding, at least when run

alone, have not shown to advantage. It is nevertheless true that the breaking-strength is in no way inferior to that possessed by some of the finest qualities of paper made from varieties of pulps more generally employed. On the other hand, Lallang fibre might be used in countless ways for the purpose of mixing with all kinds of pulps, and is especially suitable for use in conjunction with hard, non-flexible fibres, such as Sulphite, Flax and Megass.

The results of this investigation tend to the conclusion that the paper furnished by this grass is of doubtful commercial value when compared with the figures obtained on other specimens of fibres previously examined under similar conditions, but if utilised in conjunction with different kinds of pulp would probably repay the cost of preparation. In connection with this point, it may be mentioned that with a plentiful supply of cotton or flax available the prospects of practical development can be recommended as being particularly favourable.

J. STEWART REMINGTON.

"MEGASS" IN PAPERMAKING.

A Report on its Development.

BY J. STEWART REMINGTON, DOUGLAS A. BOWACK AND ARTHUR J. B. CARRINGTON.

Following upon the extensive experiments that have been carried out in Mr. Bert de Lamarre's sugar factory, at Tacarigua, dealing with the production of paper from the fibrous substance derived from the cane, after the latter passes from the sugar factories, the suitability of this raw material for the purpose appears to have been well established. Considerable success has attended this application of the fibrous substance, which up to the present has been consumed chiefly for fuel, or regarded more or less as a waste product.

The results of the present investigation tend to illustrate that with improved methods of preparing the pulp, and the proper elimination of the extractive matter in the earlier stages of working, a valuable product may be obtained readily available for immediate use.

A quantity of this raw material recently received from Trinidad together with a specimen copy of the first newspaper that has been printed from paper made from megass has served to awaken further interest in this important discovery; and, at the same time, suggested the possibility of improving the paper by means of scientific investigation. The sample forwarded for examination was received in a well broken-up condition of a straw to buff colour, and marked by a few patches of hard brownish outer-cane. The material is rather uneven in strength, some of the fibres are fairly strong, but the majority when reduced are soft, and variable in composition.

The chemical examination furnished the following results, the percentages (other than that of moisture) being expressed on the dry material:

Moisture	11·05
Asn	1·54
Loss on (A) hydroslyis	30·01
Loss on (B) hydrolysis	48·70
Loss on mercerisation	32·73
Gain on nitration	10·21
Cellulose	47·71
Length of ultimate fibre	3·5 mm.

The behaviour of the fibre with re-agents shows that it is highly lignified, with uneven distribution; the percentage of cellulose, however, is sufficient to make it probable that it would meet with a ready demand as a papermaking material if it could be placed upon the market at a price which would enable it to compete with other materials of this class.

Although several kinds of strong paper can be made from megass, it is found most suitable for printing and wrapping papers, and notwithstanding its natural hardness the finished paper possesses good folding and crumpling properties, and, moreover, is of unusual strength. It is, therefore, only reasonable that its resources should be developed as fully as possible.

With this object in view special attention has been given to the study of its percentage yield by technical trials in the digester. It was found from a number of preliminary boils with caustic soda that the stuff could be treated to yield a good pulp without resorting to high pressure boiling at a consumption of only 7 per cent. to 10 per cent. of caustic soda during a period of eight hours up to one atmosphere pressure. It yields in this manner an average of about 45 per cent. to 50 per cent. of raw fibre, whereas with more severe treatment the resultant pulp falls to 38 per cent. to 40 per cent., and under the latter conditions the consumption of bleaching powder necessary to effect a good colour is excessive.

After due consideration for the treatment of megass, it is found that the best and most profitable pulp is resolved after subjecting the material to a digestion for a period of about twelve hours at one atmosphere. At this stage the mass of fibres still retain a small proportion of extractive matter, which must be completely washed out before entering upon the later process of preparation.

This pulp, after beating, shows rather marked variations in the dimensions of the ultimate fibres, which appears to be a definite characteristic of this particular pulp. Some of it exists in a finely-divided state, whilst that originally derived from the more external parts of the sugar-cane is rather coarse and incompletely disintegrated. On this account, the effect of a too strong alkalinity in the boilers causes the breaking up into an extremely short pulp which is weak, and possesses but little felting power; whereas, by working at low pressure, a state of pulp is produced which, on gentle treatment in the beating-engine is easily resolved into a most valuable stuff, and though somewhat harsh may be manipulated in such a manner as to produce an exceptionally strong and serviceable paper.

It is most important in practice that great care should be exercised during the beating operation, especially when running without admixture of other stock as a distinctive and valuable property may be imparted directly affecting the quality of the finished paper.

It has been stated by prominent experts that satisfactory results from the use of bleaching agents were not available, and in accordance with the results of experimental investigation the chances of successful treatment at first seemed somewhat remote; nevertheless, under modified conditions of working, a very fair pulp may readily be obtained at a comparatively small cost. An approximation of the amount necessary to bleach a well-boiled pulp being about 15 per cent. of powder on the dry fibre. To this must be added the inconsiderable cost of about 1 to 2 per cent. of other chemical materials. *Apropos* of this, it is admitted to be a matter of no little difficulty to bleach direct with chlorine in an economical manner.

In the first place, however, it should be remembered that apparently unimportant variations in the boiling process give rise to considerable differences in the after-reaction of the bleaching agents employed. Again, although it has been clearly recognised that any definite development in the use of megass as a raw material must depend largely upon the question of efficient bleaching, it may be pointed out that the doubtful opinion as to its value which is entertained by some chemists arises to a great extent from the fact that their experiments have probably been conducted on over-boiled pulp. So far as megass is concerned, the information gained from the results of the experiments described in this publication clearly tends to confirm the idea that high pressure treatment in the boilers breaks down the lesser cellulosis with the formation of substances which are specially obstinate of removal by ordinary methods of bleaching. Under these circumstances special attention has been devoted towards the question of finding out the best means of bleaching the fibre. In the normal operation of bleaching with chlorine obtained from bleaching powder or hypochlorite of soda, the consumption of bleach has regularly, as for as this work is concerned, been found too great for consideration on a commercial scale—consequently many experiments have been carried out on the various modifications of existing methods usually employed, both with the pulp in question and other fibres of this class, with the result that an effective means has been successfully evolved by which the most resistant pulp may be readily bleached. [This is evidenced by a sample of paper submitted by the authors for our inspection.] Although the chemical reaction in this mode of procedure is somewhat complex, the series of operations in practice may be simply and conveniently carried out at a very much smaller cost with the ultimate saving of a relatively large amount of bleaching materials. The results of the quantitative tests also indicate, as has been previously mentioned, that the product derived from a low pressure boil must be taken for a successful application of this principle.

Mr. Bert de Lamarre in his mill seemingly makes no attempt to bleach the pulp, which as far as can be gathered from information to hand, is conveyed direct from the boilers to the receiving tank in a state ready to run off on the machine. Yet it would seem to be well worth the introduction of a completely equipped bleaching plant of a moderate capacity with the additional advantage of securing a more profitable and far-reaching utilisation of megass for papermaking purposes.

In view of the fact of the interesting and attractive description given in the *Trinidad Mirror* of Mr. Bert de Lamarre's paper mill, it is not proposed to enter into any detailed account of the actual making of the papers except perhaps as a pardonable digression to mention that these specimen samples have been run off a "Marshall Miniature Machine," the smallest working model in existence.

Some considerable attention has been devoted to testing the effects produced on papers obtained by the admixture of other kinds of furnish with this material, which might be applicable for other purposes, such as printing or writing papers, where the megass alone is unsuitable. Some of the most useful examples, each accompained by an account of their composition and properties, together with the results obtained by comparative tests on the paper used for the publication of the *Trinidad Mirror* are enumerated in the following table :—

PHYSICAL CHEMICAL CONSTANTS.

Description and Furnish.	Thickness per sheet "decimals of an inch.	Way of Machine. Breaking strength in lbs.	Stretch per cent.	Folding test.	Moisture per cent.	Loading per cent.	Rosin per cent
(1) MEGASS— Bleached, Sized	0·0070	25·91	1·82	3201	10·36	—	2·45
(2) MEGASS— Loaded, Bleached, Sized	0·0065	12·08	1·11	85	11·49	4·25	2·88
(3) MEGASS— Bleached, Tinted, Loaded, Sized	0·0075	13·41	1·48	254	10·82	2·41	2·55
(4) MEGASS (70%), SODA PULP (30%)— Ordinary Bleached, Sized	0·0055	11·70	1·58	213	10·43	—	2·01
(5) MEGASS (28%), LALLANG (72%)— Bleached, Sized	0·0050	12·98	1·04	51	13·02	—	2·75
(6) MEGASS (47%), BAMBOO (53%)— Bleached, Loaded, Sized	0·0060	9·62	0·93	14	9·35	5·24	1·95
(7) "TRINIDAD MIRROR"— Thin	0·0065	9·93	1·60	208	9·10	—	1·51
(8) "TRINIDAD MIRROR"— Thick	0·0110	18·50	1·10	1571			

Megass pulp when used by itself invariably yields a stiff hard paper, no matter how it may be manipulated in the beater, and moreover it is no easy matter to obtain the papers free from coarse fibres. Its great strength, as amply illustrated in the case of the specimen marked No. 1, depends upon a system of gradual beating of the half-stuff, whilst, on the other hand, it is readily liable to become overdone and consequently work too "free" on the machine, the resultant paper showing considerable loss in strength. Nos. 2 and 3 show the effects of short sharp beating and fast running. When used in combination with other kinds of furnish megass gives some very useful products, the general nature and appearance of the papers being considerably altered. The specimens obtained by admixture with chemical wood and lallang pulp are especially promising, and further the harsh, effects of the megass are neutralised and a softer feel and altogether superior surface is imparted to the finished paper.

It is a matter of regret that more experimental investigation could not be provided in connection with the "bamboo-megass" combination; however, the excellent effects obtained by running the megass pulp in conjunction with lallang fibre seem to justify the statements made by Mr. de Lamarre with regard to its future development and enhance the prospects of ultimately making paper

of the finest quality, more especially as the Para grass referred to rather resembles lallang and grows in great abundance in the immediate vicinity of the present installation at Tacarigus.

In conclusion it has been thought necessary in dealing with this subject to give a brief description of the properties of the paper used for the publication of the *Trinidad Mirror.* The paper under consideration is not altogether uniform in composition. some of the sheets in parts being only just over half the thickness of the mean average. Some of the strongest show a breaking strain in the machine direction of 18·5 lbs. and resist the "folding test" 1,571 rubs; whilst, some of the less even portions break at a figure as low as 6·75 lbs. and withstand a folding test of only 70. Futhermore, it is noticed that the paper is unevenly sized, and in this respect is not quite up to the normal according to specifications on paper standards.

PARA RUBBER FROM OLD TREES.

We published a letter which has been freely circulated from the United States Rubber Company stating that their analyst cannot find any difference in strength between young and old plantation rubber. This is rather remarkable as it is easy to feel the difference in a sheet of a five-year tree and one of 20 years' old. We therefore add a letter from Gow Wilson, and Stanton, received recently, giving a report on some rubber from old trees in the Botantic Gardens "which especially as regards strength" is very superior to ordinary plantation rubber. Of course the rubber was prepared carefully, but in no way that plantation could not be prepared. Presuming that the United States Rubber Company was working with good plantation rubber clean and well made, the only thing that seems obvious is that the old trees of the Botanic Gardens produce a stronger rubber and that is due to their age.

(To H. N. Ridley, Esq., Singapore Botanic Gardens).

DEAR SIR,

We now have pleasure in enclosing report and valuations of the two cases lightly smoked sheet rubber ex S.S. "Egypt."

You will notice from this report that we have a high opinion of the rubber, but it is a new grade on the market, being different from the ordinary smoked sheet, and it would therefore require larger quantities to establish its proper value. We are rather doubtful whether it would be generally recognised by the Trade that the rubber is smoked, as the smell is not very distinct on the samples.

It is very satisfactory, however, that the smoking seems to have had no deteriorative effect on the colour or appearance of the rubber; this we consider a great point in its favour, and we would suggest further efforts be made in this direction. We also think it would be advisable to stamp each sheet as "Smoked," as this would form a sort of guarantee.

If you could send us a larger shipment, we think we might arrange for valuable experiments to be carried out with it. The parcel at present to hand is really too small for many of our manufacturers here to base definite calculations upon.

In conclusion, we consider that the rubber is one of the best samples that we have seen from the East of this grade, especially as regards strength, which, judging by the ordinary crude tests, appears to be very materially above the average of plantation rubber, and to compare favourably with hard para.

The consignment will be included in the public auction to be held on the 1st February, and we will forward you account sales and proceeds in due course.

In the meantime, with compliments.

We are, Dear Sir,
Yours faithfully,
for, Gow, Wilson & Stanton, Ltd.,
SPENCER BRETT,
Director.

(To H. N. Ridley, Esq., Botanic Gardens, Singapore).

DEAR SIR,

Herewith we have the pleasure to hand you our report and valuations of two cases Rubber marked $\frac{\text{B. P.}}{\text{TR. IG.}}$ ex S.S. "Egypt.

1 CASE SHEET No. 1.

DESCRIPTION.—Fine pale and amber sheet. The rubber is clean, of exceptionally good strength and in excellent condition. The sheets have been carefully prepared and have a slight smell of smoke. It would perhaps be better if the smell were more pronounced, if this could be done without affecting the colour. The rubber requires testing in commercial quantities in order to place an exact estimate of value upon it. As a small sample consignment it is unlikely to realise what we should consider its proper price in quantity. We make it worth about 8s. 6d. per lb. very uncertain.

1 CASE BISCUITS, No. 2.

DESCRIPTION.—Similar to above in all respects except shape. The rubber has arrived in splendid condition, and the samples have an attractive appearance.

for, Gow, Wilson & Stanton, Ltd.
SPENCER BRETT,
Managing Director.

(To H. N. Ridley, Esq., Botanic Garden, Singapore.)

DEAR SIR,

Herwith we have the pleasure to hand you contract for the sale of the 2 cases Smoked Sheet and Biscuit ex S/S "EGYPT".-which you will be pleased to hear we disposed of at last Tuesday's sale, realising the highest price in the auction, viz 9/- per lb.

We think you will agree that, considering that many of the buyers were very doubtful as to the smoking of the rubber and also taking into account the very small quantity, this was a highly satisfactory result, and we trust it may have the effect of producing further efforts in this kind of manufacture.

Account/sales and nett proceeds will be forwarded to you in due course, and in the meantime with compliments.

We are, Dear Sir,

Yours faithfully,

for, Gow, Wilson & Stanton, Ltd.,

SPENCER BRETT,

Director.

THE ABOLITION OF THE BOTANIC GARDENS OF PENANG.

Nothing lasts for very long in this world, and perhaps in the East changes and disappearances are more frequent than elsewhere. Still we must view many of these with regret, and this feeling will be felt by all Horticulturists and admirers of the beautiful in all parts of the world on learning of the abolition of the world-famed Gardens of Penang which, on the retirement of Mr. Fox, who has occupied the post of superintendent of the Gardens since the retirement of Mr. Curtis in 1903, will be handed over to the Municipality to convert into a reservoir.

The Gardens, which are the third founded and abolished since the settlement of Penang by Captain Light, in 1786, were instituted by Mr. Cantley, Superintendent of the Botanic Gardens of Singapore in 1884 and Mr. Curtis, appointed Assistant Superintendent of Forests, took over his appointment in July 1884, and immediately set to work with much energy. He started a forest tree nursery and an experimental nursery and laid out the waterfall gardens which was intended to be a garden for Colonial produce. All this was effected in the first year of his work.

The ground of the waterfall valley had been a quarry and was covered with lalang and huge blocks of stone giving it a most hopeless appearance and an immense amount of labour was required to get it into the semblance of a garden. But Mr. Curtis was a man full of energy and skill as a landscape gardener and was not to be daunted by difficulties. In a surprisingly short time, the lalang was exterminated, the stones removed, the stream bridged in several places, plant houses and ponds made, and an extensive collection of rare and beautiful plants made.

Meanwhile, during his excursions in the forests of Penang, the Dindings, Perak and Lankawi, he collected specimens for the herbarium, and for the Garden, and the great number of plants associated with his name attest to his success in this direction. He possessed indeed the greatest skill not only in discovering but in importing alive and cultivating plants worthy of the admiration of all lovers of nature. A garden for trees was also formed by him at Kubang Ulu in Province Wellesley, chiefly for roadside and forest trees for planting out in the province, in 1887, and proved very useful for some time, but was at length abandoned.

The experimental nursery towards the top of the Government Hill was intended for attempting to acclimatise European fruits, olives, apples and peaches; lemons and many other trees were planted there, and the last two mentioned produced good fruit. The olives formed large bushy trees but did not fruit. It was found, however, that this altitude, rather over 2000 feet, was not high enough for European fruits and this little garden was not kept up beyond 1898. At the top of the Hill was a small garden where flowers and vegetables were cultivated for the use of people occupying the Governor's bungalow. Peas, leeks, kohlrabi, new potatoes, carrots, etc., were grown here with great success, although the available space was small and all manure had to be carried up by hand. Roses, carnations and other European flowers were also cultivated here, and numbers of Burmese orchids were planted on the trees.

The waterfall gardens soon became the admiration of all visitors to Penang, and Mr. J. H. Veitch, of Messrs. Veitch and Sons, in his "Traveller's Notes," written in 1896, gives an excellent account of what he saw in his visit there, a description too long to reprint. Axel Preyer, in his Indo-Malayishe Streifzuge, published in 1903, says "Der Garten ist zwar nur klein aber gut gehalten und zeigt in seinem Orchideen und Palmen charakterische formen der Malayischen Flora, Auch die Gauze Anlage un Englischen Parkstil gehalten bietet reisvolle Bilder."

The soil of the gardens was poor and sandy, but in spite of such difficulties many fine and rare trees and shrubs were successfully grown, while the plant houses beautifully kept and stocked with indigenous and exotic plants were highly admired. In one spot grew probably the biggest *Grammatophyllum speciosum* in cultivation anywhere. It measured forty-three feet round, and in the season produced a great abundance of flowers on racemes over seven feet tall.

The situation of the garden, a valley surrounded with magnificent forest-clad hills, and the waterfall and picturesque Indian shrine at the further end produced a series of vistas unequalled by any garden in the East. It was of course the greatest, one might say the only, attraction in Penang to the traveller, and inspite of its distance from the town was visited by hosts of visitors from all parts of the globe. The King of Siam, on his rare visits to Penang, never failed to drive to the Gardens, and to inspect them under the guidance of Mr. Curtis.

But in about 1900, a scheme for converting them into a reservoir to increase the supply of water to Penang town was talked about, and as from that date it was uncertain whether at any minute the work of destruction would not commence, it was not considered worth while to continue planting out valuable or rare trees to be destroyed immediately. But now, after an uncertainty of ten years, it has been decided that the ground is required for a reservoir, and the abandonment and destruction of this beautiful garden is practically an accomplished fact. We can only condole with Penang on the loss of its only attraction.

As the Gardens are so intimately connected with Mr. Curtis, it may not be out of place here to give some account of his history. Mr. Charles Curtis was born in 1854 and was employed at Messrs. Veitch's nurseries at Chelsea in 1874. Four years later, he was selected by the firm to go to the East on an important mission in search of plants for cultivation. His first trip was to Mauritius and Madagascar, whence he sent home the handsome pitcher plant *Nepenthes madagascariensis* and large quantities of the beautiful *Angræcums* of that country. After a year he returned to England, and was sent, in 1880, to the Malay Archipelago, where he explored Borneo, Sumatra, Java and the Moluccas and sent home very many grand novelties. The main object of this expedition was to obtain the fine pitcher plant *Nepenthes Northiana,* only known at that time from a drawing by Miss North. Its actual habitat was unknown till after much search Mr. Curtis rediscovered it in Borneo and successfully introduced it into cultivation. After sending home his collections he went to Pontianak in search of *Phaloenopsis violacea,* then very rare in England, but after collecting for a month he had a mishap with a boat, and lost all his collections and baggage and narrowly escaped with his life. During his Eastern expeditions he introduced to European Gardens very many ornamental plants and among those associated with his name are *Nepenthes Curtisii, Cyprepedium Curtisii, Medevellaa Curtisii, Rhododendron tricolor* var *Curtisii,* the latter being one of the parents of a large series of the superb hybrid Rhododendrons now cultivated in the hot house of European Gardens (Hortus Veitchianus). In 1884 he accepted the post of assistant superintendent of the Penang Forests and the Gardens where he remained till 1903, when illness, no doubt, induced by his hard labours in Madagascar and the East Indies in the cause of Botany and Horticulture, compelled his retirement to England. He returned to Devonshire, his former home, and is occupying himself in the cultivation and improvement of roses, sweet peas, tomatos and other plants.

During his superintendence of the Penang Gardens, he did not confine his attentions to Horticulture only. His collections of herbarium specimens were very valuable and contributed largely to the knowledge of the Flora of the Malay Peninsula. His name is associated with a very large number of plants discovered by him in his expeditions.

Besides the ordinary reports, and accounts of expeditions he published a list of the plants of Penang in the Journal of the Straits Branch of the Royal Asistic Society and a Latin-Malay list of plant names in the same Journal. He also wrote a number of articles on agriculture in the Bulletin, chiefly dealing with his experiments and observations on rubber, gutta percha, and many other economics. The foundation of the series of Agricultural Exhibitions on a large and more general scale than they were formerly held was due to his initiative. He was made a fellow of the Linean Society for his contributions to Botanical Science.

History of the Gardens of the Peninsula.

As has been mentioned in the first part of this article the Gardens doomed to disappear are the third gardens made and destroyed in Penang since its founding, and though reference has been made in a previous paper to the history of the Gardens of the Peninsula it will be interesting no doubt to many to read the story of the previous Gardens as fully as I have been at present able to trace their history. The first settlement at Penang was made in 1786, by Captain Light, and shortly after this the Honourable East India Company decided to start spice-gardens with a view of breaking down the Dutch monopoly of the spice cultivation and trade. So in 1794 Christopher Smith was appointed their Botanist, and in 1796 was sent to the Moluccas to collect living plants of nutmegs and cloves with which to start the cultivation. In 1798 five park-slaves from the Banda nutmeg parks, as they were called, arrived in Penang, sent by the Resident of Banda to look after the nutmegs and cloves, of which about 600 nutmeg plants and half a dozen clove trees had been already received in Penang. In May, 1800, there were 1300 plants in the Gardens, which consisted of 20 orlongs at Ayer Hitam and 300 orlongs reserved at Sungei Cloan, chiefly for growing pepper. In June 29, the ship Amboyna arrived from Amboyna with 15,000 cloves and 500 nutmeg trees. The Botanic Gardens were now much enlarged, and it was urged that Mr. Smith should return and take charge of them as soon as possible. In 1802 there were 19,000 nutmeg trees and 6,250 cloves in the Gardens and altogether about 33,000 spice plants in the island.

The first nutmeg fruit and the first mangosteen in Penang were produced in 1801. At this time Sir William Hunter, surgeon to the East India Company, was in charge of the Gardens, with a staff of fifty convicts. An account of the plants of Prince of Wales Island from a manuscript, in the British Museum, was published recently by the Editor in the Journal of the Straits Branch of the Royal Asiatic Society, Vol. 53. It shows that a number of other plants of a useful and ornamental character, many obviously sent from the Moluccas by Smith, were cultivated in the spice gardens. Among the plants recorded in this work and elsewhere are Cinnamon, Pimento Coffee, Kaya Puteh, Colelava (*sic*, probably clove bark) Kulit Lawan, *Cinnamomum, Kulit Lawan Bl*) Teak, Loquat, *Artabotrys odoratissima,* Canary nut, etc.

Christopher Smith returned from the Moluccas and was appointed Superintendent of the Botanic Gardens in 1806, having sent to Penang 71,266 nutmeg plants, 55,264 cloves and large quantities of *Canarium commune* the Canary nut and *Arenga saccharifera,* the well known Kabong Palm.

Capt. James Law, in his dissertation on the soil and agriculture of Penang (1836), describes the position and area of the Gardens thus:—"It comprised 130 acres of land lying on the slopes which skirt the base of the hill near Amie's mills, a romantic spot and well watered by a running stream called Ayer Puteh. It contained 19,628 nutmegs from 1 to 4 years old, 3,460 being four years old and 6259 clove trees, of which 669 were above six and under 7 years old." Hunter says the Gardens were in the valley of Ayer Hitam.

Sir George Leith was Lieut. Governor but was succeeded by Col. R. T. Farquhar in 1803. He appears to have been a reckless and extravagant man, spending large sums on his own luxury and on useless fortifications.

Hunter seems to have left the island about 1803, and Smith died in 1806, or soon after.

The Gardens, which in 1804 to 1805 had a staff of 80 coolies and cost $11,909.41, were sold at 12 days' notice by auction for $9,656. The trees were dug up and carried off by the purchasers but most of them died. So ended the first Gardens of Penang.

From 1805 to 1822 Penang possessed no gardens, then at the instance of Sir Stamford Raffles the second gardens were founded. They were also situated at Ayer Hitam, and put under the charge of a botanical school master, George Porter. These gardens existed till 1834, when Governor Murchison who took no interest in gardens or agriculture sold them for 1,250 rupees because his wife could not get enough vegetables from them to diminish the cost of her cook's bills, and so ended the second Penang Gardens.

There were no other gardens in Penang till 1884, nor do we hear of any attempts on the part of the Government to improve cultivation or develop agriculture in the meantime.

On the founding of Singapore, Sir Stamford Raffles introduced nutmegs, cloves and cocoa, and founded the first Botanic Gardens there in 1822. He writes to Marsden, January 31, 1823. "I am laying out a Botanic and Experimental Garden" and to Dr. Wallich February 8: "The Botanic Garden goes on well. I am now employed in laying out the walks and stones are collected to make a handsome hand railway round it" (Memoirs, by his Widow, p.p. 535, 537). A superintendent of the name of Dunn was employed to look after it, as early as 1819. Dr. Wallich though no doubt much interested in the garden was not, as Buckley in his anecdotal history of Singapore says, superintendent. He had come down from Calcutta for his health in 1822 and returned in 1823. The gardens were on the North East of the Government house (Fort Canning) and were 48 acres in extent and a bungalow for the Superintendent was built in them. Sir Stamford Raffles left the East in 1823, a monthly vote of 60 dollars was allowed for the upkeep.

In 1829 the establishment was discontinued and ten convicts were put on to keep the ground in order. Lord George Bentinck had come as Governor-General. In 1827 Dr. Montgomerie who took much interest in agriculture and horticulture was superintending the gardens, and cultivating spices and endeavouring to induce planters to take them up as there was a good demand for them and Penang could not supply sufficient.

Lord George Bentinck had been sent to retrench the expenditure of the colony and soon sold off the gardens, and that was the end of the first Singapore Gardens. By this time agriculture in Singapore was beginning to develop rapidly and Jose D' Almeida, T. C. Crane, Dr. Montgomerie and Dr. Oxley were doing their best to aid in its development.

The Government however did not encoutrage these efforts. There were no Gardens, nor was there any Botanist or agriculturist employed by them and the land-laws were so bad that in 1836 Dr. Montgomerie and others formed an Agri-Horticultural society to petition the Government to encourage agriculture. This does not seem to have been of much use as the same complaints were made in 1843. Though a great deal of good work was done by the amateurs, Montgomerie, Crane, Oxley, Almeida, Whampo and others, the utter absence of any professional agriculturist who could employ his whole time in the study of agriculture prevented its becoming a really important feature in the progress of the country. Practically no new plants were introduced, no investigations into pests, no improved methods of cultivation tried during this period.

The same year that the Singapore Agri-Horticultural Society was founded a similar one was formed in Penang, but probably died in the same year, viz. In 1846. Three years after Dr. Montogomerie, the leading spirit, left Singapore. Another Horticultural Society was founded in Singapore in 1859 or 1860. It got hoplessly into debt in 1873, and the Government eventually took over its property in 1878, and thus was founded the second Botanic Gardens of Singapore.

The apathy of the Government from 1829 to 1860 naturally ended in disaster, which took the form of a ruinous collapse of the most important industry in Penang and Singapore, viz., the nutmeg cultivation. The trees died wholesale in a single night apparently from the attacks of a beetle. Cullingwood thus describes the catastrophe. "The planters abandoned the plantations in disgust in many cases where there were still numerous healthy trees and the land reverted to Government. In other cases, where expensive bungalows had been built upon the estate, they were sold for a small proportion of the sums expended in building them since they were as a rule too far from town to command any competition and ceased to be conveniently situated. Many planters, both English and Chinese, whose whole estates were invested in nutmeg plantations were thus reduced to ruin and absolutely penniless and distress and disappointment everywhere prevailed." Had the Penang Garden, abolished by Bentinck, been maintained and suitable superintendents employed to watch the interests of the planters, this catastrophe would probably have never occurred or at worst would have been much mitigated.

But to return to the Gardens. The Singapore Gardens really commenced in 1875 when H. J. Murton was appointed to take charge of the agri-horticultural gardens now under Government though not formally so till 1878. He was succeeded by N. Cantley, in 1880, who established the third Penang Gardens in 1884, and the Malacca Gardens at Bukit Sabukor in 1886. These Gardens, over which Mr. Derry had control, were very useful in experimental work and in supplying economic plants to the Malacca planters. They were abolished by Sir Charles Mitchell, in 1896, and as a large portion of the ground had been presented to the Government by a Chinaman on condition that they should serve as a Botanic Garden for Malacca and revert to him when no longer so used, the ground on the abolition of the gardens was returned to the former owner.

In Perak, Sir Hugh Low took a great interest in agriculture at a time when there was practically no agriculture worthy of the name in the Peninsula, and he founded several gardens or experimental stations for the introduction and cultivation of economic plants. I have found very few records of this work, but it appears that most of them were instituted in about 1875 or 1876. They comprised the Gardens of Kuala Kangsar, the Tea Gardens and Maxwell's Hill Gardens, on the Taiping Hills the Hermitage Hill Garden and Waterloo Garden, and Telok Anson.

After Sir Hugh Low retired from the Peninsula these were all abandoned or sold or remained as gardens attached to various bungalows or Government residences. In any cases, they lost the status intended and established by him.

In 1903 an economic garden was started at Batu Tiga near Kuala Lumpur, and Mr. Stanley Arden was put in charge. It contained only economic plants and was liberally supplied free with these from the Singapore Botanic Gardens and it contained eventually a very complete series of plants likely to prove useful to planters.

Mr. Arden left about 1906, and the garden seems to have been practically abandoned shortly afterwards, but we understand that the camphor bushes and rubber trees are still being protected.

The Federated Malay States Agricultural Department commenced to open out a considerable area of ground for planting rubber and camphor trees, near Kuala Lumpur, in 1906, and this work appears to be progressing.

Thus we have the history of the Botanic Gardens of the Malay Peninsula as follows :—

	(Founded)	(Abolished)
First Penang Garden	1800	1805
Second Penang Garden	1822	1826
First Singapore Garden	1823	1829
Second Singapore Garden	1878	still existing
Third Penang Garden	1884	1910
Malacca Garden	1886	1894
Kuala Kangsar Garden	1876	before 1888
Maxwell's Hill, Tea Gardens	1882	,,
Hermitage Hill	before 1880	1893
Waterloo Hill	,,	before 1888
Durian Sabatang or Telok Anson	,, ,,	,,
First Selangor Garden	1903	1906
Kuala Lumpur Experiment Plots	1906	existing

This does not include such smaller nurseries as the hill experimental garden at Penang, the Kubang Ulu nursery, the Damansara road nursery, Kuala Lumpur, also mostly abandoned, nor the various bungalow gardens and parks kept up by the Government such as the Lake Club Gardens, at Kuala Lumpur, the Taiping Gardens, Reservoir Gardens, etc., which cannot be classed as Botanic Gardens in any sense of the word.

I have no clue as to the exact dates of any of these gardens. Possibly some of our readers may be able to give more of their history.

The table above shows that no less than 14 Botanic Gardens and stations have been founded in the Malay Peninsula in little more than a century and of these 11 have been abolished, after a life of from four to fourteen years.

The Gardens which have existed longest are the Botanic Gardens of Singapore, 32 years, and the next oldest are the Penang Gardens now abolished. The remainder from about four to eight years.

This is certainly unique in the history of the Gardens of the Empire and indeed of the foreigen nations, too, and represents a great amount of hard work by energetic men, and a great deal of money thrown away.

To compare this with other gardens ; that of Peradeniya, Ceylon was founded in 1821 and has gone on without a break ever since, that is for 89 years. That of Buitenzorg was founded in 1819 and has run continuously. The Botanic Gardens at Calcutta were founded in 1787, Trinidad about 1827, Sydney 1788. These Gardens have all run continuously on the same ground ever since they were founded. There has been none of the making and abolishing after a few years in the manner which seems to have characterised the Straits Settlements. It may be taken that it requires at least 20 years with a suitable staff and sufficient funds to make a practical and well-stocked Botanic Gardens and the longer it lasts and the more continuous its existence in a well found condition, the greater its value. The uncertainty of continuity naturally prevents the Botanist in charge from carrying out satisfactorily researches on slow-growing trees or any of that most important series of investigations which require many years of continuous experiment and observation for their solution, But this must be obvious to every thinking person.

The story, which is as historically accurate as the author has been able to make it, will, he thinks, be read with astonishment and interest by many agriculturists and botanists. It is a history of enthusiasm, energy and hard work of men who devoted themselves heart and soul to the progress of agriculture and built up Gardens for this purpose which were destroyed ruthlessly after the enthusiast was gone, with the inevitable result of delay of progress, failure of agriculture and catastrophe.—Ed.

HORTICULTURAL NOTES.

Peliosanthes violacea var Clarkei.

This plant is figured in the Botanical Magazine for 1909, plate 8276, from a specimen sent to Kew from the Botanic Gardens, Singapore. There are said to be four varieties of the species ; two of these from India have green flowers, and I would suggest are distinct specifically the typical form *violacea* has a deep violet perianth, the variety Clarkei, which ranges from the Khasiya hills in Assam to Singapore has dark purple flowers, almost black indeed. There is a little if any other difference in the rest of the plant from the true *violacea* of Wallich. The figure of the plant in the Botanical Magazine is somewhat less deep and rich in colour than it is in the wild state. This is probably due to the deficiency of light in the dull English climate. The same deficiency of the depth of the rich brown purples of many of our flowers is noticeable in other figures of plants drawn from specimens from our gardens here, especially *Bulbophyllum macranthum* Fig. 7208 which is much lighter in colour than usual and *Zinziber spectabile,* Plate 7967, of which the lip is given with distinctly red wings instead of black as is usual. The fine purple grass. *Pennisetum macrostachyum* from New Guinea, which is so noble an ornament to our gardens with its rich deep purple leaves like those of a dark red Dracaena, in England, only appears of a dirty brownish pink green colour, doubtless from want of our brilliant sunshine.

Dendrobium spectabile.

This curious and beautiful orchid originally described as *Latouria spectabilis,* Blume flowered this year in January in the plant house of the Botanic Gardens. The plants were received from the Solomon islands.

It seems to be widely spread over New Guinea and the Pacific islands and has been flowered in Europe, and is figured in the Botanical Magazine, Plate 7741, and also in Blumes Rumphia. In these and all other figures of it the flowers are different in colouring from the two plants now in flower in the Gardens plant house, though in structure the flowers seem identical. The long twisting sepals and petals are olive yellow, faintly streaked with brownish red. The lip in the other figures is red at the base and yellow at the tip covered with reticulations of a violet colour with a central violet bar. In the Singapore plants the whole lip is closely reticulated with a deep purple black on a white ground giving it a very distinct appearance. Mr. Micholitz who has seen this plant commonly in flower in the Polynesian islands and New Guinea has never seen a plant resembling it, even in Solomon islands whence these plants were received. Both plants are exactly similar, and though perhaps not as pretty as the commoner form, are very quaint and striking.

Hosea Lobbiana, Ridl.

This beautiful climber has been usually brilliant this year and has attracted much attention. It is a native of Kuching in Sarawak where it grows in swamps in full sun climbing over the bushes and trees. The stem is stout and woody, and the leaves deep shining green, toward the end of the branches some of the leaves show red blotches or spots, or a leaf may be half red. The terminal leaves on a flowering spray are produced entirely of a light bright orange red, generally four to six pairs. The flowers in a lax spreading panicle are salmon red, with long dark crimson skamens. The brilliant leaves are the attractive part of this charming plant but the elegant though less brilliant flowers add to its beauty. The fruit is dark purple brown and sausage shaped about three inches long, pointed at both ends and containing a single seed. It has failed to germinate as yet, and no plants have been raised from seed. It is propagated by cuttings and it is hoped shortly to have a good number for distribution to horticulturists. *Hosea Lobbiana* was first discovered by Lobb, no doubt at Kuching, during his visit to Borneo but his dried specimen was labelled Penang by some accident and the plant described as *Clerodendron Lobbiana* by Clarke in the Flora of British India. Lobb does not seem to have got it home alive. Miss North found it again and made a coloured drawing of it now in the North Gallery at Kew. Specimens were also collected in Borneo by Hullett, Haviland and others.

The plant is certainly allied to *Clerodendron* differing, however, entirely in its fruit which appears to be adapted for dispersal by water. It grows in very wet swampy spots and its fruits are doubtless floated away by streams.

Its introduction to cultivation is due to the Right Reverend Bishop Hose who had it in his garden at Kuching and sent a cutting to Singapore. An additional plant was sent later by Mr. Hewett.

Being found to be generically distinct it was described by the Editor in the Journal of the Straits Branch of the Royal Asiatic Society as a new genus under the name of Hosea Lobbiana, Ridl, in honour of its first introducer Bishop Hose. It is known to the Dyaks, says the Bishop, as Tanga Bulan, or the moon-ladder.

Hosea, though not a very fast grower, seems to make a tolerably strong growth in damp soil, and will also grow in stiff clay soil of which so much of our country is composed. It is improved by manuring, with leaf mould and cowdung, and is best grown on a trellis or arch, as it is not stiff enough to grow in a bush form like Mussaenda and Allamanda.

It is a decidedly fine acquisition and addition to tropical gardens, its brilliant colouring being very distinct, and the sprays lasting a long time in beauty.

Cleaning Cement Floors.

In plant houses where the floors or paths are cemented or tiled, it frequently happens that they get slippery and dangerous from the presence of a minute alga usually blackish in colour which is especially abundant in wet weather and usually entails much scrubbing with sand to get the surface fit to walk on with safety. We find that such a condition is most quickly and economically cured by spraying with a squirt with a weak solution of copper sulphate which destroys the alga and leaves the floor clean and safe. The system could be used successfully for bath rooms, etc.—Ed.

RUBBER NOTES.

From Uganda.

A note in the India Rubber World from Mr. J. W. Johnson, Manager of the Mabira Forest Rubber Company, states that *Funtumia* rubber, has fetched recently as much as 6s. 4½d. per pound, the third highest price in the market. He hopes to so improve this rubber that it will top the best Para.

Funtumia as a cultivated tree has had but little reputation as a high class rubber producer both in the matter of returns and it its product. We are glad to see signs that it is not so bad as its reputation.

The Mabira Forest estate seems to be getting on well. It turned out 10,000 pounds in 1907, and 35,137 in 1908, and the first six months of 1909 was 26,000 pounds. Both *Funtumia elastica* and Para rubber are being planted, with also coffee, cocoa and sisal. The Para rubber seeds are supplied from the Botanic Gardens, Singapore.

Guano for Rubber Trees.

A planter from the Dutch Islands calling recently stated that he had remarkable increase in growth of his Para rubber trees, after using guano, imported from Europe. A small quantity was put round each tree in a shallow trench surrounding the tree and covered in with soil. The cost was three cents a tree. This inexpensive method of manuring might be very useful in bringing on young plants.

"Physiological Principles of Rubber Tapping Methods."

This is a translation of the important paper on this subject by Dr. Hans Fitting, it was originally published in the Tropenpflanger and has been translated by Mr. T. H. Renton and is sold for 1 rupee at the Times of Ceylon Office, 27 Mincing Lane, and the Times Building of Colombo. The paper is one of the greater value and should be read by every planter.

H. N. Ridley, Esq., Botanic Gardens, Singapore.

DEAR SIR,

Herewith enclosed is a report of the findings of our Scientific Department as to the respective excellence of plantation rubber as compared with Fine Para.

The conclusion, which is of the most importance to those interested in the industry, is the fact that a series of tests on rubber from 4½, 5, 9, 10, 17 and 27 year old trees show very little difference in the

strength of the rubber from the trees of various ages, but the fact remains that the POTENTIAL STRENGTH of plantation rubber OF ANY AGE IS LESS THAN THAT OF FINE PARA, and it seems clear that the necessary improvement in the cultivated product can be obtained only through IMPROVED METHODS OF TREATMENT.

Trusting that this report may be of some benefit to you, and with kind regards believe me,

Yours truly,

(Enclosure) EDGAR B. DAVIS.

Plantation Rubber.

(Heveá Braziliensis).

First :—The rubber from young trees is not materially different from those of much greater age, and leads us to the conclusion that the age of the tree from which the rubber is extracted is not so important as has been generally supposed.

Second :—The potential strength of the plantation rubber is less than that of Fine Para.

Third :—Stretch satisfactory for all practical purposes.

Fourth :—The plantation product has slightly less resin than Fine Para.

Fifth :—The plantation rubber has slightly less mineral matter than Fine Para.

Sixth :—The well-known fact that plantation rubber has from 15 to 18% less moisture than Fine Para.

OBITUARY.

Dr. M. Greshoff.

We regret greatly to have to record the death of Dr. M. Greshoff, the Director of the Koloniaal Museum, Haarlem, and a well-known authority on drugs and other produce of the East. He was found dead at his desk on the morning of the 8th December having gone to work there on the previous night. Dr. Greshoff was a frequent correspondent with the Botanical Department, and was the author of many works on drugs, and the chemistry and properties of many useful Oriental plants. He translated into Dutch the articles on Malay timbers and Malay drugs published in the Bulletin by the Editor adding additional notes thereto.

THE INTERNATIONAL AND ALLIED TRADES EXHIBITION.

To be held in London in the first week of June, 1910.

(*To H. N. Ridley, Esq., Botanic Gardens, Singapore.*)

DEAR MR. RIDLEY,

The attached letter with reference to the forthcoming International and Allied Trades Exhibition has been sent me by the Organising Manager probably on the strength of my being Co-Commissioner at the last Exhibition. It has occurred to me that having had a knowledge of the last Exhibition I could venture to offer some brief suggestions for the better exhibiting of the great rubber industry of the Colony and F. M. S. at the next Exhibition.

My suggestions are as follows :—

(a). For the purpose of comparison with Brazil and other countries as well as impressing the Trades and interested public with the immensity of Rubber in Malaya a fair proportion of the Malayan Court should consist of rubber in bulk.

(b). I suggest this could be best accomplished by an amalgamation of the largest producing plantations. These, if combined, might stage about 15 tons of the different descriptions prepared—such as block, crepe of grades, sheets, blankets or biscuits, in bulky samples—which could be staged in the centre of the Court in place of the Malayan House.

(c), Usual estate samples would be best if sent direct from the different Associations to the Commissioners in London with a list of the estates represented and instructions as to the disposal of the samples after the Exhibition is closed. All parcels and samples should be marked with the name of the estate and State.

(d). Sufficient maps on a fairly large scale showing the land alienated for rubber are of much value, and diagrams and charts showing the rise, present, and prospective position of the industry would be of much interest and information.

(e). Photographs should be enlargements of an uniform size and good. Ceylon and the Netherlands were both well represented in this direction two years ago.

(f). We were starved for the want of technical literature at the last Exhibition, all departmental phamphlets, museum notes, and the Agricultural Bulletin, would prove a great advantage. These might be arranged in a suitable (Malayan) waiting or rest room with perhaps a sample copy of all the newspapers published in Malaya—in charge of an attendant. The pamphlet written by Mr. R. G. Watson for the last Exhibiton was largely in demand and a revised and a later copy would be sure to prove most acceptable.

In conclusion I would repeat that I can think of nothing of so much importance in the best interests of Malaya at the Exhibition as rubber in bulk.

Yours truly,
R. DERRY.

(*To Robert Derry, Esq., Curator, Botanical Gardens, Singapore.*)

DEAR MR. DERRY,

I shall be glad if you will make known the next International Rubber and Allied Trades Exhibition will be opened in London in the first week in June, 1911. The support from all directions is very considerable.

I understand that Brazil are going to make a mammoth show. I hope the F.M.S. will make a large and attractive exhibit. I have the Malay House still packed away in case it may be required. I am writing to the Colonial Secretary of the F.M.S., and also to the Secretary of the Planters Association, drawing their attention to the Exhibition. There is now plenty of time to make complete arrangements.

Might I make the suggestion that the F.M.S. should have a small exhibition beforehand, and give prizes, and then to forward the whole of that Exhibition on to the London Show, with any additional attractions.

The rates for space will be 4/- per sq. foot, and the Exhibition will be open fourteen days.

I am reserving the two positions by the Main Entrance one side for the F.M.S. and the other for Ceylon as at the previous Exhibition. Brazil and several other countries are anxious to get well forward this time. It will be necessary for me to know early what amount of space the F.M.S. will require.

It is again proposed to hold a conference during the Rubber Exhibition.

I have many promises of support from manufacturers both in England, Germany, America and Holland, and no doubt Italy and other countries will be represented.

I shall be glad if you will give me any advice and suggestions, and also the names of any persons and firms to whom I should send letters and matter with reference to the Exhibition.

May I again include your name amongst the list of the advisory Committee? Sir Hy. A. Blake, G.C.M.G., will again be the President.

Yours faithfully,
A. STAINES MANDERS,
Organising Manager.

EXPORTS TELEGRAM TO EUROPE AND AMERICA.

January, 1910.

				Tons.
Tin	Str.	Singapore & Penang	to U. Kingdom &/or	1,103
Do.	,,	do	U.S.A.	1,101
Do.	,,	do.	Continent	287
Gambier	,,	Singapore	Glasgow	—
Do.	,,	do.	London	25
Do.	,,	do.	Liverpool	225
Do.	,,	do.	U.K. &/or Continent	—
Cube Gambier	,,	do.	United Kingdom	50
Black Pepper	,,	do.	do.	110
Do.	,,	Penang	do.	—
White Pepper	,,	Singapore	do.	180
Do.	,,	Penang	do.	—
Pearl Sago	,,	Singapore	do.	25
Sago Flour	,,	do.	London	—
Do.	,,	do.	Liverpool	1,050
Do.	,,	do.	Glasgow	—
Tapioca Flake	,,	Singapore	United Kingdom	320
T. Pearl & Bullet	,,	do.	do.	200
Tapioca Flour	,,	Penang	do.	575
Gutta Percha	,,	Singapore	do.	125
Buffalo hides	,,	do.	do.	90
Pineapples	,,	do.	do.	14,250
Gambier	,,	do.	U.S.A.	775
Cube Gambier	,,	do.	do.	30
Black Pepper	,,	do.	do.	50
Do.	,,	Penang	do.	—
White Pepper	,,	Singapore	do.	25
Do.	,,	Penang	do.	60
Tapioca Pearl	,,	Singapore	do.	75
Nutmegs	,,	Singapore & Penang	do.	14
Sago Flour	,,	Singapore	do.	5
Pineapples	,,	do.	do.	1,000
Do.	,,	do.	Continent	3,250
Gambier	,,	do.	S. Continent	130
Do.	,,	do.	N. Continent	—
Cube Gambier	,,	do.	Continent	15
Black Pepper	,,	do.	S. Continent	50
Do.	,,	do.	N. Continent	950
Do.	,,	Penang	S. Continent	—
Do.	,,	do.	N. Continent	—
White Pepper	,,	Singapore	S. Continent	5
Do.	,,	do.	N. Continent	5
Do.	,,	Penang	S. Continent	—
Do.	,,	do.	N. Continent	—
Copra	,,	Singapore & Penang	Marseilles	700
Do	,,	do.	Odessa	—
Do.	,,	do.	Other S. Continent	100
Do.	,,	do.	N. Continent	500
Sago Flour	,,	Singapore	Continent	875
Tapioca Flake	,,	do.	do.	—
Do. Pearl	,,	do.	do.	—
Do. Flake	,,	do.	U S.A.	45
Do. do.	,,	Penang	U.K.	—
Do. Pearl & Bullet	,,	do.	do.	60
Do. Flake	,,	do.	U.S.A.	80

				Tons.
Tapioca. Pearl	Str.	Penang	U.S.A.	430
Do. Flake	,,	do.	Continent	130
Do. Pearl	,,	do.	do.	370
Copra	,,	Singapore & Penang	England	200
Gutta Percha	,,	Singapore	Continent	5
Cube Gambier	,,	do.	U.S.A.	
T. Flake & Pearl	,,	do.	do.	
Sago Flour	,,	do.	do.	
Gambier	,,	do	S. Continent	
Copra	,,	do.	Marseilles	
Black Pepper	,,	do.	S. Continent	
White Pepper	,,	do.	do.	
Do.	,,	do.	U.S.A.	
Pineapples	,,	do.	do.	
Nutmegs	,,	do.	do.	
Black Pepper	,,	do.	do.	
Do.	,,	Penang	do.	
White Pepper	,,	do.	do.	
T. Flake & Pearl	,,	do.	do.	
Nutmegs	,,	do.	do.	
Tons Gambier				1,100
Do. Black Pepper				65

EXPORTS TELEGRAM TO EUROPE AND AMERICA.

February, 1910.

				Tons.
Tin	Str.	Singapore & Penang	to U. Kingdom &/or	1,601
Do.	,,	do.	U.S.A.	318
Do.	,,	do.	Continent	340
Gambier	,,	Singapore	Glasgow	—
Do.	,,	do.	London	—
Do.	,,	do.	Liverpool	—
Do.	,,	do.	U.K. &/or Continent	150
Cube Gambier	,,	do.	United Kingdom	35
Black Pepper	,,	do.	do.	55
Do.	,,	Penang	do.	—
White Pepper	,,	Singapore	do.	125
Do.	,,	Penang	do.	5
Pearl Sago	,,	Singapore	do.	—
Sago Flour	,,	do.	London	350
Do.	,,	do.	Liverpool	430
Do.	,,	do.	Glasgow	—
Tapioca Flake	,,	Singapore	United Kingdom	70
T. Pearl & Bullet	,,	do.	do.	150
Tapioca Flour	,	Penang	do.	150
Gutta Percha	,,	Singapore	do.	60
Buffalo hides	,,	do.	do.	30
Pineapples	,,	do.	do.	16,250
Gambier	,,	do.	U.S.A.	225
Cube Gambier	,,	do.	do.	85
Black Pepper	,,	do.	do.	50
Do.	,,	Penang	do.	—
White Pepper	,,	Singapore	do.	20
Do.	,,	Penang	do.	—
Tapioca Pearl	,,	Singapore	do.	90
Nutmegs	,,	Singapore & Penang	do.	13

				Tons.
Sago Flour	tr.	Singapore	U.S.A.	210
Pineapples	,,	do.	do.	1,250
Do.	,,	do.	Continent	1,500
Gambier	,,	do.	S. Continent	125
Do.	,,	do.	N. Continent	160
Cube Gambier	,,	do.	Continent	20
Black Pepper	,,	do.	S. Continent	70
Do.	,,	do.	N. Continent	—
Do.	,,	Penang	S. Continent	80
Do.	,,	do.	N. Continent	—
White Pepper	,,	Singapore	S. Continent	20
Do.	,,	do.	N. Continent	10
Do.	,,	Penang	S. Continent	10
Do.	,,	do.	N. Continent	—
Copra	,,	Singapore & Penang	Marseilles	150
Do.	,,	do.	Odessa	—
Do.	,,	do.	Other S. Continent	—
Do.	,,	do.	N. Continent	940
Sago Flour	,,	Singapore	Continent	850
Tapioca Flake	,,	do.	do.	120
Do. Pearl	,,	do.	do.	10
Do. Flake	,,	do.	U.S.A.	25
Do. do.	,,	Penang	U.K.	35
Do. Pearl & Bullet	,,	do.	do.	160
Do. Flake	,,	do.	U.S.A.	—
Do. Pearl	,,	do.	do.	—
Do. Flake	,,	do.	Continent	—
Do. Pearl	,,	do.	do.	65
Copra	,,	Singapore & Penang	England	500
Gutta Percha	,,	Singapore	Continent	—
Cube Gambier	,,	do.	U.S.A.	
T. Flake & Pearl	,,	do.	do.	
Sago Flour	,,	do.	do.	
Gambier	,,	do.	S. Continent	
Copra	,,	do.	Marseilles	
Black Pepper	,,	do.	S. Continent	
White Pepper	,,	do.	do.	
Do.	,,	do.	U.S.A.	
Pineapples	,,	do.	do.	
Nutmegs	,,	do.	do.	
Black Pepper	,,	do.	do.	
Do.	,,	Penang	do.	
White Pepper	,,	do.	do.	
T. Flake & Pearl	,,	do.	do.	
Nutmegs	,,	do.	do.	
Tons Gambier				550
Do. Black Pepper				240

SINGAPORE MARKET REPORT,

January, 1910.

Articles.	Quantity sold.	Highest price.		Lowest price.	
	Tons.	$	c.	$	c.
Coffee—Palembang	...	...		...	
,, Bali	...	...		...	
,, Liberian	10	27	00	26	10
Copra	34,50	10	70	10	00
Gambier Bale	2,240	11	70	10	95
,, No. 1 and 2 ...	162	15	00	13	80
Gutta Percha 1st quality	...	350	00	300	00
,, Medium	...	240	00	120	00
,, Lower	...	100	00	26	00
Gutta Jelutong	...	11	00	9	50
Nutmegs, 110 s.	...	18	00	17	50
,, 80 s.	...	24	00	22	00
Mace, Banda	...	125	00	120	00
,, Amboina	...	95	00	80	00
Black Pepper	357	15	75	15	12½
White Pepper	139	27	50	27	00
Sago, Pearl Small	85	5	40	5	12½
Sago Flour, No. 1	4,655	4	64	3	75
,, 2	155	1	20	1	16
Tapioca Flake, Small	584	4	75	4	60
,, Pearl, Small	345	5	75	4	70
,, Medium	353	5	15	4	72½
,, Bullet	2	6	75	...	
Tin	2,130	77	60	74	00

SINGAPORE MARKET REPORT.

February, 1910.

Articles.	Quantity sold.	Highest price.		Lowest price.	
	Tons.	$	c.	$	c.
Coffee—Liberian	24	26	50	25	00
Copra	3,740	10	65	10	00
Gambier	1,107	11	25	11	05
" No. 1 and 2 ...	230	14	70	14	25
Gutta Percha, 1st quality	..	350	00	300	00
" Medium	...	240	00	120	00
" Lower	...	100	00	26	00
Gutta Jelotong	...	11	95	9	50
Nutmegs, 110 s.	...	18	00	17	75
" 80 s.	...	23	00	21	00
Mace, Banda	...	120	00	90	00
" Amboina	...	95	00	75	00
Black Pepper	444	15	25	14	62½
White Pepper	157	27	25	25	25
Pearl Sago, small	...	5	10	...	
Sago Flour, No. 1	3,370	4	09	3	56
" 2	70	1	15	1	10
Tapioca Flake, small	476	4	80	4	45
" Pearl, small	139	5	75	4	75
" Medium	190	5	10	4	70
" Bullet	...	6	75	...	
Tin	2,038	77	00	74	15

MEDICAL REPORT.

Meteorological Return according to the Christian Year.

RAINFALL.

I. Annual Return of Rainfall for the Year 1909.

Months.	Alor Star.	Pya Kamunting, and Singora Road 14 miles from Alor Star.	Kanga Perlis.	Kulim	Kota Kuala Muda.	Bagan Samak, Krian Kedah.	Sg. Batu Estate near Semiling.
	Inches. Cents.	Inches. Cents.	Inches. Cents.	Inches. Cents.	Inches. Cents.	Inches. Cents.	Inches. Cents.
January ...	5.86	5.18	3.63	11 31	5.54	9 20	5.40
February ...	5.23	4.82	3.82	13.04	5.86	14.17	4.71
March ...	4.08	3.34	2 97	11.73	4 58	10.18	4.71
April ...	5.96	11.30	6 23	11.83	4.67	10.30	5.67
May ...	7.20	6.53	5.73	11.35	9.14	5.43	7.18
June ...	8.80	9.02	8 00	4.57	6.75	4.35	6.70
July ...	7.04	7.87	7.00	2.49	7.99	3.84	5.85
August ...	12.42	13 50	12.40	11.90	16 19	7 96	14.00
September ...	11.87	14.61	21.06	15.06	12.10	10.69	31.65
October ...	12.40	7.77	8.62	11.48	14 21	9.37	11.92
November ...	6.18	5.38	7.05	8.18	14.82	9 86	13 77
December ...	.82	3.30	...	5.30	2.43	3.83	.60
Total ...	87.86	92.62	86.51	118 24	104.28	99.18	112.16

The greatest rainfall in 24 hours was 6.54 inches at Kulim on 15-9-09. December was the driest month and September the wettest.

It will be noted that the rainfall in North Kedah (Alor Star and Pya Kamunting) and in Kanga Perlis was rather deficient. While in South Kedah it was normal. In September the heavy rainfall of 31.65 inches was registered at Sungei Batu Estate, near Semiling under Kedah Peak.

For comparison the rainfalls for the years 1908 and 1907 are appended.

2 Annual Return of Rainfall for the year 1908.

Months	Alor Star	Pya Kamunting	Kulim	Kota Kuala Muda	Bagan Samak Krian Kedah	Sungei Batu near Semiling
	Inches Cents.	Inches Cents.	Inches Cents.	Inches Cents.	Inches Cents.	Inches Cents.
January ...	.98	1.52	... ...	... ...	... ...	... ...
February ...	4.45	3 03	... ...	... ...	... ...	... ...
March ...	1.52	3 82	... ...	... ...	... ...	... ...
April ...	9.81	11 89	... ...	... ...	... ...	5.93
May ...	19.03	11.92	... ...	... ...	... ...	8.73
June ...	7 62	5 40	... ...	... ...	... ...	7.78
July ...	8.17	4.97	... ...	... ...	... ...	5.72
August ...	16 91	11 08	... ...	... ...	... ...	12.34
September ...	21 87	13.35	18.10	21.50	14.49	31.48
October ...	11.58	13 41	16.15	12 26	13.05	13.44
November ...	5.03	8.02	11.10	5.75	9.03	10.47
December ...	7.24	5 62	7.95	4.16	4.90	6.62
Total ...	114.21	94.03	53 30	43 67	41.47	102.51

Greatest rainfall in 24 hours was 6.80 inches on September 27, 1908, in Alor Star. January was the driest month and September the wettest.

3. Annual Return of Rainfall for the year 1907.

Months	Alor Star	Pya Kamunting on Singora Road, 14 miles from Alor Star.
	Inches Cents	Inches Cents
January ...	5.32	4.06
February ...	.08	1.44
March ...	7.54	5.56
April ...	6.94	6.64
May ...	8.83	8.98
June ...	10.09	6.20
July ...	7.69	11 62
August ...	7.53	7.09
September ...	6.91	5.22
October ...	15.90	14.18
November ...	11.67	12.42
December ...	7.05	6.69
Total ...	95.54	90.10

Greatest Rainfall in 24 hours was 3.32 inches at Pya Kamunting on 16-7-07. February was the driest month and October the wettest.

4 Average Shade Temperature for the year 1909.

Months.	Maximum.	Minimum.	Range.
January	91 48	70.66	20 82
February	92 32	70.98	21.35
March	96 59	73 77	22.82
April	97 80	73.90	23.90
May	96 72	73.54	23 18
June	93.70	74 01	18.69
July	91.59	73 27	18.22
August	91.69	71 01	20.68
September	91 16	73 73	17.43
October	89 64	74 11	15.53
November	88.91	73 31	15.60
December	88 95	70.27	18.68

Highest temperature registered near sea-level was 101° F. on { 28—4—09 / 21—5—09

Lowest temperature registered near sea-level was 67° F. on 17—12—09

Extreme range was 34° F.

The nights are generally cool in Alor Star between November and February, the thermometer often registering below 70° F.

April and May were the hottest months in 1909, the maximum shade temperature frequently rising to 99° F. and 100° F.

SEREMBAN.

Table showing the Daily Results of the Reading of Meteorological Observation taken at the General Hospital, Seremban, for the month of January, 1910.

Date.	Temperature of Radiation. 9 H.	15 H.	Mean.	Maximum.	Minimum.	Range.	Temp. of Radiation. Sun.	Difference Sun & Shade.	Wind Direction. 9 H.	15 H.	Temp. of Evaporation. 9 H.	15 H.	Mean.	Computed Vapour Tension 9 H.	15 H.	Mean.	Relative Humidity. 9 H.	15 H.	Mean.	Clouds 0 to 10 9 H.	15 H.	21 H.	Cloud and Weather Initials. 9 H.	15 H.	21 H.	Rain. Inches.
1	78	79	78.5	85	65	20	117	32	NW	NE	72.9	70.6	71.7	.810	.749	.779	84	75	79.5	3	7	5	S	N	C	.05
2	77	80	78.5	89	65	24	126	37	NW	NW	73.6	73.3	73.4	.829	.820	.824	89	80	84.5	4	9	6	C	N	C	.22
3	77	82	79.5	88	65	23	115	27	NW	NW	73.6	77	75.3	.829	.926	.877	89	85	87	2	0	3	S	S	S	
4	78	84	81	86	67	19	128	42	N	NE	72.9	74	73.4	.810	.840	.825	84	72	78	0	5	4	S	C	C	.08
5	77	83	80	85	66	19	108	23	NE	NE	71.9	73	72.4	.783	.810	.796	84	72	78	2	0	3	S	S	S	
6	75	78	77	84	65	19	110	26	NE	NE	73.3	74.6	73.9	.820	.857	.838	94	89	91.5	10	8	5	N	N	C	.58
7	75	84	79.5	86	63	23	133	47	NE	N	73.3	75.7	74.5	.820	.888	.854	94	76	85	0	4	0	S	C	S	
8	77	85	81	91	64	27	154	63	N	N	71.9	76.7	74.3	.783	.922	.852	84	76	80	0	0	7	S	S	N	.10
9	77	84	80.5	87	64	23	155	68	N	N	73.6	75.7	74.6	.829	.888	.858	89	76	82.5	2	0	3	S	S	S	
10	79	83	81	89	65	24	141	52	N	N	72.3	76.3	74.3	.793	.905	.849	80	80	80	0	5	6	S	C	C	
11	78	83	80.5	88	65	23	143	55	NE	NE	71.2	78	74.6	.765	.956	.860	79	85	82	2	9	6	S	N	C	.14
12	77	85	81	88	66	22	134	46	NW	NW	73.6	76.7	75.1	.829	.922	.875	89	76	82.5	4	7	0	C	N	S	
13	79	88	83.5	90	65	25	143	53	NW	NW	72.3	76.5	74.4	.793	.913	.853	80	69	74.5	0	6	2	S	C	S	
14	78	77	77.5	89	66	23	145	56	NW	NW	72.9	73.6	73.2	.810	.829	.819	84	89	86.5	0	10	7	S	N	N	.20
15	78	87	82.5	93	66	27	156	63	N	N	74.6	75.5	75	.857	.884	.870	89	69	76	3	6	4	S	C	C	
16	80	84	82	87	68	19	130	43	N	N	73.3	74	73.6	.820	.840	.830	80	72	76	0	4	2	S	C	S	
17	79	85	82	87	68	19	130	43	N	N	70.6	70.1	70.3	.749	.738	.743	75	61	68	3	5	4	S	C	C	
18	75	85	80	87	64	23	135	48	N	N	73.3	75.1	74.2	.820	.873	.846	94	72	83	1	0	10	S	S	N	.21
19	75	80	77.5	82	66	16	114	32	N	N	73.3	71.6	72.4	.820	.775	.797	94	75	84.5	7	3	2	N	S	S	
20	74	80	77	81	65	16	110	29	N	N	72.3	75	73.6	.793	.867	.830	94	85	89.5	3	6	0	S	C	S	
21	74	83	78.5	86	64	22	124	38	NW	NW	74.	74.7	74.3	.840	.856	.848	100	76	88	9	7	3	N	N	S	.35
22	76	84	80	87	64	23	145	58	NW	W	72.6	77.4	75.	.801	.938	.869	89	80	84.5	0	5	3	S	C	S	
23	76	87	81.5	91	63	28	151	60	NW	NW	70.9	77.1	74.	.756	.933	.844	84	73	78.5	0	2	1	S	S	S	
24	78	87	82.5	91	65	26	130	39	NW	SW	72.9	77.1	75.	.810	.933	.871	84	73	78.5	0	3	5	S	S	C	
25	75	84	79.5	89	65	24	147	58	NW	SW	73.3	74	73.6	.820	.840	.830	94	72	81	1	8	10	S	N	N	1.55
26	75	81	78	86	64	22	144	58	NW	N	71.6	74.3	72.9	.774	.849	.811	89	80	84.5	5	7	8	C	N	N	.03
27	75	84	79.5	86	67	19	140	54	N	N	69.8	70.7	70.2	.731	.751	.741	84	64	74	9	6	4	N	C	C	
28	77	85	81	87	63	24	114	27	N	N	70.2	71.8	71	.739	.781	.760	79	64	71.5	0	4	0	S	C	S	
29	76	82	79	85	64	21	110	25	N	N	70.9	72	71.4	.756	.785	.770	84	72	78	0	10	0	S	N	S	2. 49
30	77	82	79.5	85	65	20	121	36	N	N	71.9	70.3	71.1	.783	.742	.762	84	68	76	0	5	3	S	C	S	
31	76	86	81	87	64	23	120	33	N	N	70.9	69.5	70.2	.756	.721	.738	84	58	71	2	1	0	S	S	S	
Mean.	76.6	83.2	79.9	87.1	64.8	22.1	131.3	44.2	N	N	72.4	74.2	73.3	.797	849	.823	86.5	74.6	80.5							6.00

Highest Temperature 93
Lowest ,, 63

Greatest Rainfall in 24 hours 2.49

J. LUCY,
Senior Medical Officer.

PENANG.

Abstract of Meteorological Readings in the Prison Observatory, Penang, for the month of January, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°	°	°	°	°	°	%	°	°		Ins.	Ins.
Penang Prison Observatory ...	29·849	141·7	82·3	89·9	70·0	19·9	76·9	·854	73·3	77	N.-W.	2·57	1·01

Surgeon's Office,
Penang, February 8, 1910.

M. E. SCRIVEN,
Assistant Surgeon.

A. H. KUN,
Medical Officer.

PAHANG.

Abstract of Meteorological Readings in the various Districts of the State for the month of December, 1909.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	TEMPERATURE.				HYGROMETER.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Mean Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kuala Lipis	...	...	73	90	66	15.7	73	...	...	...	...	5.50	1.73
Raub	...	...	77	89	68	17.4	73	...	...	...	...	3.58	1.15
Bukit Fraser	...	...	...	57	...	...	...	...	...	...	...	7.22	1.20
Bentong	...	...	78	91	68	16.5	74	...	...	...	...	6.09	2.02
Temerloh	...	...	...	95	73	17.3	...	...	...	...	...	5.00	0.60
Pekan	...	...	79	89	70	13.3	75	...	...	...	...	22.32	4.54
Kuantan	...	...	81	91	69	14.7	75	...	...	...	...	6.80	4.57
Sungei Lembing	...	...	...	86	65	...	...	...	...	...	...	13 39	2.45

OFFICE OF THE SENIOR MEDICAL OFFICER,
Kuala Lipis, 30th January, 1910.

S. C. G. FOX.
Senior Medical Officer, Pahang.

PAHANG.

Abstract of Meteorological Readings in the various Districts of the State for the month of January, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Mean Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kuala Lipis	...	...	77	90	64	17.8	74	...	...	...	...	6.39	.99
Raub	...	...	77	89	68	13.5	73	...	...	...	...	8.54	2.53
Bukit Fraser	...	...	...	55	...	...	...	...	...	...	...	11.87	2.90
Bentong	...	...	79	90	70	15.4	75	...	...	...	...	7.53	1.21
Temerloh	...	...	...	92	72	16.7	...	...	...	...	...	7.65	2.00
Pekan	...	...	80	87	69	12.0	77	...	...	...	...	14.17	3.24
Kuantan	...	...	80	88	68	13.1	75	...	...	...	...	15.35	2.13
Sungei Lembing	...	...	...	85	64	...	...	...	...	...	...	16.97	3.45

Office of the Senior Medical Officer,

Kuala Lipis, 1st March, 1910.

S. C. G. FOX,

Senior Medical Officer, Pahang.

NEGRI SEMBILAN.

Abstract of Meteorological Readings in Negri Sembilan for the month of January, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Seremban		131.3	79.98	87.1	64.8	22.1	76.01	.823	73 3	80.5	N.	6 00	2.49
Mantin												2.37	.50
Jelebu												2.42	.32
Kuala Pilah												3.79	.66
Tampin												3.18	.60
Port Dickson Town												4.93	1.13
Do. Beri-Beri Hospital												5.91	1.10

S. M. O's Office,
February, 1910.

J. HUNT,
S. M. O.

SELANGOR.

Abstract of Meteorological Readings in the various Districts of the State for the month of January, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
General Hospital, Kuala Lumpur ...	29.871	146.8	80.5	88.6	71.2	17.4	76.1	0.815	73.0	78	S.W.	4.42	1.30
Pudoh Gaol Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	3.56	1.03
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	4.22	1.06
,, Klang...	...	...	...	88.2	70.1	18.1	...	...	...	...	...	6.17	2.25
,, Kuala Langat	...	...	...	87.5	72.9	14.6	...	...	...	...	...	4.58	1.19
,, Kajang	...	...	...	84.3	74.2	10.1	...	...	...	...	...	6.65	1.74
,, Kuala Selangor ...	...	...	...	86.9	71.8	15.1	...	...	...	...	...	9.93	2.60
,, Kuala Kubu	...	...	...	88.5	70.4	18.1	...	...	...	...	...	9.76	3.60
,, Serendah	...	...	...	91.9	70.7	21.2	...	...	...	...	...	6.49	1.64
,, Rawang	...	...	...	90.0	70.9	19.1	...	...	...	...	...	12.64	5.00
,, Sabak Bernan... ...	...	...	...	...	...	...	...	...	...	...	...	9.68	3.10

Office of the Senior Medical Officer,
Kuala Lumpur, 22nd October, 1909.

W. D. FREER,
Senior Medical Officer, Selangor.

PERAK.

Abstract of Meteorological Readings in Perak for the month of December, 1909.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
Taiping	...	152	81.70	92	70	22	77.05	867	...	80	...	8.60	2.50
Kuala Kangsar	...	...	79 44	93	68	25	74.81	803	...	79	...	3.82	.72
Batu Gajah	...	156	79.32	90	70	20	75.41	828	...	82	...	6.42	1.42
Gopeng	...	..	79 31	89	61	28	74.18	779	...	77	...	9.80	3.40
Ipoh	...	...	79.92	91	70	21	76 54	869	...	86	...	11.82	1.90
Kampar	...	...	79.48	93	70	23	75.55	831	...	82	...	10.72	2.25
Teluk Anson	...	...	80.62	92	69	23	76.31	851	...	81	...	6.45	1.12
Tapah	...	...	79.53	90	67	23	75.65	836	...	83	...	12.65	2.76
Parit Buntar	...	...	80.46	88	70	18	75.48	817	...	78	...	2.09	.95
Bagan Serai	...	...	79 92	89	69	20	76.12	852	...	83	...	3.74	1.51
Selama	...	...	80.65	92	70	22	76.01	837	...	79	...	7 62	2.36

Office of Senior Medical Officer,
Taiping, 14th January, 1910.

W. B. Orme,
Ag. Senior Medical Officer, Perak.

PERAK.

Abstract of Meteorological Readings in Perak for the month of January, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Taiping	...	152	81.85	92	69	23	77.51	887	...	82	...	15.75	2.62
Kuala Kangsar	...	...	79.96	92	69	23	75.44	821	...	80	...	7.22	1.50
Batu Gajah	...	156	79.84	90	72	18	75.58	832	...	81	...	9.32	1.70
Gopeng	...	...	79.62	90	61	29	74.76	798	...	79	...	8.07	1.59
Ipoh	...	...	80.51	92	70	22	77.29	896	...	86	...	4.00	.86
Kampar	...	...	80.00	92	70	22	76.13	852	...	83	...	14.37	2.52
Teluk Anson	...	...	81.39	92	70	22	76.86	862	...	80	...	8.41	1.62
Tapah	...	...	80.07	91	68	23	76.14	848	...	82	...	9.03	2.53
Parit Buntar	...	...	80.42	90	70	20	76.48	860	...	82	...	6.86	2.30
Bagan Serai	...	...	80.81	90	69	21	76.84	869	...	82	...	12.23	2.33
Selama	...	...	81.75	93	71	22	76.78	855	...	78	...	10 57	2.50

State Surgeon's Office,

Taiping, February 17, 1910.

W. B. Orme,

Ag. Senior Medical Officer, Perak.

KELANTAN.

Abstract of Meteorological Readings in Kelentan for the Month of January, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
		° F.	° F.	° F.	° F.	° F.	° F.	%	° F.	° F.		Ins	Ins.
Kota Bharu ...	...	151.6	78.9	84.2	73.4	10.8	75.6	...	...	...	...	11 39	2 21
* Kuala Lebir ...	...	...	74.8	84.7	71.4	13.3	73.3	.788	72.1	91.2	...	12.01	2.60
* Kuala Kelantan ...	...	...	...	82.8	72.7	10.1	...	...	...	...	...	12.26	4.10
* Kuala Pergau ...	...	...	...	93.4	72.4	21.0	...	...	...	...	...	9.45	1.69
* Taku Plantation ...	...	...	...	...	...	...	...	...	...	...	...	11.28	1.92
* Pasir Besar ...	...	...	...	...	...	...	...	...	...	...	...	14.64	2 74

* Supplied by the courtesy of the Duff Development Co., Ltd.

Residency Surgeon's Office,
Kota Bharu, *25th February, 1910.*

John D. Gimlette,
Residency Surgeon.

KUALA TRENGGANU.

Meteorological return of Kuala Trengganu District for the month of January, 1910.

Date.	Thermometer. 9 A.M. Maximum.	Minimum.	Range.	Rainfall. 6 P.M. Inches.	General Weather Observations.
1	81½	76	5½	...	
2	81	76	5	0 41	
3	80	75	5	0.62	
4	81	76½	4½	0.17	
5	82	77	5	0 02	
6	82	76½	5½	0 13	
7	83	77	6	0.01	
8	82	77	5	0.08	
9	83	78	5	...	
10	83	78	5	...	
11	81½	77½	4	...	
12	81	76½	4½	...	
13	81	76	5	...	
14	81½	76	5½	0.07	
15	81	77	4	0.15	
16	81	76½	4½	...	
17	82	75	7	...	
18	81	78	3	...	
19	81	75	6	0.16	
20	82	74½	7½	0.91	
21	81	75½	5½	0 29	
22	82	74	8	0.28	
23	82	74	8	3.25	
24	81	76	5	0.13	
25	81	76	5	0.17	
26	82½	76½	6	0.50	
27	80	77	3	0.05	
28	81	75½	5½	...	
29	79	74	5	...	
30	79	74	5	...	
31	80	77	3	...	
Means.	81 29	76.08	5.2		
			Tota ...	7.46	

Highest Temperature 83
Lowest do. 74
Greatest rainfall in 24 hours 3.25

W. L. CONLAY,
British Agent, Trengganu

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No. 4.] APRIL, 1910. VOL. IX.

Agricultural Bulletin

OF THE

STRAITS

AND

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EDITED BY

H. N. RIDLEY, M.A., F.R.S., F.L.S., F.R.H.S.

Director of Botanic Gardens, S.S.

From the first of January, 1910

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No. 4.] APRIL, 1910. [VOL. IX

PROGRESS IN RUBBER CULTIVATION IN 1909.

An excellent and interesting article on a Retrospect of 1909 by the Editor of the India Rubber Journal appears in that periodical on January 10. It deals with the advance made in the manufactures trade, cultivation and knowledge of the industry, and gives many suggestions for future lines of work. Some of these latter are certainly suitable for adoption, but here and there are few which perhaps are dubious. The intercropping of Para rubber with coffee, which he says is gaining favour in the Dutch East Indies in the place of green manures used weed killers which may assist in the spread of certain diseases common to them and Para rubber, does not seem to us commendable. We have already had it shown that coffee is liable to attacks of *Corticium* which readily passes from it to the Para rubber, (Bulletin VII p. 440,) and *Irpex flava* was a well known coffee pest in days of coffee cultivation and has certainly been known to attack Para rubber. It would appear advisable not to utilise a woody plant as an intercrop with a tree like Para rubber, but rather a herbaceous crop of some kind. There is less modification required for a fungus or insect pest accustomed to attack and live on a woody plant to adapt itself to attack another woody plant than for it to change its host from a herbaceous plant to a woody one. The number of pests that have adopted the coffee bush as their prey is very large, and a certain proportion of these could more easily adopt the Para rubber, than could any of the parasites of any herbaceous plant. *Corticium* attacks a number of different plants, it is true, but we do not remember to have seen it on a strictly herbaceous plant. There was a rumour that *Fomes* had been found attacking Ceylon *Crotalaria*, but the Ceylon crotalaria developes a stout woody stem often thicker than a two years old Para rubber tree. One would suggest that the wild local form of crotalaria, which is hardly at all shrubby, would be

safer. Monocotyledonous plants like bananas, sanseviera, etc., would be safer intercrops still as they are not at all adapted to act as hosts to pests of woody Dicotyledons.

The Editor's note, too, as to science on plantations is much to the point. He says our only complaint is that the work which any one officer is expected to do is colossal and of such a diverse character that the time necessary for searching investigation and research is never available. This is very true. An agricultural Botanist is, at least in the British Empire, expected to keep a stock of every conceivable economic plant and be ready at a minute's notice to give the latest information extracted from some fifty monthly periodicals as to its cultivation, industry and commerce, and at the same time to report from experiment how it has succeeded in his region, and to know the life history of every pest likely to attack it and how to kill it, to maintain in good and ornamental condition a garden often as large and far more varied in contents than a decent sized estate, to keep and add to a herbarium and a museum of local products, as well as a library, to conduct a very extensive correspondence with planters, merchants, investors and other people, and interview a large number of them as well, to write and publish periodical reports or journals, and frequently also to give lectures from time to time, and export for sale or exchange seeds and plants, sometimes on a very extensive scale, to carry out researches and experiments, many of which really require undivided attention for months, and to do anything else his Government may happen to think he can do. Formerly one or at most two men were supposed to be quite sufficient to perform this work, and the general public were puzzled to know how with this work he could fill up his time. But things are altering and reluctantly Colonial Governments are allowing increases in the staffs of agricultural establishments and making progress in Agriculture more possible all over the Empire. Some other nations have realised the necessity sooner, but the fact that the importance of research in Agriculture is beginning to be realised by our nation at last is a decided forward step.

The increase in cultivation of Para rubber last year was phenomenal, not only in the Native States but in the Colony, as well as in many other parts of the world. The waste grounds of Singapore island useless for so many years after the disappearance of the gambier and pepper plantations, are now being covered with Para rubber, and so great is the demand for plants that a considerable area of swamp land on the Orchard Road in Singapore is being converted into a large nursery of *Hevea* seedlings, the seed being imported from Klang in tongkang loads.

As to Malacca the miles of country covered with lalang, which formerly were so conspicuous and depressing, are now flourishing rubber estates, and thanks to rubber, and to some extent the railway too, Malacca is in a more flourishing state than it has been since the time of Albuquerque and so wealthy have the Chinese there become that they have even largely increased the sale of town land in Singapore by their investment there. Twenty years ago there was a bank in Malacca but it had long died of inanition; now we understand there are three, and that Malacca is again becoming an important town. It is interesting to note that the first practical planter in the rubber industry was a Chinaman in Malacca, Mr. Tan Chay Yan, who led off with his estate at Bukit Lintang. Mr. T. Heslop Hill, however, our pioneer planter, had a fine lot of Para rubber trees much earlier, though nothing was done with them till later.

There has been a slight tendency we find among Chinese, and in or two cases among Europeans to abolish coconuts for rubber. This seems to be a mistake. It is by no means desirable that any country should depend entirely on one product, and this is especially the case in dealing with trees which are of slow growth. The rush of planters to one cultivation leading to the abandonment of others naturally causes a rise of price in the latter and sooner or later they come in again. We note with interest the reappearance of gambier and pepper again in Singapore during the last year. We note too the appearance of two more parasitic fungi on our rubber trees, the dangerous black *Diplodia rapax*, and the *Hymenochaete*. Comparatively little attention has been paid to the former. The treatment for *Fomes* by the more up-to-date planters will equally dispose of the *Hymenochaete*.

Many planters are now stubbing their estates with a view of destroying the parasitic root-fungi remaining in the ground from the relics of the original forest trees, and ploughing both with the native plough and disc-ploughs is being also resorted to. Curiously there has been rather a reversion in feeling towards the formerly despised lalang land, owing to its being quite free of underground wood and roots, likely to carry fungi.

In manufacture the notable thing is the return to smoked rubber, this form having obtained very high prices during the year. In 1898 and following years rubber was commonly smoked but later the clear amber coloured biscuits took the fancy of the trade and the darker coloured smoked rubber was at a discount. The increase in output of rubber from the East is given by Messrs. Gow Wilson and Stanton as 2,252 tons from the Peninsula in 1909, as against 250¼ in 1906, and 432 tons from Ceylon in 1909, against 98¼ in 1906, the Malay Peninsula having increased its output nine times, and Ceylon four and a half times.

Since writing the above we learn that the low price of tapioca has been a considerable factor in the increase of rubber growing among the Chinese, as the tapioca growers find that at the present price it does not pay. The Dutch and Javanese, we learn from Mr. de

Kruyff, Director of the Department of Agriculture, do not make up the tapioca into starch but cut the roots in two and dry them in the sun, and thus dried export them to Belgium, France and Holland where they are utilised for the manufacture of alcohol.

This cheap method might pay even while the tapioca is at so low a price.—ED.

NOTES ON THE ANGSANA TREE DISEASE IN PENANG.

Between 30 and 40 years ago there grew along the sea front in Malacca a magnificent avenue of Angsana trees (*Pterocarpus indicus*), and it appears that about that time they were attacked by some disease which killed practically the whole of them. Since that date up to within about 4 years ago, the Angsana tree, which is largely planted in the Straits, and especially so in Penang, seems to have been free from any attack, about the last mentioned date, however, I noticed in Macalister Road, Penang, three medium-sized trees showing signs of disease. Examination shewed no palpable cause, except an exhudation of Kino. The trees died in less than three months, from the first sign of attack and were cut down and burned. A few months later, trees for the most part of the largest size, here and there along the road sides began to exhibit the same symptons and eventually died, the greatest number dying during the year 1898-1899. In all close on a hundred trees have been killed by this disease, a calamity of no small magnitude since, I have said they were mostly magnificent trees averaging a diameter at 3 feet from the ground of about 5 feet. As they form the principal shade-tree planted along our road sides, it can be imagined how serious is the loss occasioned by the destruction of such noble trees, to say nothing of the labour involved in cutting them down. As regards the preventive measures adopted for arresting the spread of the disease, the usual one of isolation was tried, by digging a trench round the tree throwing the infected soil inwards toward the stem, and liberally dusting the bottom and sides of the trench with lime and sulphate of copper, powdered fine. Unfortunately from the situation of the trees along the public roads, with a metalled road on the one side, and a ditch on the other it was impossible to completely encircle the tree, consequently two trenches were cut one on either side of the tree, from the road to the ditch. From such partial protection it was impossible to prevent the mycelium travelling under ground from tree to tree. The ultimate plan of cutting out every tree that was affected was adopted and I am glad to say that although the disease is not perhaps quite stamped out, it is under control. During the worst of the epidemic I got permission of the Municipal Commissioners to invite Mr. Gallagher, the then F.M.S. Government Mycologist (now Director of Agriculture) to visit Penang and examine the affected trees. Together we examined a large number of trees and took specimens of the roots, bark, and wood, Mr. Gallagher succeeded in finding numerous hyphæ of an unknown fungus in the cell tissue, but was unable to determine the species in the absence of the Carposphores or spore-bearing portion of the fungus. Subsequently I collected a number of these Carposphores and sent them to Kew where they were examined by Mr. Massee the Mycologist there. They proved to be of three species, two non-parasitic, and one, by far the commonest, parasitic and presumably the one causing the mischief. It is named *Polystictus Occidentalis.* I attach a copy of Mr. Massee's Memorandum on the material sent, I also received a symphathetic letter from the Director of Kew, Lt. Col. Prain, who mentioned that the Angsana was one of his favourite trees when in India, he told me what I was not aware of before that the tree is not a native of India as its name would suggest, but that it was introduced from the Moluccas, where it is really wild. It will be seen from Mr. Massee's notes that he thinks there is no known cure, the remedial measures he suggests can only be regarded as slightly prolonging the life of the tree. Since the receipt of this communication I have read some extremely interesting work done by Mr. G. F. Scott-Elliot in the curing of plant diseases. The method adopted, is by the injection of antitoxin as is done in medical practice. He also mentions an experiment made by Mohrzecki, where an apple tree suffering from chlorosis or the yellows which presented a sickly and languishing appearance due to the chlorophyll (green colouring matter of plants), having developed imperfectly. An injection was made into the trunk of an apple tree (9 inches in diameter) of a solution containing 12 grams of iron sulphate. In ten days there was no trace of chlorosis, and after 3 weeks, the leaves were dark green, and to all appearances perfectly sound and healthy. Mr. Elliot describes the method as exceedingly simple, using plasticine or putty, in the case of small trees to make a circular basin round the stem, which is filled with water containing the solution of the fungicide. In the case of large trees like our Angsana it would probably not be necessary to make a basin all round the tree, but probably a series of cups at short intervals round the base of the tree would suffice. The stem is then pierced with a sharp knife when the fungicide would pass into the sieve tubes and so be taken up by the sap, and come in contact with the disease. Injection does not seem to be so successful with resinous, and possibly also latex bearing trees. The method however, which is only outlined here seems to afford a very promising field for experiments.

W. FOX,
Superintendent, Forests and Gardens, Penang.

FORESTS AND GARDENS OFFICE, PENANG.
28th February, 1910.

FUNGI FROM PENANG; FROM Mr. FOX, 6—1—10.

Nos. 4, 5, 7 and 9. *Polystictus occidentalis,* Fries.
No. 6. *Polystictus floridanus,* Berk.
No. 8. *Schizophyllum commune,* Fries.

Polystictus occidentalis is the only parasitic species, and but little is known respecting its life-history, but judging from analogy its diffusion can be affected by wind borne spores or by underground mycelium spreading from one tree to another. As the trees are so large and presumably old, the question arises as to whether they have not passed their prime, and are becoming too weak to supply the required amount of water and food to the branches. If a trench could be formed around the base of the trunk, and flooded with a solution of nitrate of potash or nitrate of soda (preferably the first named), using one pound to three gallons of water, say once a week, for two months, the end would be somewhat delayed, but no cure is known.

(Signed) G. MASSEE.

18—1—10.

RUBBER AND ITS SUBSTITUTES.

The circular which was issued recently by the Synthetic Rubber Co. announcing the proposed voluntary winding-up, on the grounds that further expenditure was not justified, has given great satisfaction to dealers and brokers in rubber, although it may be said that in Mincing Lane the synthetic bogey never caused much apprehension, even though Professor Dunstan, at the British Association Meeting in 1906, confidently predicted the synthetic production of rubber before the Association met again at York. At present there is still no likelihood of the prophecy coming true, but the commercial production is by no means an impossibility. It is interesting from this point of view to give a resume of the many attempts, especially during the last decade, to make artificial rubber or prepare satisfactory substitutes for it. The only known actual synthesis of caoutchouc is that accomplished by Bouchardet and Tilden by polymerising isoprene (CH : (CH_2). (CH_2) CH), which is itself one of the distillation-products of caoutchouc. Wallach and Tilden (1892) also showed that isoprene obtained from turpentine behaves similarly to that obtained in the destructive distillation of rubber. Kondakow, in 1902, prepared a substance closely resembling caoutchouc, by the action of light for a year on di-iso-propenyl or methyl isoprene. A British patent granted in 1907 proposes to convert acetelene and ethylene into di-vinyl under the influence of a dull red heat, which latter product yields methyl di-vinyl or isoprene on treatment with methyl chloride. The isoprene is then to be condensed to rubber. Other processes have been patented on the assumption that coal tar contains polymers of isoprene or compounds convertible into such substances. Thus Seguin and Boussy de Sales patented in France during 1903, a process according to which tar (containing isomers of a caoutchouc) is seeded with caoutchouc particles or treated with other appropriate ferment at 60°C. in an atmosphere of nitrogen. Later a method was patented of preparing the "ferment." To obtain this the "thick deposit" from a caoutchouc solution in benzine, kept at a temperature of 50°C. and exposed to daylight in a closed bottle, is re-dissolved and then precipitated again by alcohol. The precipitate is scattered over the surface of a mixture of coal tar and boric acid which is maintained at 50°C. in an atmosphere of oxygen. A brownish-grey powder is stated to be formed on the walls, and this is the "ferment" in an active form. Prior to the last process, Jasset (1902) stated in his specification that coal tar (4 parts) and boric acid (1 part), heated until the burning vapours were coloured green and then kept at 60°C. in a current of oxygen, yielded a brown highly elastic body to suitable solvents after drying on a water-bath. Phosphoric or iodic acid may replace boric acid. An American patent, by Dupont and Franklin (1903) gives a variation of the above, since the tar and boric acid are dissolved in alcohol, heated until vapours burning with green flame are evolved, then oxygen is passed through the mixture. Blum and Carpenter (French patent, 1909) propose to obtain a glutinous mass consisting of a hydrocarbon of the formula $(C_5H_8)_4$ by subjecting vegetable substances, such as peat, to fermentation at about 60° C., and simultaneously or subsequently to a reducing process. The enzyme is stated to be present in imperfectly formed caoutchouc, or an "enzyme which will produce alcohols of a series higher than the ole fine series" may be used. The reducing agent is a nitrogenous compound, preferably the red substance resembling seed in red Upper Congo rubber, with the addition of mineral salts. In 1908 the same two patentees specified a process to produce "synthetic Para rubber" by treating with a nitrogenous derivature of irone, the mucilaginous mass "containing a large percentage of isoprene" produced from fermented peat, etc. The irone was stated in a subsequent patent to be obtained from roots of species of Iris. The irone is converted by chlorine into a hydrochloride, then by addition of a suitable substance, preferably an amide, into a nitrogenous compound. Protein-coagulating enzymes are known to occur in the latex of rubber-producing plants, but exactly in what form caoutchouc pre-exists is not known; but to produce artificial rubber from tar by a volatile enzyme capable of growth does not accord with known facts.

Rubber substitutes have met with greater success since at present considerable difficulty is experienced in obtaining rubber goods free from substitutes. Their use as a cheapener is responsible for many of the defects to which rubber articles are liable. The non-resistance of rubber substitutes to the action of potassium hydrate is the method used for the detection and estimation of substitutes. Among the multifarious substances proposed to be employed for the diluting rubber the oxidation-products of drying-oils are the basis of the main modern class. Dry oxidation of a suitable fixed oil, usually linseed oil, is affected with a manganese dioxide, etc., or in the wet process

nitric acid is used, the object being to form elastic substances similar to linoxyn. Stiffeners such as resin, pitch, tar, acacia, tragacanth, and albuminoids such as gelatin or casein, may be added, as also "filling" materials, including chalk, magnesia, silica, kaolin, zinc oxide, cork, sawdust, chopped feathers, and waste leather. The product is vulcanised in the usual manner, frequently with the addition of waste or regenerated rubber, and is then used for lower-grade goods. The elastic product yielded by heating nitrated castor oil to 130°C., for ten hours is the subject of a patent by the Velvril Co. Passing ozone through a mixture of castor oil containing colophony and sulphur is a variation of the oxidation process patented in America, the product being finally heated with sulphur chloride. Ditmar (1906), in his specification for a process for the removal of unvulcanised oil by means of solvents, states that the defects in substitutes are due mainly to its presence. Gelatin or glue, with or without admixture of glycerin, rendered insoluble by treatment with formaldehyde or chormic acid, gives another form of rubber substitute. The viscous masses obtained by heating carbohydrates, such as sugar and starch, are the subjects of patents, as also elastic plastic masses stated to result from the action of acetylene and oxygen on a mixture of copper and nickel, the metals acting as catalyst. Rouxville (1906) filed a specification in France for producing caoutchouc, etc., from terpenes (turpentine), but did not complete the patent in England. The conclusion arrived at is that cheaper rubber of improved quality is more likely to be derived from increased production by recent rubber-plantations than by artificial production.—*The Chemist and Druggist*, January 1, 1910, Page 19).

On the effect of Arsenical and Sulphur Fumes on Vegetation, with particular reference to the Para Rubber Tree (*Hevea Brasiliensis*) and Rambong (*Ficus Elastica*).

NOTE:—With reference to the article on this subject appearing in the Agricultural Bulletin, February, 1910, Vol. IX., No. 2, page 46 et seq. it has been pointed out to me that the data showing the total period during which roasting was carried on might possibly be understood to be fifteen days, and that the "Observations on the fifteenth day" might indicate that the plants had by this time become immune to the effects of the fumes.

On page 47, under the heading "Method of Roasting," it is stated that the roasting was continued for twelve hours. Only one batch of ore of 80 lbs. was roasted for a period of twelve hours and the effects produced on the plants were caused entirely by this single roasting, the first effects being observed on the second day after the roasting had cleased and continuing till over the 7th day, after which no further effects were observed, and the plants gradually recovered; the recovery being well advanced and the plants forming a number of new leaves by the fifteenth day.

B. J. EATON,
Government Chemist, F. M. S.

THE MAKING AND APPLICATION OF BORDEAUX MIXTURE.

E. S. SALMON, F.L.S.,

Mycologist to the South-Eastern Agricultural College, Wye, Kent.

I. *The Making of Bordeaux Mixture.*—Directions as to the best method of making Bordeaux mixture have already been given in this Bulletin. In order, however, to make the present articles more complete, we reprint the following from the *Journal of the Board of Agriculture*, Vol. XVI, No. 10.

"Bordeaux mixture for spraying fruit-trees generally (excluding peaches) should be made according to the following formula and in the following manner:—

Copper sulphate ("bluestone") †	4 lb.
Quicklime (in lumps)... ...	4 lb.
Water	50 gallons.‡

Dissolve the 4 lb. of copper sulphate in a wooden tub or bucket—*iron or tin vessels must not be used.* The easiest way to do this is to suspend the material, wrapped in a piece of coarse sacking, in a few gallons of cold water, from a stick placed across the top of a tub, or wooden bucket. If this be done over night, the copper sulphate will be found to be dissolved in the water by the morning. (If hot water be used, the copper sulphate can be placed at the bottom of the tub or bucket, and be dissolved in a few minutes.) Then add water to make twenty-five gallons. Now take the four pounds of quicklime, and put it in a tin pail. Add a few pints of water until all the lime is slaked, taking care to add only a little water at first; in this way a thick creamy paste is obtained. Add water to make twenty-five gallons. We have now twenty-five gallons of copper sulphate solution, and twenty-five gallons of "milk-of-lime." When the two substances are thus diluted with water, they can be mixed together by pouring one into the other, or a bucketful of each can be poured simultaneously or alternately into a third tub,—a wooden bucket being used for the copper sulphate solution. The

† In purchasing copper sulphate an article of 98 per cent. purity should be demanded; substances described as "agricultural bluestone" or "agricultural sulphate of copper" must be avoided, as these are usually adulterated with iron sulphate. In this *Journal* for September last a number of cases were recorded of the sale in this country of adulterated copper sulphate; it is clear, therefore, that it is important for the fruit-grower to insist on an article of 98 per cent. purity.

‡ The strength of Bordeaux mixture at present most widely recommended in the United States is $4\frac{3}{4}$ lb. of copper sulphate, $4\frac{3}{4}$ lb. quicklime, 50 gallons (Imperial) of water. This strength is expressed in America by the formula 4 : 4 : 50, since, as Mr. S. U. Pickering has lately pointed out, the relative value of the American and Imperial gallon is different, the former weighing 8·345 lb. and the latter 10 lb. As, however, excellent results have followed the use in this country of Bordeaux mixture made of the strength 4 : 4 : 50 (Imperial), and as, further, some "scorching" is liable to occur on some varieties of apples, it would seem advisable, for the present at any rate, for the English grower to continue to use this as his "standard" mixture.

"milk-of-lime" must be well strained, and it is advisable also to strain the Bordeaux mixture before spraying. In this way we obtain fifty gallons of Bordeaux mixture of the best quality.

Two points are of primary importance in making Bordeaux mixture. The first is that *quicklime*, in lumps, that is to say, as freshly burnt as possible, should be used. Powdered *airslaked* lime, such as is often found in builders' yards, will not make Bordeaux mixture. The second point to observe is that the two constituents, *viz.*, copper sulphate and lime, are diluted with water as much as possible (consistent with the formula) *before being mixed together.** If concentrated solution of copper sulphate and lime are mixed together, and water then added to make up the fifty gallons, the resulting Bordeaux mixture will be of very inferior quality.

Bordeaux mixture is fully efficacious only when freshly made, and will not keep. If more than a day old, it requires to be very thoroughly and constantly stirred while being used, and the use of *only freshly-made* Bordeaux mixture is far more economical in the long run, and is here strongly recommended.

If a considerable quantity of Bordeaux mixture is required for use, the making of *stock solutions* of copper sulphate and lime, which can be kept through the spraying season and used when wanted, saves both time and labour, and is free from all objection. The stock solutions are made as follows :—Take two 50-gallon barrels. In one dissolve 50 lb. of copper sulphate in exactly 50 gallons of water. In the other slake 50 lb. of lime by the gradual addition of a little water ; to the creamy paste thus obtained add water to make exactly 50 gallons of "milk-of-lime." These stock solutions will keep for months. Before the "milk-of-lime" is used, the contents of the barrel must be thoroughly stirred as the slaked lime will have sunk to the bottom. (Care must be taken to stir the "milk-of-lime" *very thoroughly each time before measuring it out*, so as to get the slaked lime thoroughly in suspension. If this is done there is no difficulty in obtaining the correct quantity of lime per gallon of fluid.) Each gallon which is taken out from the "stock solutions" will be equivalent, respectively, to 1 lb. of copper sulphate or 1 lb. of lime. The required amount of each stock solution is then diluted with water, according to the formula given above, before being mixed together. The "stock" copper sulphate solution must be measured out in a wooden pail.

---

* The method of mixing described above is that recommended by all scientific authorities in the United States and in our Colonies. Bordeaux mixture prepared by growers in accordance with these instructions has long proved in these countries—and more recently in England—to be of the greatest value, under practical conditions in the orchard and plantation, in keeping off fungus pests from cultivated plants. According, however, to the recent important investigations of Mr. S. U. Pickering into the nature of Bordeaux mixture, a slightly superior method of mixing the two constituents is "to take the lime in as weak a condition as possible and, consequently, the copper sulphate in as strong a condition as possible, and to add the copper sulphate to the lime. The 'milk-of-lime,' after being diluted with the bulk of the water and stirred up several times during about half an hour, should be left for the grosser particles to settle before the copper sulphate is added to it, and, after the addition of this, very little more stirring should be done."

If it be desired to economise space the "stock solution" of copper sulphate may be kept at the strength of 2 lb. of copper sulphate to each gallon of water, that is to say, 100 lb. of copper sulphate may be dissolved in 50 gallons of water. It is not well, however, to increase the strength of the "stock solution" of lime, since the slaked lime in "milk-of-lime" made at the rate of 2 lb. of quicklime to one gallon of water settles so quickly that it cannot be measured out accurately.

The barrels containing the "stock solutions" must be kept under cover, *i.e.*, protected from sun and rain. If stood in a shed, and covered with fairly close-fitting lids made by nailing sacking round the edges of a wooden lid—such "stock solutions" keep perfectly satisfactorily throughout the spraying season. Two 50-gallon barrels hold sufficient for the making of 625 gallons of Bordeaux mixture; while if the "stock solution" of copper sulphate be increased in strength to 100 lb. in 50 gallons of water, and another 50-gallons barrel of "stock solution" of "milk-of-lime" is added, these three barrels will supply enough to make 1,250 gallons of Bordeaux mixture. By storing such "stock solutions," made just before the summer spraying season commences, the grower has the means of obtaining in a few minutes at any time a large supply of Bordeaux mixture of the best quality.

The making of Bordeaux mixture on a large scale from "stock solutions" is greatly facilitated if some simple "plant" be erected. The erection consists of two elevated platforms. The higher platform is carried on four 9 ft. 6 in. posts, 5 in. by 4 in., sunk 2 ft. 6 in. in the ground and well rammed. Joists, 5 in. by 4 in., connect the heads of the posts, into which they are halved. An intermediate joist is halved into the middle of two opposite joists. The upper platform is 5 ft. square, and consists of 6 in. by 1 in. boarding in the rough, laid to the edges. The lower platform, which is 6 ft. 6 in. square, is similarly constructed, and is carried on sleepers, 6 ft. long and 10 in. by 5 in., set vertically and sunk 2 ft. 6 in. in the ground and well rammed. The two structures are bolted together at the two back posts and where the front post of the higher platform touches the joist of the lower platform.

On the higher platform are two 50-gallon "dilution barrels," marked inside at the 50-gallon level, and fitted with taps. If possible, water should be laid on to this higher platform. On the lower platform stands a vat (fitted with a tap) capable of containing 100 gallons. A short length of hose ("canvas hose" is convenient to use) is fitted to the taps of the "dilution barrels" and of the 100-gallon vat. The process of making 100 gallons of Bordeaux mixture is as follows:—Eight gallons of the "stock solution" of "milk-of-lime," and the same amount of copper sulphate "stock solution" (or four gallons only if this has been made of the strength of 2 lb. of copper sulphate to the gallon of water) are carried up to the upper platform, and poured separately into the two "dilution barrels," which are then filled with water up to the 50-gallon mark. The 50 gallons of "milk-of-lime" thus obtained in one of the barrels are stirred vigorously for a couple of minutes. A strainer is now placed over the vat, in such a position as to allow the hose from the taps of the "dilution barrels" to project into it. The taps of the "dilution barrels" are now turned on, and—the contents of the barrel containing the lime being stirred continuously—the two 50-gallon barrels empty themselves through the strainer into the vat, filling it with 100 gallons of Bordeaux mixture. The whole process can be easily controlled by one man standing on the higher platform, as with his stirring-pole he can reach the taps and so regulate the flow if necessary, and also stir and clear the strainer should this become clogged.* The Bordeaux mixture is immediately ready for use, and can be run off from the tap of the vat into the spraying machine. Thus all the labour and waste of time in handling the mixture are saved; and, given some such "plant," as is shown in the illustration, and "stock solutions," 100 gallons of Bordeaux mixture can be prepared in a few minutes at any time during the spraying season. It is of the greatest importance for a fruit-grower to have the means of obtaining the proper "wash" directly the right period of vegetation and suitable weather conditions arrive,—spraying at the right time is just as important as spraying with the right "wash."

Good straining of Bordeaux mixture is essential for success in spraying, since, as pointed out below, it is absolutely necessary to use a nozzle with a very fine opening. It is best to strain the mixture twice, in the following manner:—First, a strainer with meshes of medium fineness should be placed over the vat. Then a second straining must be given as the Bordeaux mixture flows into the spraying machine. Here the best type of strainer is one with copper gauze with very fine meshes—35 to 40 holes to the linear inch. Such a strainer, made with a wooden bottom and sides of copper gauze, is fitted to spraying machines. A simple and very useful type of strainer (suitable for "barrel" spraying machines and for general straining), as recommended by the United States Department of Agriculture,† is made as follows. It is in the form of a wooden box about a foot square, the bottom of which is formed of hard wood, with a hole bored through it, into which a piece of gas-pipe, 1½ in. or 2 in. in diameter and from 6 in. to 9 in. long, is fitted. The box is, of course, open at the top. Fitting just inside this box is a second and lighter box, also open at a top, and having an overhanging strip nailed round the top which supports it. The bottom of this inner box should be made so as to slope at an angle of about 30°, and should be made of fine copper gauze. The slanting bottom

* In the actual "plant" shown in Fig. 1 the top platform is higher than it need be to allow of the contents of the "dilution barrels" running into the vat. This extra height was fixed upon in order to allow at any time of a 50-gallon barrel being placed on the lower platform, when lesser quantities of any mixture made for experimental purposes can be run into it from smaller "dilution barrels" placed on the upper platform.

† *Farmers' Bulletin*, No. 243.

makes it harder to clog, and the inner box, being removable, can be inverted and washed in a tub of water. Bordeaux mixture, if properly strained, will pass easily through nozzles which throw the finest "misty" spray, while if not properly strained, frequent clogging of the nozzle will result. Where all the fluid has to pass through the minute hole in the circular disc—and owing to the Bordeaux mixture used having been properly strained, have not had to stop once for any blocking of the nozzle.

If the lime used is freshly burnt (and it must never be forgotten that air-slaked lime is useless for making Bordeaux mixture) and carefully weighed out there is no need to test the mixture before using it. When using "stock solutions," it is a good plan to apply a test at the first mixing. A rough test consists in immersing a clean iron wire of French nail in the Bordeaux mixture for one minute; if safe to use, the mixture does not affect the nail; while if unsafe, a copper-plated appearance is given to it. A more delicate and quite simple test is as follows:—Procure from a chemist a 10 per cent. solution of ferrocyanide of potassium (which is a poison) and pour a little of this into a white saucer; then drop a few drops of the Bordeaux mixture into the ferrocyanide of potassium. No change of colour occurs if the mixture is safe to use, while a cloudy reddish-brown discoloration (very easy to see) occurs immediately if the mixture is unsafe to use. An unsafe mixture can be made safe by adding more "milk-of-lime" until it passes the test.

In spraying fruit trees (and also potatoes) there is no need whatever to add anything to the Bordeaux mixture with the object of making it adhere better; soap is quite unnecessary and should never be used, and treacle is useless.* The nature of the precipitate which constitutes Bordeaux mixture causes it, when applied in a "misty" spray (see below), to adhere most intimately to the part sprayed.

Ready-made Bordeaux mixture is at present put on the market in powder form, and as a paste. The best results, however, in my experience, are only obtained when Bordeaux mixture is home-made and freshly-mixed. As regards the numerous proprietary Bordeaux mixtures put up in powder form, the fruit-grower must be warned against using these. Such preparations are made by mixing lime and copper sulphate in concentrated form, and then drying and grinding the product. As Mr. S. U. Pickering has lately pointed out,† Bordeaux mixture made from these proprietary powders settles at least ten times more rapidly than the freshly-prepared mixture; consequently it is a very inefficient spraying material. There is a general consensus of opinion that in practical spraying dried Bordeaux mixture is less efficient than the ordinary mixture. As long ago as 1900, Mr. R. U. Moss pointed out ‡ how thoroughly

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* See Pickering, in *Jour. Agric. Science,* iii (1909).
† *Jour. Agric. Science,* iii. 170 (1909).
‡ *Econ. Proc. Royal Dublin Soc.,* vol. i, part iii, p. 109.

inferior such ready-made Bordeaux mixtures are to the home-made freshly-mixed article. One of the best known of these mixtures sold in powder form was tested in two ways. In the first experiment the powder after, being mixed with water according to the directions, was thoroughly shaken up in a glass cylinder, and then allowed to stand for five minutes. It was found that the suspended matter (containing all the copper) had almost completely disappeared, through subsidence, from the upper half of the liquid in so short a time as five minutes—the percentage of copper in the upper half of the cylinder being only 1·6. Another similar cylinder was filled with home-made Bordeaux mixture, and exactly the same treatment given to it, but here the tendency of the suspended matter (*i. e.*, all the copper) to subside was very different,—the percentage of copper in the upper half of the cylinder, after five minutes, being 48·4. In the second experiment, the adhesive property of home-made Bordeaux mixture was compared with that of the mixture made from the proprietary powder mentioned above. Investigations showed that in the case of leaves sprayed with home-made Bordeaux mixture, the first shower of rain removed only 2·92 per cent. of the copper, and the second shown 3·65 per cent. of the copper—making a total washed off of 6·57 per cent. of the copper. In the case of leaves sprayed with Bordeaux mixture made from the proprietary powder the first shower removed 46·60 per cent. of the copper, the second shower 5·97 per cent. of the copper—making a total washed off of 52·57 per cent. of the copper.

The Irish Department of Agriculture have carried on investigations for several years past in the spraying of potatoes with Bordeaux mixture, both home-made and made from spraying powders, and now strongly urge the farmer to prepare his own mixture.

It is clear that on account of the marked tendency of the suspended matter to settle, and of the very low adhesive powers, all Bordeaux mixtures put up in powder form should be avoided.

Ready-prepared Bordeaux mixture in paste form stands in quite a different category to the above-mentioned Bordeaux powders. Through the recent chemical discoveries of Mr. Pickering, Bordeaux mixture can now be prepared by a new process and put on the market as a concentrated paste. From the chemical standpoint, certain advantages (which cannot be discussed here) are claimed for the Bordeaux mixture made from this paste over that made by mixing equal quantities of copper sulphate and lime, as described above. Of what value these improvements from the chemical point of view will prove in practical spraying against fungus pests has yet to be ascertained, for there is probably a biological side to the question of the action of fungicides. For the reason given below, I consider that the practical fruit-grower should continue to make his Bordeaux mixture with equal parts of copper sulphate and lime, *i. e.* with a considerable excess of lime. So far as I have seen, if Bordeaux mixture is made (like that made from the Woburn Bordeaux Paste) with practically no excess of lime,* it either does not adhere so well to the parts sprayed, or more quickly washes off under the action of rain or dew, and consequently does not protect the plant for long from fungus pests. In 1908 I compared the adhesive power of Bordeaux mixture made with "milk-of-lime," *i. e.*, a mixture containing an excess of lime, with that of the mixture made with "lime-water," *i. e.*, a mixture containing no excess of lime. The two mixtures were tested in potato spraying on a fairly large scale. It was found that the latter mixture was washed off comparatively soon by the rain, and in consequence of this the "blight" *(Phptophthora infestans)* was not kept in check to anything like the same extent as where the haulm had been sprayed with the Bordeaux mixture made with "milk-of-lime." Experiments were made during 1909 with Bordeaux mixture made from the Woburn Bordeaux paste, both on apple trees and on potato haulm. In both cases all visible traces of the spray had disappeared several weeks before the spray from Bordeaux mixture made with "milk-of-lime" had become washed off. In the case of apple fotiage, the "scab" fungus began to grow on the leaves, showing that there was a complete absence there of any fungicide. The same experience has been reported to me by a fruit-grower in East Kent, who for several seasons past has been successful in keeping a large acreage of appeals practically free from "scab" by spraying with home-made Bordeaux mixture, although previously this paste had been very prevalent. This grower writes as follows: "I experimented with the Bordeaux paste and used it in exactly the same way as that which I made myself and found it practically worthless. Those trees which were sprayed with it (three times) were covered with apple "scab," while those sprayed with the home-made mixture were kept practically free." On the other hand, a fruit-grower in Sussex tells me that the use this season of Bordeaux mixture made from the Woburn paste kept his trees healthy, although last season they suffered severely from "scab."*

From my own experience I should advise the commercial fruit-grower at present—until more experiments have been made—to continue to make the bulk of his own Bordeaux mixture himself, while using a small quantity of the Woburn Bordeaux paste experimentally.

II. *The Application of Bordeaux Mixture.*—The best type of spraying machine for spraying with Bordeaux mixture depends to a large extent on such circumstances as the height of the trees

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* Bordeaux mixture containing no excess of lime can be easily made by using just enough lime, in the form of "lime-water," to precipitate all the copper (see *Woburn Exper. Fruit Farm*, 8th Report, p. 9 (1908).

* Mr. Pickering *(Woburn Expt. Fruit Farm*, 11th Report, p, 178) says, "Reports received have led to the conclusion that the paste has been about as efficient [during the season 1909] as ordinary Bordeaux mixture."

and whether these are grown in a plantation or in an orchard. But the chief point that requires to be emphasised is that the nature of the spray is the essential factor for success in spraying with Bordeaux mixture. The spray *must* be very fine and "misty," or smoke-like; a hanging "mist" or "fog" must be produced which drifts over and through the tree and deposits on the surface of the leaves excessively minute drops, which when dry give the parts of the trees which have been sprayed the appearance of being almost uniformly covered with a very thin bluish film or dust. Such a deposit of Bordeaux mixture is so intimately attached to the surface of the leaf or fruit that it does not readily wash off. Last season, notwithstanding the frequent rains, I saw apple trees which had been properly sprayed with Bordeaux mixture still showing a bluish film over the leaves (and thus completely protected from the "scab" fungus) nine weeks after the application.

In order to obtain the right kind of spray, attention must be paid to two points; (1) a special type of nozzle must be used, and (2) sufficient pressure must be maintained at the nozzle. If these two requirements are not fulfilled, the full benefit from spraying with Bordeaux mixture cannot be obtained.

As regards the nozzle, the fact must be employed that a special type is required, which may be called the "Bordeaux nozzle." There is at the present time a considerable amount of spraying with Bordeaux mixture being done in this country with unsuitable nozzles. This results not only in a waste of labour and material, but even in actual harm—sometimes to the trees by "drenching" those varieties which should be only lightly sprayed (see below), and sometimes (in the case of orchards) by causing so much dripping from the trees and actual spraying of the grass around, that poisoning of sheep which may be allowed to feed on the grass in the orchard may result. It seem probable that actual cases of the death of sheep poisoned by feeding on grass around trees improperly sprayed with Bordeaux mixture occured in Kent last season.

It follows that because the spray of Bordeaux mixture must be "misty," and not jet-like, it must be carried close to the part sprayed. In the case of tall trees this necessitates the use of long bamboo "extension rods." The fact that tall trees cannot be sprayed with Bordeaux mixture by means of a jet-like spray sent up from the ground cannot be too strongly insisted upon; to secure a fine "misty" spray which shall drift over and through the tree and deposit itself uniformly over the leaves, a "Bordeaux nozzle" at the end of a road of sufficient length must be used.

The best nozzles, in my experience, for putting on Bordeaux mixture are the "Vermorel" and its modifications of French, American, and English make; the "Mistry" and "Mistry Junior" (of American make) and the "Spramotor" nozzle (of Canadian make).

(The Journal of Board of Agriculture Vol. XVI. p 793).

MINUTES OF MEETING OF THE PLANTERS' ASSOCIATION OF MALAYA,

HELD AT THE MASONIC HALL, KUALA LUMPUR, ON FEBRUARY 27th, 1910, AT NOON.

PRESENT:

Chairman:—Mr. C. M. Cumming.

Secretary:—Mr. H. C. E. Zacharias.

Legal Adviser:—Mr. G. H. Day.

For Kuala Langat District Planters' Association:—Mr. C. E. S. Baxendale; Mr. E. Macfadyen.

For Taiping District Planters' Association:—Mr. A. B. Milne.

For Klang District Planters' Association:—Mr. E. B. Prior.

For Malacca District Planters' Association:—Mr. H. M. Darby.

For N. Sembilan Planters' Association:—Mr. W. T. Mackenzie representing Mr. S. H. Hingston.

For Kualar Lumpur District Planters' Association:— Mr. H. F. Dupuis, Mr. A. J. Fox, Mr. H. C. E. Zacharias.

Mr. W. J. Gallagher, Director of Agriculture and several other visitors were also present.

1. The Minutes of the previous meeting are, on the motion of Mr. Fox, seconded by Mr. Milne, taken as read and confirmed.

2. INDIAN IMMIGRATION COMMITTEE.

The Secretary reads the following correspondence:

The Federal Secretary, F.M.S.,
Kuala Lumpur. 8th December, 1909.

SIR,—I have the honor to acknowledge receipt of your letter No. 1397 of the 18th November and in reply am instructed to submit that His Excellency do give the directions suggested in my letter of July 23rd.

I have, etc.,
(Sgd.) H. C. E. ZACHARIAS,
Secretary.

No. 1397/1909. 9th December, 1909.

SIR,—I am directed to acknowledge the receipt of your letter of the 8th December, 1909, in which you make a further reference to your letter of the 23rd July.

I have, etc.,
(Sgd.) R. G. WATSON,
Federal Secretary.

3. RUBBER DEALERS' BILL.

The Secretary reads the following correspondence:

The Resident General, F.M.S.
Kuala Lumpur. 8th December, 1909.

SIR,—I have the honor to inform you, that at the last Meeting of this Association held on the 5th instant, a resolution was passed with acclamation to express to you the thanks of our Members for the great trouble taken by you over this Bill and for the careful consideration you have given to our representations.

At the same time it was suggested, that, to insure the smooth working of the Enactment, a similar Ordinance ought to be in force in the Colony and I therefore would respectfully submit to you, to approach His Excellency the Governor of the Straits Settlements on this subject.

I have, etc.,
(Sgd.) H. C. E. ZACHARIAS,
Secretary.

The Secretary,
The Planters' Association of Malaya,
Kuala Lumpur.
Batu Tiga,
7th February, 1910.

DEAR SIR,—I wish to call the attention of your Association to the practical working of your new Praedial Products Ordinance.

Last week a Chinese Kade man in Batu Tiga was caught buying this Estate's rubber from one of my Tamil coolies.

They were caught red handed; the Klang magistrate said there was no doubt about it, and fined the Chinaman $50-, a most inadequate punishment in my opinion, but the coolie (a wretched boy of 15) got 4 months.

The value of the rubber was about $6-, for which the boy received 10 cents.

I know there is a great deal of stolen Rubber being sold in Batu Tiga, but it may be years before another receiver is caught and convicted.

I trust the Association will consider the case for I do not think the magistrate's fine likely to discourage theft, it is more likely in my opinion to have a contrary effect.

I have, etc.,
(Sgd.) H. E. G. SOLBE

H. E. G. SOLBE, Esq.,
Batu Tiga. 8th February, 1910.

DEAR SIR,—I beg to acknowledge receipt of your letter of the 7th instant which I will lay before the next Meeting of my Association, to be held on the 27th instant.

I have, etc.,
(Sgd.) H. C. E. ZACHARIAS,

Mr. Macfadyen proposes, Mr. Fox seconds, and it is resolved unanimously, that Mr. Solbe's case be submitted to Mr. Day for his opinion.

4. RECRUITING ADVANCES.

The Secretary reads the following letter:

The Chairman.
Indian Immigration Committee,
Penang. 8th December, 1909.

SIR.—I have the honor to inform you, that at the last Meeting of this Association, held on the 5th instant, the following resolution was unanimously agreed:

" *That the Resolution passed at the Indian Immigration Committee Meeting of October 24th is not in the best interests of the Planting Industry, and that advances up to and not exceeding $7/-. per head made in India to intending emigrants be made recoverable at law in the area ontrolled by the Indian Immigration Committee* ".

I have, etc.,
(Sgd.) H. C. E. ZACHARIAS,
Secretary.

and reports having not yet received any acknowledgement. The Secretary also reads out a similar Resolution passed by the Malacca Planters' Association.

Resolved that the Secretary write again to the Chairman of the Indian Immigration Committee and press for a reply.

5. RUBBER CONGRESS AT MANAOS.

The Chairman reads a letter, received from the Resident General stating that it was not the intention of the F. M. S. Government to be represented at the Congress as it was thought that all the information and more, that could be obtained through a representative present at the Congress, could be obtained by other means, such as reports of Consuls and experts.

As it is in any case now too late to do anything, the matter had to rest there.

6. WHITE ANT REWARD.

The Secretary reads the following letter:

The Federal Secretary, F.M.S.,
Kuala Lumpur. 8th December, 1909.

SIR,—With further reference to my letter of the 13th ultimo re White Ant Reward, I have the honor to inform you, that at a Meeting of my Association, held on the 5th instant, it was unanimously agreed, that the said award be withdrawn.

I have, etc.,
(Sgd.) H. C. E. ZACHARIAS,
Secretary.

7. BENEVOLENT FUND.

The Secretary gives a resume of the correspondence received by him from the Originators of the Ceylon-Malaya Benevolent Fund.

After some discussion, it is resolved, that a Committee of three (viz. Messrs. Prior, Quartley and Zacharias) draw up a report on the subject.

8. KELANTAN DISTRICT PLANTERS' ASSOCIATION.

The Secretary reads the following letter, received from Mr. R.W. Duff.

The Secretary,
The Planters' Association of Malaya,
Kuala Lumpur.

Kuala Lebir,
Kelantan,
8th January, 1910.

DEAR SIR,—On the 2nd instant, a Meeting of representative Planters in Kelantan was held at Kuala Lebir when the question of the establishment of a District Planters' Association was discussed.

The following Estates were represented:

Kelantan Rubber Syndicate	Mr. E. D. Cameron
Bagan Rubber Co.	„ Hilton McGill
Kuala Pahi Estate	„ John Wood
Kelantan Rubber Estates, Ltd.	Messrs. Anderson & Bowie
Dominion Rubber Co., Ltd.	Mr. J. F. Bell
Austral Malay Rubber Co., Ltd.	„ „
Duff Development Co.'s Estates.	„ R. W. Duff.

It is proposed by Mr. Duff and seconded by Mr. Cameron that it was advisable in the interests of Planters that a District Association should be formed. After some discussion this proposal was carried unanimously.

Mr. McGill proposed that Mr. Duff. should obtain information from other Associations with regard to constitution and rules of other District Associations, and that all other information regarding the scope of the work usually undertaken by District Associations should also be procured, and that the information acquired should be circulated to all Estates in Kelantan. This proposal was also carried unanimously.

It was further resolved that Mr. Duff should be authorised to convene a Meeting after receiving and circulating information and to invite all Planters to attend with a view to securing as many members for the Association as possible.

I may tell you that some 36,000-40,000 acres of land have been alienated in Kelantan by the Government and by the Duff Development Company Limited for the cultivation of rubber, and that some 14 or 15 Estates have been opened, and that moreover the industry is likely to be extended in the future.

I should esteem it a great favour therefore if you would kindly provide me with any information that you can which would enable the Planters in Kelantan to form a District Association on satisfactory lines, and I would also be much obliged if you would give me your advice as to the advisability of such Association, if it be formed, being affiliated with the Planters' Association of Malaya.

I should also be grateful for any printed matter which you have and which might prove of assistance to us.

I have, etc.,
Sgd.) R. W. DUFF.

The affiliation of this new body is approved of by acclamation.

9. PLANTING CONFERENCE.

The Secretary reads the following letter received from the Director of Agriculture, F. M. S.

D. A. No. 1215/1909. 24th December, 1909.

SIR,—I have the honor to suggest for the consideration of your Association the advisability of holding a Planters' Conference in Kuala Lumpur early in May.

2. There is no individual competition among estates; everything that is found to make for improvement should be adopted so as to strengthen the position of cultivated against wild rubbers. It would be well, therefore, to make public and induce discussion on the experience in organisation, cultivation, &c., of the individual Planter.

3. Up to the time rubber comes into bearing there is considerable uniformity of method but from that time onwards there is great divergence in details. I think that most profit would result if the conference confined itself to points connected with tapping and with the preparation and shipment of the raw product. This is the period demanding most organisation and offering the greatest opportunities for promoting efficiency.

4. The conference might last two days, the first being a Sunday. The attendance ought to amount to at least fifty per cent of the planters in the Peninsula, managers and assistants. Very short papers should be read, and most of the time of the conference would be occupied in discussion. These details can, perhaps, best be settled by a committee appointed by the Planters' Association of Malaya.

5. I shall be glad if you will cause the substance of this letter to be made known to all your members so that the matter may be well considered.

I have, etc.,
(Sgd.) W. J. GALLAGHER,
Dir. of Agr. and Govt. Mycologist.

Mr. Gallagher addresses the Meeting and outlines the scope of such a conference. He thinks that the discussion of various points would make for efficiency. The conference should discuss the whole work from tapping to putting the rubber on the ship. Mr. Gallagher enumerates some of the heads of discussion and said that figures should be produced wherever possible to substantiate the opinion of the speaker. He suggests the appointment of a committee, which could meet conveniently, to draw up and have printed a schedule of papers.

Mr. A. B. Milne thinks Mr. Gallagher's scheme implied Utopia as the planters were not going to give away their knowledge.

The Chairman says that the Planters should help one another and thinks that the majority of planters were not so selfish and shortsighted as not to be willing to give information gained by them to the rest of their fellow-planters.

Mr. Darby suggests that the conference take place in conjunction with the forthcoming Agri-Horticultural Show in Singapore.

Mr. Gallagher says that planters had to fight wild rubber and that the day of one Estate competing against another was too far off for practical politics. Discussing the venue of such conference, he was strongly in favor of same being held in Kuala Lumpur, which was the centre of the industry. He did not think there would be many planters at the Agri-Horticultural Show in Singapore.

Mr. C. E. S. Baxendale considers that another objection to holding the conference at Singapore at show time was the social counter-attractions.

Resolved, to hold the conference on May 1st, the day after the Annual General Meeting of the P. A. M.; the Chairman and Secretary to confer with Mr. Gallagher on the subject.

10. BRUSSELS EXHIBITION.

The Secretary states that he had received a circular suggesting that Malaya should exhibit in the rubber section of the Brussels Exhibition, 1910. The Chairman suggests to get a firm of London brokers to purchase half a ton of each variety, best quality, in the open market and forward it for exhibition.

This proposal being seconded by Mr. Baxendale, is carried unanimously; all details to be left in the hands of the Chairman and Secretary.

11. CHINESE LABOR.

Mr. E. Macfadyen proposes the following resolution:—

"That a committee be formed to consider the feasibility of establishing in Southern China a bureau for the recruiting of Chinese coolies for employment on Estates".

It was necessary to think now of an alternative, if Tamil labour proved inadequate. The Chinese were not ideal coolies, but neither was the Tamil. The latter was of poor physique, and lived under unhealthy conditions. He could not be induced to stay in the country, the average stay being about two years. If the average were three years, there would be a fifty per cent increase in the estate population.

According to the figures of the latest official reports, there were 78,000 coolies employed on estates in the Colony, F. M. S. and Johore at the end of 1908. Allowing for sugar, tapioca, coconuts, etc., the coolies employed in rubber cultivation cannot be put much above or below 70,000. At that date a very small percentage of the 241,000 acres then under rubber was being tapped, and the resulting proportion is only one coolie to three and a half acres. The area now under cultivation may be estimated at 300,000 acres of rubber, all of which in five years' time may be tappable, and if tapped will require, for tapping and general estate purposes, not less than one coolie to two acres. But in five years time, even if extension goes on at a considerably slower rate than during the last three years, the total area under rubber will still have been doubled. If these extra 241,000 acres of new clearings can be worked with one coolie to three and a half acres, if the old cultivations do not in the aggregate expand by a single acre, and if the development of the new northern states makes no drain whatever upon our existing resources, our agricultural population, to be adequate for the needs of 1916, will have to amount to 228,000. This is more likely to prove an under-estimate than an over-estimate.

It is claimed for the present immigration policy that it has put Tamil recruiting on a satisfactory footing, but the present rate of Tamil immigration will have to be doubled if these requirements, very moderately estimated, are to be made good from the source. In what other direction are we to look for a new supply at least as productive as our existing one? I can see no other source but China. We know we can get them. If there is no organisation, it would be very unsatisfactory. We should be crimping the towkays' coolies. It would be an expensive matter, more expensive than if we make arrangements before the demand arises. We should further be independent of the Immigration committee, and pay our own men and our own expenses.

Mr. E. B. Prior, in seconding the resolution, said that labour was the one and only question. When in Sumatra recently, he learned that the manager of a European Estate had been informed that the Dutch Government was going to stop the exportation of coolies. There had been applications for 5,000 in one month for the F. M. S. It was pretty certain that in the near future Java would be a blank field. He heard that even the interior of Sumatra was to be opened up. If they did not do something soon, they would be left behind.

The Chairman said that it was absolutely necessary to take some steps. The Chinese, where they were employed on estates, had been found very satisfactory, though certainly they were expensive.

The resolution was carried, and a committee to report was appointed as follows :—

The Chairman, the Secretary and Mr. N. S. Mansergh, with power to co-opt two others.

12. PLANT DISEASES.

The Secretary reads out the following circular, drafted by Mr. Cumming:

As it is universally admitted throughout the Planting Community in the Federated Malay States that steps should be taken at once for establishing means and ways for combating diseases and pests on rubber, should they arise in a virulent form, it is proposed as preliminary measures:

1. That advisory committees for each State should be elected by the Planters.

2. That a request be made to Government that the Director of Agriculture may be allowed to become a member of each Committee ex-officio.

That the Director of Agriculture be previously consulted as to his willingness to accept this position.

The above advisory Committees having been constituted it is suggested that they should proceed somewhat on the following lines:-

3. Prepare proposals for dealing promptly with any disease or pest of a dangerous character that may arise.

4. Showing the impossibility of foreseeing in what shape or form disease or pest may arise (the sudden inroad of the bee hawk pest on coffee a few years back being a good example) to request Government to pass an Enactment on the lines of the coconut Enactment, with permissory powers of a stringent character. These powers to be permissory, in fact to lie in abeyance till required ; but to be of such a nature that Government can at any time put them into force without any delay on good cause being presented to the Government by the Committees.

That it will be the duty of the Committees on such case arising to at once inform the Government of the exact nature and outward signs of the disease or pest, etc., etc., as far as they are able.

To propose means for prevention and eradication, penalties, etc. etc.,

5. In the meantime as a means of prevention, it would be advisable for the committees to appoint Inspectors. It is suggested that if Managers and experienced Assistants were given local areas, near their own Estates, that the greater part of the planted area of a State could be mapped out and divided up with little difficulty to all concerned; and that periodical inspection could be carried out without interfering with Estate duties.

6. Finance for carrying out above proposals suggested that funds be raised from Estates generally on the lines of the assessment fees, the Government contributing proportionally.

7. Suggested that "as a stitch in time saves nine" that there be no unnecessary delay in carrying these preliminary measures, or in establishing a system which will be capable of prompt action when required and of development in a case of emergency.

Resolved that all constituent Associations be circularized and their opinions invited on the subject.

The following are laid on the Table:

1. Letter dated December 15th 1909 from Mr. David Wilson.
2. 56th Annual Report of the Planters' Association of Ceylon.

The Meeting terminates at 1.15 p.m.

H. C. E. ZACHARIAS,
Secretary.

EXPORTS TELEGRAM TO EUROPE AND AMERICA.

March 1910.

	Steamers.		Tons.	Tons.
Tin	Singapore & Penang to	U. Kingdom &/or	1,025	1,103
Do.	do.	U.S.A.	755	625
Do.	do.	Continent	135	375
Gambier	Singapore	Glasgow	—	—
Do.	do.	London	75	75
Do.	do.	Liverpool	—	200
Do.	do.	U.K. &/or Continent	50	50
Cube Gambier	do.	United Kingdom	40	80
Black Pepper	do.	do.	—	15
Do.	Penang	do.	20	10
White Pepper	Singapore	do.	110	75
Do.	Penang	do.	—	—
Pearl Sago	Singapore	do.	10	85
Sago Flour	do.	London	250	200
Do.	do.	Liverpool	—	1,700
Do.	do.	Glasgow	—	75
Tapioca Flake	Singapore	United Kingdom	140	240
T. Pearl & Bullet	do.	do.	120	360
Tapioca Flour	Penang	do.	350	110
Gutta Percha	Singapore	do.	30	85
Buffalo hides	do.	do.	5	80
Pineapples	do.	do.	8,000	24,000
Gambier	do.	U.S.A.	225	100
Cube Gambier	do.	do.	—	85
Black Pepper	do.	do.	—	75
Do.	Penang	do.	5	—
White Pepper	Singapore	do.	15	40
Do.	Penang	do.	50	—
Tapioca Pearl	Singapore	do.	25	80
Nutmegs	Singapore & Penang	do.	7	17
Sago Flour	Singapore	do.	25	470
Pineapples	do.	do.	—	800
Do.	do.	Continent	2,000	1,750
Gambier	do.	S. Continent	—	150
Do.	do.	N. Continent	190	575
Cube Gambier	do.	Continent	15	40
Black Pepper	do.	S. Continent	200	95
Do.	do.	N. Continent	55	10
Do.	Penang	S. Continent	20	—
Do.	do.	N. Continent	—	—
White Pepper	Singapore	S. Continent	5	5
Do.	do.	N. Continent	45	10
Do.	Penang	S. Continent	—	—
Do.	do.	N. Continent	—	—
Copra	Singapore & Penang	Marseilles	660	480
Do.	do.	Odessa	1,475	440
Do.	do.	Other S. Continent	460	—
Do.	do.	N. Continent	1 600	2,700
Sago Flour	Singapore	Continent	650	825
Tapioca Flake	do.	do.	80	150
Do. Pearl	do.	do.	25	10
Do. Flake	do.	U S.A.	100	175
Do. do.	Penang	U.K.	—	10
Do. Pearl & Bullet	do.	do.	70	110
Do. Flake	do.	U.S.A.	—	—

	Steamer.		Tons.	Tons.
Tapioca. Pearl	Penang	U.S.A.	100	10
Do. Flake	do.	Continent	10	35
Do. Pearl	do.	do.	65	130
Copra	Singapore & Penang	England	—	360
Gutta Percha	Singapore	Continent	170	90
Cube Gambier	do.	U.S.A.	—	—
T. Flake & Pearl	do.	do.	—	—
Sago Flour	do.	do.	—	—
Gambier	do	S. Continent	—	—
Copra	do.	Marseilles	—	—
Black Pepper	do.	S. Continent	—	—
White Pepper	do.	do.	—	—
Do.	do.	U.S.A.	—	—
Pineapples	do.	do.	—	—
Nutmegs	do.	do.	—	—
Black Pepper	do.	do.	—	—
Do.	Penang	do.	—	—
White Pepper	do.	do.	—	—
T. Flake & Pearl	do.	do.	—	—
Nutmegs	do.	do.	—	—
Tons Gambier			300	650
Do. Black Pepper			210	450

SINGAPORE MARKET REPORT.

March, 1910.

Articles.	Quantity sold.	Highest price.		Lowest price.	
	Tons.	$	c.	$	c.
Coffee—Liberian	40	26	50	24	00
Copra	6,834	11	25	10	15
Gambier Bale	1,669	11	55	11	00
Cube „ No. 1 and 2 ...	235	15	00	14	37½
Gutta Percha, 1st quality	..	350	00	300	00
„ Medium	...	240	00	220	00
„ Lower	...	100	00	26	00
Gutta Jelotong	...	16	00	11	00
Nutmegs, 110 s.	...	18	00	17	50
„ 80 s.	...	22	00	21	50
Mace, Banda	...	100	00	90	00
„ Amboina	...	75	00	65	00
Black Pepper	743	15	50	14	50
White Pepper	303	29	00	25	75
Pearl Sago, small	130	5	15	4	10
„ Medium	25	...		...	
Sago Flour, No. 1	4,395	4	02½	3	70
„ 2	205	1	10	1	00
Tapioca Flake, small	925	6	25	4	95
„ Medium	17	...		...	
Tapioca Pearl, small	433	7	00	5	20
„ Medium	434	6	30	5	20
„ Bullet	20	...		...	
Tin	2,073	75	82½	72	75

SEREMBAN.

Table showing the Daily Results of the Reading of Meteorological Observation taken at the General Hospital, Seremban, for the month of February, 1910.

Date.	Temperature of Radiation. 9 H.	15 H.	Mean.	Maximum.	Minimum.	Range.	Temp. of Radiation. Sun.	Difference Sun & Shade.	Wind Direction. 9 H.	15 H.	Temp. of Evaporation. 9 H.	15 H.	Mean.	Computed Vapour Tension 9 H.	15 H.	Mean.	Relative Humidity. 9 H.	15 H.	Mean.	Clouds 0 to 10. 9 H.	15 H.	21 H.	Cloud and Weather Initials. 9 H	15 H.	21 H.	Rain. Inches.
1	75	87	81	88	64	24	119	31	N	N	69.8	70.6	70.2	.731	.749	.740	84	58	71	3	4	0	S	C	S	
2	75	82	78.5	85	66	19	91	6	N	N	71.6	72	71.8	.774	.785	.779	89	72	80.5	2	5	6	S	C	C	
3	78	83	80.5	85	67	18	110	25	N	N	69.5	71.3	70.4	.722	.766	.744	75	68	71.5	4	0	0	C	S	S	
4	75	79	77	81	67	14	95	14	N	N	71.6	70.6	71.1	.774	.749	.761	89	75	82	6	3	0	C	S	S	
5	75	77	76	84	65	19	95	11	N	N	71.6	71.9	71.7	.774	.783	.778	89	64	86.5	3	3	5	S	S	C	1.10
6	75	78	76.5	81	65	16	90	9	N	N	71.6	71.2	71.4	.774	.765	.768	89	79	84	10	5	5	N	C	C	.45
7	76	80	78	81	64	17	97	16	N	N	72.6	73.3	72.9	.801	.820	.810	89	80	84.5	7	9	8	N	N	N	1.00
8	76	81	78.5	82	64	18	98	16	N	N	74.3	74.3	74.3	.848	.849	.848	94	80	87	6	9	8	C	N	N	2.29
9	75	75	75	83	65	18	110	27	W	W	73.3	73.3	73.3	.820	.820	.820	94	94	94	10	10	9	N	N	N	.20
10	74	82	78	84	64	20	131	47	W	W	72.3	72	72.1	.793	.785	.789	94	72	83	2	3	7	S	S	N	
11	75	81	78	83	65	18	90	7	W	W	71.6	74.3	72.9	.774	.849	.811	89	80	84.5	4	8	6	C	N	C	
12	75	85	80	91	63	28	144	53	N	N	73.3	73.4	73.3	.820	.826	.823	94	68	81	0	2	1	S	S	S	
13	80	83	81.5	89	67	22	120	31	NW	NW	71.6	74.7	73.1	.775	.856	.815	75	76	75.5	4	0	0	C	S	S	
14	78	85	81.5	89	69	20	126	37	NW	N	74.6	76.7	75.6	.857	.922	.889	89	76	82.5	5	7	0	C	N	S	
15	80	88	84	92	75	17	140	48	N	NW	73.3	71.6	72.4	.820	.775	.797	80	58	69	0	2	4	S	S	C	
16	77	92	84.5	94	73	21	146	52	NW	SW	73.6	72.6	73.1	.829	.802	.815	89	53	71	3	0	0	S	S	S	
17	75	90	82.5	92	73	19	149	57	NW	NW	71.6	72.1	71.8	.774	.788	.781	89	56	72.5	4	0	0	C	S	S	
18	77	91	84	95	73	22	150	55	NW	SW	71.9	76.4	74.1	.783	.910	.846	84	62	73	0	6	10	S	C	N	2.33
19	75	89	82	90	70	20	148	58	N	NW	73.3	74.3	73.8	.820	.847	.833	94	61	72.5	0	10	9	S	N	N	1.73
20	76	87	81.5	88	73	15	148	60	NW	NW	74.3	73.9	74.1	.848	.837	.842	94	65	79.5	0	10	10	S	N	N	1.42
21	74	83	78.5	84	72	12	132	48	N	N	74.	74.7	74.3	.840	.856	.848	100	76	88	4	6	9	C	C	N	1.09
22	74	83	78.5	85	73	12	133	48	NW	NW	74.	74.7	74.3	.840	.856	.848	100	76	88	5	5	0	C	C	S	.12
23	75	87	81	89	70	19	146	57	NE	SW	73.3	75.5	74.4	.820	.884	.852	94	69	81.5	0	0	0	S	S	S	
24	78	90	84	91	74	17	145	54	NW	SW	74.6	77.	75.8	.857	.930	.893	89	65	77	0	6	7	S	C	N	.14
25	77	90	83.5	92	73	19	130	38	N	SW	73.6	73.7	73.6	.829	.833	.831	89	59	74	0	0	0	S	S	S	
26	79	85	82	88	73	15	129	41	NW	NW	72.3	70.1	71.2	.793	.738	.765	80	61	70.5	0	0	0	S	S	S	
27	78	87	82.5	90	71	19	140	50	NW	NW	71.2	73.9	72.5	.765	.837	.801	79	65	72	0	0	0	S	S	S	
28	78	85	81.5	87	74	13	100	13	NW	W	74.6	76.7	75.6	.857	.922	.889	89	76	82.5	0	6	5	S	C	C	.21
Mean.	76.2	84.4	80.3	87.2	68.9	18.2	123.2	36.1	N	N	72.6	73.4	73.	.804	826	.814	88.6	70.1	79.5							12.08

Highest Temperature 95
Lowest ,, 63

Greatest Rainfall in 24 hours 2.33

J. LUCY,
Senior Medical Officer.

PENANG.

Abstract of Meteorological Readings in the Prison Observatory, Penang, for the month of February, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°	°	°	°	°	°	%	°	°		Ins.	Ins.
Penang Prison Observatory ...	29·830	147·8	80·9	90·3	70·4	19·9	77·8	·918	75.7	86	N.-W.	5·34	1·30

Surgeon's Office,
Penang, 8th March, 1910.

M. E. SCRIVEN,
Assistant Surgeon.

A. H. KUN,
Medical Officer.

NEGRI SEMBILAN.

Abstract of Meteorological Readings in Negri Sembilan for the month of February, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
Seremban		123.2	80.3	87.2	68.9	18.2	75.9	.814	73.	79.5	N.	12 08	2 33
Mantin												7 71	2.26
Tampin												8 27	1 60
Kuala Pilah												7.05	1 92
Jelebu												8 07	1 60
Port Dickson Town												5.71	1 05
Do. Beri-Beri												6.19	1 02

Seremban Office,
8th March, 1910.

J. HUNT,
S. M. O.

SELANGOR.

Abstract of Meteorological Readings in the various Districts of the State for the month of February, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
General Hospital, Kuala Lumpur ...	29.866	148.7	79.3	88.7	71.7	17.0	73.3	0.810	72.9	80	S.W.	4.33	1.30
Pudoh Gaol ,, ...	...	...	...	...	...	...	...	...	...	...	...	4.28	1.63
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	3.56	1.28
,, Klang...	...	...	...	88.3	70.0	18.3	...	...	...	...	...	5.25	1.78
,, Kuala Langat	...	...	...	87.3	73.4	13.9	...	...	...	...	...	5.04	1.46
,, Kajang	...	...	...	84.3	74.7	9.6	...	...	...	...	...	11.76	2.00
,, Kuala Selangor ...	...	...	...	87.8	72.0	15.8	...	...	...	...	...	4.34	0.70
,, Kuala Kubu	...	...	...	89.1	71.2	17.9	...	...	...	...	...	9.59	1.55
,, Serendah	...	...	...	92.2	70.7	21.5	...	...	...	...	...	5.31	1.25
,, Rawang	...	...	...	90.1	71.5	18.6	...	...	...	...	...	7.05	1.35
,, Sabak Bernan... ...	...	...	...	...	...	...	...	...	...	...	...	7.00	3.20

Office of the Senior Medical Officer,
Kuala Lumpur, 21—3—1910.

W. D. FREER,
Senior Medical Officer, Selangor.

KELANTAN.

Abstract of Meteorological Readings in Kelentan for the Month of February, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
		° F.	° F.	° F.	° F.	° F.	° F	° F.	° F.	%		Ins.	Ins.
Kota Bharu ...	..	151.4	78.7	83.9	74.0	9.9	75.6	.826	73.5	86 0	...	15 44	3.80
* Kuala Lebir ...	...	...	75.9	85.7	72.6	13.1	74.2	.785	72.0	90.7	...	14.02	4.45
* Kuala Kelantan ...	...	...	...	82.6	73.3	9.3	...	...	...	...	...	6.84	2.80
* Taku Plantation ...	...	...	...	...	...	...	...	...	...	...	...	14.73	3.90
* Pasir Besar ...	...	...	...	...	...	...	...	...	...	...	...	15.87	4.70
* Nenggiri ...	...		...	...	...	...	...	...	...	...	...	14.58	6 10

* Supplied by the courtesy of the Duff Development Coy., Ltd.

Residency Surgeon's Office,
Kota Bharu, *14th March, 1910.*

John D. Gimlette,
Residency Surgeon, Kelantan.

PERAK.

Abstract of Meteorological Readings in Perak for the month of February, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Taiping	...	151	81.56	92	69	23	77.38	886	...	82	...	21.61	4.57
Kuala Kangsar	...	...	79.64	93	70	23	75.02	808	...	79	...	10.01	3.30
Batu Gajah	...	160	80.01	92	72	20	75.83	839	...	81	...	7.87	1.72
Gopeng	...	..	79 28	91	60	31	74.67	795	...	79	...	9.08	2.42
Ipoh	...	...	80.34	92	70	22	77.20	894	...	86	...	8.94	3.61
Kampar	...	...	79.79	93	67	26	75.60	832	...	81	...	15.24	4.40
Teluk Anson	...	...	80.21	92	70	22	76.19	851	...	82	...	11.85	5.71
Tapah	...	...	80.18	92	68	24	76.07	844	...	81	...	12.61	3.27
Parit Buntar	...	...	80.15	90	69	21	76.11	848	...	82	...	7.50	1.90
Bagan Serai	...	...	80.48	91	68	23	76.51	860	...	82	...	7.46	2.90
Selama	...	...	80.60	93	69	24	76.30	851	...	81	...	17 26	5.25

Office of Senior Medical Officer,
Taiping, 15th March, 1910.

W. B. Orme,
Ag. Senior Medical Officer, Perak.

KUALA TRENGGANU.

Meteorological return of Kuala Trengganu District for the month of February, 1910.

Date	Thermometer. 9 A.M. Maximum.	Minimum.	Range.	Rainfall. 6 A.M. Inches.	General Weather Observations.
1	81	76	·5	...	
2	80½	76½	4	13	
3	80½	76	4½	...	
4	79	75	4	21	
5	80	76½	3½	4	
6	79	76	3	5	
7	79	75	4	30	
8	79½	76	3½	12	
9	81½	76½	5	26	
10	81	74½	6½	1.15	
11	78	74½	3½	...	
12	79	75	4	8.	
13	77	73½	3½	52	
14	78	75	3	27	
15	80	76	4	...	
16	81½	75½	6	...	
17	81	75	6	...	
18	81	77	4	...	
19	81	76	5	2.80	
20	81	75½	5½	...	
21	81½	76½	5	...	
22	79	73½	5½	...	
23	81	75½	5½	2.20	
24	82	77	5	...	
25	83½	77	6½	...	
26	84	77	7	1.02	
27	83	76	7	...	
28	84	76	8	...	
29	85	77	8	...	
30	83	75	8	...	
31	84	76	8	...	
Means.	81.75	75.72	5.19		Greatest diurnal range of shade temperature 8° 14 rainy days.
	Tota	...	17.07		

Highest shade Temperature 85
Lowest do. 73.5
Greatest rainfall in 24 hours 8.00

W. L. CONLAY,
British Agent, Trengganu.

No. 5.] MAY, 1910. VOL. IX.

Agricultural Bulletin

OF THE

STRAITS

AND

FEDERATED MALAY STATES.

EDITED BY

H. N. RIDLEY, M.A., F.R.S., F.L.S., F.R.H.S.

Director of Botanic Gardens, S.S.

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From the first of January, 1910

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Annual Subscription for other places in Malaya	$5.50
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COFFEA ROBUSTA.

An article on this Coffee has recently been published by the F.M.S. Government. The plant, correctly known as *Coffea Laurentii robusta,* was introduced to the country by the Botanical Gardens of Singapore, in 1900, the plants being received from Kew. Some were sent to Selangor a year or two later. We found it very floriferous, and a most beautiful ornamental plant, the branches covered with its fragrant white flowers, but its fruiting power was not as great, very few fruits in proportion to its flowers were produced. This might improve, as it often happens that a newly introduced plant does not fruit well for its first few years, though eventually becoming a more heavy fruiter. It certainly seems to have done better in Java. Unfortunately the writer of the article alluded to, Mr. Gallagher, does not give any figures as to the return of the plant in the peninsula, a most important point in the case of a crop which has shown poorly at first at least in our country.

Coffea robusta came into cultivation here shortly after *C stenophylla* was introduced, but just at that time Coffee cultivation was being dropped. Mr. W. W. Bailey, at Highlands, got both plants from the Singapore Gardens as he was keen on new Coffees, and from a plant of *C stenophylla,* one of the first three or four we introduced, raised a very fine hybrid with *C liberica,* which Dr. Treub declared would revolutionise the coffee industry. It fruited very early and cropped well with a very superior class of coffee. What became of his little plot of *stenophylla hybrids?*

No doubt had Coffee cultivation not been dropped almost entirely in these years *Coffea robusta* and the *stenophylla* hybrids would have been long ere this extensively cultivated in the F.M.S. We shall be interested to hear if in Selangor *C. robusta* fruits as well there as it does in Java. To this day in Singapore it is a very poor fruiter compared with *liberica* or even *Arabica.*

Preliminary Notice.

THE SEVENTH JOINT
Annual Agri-Horticultural Show

OF THE

Straits Settlements and Federated Malay States

WILL BE HELD ON

RAFFLES RECLAMATION GROUND AT SINGAPORE,

ON THE

17th, 18th, 19th & 20th of August, 1910.

Classes for all kinds of Agricultural Produce,—Horses, Dogs, Native Industries and Manufactures, Flowers, Fruits and Vegetables, Agricultural Implements, etc. Valuable prizes of Cups, Medals and Money in all classes.

The attention of Planters is particularly drawn to the Rubber Exhibition of this Show, which will be the largest and most instructive ever held in Malaya.

For full particulars, apply to

T. W. MAIN,
Hon: General Secretary,
Singapore.

AGRI-HORTICULTURAL SHOW 1910.

NOTICE.

The attention of planters and others is drawn to the seventh joint annual Agri-Horticultural Show of the Straits Settlements and Federated Malay States which will be held on Raffles Reclamation Ground, Singapore, (facing Raffles Hotel) on Wednesday, Thursday, Friday and Saturday the 17th, 18th, 19th and 20th of August 1910.

The Show will be opened on Wednesday, the 17th August, at 11 a.m., and closed at 6 p.m., and on the following three days from 9 a.m. to 6 p.m.

The charges for admittance will be :—1st day, from 11 a.m. until 2 p. m., $ 2, and at all other times 25 cents.

The Prize List is an attractive one, and is now being circulated. $3,000 are offered in cash prizes, besides 40 silver & bronze medals, and over 50 valuable silver cups. Copies can be obtained on application to the Secretaries to Standing Committees in the various Settlements and States, or from the Hon : General Secretary, Singapore.

RUBBER SECTION.

A considerable amount of past experience in arranging these Shows has been brought to bear on this most important section with the result that a schedule has been prepared containing only eight classes, which are considered to cover all grades of rubber now being exported without offering that opportunity for confusion amongst the judges which is inevitable when a large number of classes, many of them more or less duplicates, are included.

Rubber Planters will be pleased to know that arrangements have been made whereby, the Rubber Exhibition will be held in the Volunteer Drill Hall a commodious and lock—fast building situated at one end of the show grounds. This is an ideal building for the purpose, offering ample space to exhibit the rubber to the best advantage and a decided advance on the open attap shed of the past where theft was easy and exhibits were not displayed to the best advantage.

Valuable 1st and 2nd prize silver cups are offered for the best exhibits in each class for Para Rubber (*Hevea brasiliensis*) and silver and bronze medals are offered for Rambong Rubber (*Ficus elastica*) and any other kinds.

The United Planters' Association of Malaya has graciously consented to present the championship cup for the best general exhibit of Rubber.

The Johore Planters' Association will give a handsome silver cup value $500 for the best sample of commercial rubber packed ready or export, not less than 100 lbs in weight.

The following are the classes :—

				1st.	2nd.
(a)	Para, crepe,	best sample,	not less than 25 lbs.	—Cup.	Cup.
(b)	„ sheet,	„	„	—Cup.	Cup.
(c)	„ sheet, smoked,	„	„	—Cup.	Cup.
(d)	„ Block,	„	„	—Cup.	Cup.
(e)	„ Best sample, ready for shipment. The exhibit to be one case of crepe, one of sheet and one of scrap,		not less than 50 lbs. of each	—Cup.	Cup.
(f)	Para, best sample of commercial rubber,		not less than 100 lbs.	—Cup.	Cup.
(g)	Rambong, any form, best sample,		„ 25 lbs.	—S.M.	B.M.
(h)	Any other rubber, plant from which obtained to be stated with each sample,		„ 25 lbs. each.	—S.M.	B.M.

Smoked Sheet is attracting universal attention at the present moment, and it will be noted, with satisfaction, that a class has been included for this form. Mr. H.N. Ridley, M.A., F.R.S., F.L.S., etc., etc., Director of Gardens, Straits Settlements, has kindly offered a cup for competition in this class.

The exhibition of rubber machinery, tools and appliances is expected to be a large one, even at this early date many applications have been received for space. A valuable gold medal and silver cup are offered for the best exhibit of machinery in motion in connection with the preparation of rubber. Keen competition is anticipated in this class and the opportunity of seeing at work many of the numerous machines now on the market should not be missed. Silver and Bronze medals are offered for the best collection of appliances for tapping and collecting latex in the field. Many classes are provided for all kinds of agricultural Implements, including ploughs, Reaping machines, Tree stump extractors, spraying machines, baskets, carts, changkolls, etc., etc., etc.

Returning to Agricultural Produce, special attention has been given to coconuts and copra.

It is well-known that the copra industry in the Malay Peninsula has been declining for some years past, due partly to the rush from this form of cultivation to that of rubber and partly to the bad quality of the copra brought in by the Chinese and native growers.

With the object of stimulating this neglected and falling industry three silver cups and two silver medals are offered in the several classes provided.

Coffee, also, receives its share of attention, and silver and bronze medals are offered in each of the two classes, viz., Liberan coffee and coffee of any other variety. Provision is made for cloves, nutmegs, pepper, camphor, getahs, gums and damars, gambier, sago, tapioca and arrowroot, etc., etc.

In the section for oils are many classes which ought to claim the attention of Planters, such, for example, as lemongrass oil, coconut oil and oil cake, Para (*Hevea brasiliensis*) seed oil and oil cake.

The day is fast approaching when Para seeds will not be required in large quantities for planting purposes and as every estate will be yielding immense numbers the production from them of an oil as a bye product is to be encouraged.

The classes provided for cottons and fibres should fill well. In the latter case silver and bronze medals are offered for the best collection of named fibres.

Fruits make up a section containing 30 classes with cash prizes in each instance, with the exception of the class for the best collection of cultivated fruits for which a silver medal is offered.

The Division for Stock and Dairy Produce consists of sections for cattle, buffaloes, goats and sheep, pigs, poultry and dairy produce. Attractive cash prizes and four silver cups and 2 silver medals are offered throughout the division and the classes are expected to fill well in consequence.

Twenty classes are provided for Horses and Dogs. The section for Horses should fill well, it consists of classes for Polo Ponies registered 14.2 or under, Gentlemen's Hacks, Single Harness Horses and Ponies, Single Harness Horses imported from the United Kingdom, Lady's Hacks, Jumping competitions, Double Turnout, and Championship events. Two prizes (cups) will be presented for each event provided sufficient horses complete. Entry forms may be obtained from the Hon: General Secretary or from the Secretaries of the various Turf clubs throughout the Federated Malay States and Straits Settlements.

In the section for Dogs eleven classes are provided and two prizes will be given in each event provided five or more dogs are competing.

Native Industries and manufactures are always well represented at these shows.

Sections are provided for Metal work, Wood carving, Embroidery, Weaving, Baskets, Mats, Old Weapons, Models, etc., etc., and also a section reserved for Malay Schools only.

Entries for Horses and Dogs close on July 30th and in all other Divisions on August 8th.

For Prize Lists, entry forms, etc., etc., application should be made to any of the following:—

The Collector of Land Revenue, Penang.

The Hon: The Resident Councillor, Malacca.

The Supt. Government Plantation, Taiping, Perak.

The Assistant to the Director of Agriculture, Selangor.

The Collector of Land Revenue, Seremban.

The District Officer, Pekan, Pahang, or to

T. W. MAIN,
Hon: General Secretary,
Singapore.

VARIETIES OF RUBBER.

(FROM A CORRESPONDENT.)

The interest taken at the present time by the British public in rubber is very great, yet it is remarkable how little the public really knows about the article. Rubber is now a fairly safe topic for conversation anywhere. In the hotel smoke-room or a railway carriage, with men or with women, one can start a rubber conversation and find that almost every casual acquaintance can talk glibly of the prices of the different plantation companies' shares, of acreage and cost per acre, trees and yield per tree from the fourth to the tenth year; and, in fact, any one whose business is entirely in the raw article itself can almost begin to think that he knows nothing about the subject.

But he can readily have his revenge, if he can get his acquaintance to pay a visit to the City and take him into a sample room of one of the brokers or merchants, where the astonished rubber-share expect would see raw rubber laid out for sale in the various forms in which it arrives—for raw rubber varies in value from 10s. 6¾d. per lb. for smoked sheet down to 1s. 2d. per lb., for Niger flake, and in between these two prices it would be possible to find a grade of rubber to answer to nearly every penny.

CREPE, SHEET, AND BISCUIT RUBBER.

Rubber reaches the home market in almost every possible shape and colour. In most cases the queer names which one reads in the market reports are fairly descriptive. Thin pale crepe, for instance, arrives in long strips, generally about 4ft. long and 8in. to 12in. broad. It varies in thickness from one sixteenth to half an inch, and has a roughish surface from which the name "crepe" is derived

This rubber is pale yellow in colour, and when held up to the light it is quite transparent, which proves its purity, and accounts for the very high price obtainable for this grade—viz., at present about 10s. 3d. per lb.

The so-called "sheet" rubber is similar to crepe, but slightly thicker and not so transparent. It is prepared in a different manner and, unlike crepe, must be put through the washing mills by the manufacturer before it can be used.

Hard cure fine Para is prepared by the native labourers on the Amazon by dipping a socalled "paddle" in the rubber, and then holding it in the smoke of a fire, which hardens the coating of milk on the paddle. The paddle is then dipped again for a second eoating, and again smoked, and so on until quite a large "biscuit"—generally weighing about ½cwt.—has been built up. The labourer then takes his knife and slits the biscuit down one side, in order to remove his paddle, when he proceeds to make his next biscuit. Rubber thus prepared contains a large proportion of moisture, but is stronger than any of the plantation rubber, and is worth to-day about 10s. per lb.

AFRICAN PRODUCTS.

From the Congo we get large supplies of clean solid black rubber, coagulated originally in large blocks and then cut up into small cubes in order to allow it to dry and ripen. We also get from the Congo rubber in reddish sausages, collected directly from the tree, the reddish appearance being caused by small portions of the bark adhering. The value of this Congo rubber varies to-day from 5s. 6d. to 6s. 9d. per lb.

From the Gold Coast we get rubber prepared by the natives' merely digging a trough in the earth and running in the latex, which in time coagulates from the outside and forms a hard skin and finally a fairly hard lump throughout; but this grade holds all the moisture which was originally in the latex, and as a result, when cut across, such lumps are found to contain 50 per cent. of their own weight in water. Notwithstanding this, however, such rubber is to-day worth about 3s. 1d. per lb. This is the so-called "Gold Coast lump."

On the Ivory Coast, the French Sudan, and in the Sierra Leone neighbourhood the natives collect rubber from the same trees, but give much more pains to the preparation of it, the resulting produce being known as "Sierra Leone Niggers" or "Conakry." This rubber is in large balls, consisting of strips carefully wound together, varying in size from that of a good sized orange to that of a man's head. This rolling process is carried out when the strips of rubber are quite fresh, so that they become one compact solid ball. Rubber treated in this way is of a reddish colour, for which reason these balls are often known as "Red Niggers"; they are worth to-day approximately 6s. per lb.

From the Niger District we get rubber varying from small balls of fine white rubber of excellent quality, known as "White Niger Niggers," down to a soft pasty substance which looks like bad honey and smells abominably. This is known as "Niger Flake," and is worth about 1s. 2d. per lb.

These descriptions might be multiplied indefinitely, but sufficient has been said to show in how many various shapes raw rubber arrives in the home market, and what a very wide experience is necessary to successfully judge the relative values of the different kinds.

One point in connexion with the values of the different varieties is, however worth attention—namely, that values do not move together. For instance, the price of hard cure fine Para may be going up when the price of Red Niggers is going down, and *vice versa;* each grade may be said to be a market to itself. There is, of course, some sort of relative proportion, but nevertheless each grade practically fluctuates by itself. The market reports of the auctions last Tuesday show that pale crepe was fetching at the auction as much as 10s. 3½d., while hard cure fine Para was selling at 9s. 9½d.; a fortnight before the respective values were 9s. 7d. and 8s. 10d. per lb.

SOURCES OF SUPPLY.

The world's present sources of supply for crude rubber are approximately as follows:—

	Tons.
The River Amazon with its tributaries	39,000
Other districts of Brazil	2,800
The Federated Malay States—Ceylon, Sumatra, &c. (plantation rubber)	4,600
The Congo Free State and the French Congo ..	5,600
Portuguese West Africa	2,900
The West Coast of Africa, excluding the Congo and Portuguese West Africa	9,500
Rangoon, Penang, Borneo, &c. (wild rubber) ..	1,200
East Coast Africa, Mozambique, Madagascar, &c. ..	800
Mexico, the East Indies, and Central America ..	1,500
	67,900

The figures given above are necessarily for the most part estimated as with the exception of the exports from the Amazon, no exact records are obtainable of the production of the various districts, nor is it possible to obtain a complete record at the different ports of arrival, as statistics of some of the ports can only be obtained in an unclassified form, and from other ports no accurate statistics at all are obtainable.

PRINCIPAL USES.

It is only feasible to give a general idea in an article of this kind as to the uses to which the different grades of rubber are put, because as a general rule it might be laid down that rubber which can be used in any high-class work, such as motor tires, elastic thread, surgical goods, &c., can be equally well used in the inferior grades of manufacture. Manufacturers vary their mixtures according to the price of the different grades, their effort always being—and at the present prices this is more than ever the case—to produce the cheapest possible mixture consistent with their standard of manufacture. While it is true that a high class rubber can be used for almost anything, the reverse is not the case, and the inferior grades of rubber can only be used in inferior work, such as, for instance, garden hose, door mats, rubber flooring, &c., where elasticity is not requiried.

The produce of the Amazon is divided approximately into three grades, which find totally different uses, these being:—Fine Para, about 24,000 tons; negroheads of various descriptions, about 8,000 tons; and Peruvian ball about 8,000 tons.

MOTOR TIRES.

Fine Para is the standard grade for the whole market. It is bought and sold on name only, without samples, being shown, and is the one grade of rubber which, generally speaking, can be used for the manufacture of any and every description of rubber goods. As its price to-day, however, is about 10s. per lb., it stands to reason that manufacturers economize in the use of this grade as much as they can, particularly as in its crude state it contains about 15 per cent. of impurities—mostly water—so that by the time the manufacturer has washed and dried it, he has to work with raw material costing him nearly 12s. per lb. However, for the manufacture of really high-class goods, such as the inner tubes of motor tires, the manufacturer has no alternative but to use hard cure fine Para. No other rubber has the necessary strength and resiliency to stand the strain.

A small quantity of the very best plantation rubber—namely, the fine smoked sheet—produced by the Highlands and Vallambrosa companies, and to a smaller extent by a few other companies, will give the same test for strength, but the total arrivals per annum of this smoked sheet are only a little over 100 tons, so that as yet they hardly relieve the situation at all.

For the outer cover manufacturers are able to use, in conjunction with fine Para, a certain proportion of the other Amazon rubbers—negroheads and ball—as well as fine plantation rubber, and some of the very best medium rubbers. It is estimated that the present annual consumption of rubber for the manufacture of motor tires amounts to not less than 30,000 tons per annum, so that it will be seen that, apart altogether from the question of cost, it is impossible for manufacturers to use nothing but fine Para in their construction.

GOLOSHES.

It will be seen from the above that motor tires alone account for a large part of the total output of the Amazon, and it will astonish many people to know that the article next in importance from the rubber consumption point of view, absorbing approximately 15,000 tons per annum, in rubber shoes, known in America simply as

"rubbers" and in this country generally as goloshes. This is a bunch of the rubber industry of which we have little to remind us in England, but in America, Russia, and Scandinavia, the wearing of rubber shoes in winter is practically universal. An American friend recently expressed the matter to the writer as follows :—

I reckon there are about four million inhabitants in New York, and about five thousand of them don't wear rubber, because somebody has told them that it is English and smart, so they prefer to go about with wet feet.

In the hotels and restaurants in Russia the cloak rooms are furnished differently from those here, because in addition to a hook for the coat and a peg for the hat there is always to be found on the floor a little wooden box arrangement into which the Russian kicks off his goloshes.

A good deal has appeared lately about the so-called American Rubber Trust, the full name of which is the United States Rubber Company. It will be news to most people to know that the "rubber" here does not stand for the commodity, but for the manufactured article "rubber," otherwise "goloshes." The varieties mostly used for this purpose are fine Para, Peruvian ball, and medium rubbers from Portuguese West Africa and the Congo.

OTHER MANUFACTURES.

Another very important item of consumption for which nothing but the very finest rubber can be used (that is, hard cure fine Para) is the so-called indiarubber thread, used in the weaving of all sorts of elastic fabrics. The German people as a whole still keep to their elasticsided boots, and are therefore very large consumers of this particular article.

It is impossible in the scope of this article to deal with the hundred and one other minor uses for rubber, but the main point upon which they are nearly all alike is that they tend to the comfort of the human race, and have become practically indispensable. This is why, in spite of the enormous rise in the price of rubber, the consumption shows no signs of decreasing, but rather increases steadily. The extra cost of a motor tire manufactured from rubber costing 10s., as against one manufactured from rubber costing only 5s., is not, as one might think at first blush, 100 per cent., but only 30 per cent., because the manufacturer's other expenses have not risen. The ground cost of his factory, his labour, his power, and the cost of his canvas and other articles have not risen. What is true of motor tires can be said of nearly all other rubber article. People have to pay in the end something from 5 per cent., to 35 per cent., extra for their rubber goods, but rather than give up their motor cars, or get their feet wet, or play golf with a solid ball, or, in the case of a large portion of the population, go to bed in the winter without a hot-water bottle, they pay the little extra amount that the retailer has to demand, and consumption goes on just the same.

The Times "Financial and Commercial Supplement," March 11, 1910.

RUBBER NOTES.

Diplodia rapax, Massee. A description of this, with a figure, is given in the Kew Bulletin, No. I 1910, by Mr. Massee, who writes:—"This fungus appears to be a true parasite on Para rubber trees. A curious and unexplained point is that specimens were received at Kew for determination almost at the same date from Singapore and the Gold Coast. It is just possible that the fungus has been conveyed along with the seed as it is difficult to realise that the same species of fungus can have adapted itself to rubber trees in two distant countries within so short a time." It is, I think, more likely to have been conveyed by stumps, It does not seem to occur in Singapore itself, at least, I have never seen it here. It has only been seen in Perak and Selangor as yet.

RUBBER IN DOMINICA.

In the Annual Report of the Botanic Station of Dominica for 1908—1909 is given an account of the attempts to grow Para and other rubbers in that island. At present the stock there is small, only fifty-two Para rubber trees planted out of which only three are big enough to tap. It is proposed to take the buds off so as to cause the trees to branch and make short bushy trees, apparently on account of wind. Rubber was obtained from three of the oldest trees and sent to the Rubber Exhibition and Imperial Institute in the form of amber biscuits and valued at 4s. 3d. per lb., as compared with Plantation Para at 4s. 4d. to 4s. lld.

Castilloa seems to do as well and biscuits valued at 3s. 6d. were sent home, the percentages of proteids and resin was rather high, caoutchouc 85.5, resin 9·4 proteids 3·8 per cent.

Funtumia elastica give its usual unsatisfactory result.

Ceara rubber yields poorly and suffers from the wind as the branches are very brittle.

Ficus elastica does well, but is rare in Dominica. Rubber was prepared as "very clean light reddish biscuits, clear and transparent, extremely well cured." The form and condition was recommended highly and it was valued at 3s. 9d. per lb.

It appears likely that Dominica may turn out rubber of good quality from any of the three trees.

RUBBER BOXES.

In the Tropical Agriculturist, Dr. Willis notes that in a visit to the Rubber Works in Hanover, Dr. Prinzhorn pointed out the importance of having smooth clean boxes for rubber packing. In many of the rough boxes, when opened, it was found that there were chips of wood, sawdust and other debris left in the boxes and adhering to the rubber requiring to be removed by the washing machine.

This naturally deteriorates the value of the rubber, and need not be.

FICUS ELASTICA.

The Rambong, *Ficus elastica*, has been rapidly falling into disfavour of late years. In early days it was interplanted with Para rubber, but that system was soon abandoned. Naturally, wherever Para rubber grows at all well, Rambong, with its smaller and somewhat irregular return of an inferior rubber, is out of the industry. But there are many parts of the world where Para rubber is a failure, while Rambong might succeed. M. Georges Vernet, who has made a study of this rubber from all points of view has reprinted his articles on it, formerly published in the Journal Le Caoutchouc et la Gutta percha under the title of Etude General sur *Ficus elastica*, with a number of photographs and diagrams. The work is well worth study by any who intend to plant Rambong. M. Vernet has no high opinion of the cultivation. He writes that in investigating the returns one hypothesis which has not been however exactly verified by experiment is that the average annual returns which decrease as tapping is continued, depend on the amount obtained by the first tapping. It is hoped to discover eventually a variety giving big returns with an insignificant annual diminution and to propagate this rapidly by marcottage or later by seeds.

The trouble in *Ficus elastica* is the gradual falling off of the amount of rubber on bleeding every year. After a rest of some years it seems to recover.

Till an improved race which gives more rubber and more regular supplies is obtained by selection he recommends the Tonkin planters to suspend the formation of new plantations. The plant is one of enormous demands, and very moderate returns, and its cultivation can only be remunerative if the expenses of the plantation are practically nil. He expresses a hope however, that those whose plantations are established may, by the aid of his researches, gain the best possible profit on the expenses already incurred. As to the rubber itself he affirms that when well prepared it will be almost equal to the best kinds in value.

FASCIATION IN RUBBER TREES.

From Mr. G. N. Stevens, of the Tong-Landor Estates, Chanderiang, we receive an excellent photograph of the fasciated top of a young Para rubber plant. The top of the shoot is broad and flattened, widening a little upwards and ending in two flat curved branches looking from a side view something like ram's horns. Fasciation of this nature is not uncommon in Para rubber seedlings and specimens have several times been sent to the Gardens. The same monstrosity is common in very many other plants. In fact it is one of the commonest and most conspicuous monstrosities we have. The Cock's comb so common in the Gardens, is a fasciation of a plant which originally had its small flowers in comparatively inconspicuous spikes.—Ed.

WALTER FOX.

Mr. Walter Fox retired in March last on pension from the service of the Government. He was originally employed at the Royal Botanic Gardens, Kew, and was appointed Assistant Superintendent of the Botanic Gardens, Singapore, on June 16, 1879, so that he has been little short of thirty one years employed in the department. The Singapore Gardens were practically founded only in 1876 and Mr. H. T. Murton was then Superintendent, Mr. Fox being appointed as Assistant to him about 3 years later, thus he has been associated with the Gardens for nearly their whole existence. After the retirement of Mr. Curtis he became Superintendent of the Penang Botanic Gardens.—Ed.

AGRI-HORTICULTURAL SHOW, 1910.

Rubber Exhibition.

Singapore, April, 1910.

Sir

I beg to bring to your notice the Rubber Exhibition which will be held in the Volunteer Drill Hall, Singapore, on the 17th, 18th, 19th, and 20th August, 1910, in conjunction with the seventh joint annual Agri-Horticultural Show, of the Straits Settlements and Federated Malay States.

2 An attractive prize list has been arranged and a large and instructive exhibition of all grades of Rubber is expected.

3. The exhibition of Rubber Machinery and appliances will be larger and more comprehensive than in former years. Rubber curing machinery in motion will be a feature of the Show.

4. We hope to receive exhibits of rubber from your estate for competition at the Exhibition.

For full particulars, entry forms, etc., etc., apply to the Hon. General Secretary.

I am, Sir,

Yours faithfully,

T. W. MAIN,

Hon : General Secretary,

Agri-Horticultural Show, 1910.

PRIZE LIST.

RUBBER.

Class.	Nature of Exhibit.	Number or quantity to be exhibited.	Prizes 1st.	Prizes 2nd.
7	Para-crepe, best sample -	not less than 25 lbs. -	Cup value $150	Cup value $50 Presented by Hogg & Co.
8	" Sheet " -	" -	Cup value $150 Presented by Malay Peninsula Agricultural Association	Cup value $50 Presented by Raffles Hotel
9	" " Smoked " -	" -	Cup value $165 Presented by H.N. Ridley, Esq.	Cup value $50 Presented by A.M. Janion, Esq.,
10	" Block (dry) " -	" -	Cup value $150 Presented by the "Straits Times"	Cup value $50 Presented by Hogg & Co.
11	" Best exhibit ready for shipment. The exhibit to be one case of crepe, one case of sheet and one case of scrap - - -	not less than 50 lbs. of each - -	Cup value $300 Presented by Hon. Tan Jiak Kim, Tan Jiak Choo, Esq., Tan Jiak Hoe, Esq.,	Cup value $ 00 Presented by John Little & Co.
12	" Best sample of commercial Rubber -	not less than 100 lbs. in weight -	Cup value $600 Presented by H.H. The Sultan of Johore and Johore Planters	Cup value $100 Presented by Tan Chey Yan, Esq.
13	Rambong, any form -	not less than 25 lbs. -	Silver Medal	Bronze Medal
14	Any other rubber, plant from which obtained must be stated with each - - -	" -	Silver Medal	Bronze Medal

NOTE :—In addition to the above prizes the Planters' Association of Malaya will give a championship Cup, for the best exhibit of Rubber in the Show.

COCONUT PALM DISEASE.

We have lately received from a correspondent, in Borneo, an account of a serious disease in coconuts, which bears so great a resemblance to that known as bud-rot, which has hitherto only been met with in India and Ceylon, at least in this part of the world, that it seems highly probable that it is identical. Our correspondent, Mr. E. Hose, describes it as follows: "The leaves turn yellow and the fruit, if there is any, hangs limp, the leaves drop down and gradually die, the stem of the tree gets thinner and thinner near the top, then the centre shoot drops out, apparently having rotted; inside the heart, at the top, it is like rotten wood-mud. It seems to attack trees of any age. Trees on wet or dry land are affected by it. According to native stories, it has only put in an appearance since the last two years." A very valuable and full account of an exactly similar disease is published in the Bulletin of the Agricultural Research Institute of Pusa, No. 9, March, 1908 by Mr. E. T. Butler, the Imperial mycologist. He says: (p. 5) As a general rule, the first indication that a coconut palm is attacked is the opening out of the outer leaves from the head. The leaf stalk becomes slightly flaccid and the weight of the leaf causes the whole to drop. Then the ends of the pinnae or leaflets at the extremity of the leaf become flaccid and hang down almost vertically, this is accompanied with a loss of colour, the drooping and discolouration of the leaflets then extend gradually backwards to the whole leaf. Later on, the tips of the leaflets turn yellow and dry up, followed gradually by the entire leaf, which eventually hangs down, withered, from the crown. The attachment of the leaf sheath to the tree is weakened so that the outer discoloured leaves can be easily torn from the crown one after another, or many together, all the leaves are similarly affected.... Gradually, as the palm weakens, new leaves that are put out are smaller than of old. This is apparent even before they unfold from the bud and results in the central shoot which is merely the unopened leafbud becoming stunted and pallid. Later on, it begins to wither and the upper free part turns brown. Eventually it may dry up altogether, but this may not occur for many years. "The top of the stem and the white internal part of the crown are quite normal, except in old cases just before death, when the latter rots. One of the conspicuous marks is the way the nuts are injured. "Even in the first year or two the nuts are affected. They are fewer and smaller than usual, on splitting the husk is found unaltered and usually the shell also. The white kernel is, however, shrivelled and indurated and copra prepared from it is said to be deficient in oil. The fluid inside is reduced in quantity, and is altered in quality, becoming unpalatable to drink. In later stages a large proportion of the nuts drop in an immature condition. In more severe cases the spathes are unable to burst out at all or if they do, rot away early and the palm becomes barren."

This description fits well the account from Borneo, and seems certainly to be of the same disease, and as it has thus approached so near to the Malay Peninsula it is very desirable that a watch be kept for its appearance here.

The disease is not situated in the bud of the tree, but in the roots, which are attacked by a parasitic fungus belonging to the genus *Botryodiplodia,* at least this fungus appears always to occur on the rotting roots of trees affected by this disease. The destruction of the lateral roots cuts off the water supply of the palm so that the bud dies of drought and starvation.

The death of the palms is very slow. " Young palms may be killed in five years, but this is exceptional. Eight or ten years appears to be a more usual period, while in many cases the disease progresses enough to cause barrenness but fails to kill the tree outright. Thus, in one large gardenonly two hundred coconut palms were in bearing out of about two thousand, while the deaths were not numerous."

" The disease is worst in heavy alluvial valleys and poor laterite hill soils. It is least severe in the sandy soil of the littoral. There is plenty of evidence that the disease is infectious. A palm evidently affected and brought from an infected district ten years ago was planted in a garden where the trees were all healthy. A few years later, it began to turn yellow and others near by were attacked; now thirteen trees are affected and the original one is dead and the disease has spread to neighbouring gardens."

The disease attacks not only coconuts, but betelnuts, and caryotas. The treatment recommended is destruction of all diseased palms whether they be only just attacked or practically dying. The roots should be dug out and with the stem leaves burnt at once. Lime, preferably quick lime, should be well dug in to the infected spot, and the ground frequently dug over to break up and aerate the soil. If necessary, the soil should be drained, as undrained or insufficiently drained soil affects the roots injuriously and the weeds on the ground destroyed, and manuring with cow dung or nitrogenous fertilizers should be tried. No plants should be planted in the infected spot for a year after the removal of the diseased trees.

As in the case of most at least of these underground root fungi, the progress is comparatively slow, so that it should be possible if taken in time to stop an outbreak with the loss of a very few trees, but in order to do this plantations must be carefully examined, and any tree exhibiting the symptoms described above should be destroyed and removed as quickly as possible.

There is another bud-ot disease in India produced by the fungus *Pythium palmivorum* in which the shoot is actually attacked by the fungus. The withering of the shoot at an early stage is the most characteristic feature. The first symptom is the turning white of a whole leaf towards the centre of the crown, the bud then turns white, rots and the crown falls off, the whole of the "cabbage" becoming converted into a putrid, foul-smelling mass. The whole palm is killed in a few months, and recovery is very rare. But these symptoms do not seem to be identical with those of the Borneo disease. It appears chiefly to attack the palmyra palm in india but also areca and coconut.—ED.

THE RUBBER EXHIBITION OF 1911.

An International Rubber and Allied Trades Exhibition is to be held in the Royal Agricultural Hall, London, from the 19th to the 28th June, 1911, under the presidency of Sir Henry Blake.

The immense success of the last exhibition and the vast development of the industry since 1908, when it was held, should be a guarantee that the exhibition of 1911 would by far exceed in importance and interest any previous exhibition of an industry. The writer of the prospectus for the 1911 exhibition notes that two days after the opening of the Exhibition of 1908 the price of rubber commenced to rise, it was then 3s. 3d. per lb. and it has been on the upward tendency ever since.

As before Mr. A. Staines Manders is manager of the exhibition and a large sized block of the exhibition-buildings has been set aside for the exhibits of the Malay Peninsula which we hope may be well filled.

All kinds of wild and plantation rubbers will be shown as well as Balata, Gutta Percha, Jelutong, methods of tapping, instruments used, machinery, fertilizers, and everything connected with the plantation industry; in the manufacturers' section, all goods manufactured wholly or partly from any form of Rubber or Gutta Percha fabrics, chemicals, machinery, rubber substitutes, vulcanite and ebonite and in fact anything connected with the manufactory. Rubber literature also finds a place in the exhibition. As before lectures will be given and a conference held.

The important position that the Malay Peninsula holds now in the eyes of the whole world as the leading country in the industry of rubber planting makes it imperative that the exhibition from the Colony and the Malay States should be the finest, most complete and illustrative in the whole exhibition, and we may hope that this may be the case.—ED.

TIMBER NOTES.

Carapa moluccana, Nireh or Niris. In a visit to Setul recently, I found a Malay working at large—sized beams of a red hard wood and asked him what it was. He told me it was niris (*Carapa moluccana*) and so it appeared to be. The tree, so common in our mangrove swamps and easily recognised by its cannonball-like fruits, is in the south of the Peninsula a short gnarled and bent tree out of which it

is impossible to get a straight beam, and it is consequently little used except as firewood, or for short posts. It was formerly at least, used for splitting granite at Pulau Ubin, by burning it on the rock and throwing cold water on the heated stone. The trees along the tidal river at Setul, however, were of great size, tall and straight, and some, the Malay informed me, were over six feet in diameter and it was the best timber for beams that they had.

There is no doubt that a tree may vary in value as a timber tree very greatly in different locality, or, perhaps it should be said different climates, although it may be, as far as its species is concerned, identical in flower, fruit and leaf, and a tree that is a valuable timber in one country may be of little or no use in others.

Carallia integerrima, Mr. R. S. Troup, in pamphlet 11 of the Forest Economy Series of India, gives an account of the timber of *Carallia integerrima*, called "Merpoin" and "Kusinga" here, a not very uncommon tree in the Malay Peninsula. He gives the dimensions as follows: "The tree ordinarily grows to a height of 50 or 80 feet with a girth of 6 or 7 feet and a clear bole of 40 to 50 feet. Logs of 50 to 60 cubic feet in Burmah. In Bombay and Madras it reaches a height of only about 40 feet with a girth of 4 or exceptionally 6 feet and a clear bole of 20 feet." Now this tree never seems rarely to attain anything like this size in our forests. It is usually about 30 feet tall and has a comparatively short clear bole. A note on a specimen collected by Mr. Cantley's plantcollector, however, in Malacca, gives a height of 80 feet and says it will produce beams. *Carallia integerrima* is however a very variable tree in foliage and perhaps some forms are bigger than others.

Sindora Wallichi var Siamensis. Saputi.

A fine tree of this species long a conspicuous object on the lawn of the Botanic Gardens was found last year to have somewhat suddenly died, it is supposed, from lightning. The tree was about 90 feet tall and branched very low, the butt was four feet through. When cleared away it was found that the wood was extremely hard, difficult to cut and split, the bark corky brown an inch thick. The sap wood is at first cutting white but soon darkens in colour, and a black resin exudes in rings. The heart wood at first is dark red reminding with its black resin of Rengas, (*Melannorhoea*) but eventually is dark and light brown. The rings are well marked but very irregular in width; in one part of the trunk I counted ten to the inch. The rays are very fine and close, the pores not very abundant, but moderately large like those of Merabau (*Afzelia*) to which this tree is closely allied. The wood indeed much resembles Merabau except in colour being brown instead of red. It has a good figure, and is harder than Merabau.

The Saputi, though seldom as thick as Merabau and not so heavily buttressed, attains a height of about a hundred feet or more, with a straight cylindric stem when grown in high forest and a large round crown. The flowers are produced in great abundance and

fertilized by flies the roar of whose wings can often be heard from the base of the tree when in flower. The flowers are green, and produce a circular flat pod covered with thorns, and containing one flat round dark brown seed, with a waxy reddish yellow aril half as large and oblong at the base. This aril is eaten by rats who carry about the seeds thus. The tree fruits heavily and seed is readily procurable and germinates well, like all good timbers. Saputi is a slow though steady grower. The wood though it does not appear to be very well-known to timber dealers should be as good at least as Merabau and it seems actually harder. It seems well worthy the attention of foresters. The tree occurs all over the Peninsula from Singapore as far north as Bangtaphan in Siam at least.

Balau. This timber was formerly reckoned one of the most valuable and durable in the peninsula, but of late it has been noticed that the timber sold under that name is by no means as valuable, not lasting for more than half as long as the old Balau of the trade.

The original Balau was a tree belonging to the order *Rosaceae* and known as *Pygeum oblongifolium* Hook-fil. An account of this timber and the tree was published in the first volume of the Bulletin, new series p. 144, where the difference between the two timbers known by the name Balau is pointed out.

As there noted the Balau of the present day, which still comes from the East Coast of Pahang, whence to a large extent the original timber came, is not a Parinarium nor does the plant in the least resemble one but is a species of *Shorea* (*Dipterocarpaceae.*) On several occasions leaves of the modern Balau have been sent by forest officers but leaves alone are useless generally in identifying specimens. Recently, however, Mr. Sanger Davies has been able to procure specimens of the flowers of one species called Balau Bukit and unripe fruits of Balau Betul.

More complete specimens are required of the ripe fruit of both and flowers of the latter species, but the materials are sufficient to give an idea of the plants and their relationships to other species. Both plants are certainly closely allied together and belong to undescribed species, so I give as complete a description as I can from the materials.

Shorea collina, n.sp. Balau Bukit.

A big tree with black branchlets, leaves oblong, shortly cuspidate base rounded, above smooth grey when dry, beneath cinnamon brown, nerves ten pairs elevated beneath with net-like conspicuous reticulations, made 5 inches long 2 inches across, petiole black rather stout 1¼ inch long. Panicle of flowers rather lax 3 inches long. Rachis covered with minute stellate hairs. Flowers shortly pedicelled sepals orbicular ovate white silky, fringed with longer hairs on the edge. Petals oblong linear obtuse twisted half an inch long the outside white silky, inside glabrous stamens 20 small, outer ones with a broad oblong filament, anther elliptic with a single process on the back with two or three cilia, inner ones longer, wit h a broad oblong base narrowed abruptly into a slender filamentous portion as long as the anther, which has a single process on the back ending in two cilia, ivory conic silky hairy style, short cylindric longer than the stameus fruit unknown.

Obtained on hills on the east coast Pahang. Sanger Davies.

In foliage this does not resemble any other of our species of Shorea. In the form of the stamens it is distinctly like *Shorea robusta,* "Sal" of Burmah, as also *S. utilis* king, the Dammar Laut, of Province Wellesley.

Shorea materialis n.sp. Balau Betul.

The branchlets are black. The leaves ovate with a broad base 5 inches long and 3 inches wide. (I have also leaf specimens probably of this in a young state, 9 inches long, and 5 inches across terminated by a long cusp), coriaceous above, smooth polished grey when dry beneath, similar in colour, but silvery scaly, nerves obscure above and slightly sunk, beneath elevate 10 to 12 pairs; petiole 1 inch long scurfy, scaly. Panicle 3 inches long, white scurfy, with short branches, pedicels ⅛ inch long. Sepals in young fruit oblong, obtuse, silky, in half ripe fruit linear oblong red, pubescent 4 developed 1 inch long ¼ inch wide, ovary conic, silky.

This, which gives the best balau timber, was found growing near the sea coast at Kuala Balak and Kuala Rompin by Mr. Sanger Davies.

It resembles to a considerable extent the other species, and it is possible that the two plants may be the same. The broad based leaf is very unusual in our species but it closely resembles that of *Shorea robusta.*

As timber trees the Shoreas may be divided into two classes, (1) the Serayah class with soft red resinous wood not at all durable and as house furniture very liable to the attacks of the house termite *Calotermes domestica.* To this group belong such species as *Shorea leprosula viz., S. macroptera* etc. The name Meranti which properly speaking belong, I believe, to species of *Hopea* is often nowadays applied to inferior grades of Serayah. (2) The Dammar laut series, a few trees with a very much harder deeper coloured high class timber, the type of this group is *Shorea utilis* King. Damar laut number satu. The Balau timber is much nearer allied to this, dark hard close grained with fine rays, pores numerous but not too many.

It seems rather remarkable that in a single genus, there should be such a distinction in the timber while at the same time there seems to be no other correlation between the plants except that the stamens in *S. utilis, S. robusta* and *S. materialis* are similar in possessing ciliated appendages.

H. N. Ridley.

SYNTHETICS.

As we still come across people who are nervous about the bugbear of Synthetic Rubber, perhaps some notes as to the present position of Synthetic Indigo, taken from the Indian Planter's Gazette of March 12 of this year may assuage their anxiety somewhat. Indigo has always been held up as an example of a cultivation destroyed by a synthetic product made in Germany, but it does not appear to be dead yet.

"The synthetic dye is at present manufactured only by the Badische Anilin und Soda Fabrik and by the Farbwerke vorm, Meister Lucius and Bruning ; all other competitors and manufacturers of the synthetic indigotine having retired and a paste containing about 20 per cent of indigotine is sold at 8d. per lb. Baron Schrottky has known for some years that this price is very near the cost of production, and it is only common sense to suppose that the producers would sell the synthetic article as low as possible in order to kill the natural industry and to have a monopoly. American Consular reports from Germany (see page 16 of "Der Indigo and seine Concurrenten by Dr. Felsen) also state, on the basis of trustwothy information, that the synthetic indigo cannot, without any profit, be sold more cheaply than at present. It can therefore be taken as quite certain that 20 per cent. synthetic indigotine paste cannot be sold at 6d. per lb. without loss, and it is an open secret that the cost of manufacture of this article has reached bottom, and that it cannot be produced more cheaply.

Dyers like the synthetic indigotine in the form of a paste; it is easier to manipulate and to dye with than is natural indigo, and the synthetic dye is more uniform in quality and character. On the other hand the natural indigo dyes better as is freely admitted by the trade; the atomically fine inter-mixture in the natural product of indigo red, indigo brown, and indigo gum tends to make the dye adhere better to the fibre, and to withstand longer the destructive influence of light air, and moisture. If dyers were offered the natural indigo, similar to the synthetic indigotine, in paste form, uniform in quality, as easy to manipulate, and as cheap, they would prefer the natural product.

The successful introduction of Java-Natal indigo (a three year crop), with the result that the planter is able to reduce his cultivation expenses and harvest 50 per cent. more green plant per acre than heretofore, the better dye yielding properties of this new variety and the improvements in manufacture which have raised the output of dye per 100 maunds of green plant from 10 or 14 seers of indigo, as heretofore, to 28 or even 32 seers, at an extra cost which leaves a large margin of profit to the planter these established facts make it not difficult to predict with whom victory must lie. The future cost of the production of natural indigo will be much below that of

the synthetic dye. The writer's intimate and long connection with the industry and thorough knowledge of all the practical details of working a factory will, he trusts, give some assurance that the data on which this statement is made have been carefully collected and considered."

Indian Planters Gazette, March 12, 1910.

Synthetic camphor is another product which has been said to interfere with the production of the natural article. It is made from pinene, a carbon compound of essential oil of turpentine. This which is the only source of real artificial rubber is of limited supply and fluctuating price. The artificial camphor however is not the same as the real article as it gives an unpleasant musty smell to clothes when used for keeping off moths. None of these synthetics are in fact the same thing as the natural products and cannot be used for all the purposes for which the natural substance is required though for certain purposes they can be used as a substitute. Both indigo and camphor are used practically for one object only the first as a dye, the second as the manufacture of celluloid and pegamoid (a substitute for leather). Rubber is used for many purposes and it is not probable any synthetic rubber would do for all while the price at which rubber can be made to pay, practically precludes most of the suggested synthetics which could not be reduced in price so as to be cheaper.—ED.

POSITION OF THE RUBBER MARKET.

"The bulk of British capital invested has gone to the Middle East. Last year eighty-nine new companies were formed, with a total capital of ten millions sterling, of which six and half millions was offered for subscription; but already this year forty-four new companies have been floated, with a capital of 54,780,001, of which 4,283,5001. has been issued, and at the time of writing they are being floated at the rate of a dozen a week in order to catch the boom. With planting on so gigantic a scale the present phenomenal high prices for raw rubber are bound to decline at some time, but nobody can say when. The intrinsic merit of the rubber position at the moment is that consumption is close up to production, hence the present record prices, for manufacturers do not as a rule lay in heavy stocks of a material that does not improve with keeping. How narrow the margin is between production and consumption may be gleaned from the fact that (according to a well known rubber-broker's annual report) the world's out-put last year was about 69,000 tons, against 65,000 tons in 1908 and 69,000 tons in 1907; while the consumption was estimated at about 68,000 tons in 1909, 65,000 tons in 1908, 60,000 tons in 1907, and 65,000 tons in 1906. The world's visible supply at the beginning of February 1910 was 5,059 tons

against 3,428 tons at the beginning of January 1910. In the following table we show where these supplies are drawn from:

WORLD'S OUTPUT.

Year	Brazil Para Receipts	West Africa	East Indies	Other sources	Total.
	Tons.	Tons.	Tons.	Tons.	Tons.
1906	34,480	17,200	530	13,800	65,000
1907	37,665	17,000	1,100	13,235	69,000
1908	38,190	14,000	2,000	10,810	65,000
1909	39,040	15,500	4,000	11,460	70,000*

* Estimated

The Brazilian supplies do not show a rapid increase, owing the arduous, costly, and haphazard manner in which collection is undertaken, although the supply of wild rubber is said to be practically inexhaustible, while the cost of production is becoming greater, as the collectors have year by year to penetrate deeper into the forests to secure supplies. This anxiety to get rubber has in its turn led to the neglect of ipecacuanha collection and cultivation in the Provinces of Matto Grosso and Minas respectively, and it may also affect cultivation in the Selangor State, from whence our supplies of so-called "Johore" ipecacuanha are drawn. On the other hand, it will be seen from the table that the rubber output from Ceylon, Malaya and other East Indian Centres has practically doubled every year, but so far their contribution is a mere drop in the bucket as compared with the world's total, and it will probably be five to ten years before the proportion becomes considerable. In years to come, it is said, the battle will be between wild and plantation rubber, in regard to the respective merits of which a great diversity of opinion prevails. The chief fact at present is that wild rubber does control the market of the world, and will continue to do so for some years yet. Planters are eager to find out which form of rubber manufacturers like best - whether in sheets, biscuits, crepe, block, worms, etc - but manufacturers themselves express no decided opinion on the point. At present plantation rubber is inferior to pure Para, and the cause has not yet been determined, though many beliefs are expressed,

As regards prices, it is questionable whether the present high level is a good thing for the welfare of the industry, it being probable that lower and more stable values would prove more beneficial in the end. The average price paid for plantation rubber in 1906 was

5s. 6¼d; per lb.; it declined to 4s. 9-5/8d in 1907, to 4s. 1¾d. in 1908 (when as the result of the American crisis of 1907; prices fell on the occasion to 2s. 9d.), and in 1909 the average price was 6s. 7⅜d while this year the average will probably be higher. The diagram (P. 390), by Messrs. Lewis & Peat, 6 Mincing Lane, London, E. C., shows that prices of fine para and plantation rubber have had some extraordinary fluctuations during the past three years. In 1909 find Para touched its lowest (5s. 2¼d.) in April and reached its highest (9s. 3½d) in November, a variation hitherto unknown; the previous record highest price was 5s. 9d. per lb. in 1905. The average price for five years, including 1909, works out at 5s. 4d., and for the last ten years at 4s. 6d. per lb. On the other hand plantation Para rose from 5s. 1½d. in January 1909 to 9s. 8½d. in November, and closed at 7s. 6d. for biscuits and sheets, against 7s. 6½d. for fine Para on the spot and 7s. 5d. for forward delivery. It must also be pointed out that large contracts now have been entered into for plantation rubber for forward delivery to the end of 1910 and 1911 at prices up to about 8s. per lb., and the fact that these profits have already been earned has to a large extent given the cue to the present boom in the leading shares and to company promotion. It is anticipated that as years roll on these "forward" sales of plantation rubber will constitute a large proportion of the business."

(*The Chemist and Druggist, March 12th 1910.*)

MORE RUBBER PRODUCING PLANTS.

Dr. P. Olson Seffer in the Journal d'Agriculture Tropicale, describes some more plants from South America, from which he has obtained rubber. Among these there are the well known Frangipanni trees which are so largely planted in native grave-yards. *Plumeria rubra* (the red flowered one), *P. mexicana* and *P. acutifolia* the common white one. The latex containing 14 to 16 per cent. of rubber is got by tapping but the best way of dealing with them is to cut off the young branches and crush and macerate them. Mr. Seffer got 1 pound 3 ounces of rubber from one tree, but this he thinks may be exceptional.

Another plant known as "Chupire" in Mexico is *Euphorbia calyculata* a large shrub giving an excellent quality of rubber. The latex contains 21 per cent. of rubber, and is obtained by tapping young branches.

An undescribed Jatropha and *Pedilanthus tomentellus* a low shrub, are two more.

The latter is allied to a plant very common in gardens here formerly used to make low hedges. It is too small to tap and has to be treated chemically like guayule.

Jatropa urens produces he says a kind of Balata very easy to work and easy to propagate from seeds or cuttings. This may be so, but it is not likely to be popular as a cultivated plant as it is one of the worst stinging plants in the world. It is quite a small plant and at Fernando de Noronha where I met with it in abundance, the botanists of the Challenger expedition said the only way to gather it was to lasso it with a string, haul it up and drop it in to the botanical papers and drop a weight on it. It is impossible to touch the plant without being stung.

These plants, Seffer says, grow usually in ground unsuited for agriculture and will give 75 pounds of rubber per acre. The Plumieras are big enough to tap in three years, and the rubber can be placed on the market at 2 fr. 50 per kilo at most. An English Syndicate is just formed to exploit these plants with a capital of 7,500,000 francs.—ED.

SOME CORRECTIONS.

Mr. Trelease sends the following note as to references concerning the publication of the account of the Zapupe, in Bulletin No. IX. p. 569.

THE MISSOURI BOTANICAL GARDEN.

St. Louis, Mo.,
January 24, 1910.

Dear Doctor Ridley,

I am pleased to learn from the December number of the Agricultural Bulletin that you are taking interest in the new Zapupes. I notice, though, that through some inadvertence you refer to Consul Millward's publication as having been contained in the Transactions of our local Academy of Science. His several important practical papers were actually published in our Government Consular Reports, or in periodicals, while it is only my own paper on the subject (which I sent you when I sent you the bulbils that you are growing) that was published by the Saint Louis Academy.

Sincerely yours,
Wm. TRELEASE,
Director.

In the Bulletin for March, p. 84, the omission of a line in the fourth paragraph makes the passage obscure, and it should read line 29 "nor does the suggestion that..........." and that thus the cotton is not affected after the death of the sorghum, does not seem to make matters any clearer.

P. 100	line 16,	Asistic read	Asiatic.
	22,	Linean	Linnean.
98	41,	Gauze	Gauge.
99	45,	Medevellaa	Medinilla.
106	43,	Skamens	Stamens.

EXPORTS TELEGRAM TO EUROPE AND AMERICA.

1st to 30th April.

	Steamers.			Tons.	Tons.
Tin	Singapore & Penang to	U. Kingdom &/or		950	1,640
Do.	do.	U.S.A.		185	765
Do.	do.	Continent		375	110
Gambier	Singapore	Glasgow		—	—
Do.	do.	London		—	150
Do.	do.	Liverpool		75	—
Do.	do.	U.K. &/or Continent		—	100
Cube Gambier	do.	United Kingdom		35	5
Black Pepper	do.	do.		25	20
Do.	Penang	do.		—	30
White Pepper	Singapore	do.		85	35
Do.	Penang	do.		—	—
Pearl Sago	Singapore	do.		15	80
Sago Flour	do.	London		75	150
Do.	do.	Liverpool		1,800	—
Do.	do.	Glasgow		25	—
Tapioca Flake	Singapore	United Kingdom		180	100
T. Pearl & Bullet	do.	do.		400	75
Tapioca Flour	Penang	do.		150	250
Gutta Percha	Singapore	do.		130	190
Buffalo hides	do.	do.		120	5
Pineapples	do.	do.	cases	7,000	7,250
Gambier	do.	U.S.A.		340	850
Cube Gambier	do.	do.		—	150
Black Pepper	do.	do.		25	85
Do.	Penang	do.		—	15
White Pepper	Singapore	do.		5	90
Do.	Penang	do.		—	—
Tapioca Pearl	Singapore	do.		60	140
Nutmegs	Singapore & Penang	do.		15	29
Sago Flour	Singapore	do.		250	420
Pineapples	do.	do.	cases	1,000	200
Do.	do.	Continent		2,750	1,750
Gambier	do.	S. Continent		230	75
Do.	do.	N. Continent		275	330
Cube Gambier	do.	Continent		40	25
Black Pepper	do.	S. Continent		370	70
Do.	do.	N. Continent		400	35
Do.	Penang	S. Continent		35	—
Do.	do.	N. Continent		10	—
White Pepper	Singapore	S. Continent		15	10
Do.	do.	N. Continent		80	35
Do.	Penang	S. Continent		—	—
Do.	do.	N. Continent		—	5
Copra	Singapore & Penang	Marseilles		1,125	460
Do.	do.	Odessa		680	—
Do.	do.	Other S. Continent		100	—
Do.	do.	N. Continent		2,800	2,900
Sago Flour	Singapore	Continent		1,300	270
Tapioca Flake	do.	do.		35	20
Do. Pearl	do.	do.		10	—
Do. Flake	do.	U.S.A.		50	100
Do. do.	Penang	U.K.		40	55
Do. Pearl & Bullet	do.	do.		110	100
Do. Flake	do.	U.S.A.		—	10

	Steamer.		Tons.	Tons.
Do. Pearl	do.	do.	90	260
Do. Flake	do.	Continent	110	10
Do. Pearl	do.	do.	675	—
Copra	Singapore & Penang	England	460	520
Gutta Percha	Singapore	Continent	45	40
Cube Gambier	do.	do.	—	—
T. Flake & Pearl	do.	do.	—	—
Sago Flour	do.	do.	—	—
Gambier	do	S. Continent	—	—
Copra	do.	Marseilles	—	—
Black Pepper	do.	S. Continent	—	—
White Pepper	do.	do.	—	—
Do.	do.	U.S.A.	—	—
Pineapples	do.	do.	—	—
Nutmegs	do.	do.	—	—
Black Pepper	do.	do.	—	—
Do.	Penang	do.	—	—
White Pepper	do.	do.	—	—
T. Flake & Pearl	do.	do.	—	—
Nutmegs	do.	do.	—	—
Tons Gambier			1,100	250
Do. Black Pepper			550	470

SINGAPORE MARKET REPORT.

April, 1910.

Articles.	Quantity sold.	Highest price.		Lowest price.	
	Tons.	$	c.	$	c.
Coffee—Liberian	47	28	00	25	00
Copra	6,535	11	80	11	00
Gambier Bale	1,340	12	30	11	90
Cube „ No. 1 and 2 ...	247	15	50	14	75
Gutta Percha, 1st quality	..	350	00	300	00
„ Medium	...	240	00	120	00
„ Lower	...	100	00	26	00
Gutta Jelotong	...	22	00	14	50
Nutmegs, 110 s.	...	18	50	18	00
„ 80 s.	...	22	50	22	00
Mace, Banda	...	95	00	...	
„ Amboina	...	68	00	65	00
Black Pepper	1,107	14	75	12	75
White Pepper	411	27	50	22	00
Sago, Pearl small	50	...		...	
Sago Flour, No. 1	4,502	4	15	3	70
„ 2	15	1	00	...	
Tapioca Flake, small	467	7	20	6	10
Tapioca Pearl, small	126	8	00	5	90
„ Medium	480	7	50	6	87½
Tin	2,125	77	00	74	85

SEREMBAN.

Table showing the Daily Results of the Reading of Meteorological Observation taken at the General Hospital, Seremban, for the month of March, 1910.

Date.	Temperature of Radiation. 9 H.	15 H.	Mean.	Maximum.	Minimum.	Range.	Temp. of Radiation. Sun.	Difference Sun & Shade.	Wind Direction. 9 H.	15 H.	Temp. of Evaporation. 9 H.	15 H.	Mean.	Computed Vapour Tension 9 H.	15 H.	Mean.	Relative Humidity. 9 H.	15 H.	Mean.	Clouds 0 to 10. 9 H.	15 H.	21 H.	Cloud and Weather Initials. 9 H	15 H.	21 H.	Rain. Inches.
1	77	77	77	88	73	15	100	12	NW	NW	75.3	75.3	75.3	.877	.877	.877	94	94	94	3	7	0	S	N	S	1.30
2	77	76	76.5	85	73	12	110	25	NW	W	75.3	74.3	74.8	.877	.848	.862	94	94	94	1	8	6	S	N	C	.43
3	74	83	80.5	88	71	17	99	11	NW	NW	74	76.3	75.1	.840	.905	.872	100	80	90	0	7	10	S	N	N	1.10
4	75	78	76.5	84	73	11	96	12	N	N	73.3	74.6	73.9	.820	.857	.838	94	89	91.5	2	9	7	S	N	N	.20
5	75	85	80	87	71	16	117	30	NW	NW	73.3	75.1	74.2	.820	.873	.846	94	72	83	0	5	0	S	C	S	
6	79	89	84	91	72	19	144	53	NW	NW	75.6	74.3	74.9	.887	.847	.867	90	61	75.5	0	0	0	S	S	S	
7	76	87	81.5	88	71	17	112	24	NW	NW	72.6	75.5	74.1	.801	.884	.842	89	69	79	0	3	0	S	S	S	
8	79	88	83.5	92	72	20	121	29	NW	NW	73.9	74.9	74.4	.839	.865	.852	85	65	75	0	5	2	S	C	S	
9	79	88	83.5	90	73	17	130	40	NW	N	72.3	74.9	73.6	793	.865	.829	80	65	72.5	0	2	7	S	S	N	1.01
10	79	84	81.5	87	73	14	126	39	N	NW	73.9	74.	73.9	.839	.840	.839	85	72	78.5	0	4	7	S	C	N	.03
11	78	83	80.5	87	73	14	147	60	NW	NW	74.6	74.7	74.6	.857	.856	.856	89	76	82.5	0	8	6	S	N	C	.50
12	76	80	78	84	70	14	135	51	N	N	74.3	75	74.6	.848	.867	.857	94	85	89.5	0	7	9	S	N	N	1.52
13	76	82	79	85	71	14	142	57	NW	N	72.6	75.3	73.9	.801	.877	.839	89	80	84.5	0	7	0	S	N	S	.05
14	76	84	80	87	71	16	147	60	N	W	74.3	77.4	75.8	.848	.938	.893	94	80	87	3	6	6	S	C	C	
15	76	75	75.5	82	73	9	110	28	NW	NW	74.3	73.3	73.8	.848	.820	.834	94	94	94	1	7	8	S	N	N	1.76
16	77	83	80	86	73	13	143	57	NW	NW	73.6	76.3	74.9	.829	.905	.867	89	80	84.5	0	9	5	S	N	C	
17	77	76	76.5	85	73	12	140	55	W	W	75.3	74.3	74.8	.877	.848	.862	94	94	94	0	7	0	S	N	S	.02
18	77	73	75	87	71	16	147	60	NW	NW	73.6	71.3	72.4	.829	.766	.797	89	94	91.5	0	10	3	S	N	S	1.26
19	75	80	77.5	87	70	17	145	58	NW	NW	73.3	76.6	74.9	.820	.916	.868	94	90	92	0	7	8	S	N	N	1.20
20	77	80	78.5	85	73	12	144	59	E	NW	73.6	78.3	75.9	.829	.968	.898	89	95	92	0	4	0	S	C	S	
21	78	75	76.5	86	71	15	149	63	NW	N	74.6	73.3	73.9	.857	.820	.838	89	94	91.5	0	7	0	S	N	S	.04
22	76	88	82	89	72	17	144	55	NW	NW	72.6	71.6	72.1	.801	.775	.788	89	58	73.5	0	0	0	S	S	S	
23	80	80	80	86	74	12	141	55	NW	N	73.3	76.6	74.9	.820	.916	.868	80	90	85	0	6	4	S	C	C	
24	76	84	80	88	72	16	141	53	N	SW	74.3	77.4	75.8	.848	.938	.893	94	80	87	0	5	0	S	C	S	.10
25	80	85	82.5	89	74	15	156	67	NW	NW	75	76.7	75.8	.867	.922	.894	85	76	80.5	0	0	0	S	S	S	
26	78	88	83	91	72	19	152	61	W	W	72.9	78.2	75.5	.810	.964	.887	84	73	78.5	0	5	0	S	C	S	
27	79	87	83	90	71	19	151	61	NW	NW	73.9	75.5	74.7	.839	.884	.861	85	69	77	0	3	1	S	S	S	
28	78	89	83.5	91	72	19	145	54	N	N	73.6	76	74.8	.829	.895	.862	89	65	77	0	10	4	S	N	C	.86
29	77	85	81	87	70	17	139	52	N	W	73.6	76.7	75.1	.829	.922	.875	89	76	82.5	0	8	3	S	N	S	.62
30	76	84	80	87	72	15	149	62	NE	N	74.3	77.4	75.8	.848	.938	.843	94	80	87	0	6	0	S	C	S	
31	78	77	77.5	85	72	13	138	53	NW	NW	74.6	73.6	74.1	.857	.829	.843	89	89	89	0	7	8	S	N	N	.18
Mean.	77.1	82.4	79.7	87.2	72	15.2	134.2	47	NW	NW	73.9	75.3	74.5	.838	.878	.856	89.8	79.9	84.8							12.18

Seremban,
13th April, 1910.

Highest Temperature 92
Lowest ,, 70

Greatest Rainfall in 24 hours 1.76

J. LUCY,
Senior Medical Officer.

PENANG.

Abstract of Meteorological Readings in the Prison Observatory, Penang, for the month of March, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°	°	°	°	°	°	°	°	%		Ins.	Ins.
Prison Observatory Penang ...	29·851	149·8	81·7	90·6	70·4	20·2	77·5	·893	74.7	82	N.-W.	9·28	2·28

Surgeon's Office,
Penang, 16th April, 1910.

M. E. SCRIVEN,
Assistant Surgeon.

A. H. KUN,
Senior Medical Officer.

NEGRI SEMBILAN.

Abstract of Meteorological Readings in Negri Sembilan for the month of March, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Seremban Hospital		134.2	79.7	87 2	72.	15.2	76.6	.856	74 5	84.8	NW	12 18	1.76
Mantin												8.08	1.72
Tampin												11.17	1 60
Kuala Pilah												8.99	1 61
Jelebu												8.54	2.01
Port Dickson Town												2.74	.52
Do. Beri-Beri												5.67	1.18

Senior Medical Officer's Office,
13th April, 1910.

A. J. M. CLARK,
S. M. O.

PAHANG.

Abstract of Meteorological Readings in the various Districts of the State for the month of February, 1910.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
Kuala Lipis	...	...	77	91	62	18.5	76	...	...	...	...	14 75	3 33
Raub	...	...	74	91	66	19.0	71	...	...	...	...	10.15	1.74
Bukit Fraser	...	...	...	...	55	...	...	...	...	...	...	13.28	2.87
Bentong	...	...	79	92	66	17.3	75	...	...	...	...	8.32	1.46
Temerloh	...	...	...	92	74	16.7	...	...	...	...	...	8.40	3.50
Pekan	...	...	79	88	70	11.4	76	...	...	...	...	18.05	4.12
Kuantan	...	...	82	90	68	14.1	76	...	...	...	...	10.27	2.57
Sungei Lembing	...	...	...	87	67	...	...	...	...	...	...	19 11	2.86

Office of the Medical Officer in Charge,
Kuala Lipis, 1st April, 1910.

S. C. G. FOX.
Medical Officer in Charge, Pahang.

PERAK.

Abstract of Meteorological Readings in Perak for the month of March, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
Taiping	...	154	82.06	91	71	20	77 60	886	...	81	...	16.60	3.00
Kuala Kangsar	...	...	79.65	92	70	22	74.19	773	...	76	...	7.42	1.71
Batu Gajah	...	159	80.13	91	72	19	75.63	827	...	80	...	13.29	2.32
Gopeng	...	...	78.85	90	61	29	74.40	792	...	80	...	18.00	3.25
Ipoh	...	...	80.30	92	71	21	76.72	873	...	85	...	11.43	2.81
Kampar	...	...	79.37	92	70	22	75.35	825	...	82	...	21.93	3.80
Teluk Anson	...	...	80.78	92	69	23	76.63	862	...	82	...	11.41	2.12
Tapah	...	...	79.78	92	68	24	75.83	840	...	82	...	20.53	2.65
Parit Buntar	...	...	80.36	90	72	18	76.55	860	...	82	...	5.77	1.45
Bagan Serai	...	...	80.59	90	71	19	76.74	866	...	82	...	8.05	4.05
Selama	...	...	80.39	93	72	21	76.64	863	...	82	...	13.18	2.25

Office of Senior Medical Officer,

Taiping, 12th April, 1910.

W. B. Orme,

For Senior Medical Officer, Perak.

SELANGOR.

Abstract of Meteorological Readings in the various Districts of the State for the month of March, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
General Hospital, Kuala Lumpur ...	29.878	142.0	79.9	88.9	71.6	17.3	75.7	0.811	73.1	80	S. E.	9.65	1.58
Pudoh Gaol ,, ...	...	...	...	...	...	...	...	...	...	...	...	15.79	2.93
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	12.65	1.70
,, Klang...	...	...	...	88.4	69 7	18.7	...	...	...	...	...	8.35	1.18
,, Kuala Langat	...	...	...	88.0	72.6	15.4	...	...	...	...	...	4.98	1.75
,, Kajang	...	...	...	84.9	74.7	10.2	...	...	...	...	...	12.08	3.45
,, Kuala Selangor ...	...	...	...	88.1	72.1	16.0	...	...	...	...	...	6.02	1.65
,, Kuala Kubu	...	...	...	91.5	70.7	20.8	...	...	...	...	...	25.57	2.64
,, Serendah	...	...	...	91.7	70.6	21.1	...	...	...	...	...	22.11	3.48
,, Rawang	...	...	...	89.6	71.1	18.5	...	...	...	...	...	16.42	2.15
,, Sabak Bernan... ...	...	...	...	...	...	...	...	...	...	...	...	5.60	1.70

Office of the Senior Medical Officer,
Kuala Lumpur, 2nd April, 1910.

W. D. FREER,
Senior Medical Officer.

KELANTAN.

Abstract of Meteorological Readings in Kelantan for the Month of March, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Mean Maximum.	Temperature. Mean Minimum.	Temperature. Mean Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Mean Vapour Tension.	Hygrometer. Mean Dew Point.	Hygrometer. Mean Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
		° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	%		Ins.	Ins.
Kota Bharu ...	...	154.0	80.3	86.6	73.5	13.1	76.0	...	...	...	...	6 42	1.26
* Kuala Lebir ...	...	...	77.16	88.58	72.72	15.85	74.77	.815	73.10	87.38	...	5.54	1.37
* Kuala Kelantan ...	...	...	...	83.74	74.06	9.76	...	...	...	...	...	4 49	1.28
* Taku Plantation ...	...	...	...	...	...	...	...	...	...	...	...	5.08	1.04
* Pasir Besar ...	...	...	...	...	...	...	...	...	...	...	...	7.05	1.16
* Nenggiri ...	...	...	...	...	...	...	...	...	...	...	...	3.98	.93

* Supplied by the courtesy of the Duff Development Coy., Ltd.

Residency Surgeon's Office,
Kota Bharu, *20th April, 1910.*

John D. Gimlette,
Residency Surgeon, Kelantan.

PENANG.

Daily Nine Hours' Observations taken at the Prison Observatory during the month of March, 1910.

Date.	Barometrical Readings corrected and reduced to 32° Fah. 9 H.	Wind. Direction. 9 H.	Wind. Velocity per hour past 24 hours.	Temperature. (a) 9 H.	Temperature. (b) Maximum of past 24 hours.	Temperature. (c) Maximum of past 24 hours.	Cloud. 9 H.	Rainfall during past 24 hours.	State of whether. 9 H.
1	29.859	W	3	83	90	70	0	.64	Clear.
2	,, 834	SE	4	80	89	72	0	.71	,,
3	,, 865	N	7	79	90	70	0	.06	,,
4	,, 859	NW	9	80	91	70	0	.20	,,
5	,, 862	NE	12	80	91	69	0	...	,,
6	,, 854	N	15	83	91	69	0	.10	,,
7	,, 895	NE	18	83	90	70	0	.03	,,
8	,, 886	N	21	82	90	70	0	.13	,,
9	,, 759	NE	2	83	91	70	0	.90	,,
10	,, 759	E	5	74	91	69	10	2.28	Rain.
11	,, 965	NW	9	84	91	72	7	...	,,
12	,, 959	N	11	81	92	70	0	.10	Clear
13	,, 962	N	14	83	90	72	0	...	,,
14	,, 975	NE	16	81	90	70	0	.04	,,
15	,, 946	N	18	84	90	70	0	...	,,
16	,, 945	E	21	83	90	71	0	.02	,,
17	,, 899	NE	3	82	91	69	0	.21	,,
18	,, 844	NE	5	84	92	70	0	.03	,,
19	,, 862	NE	7	80	91	70	0	.06	,,
20	,, 892	NE	9	82	91	70	0	...	,,
21	,, 888	NE	12	84	91	70	10	.84	Rain.
22	,, 860	NW	16	80	91	70	0	...	Clear.
23	,, 909	NE	20	85	91	70	0	...	,,
24	,, 860	NE	2	83	91	70	0	.05	,,
25	,, 883	N	3	80	90	70	0	.01	,,
26	,, 954	N	6	86	91	69	0	.58	,,
27	,, 899	NE	9	80	91	70	0	.20	,,
28	,, 888	NE	11	84	91	71	0	.69	,,
29	,, 815	NE	16	80	90	70	0	1.02	,,
30	,, 844	NE	19	84	91	70	0	.24	,,
31	,, 865	N	1	81	90	70	0	.14	,,

R. DANE,
Senior Medical Officer, S.S,

KUALA TRENGGANU.

Meteorological return of Kuala Trengganu District for the month of March, 1910.

Date.	Thermometer. 9 A.M. Maximum.	Minimum.	Range.	Rainfall. 6 P.M. Inches.	General Weather Observations.
1	82	75	7	...	
2	82½	76	6½	...	
3	83	75	8	08	
4	82	75½	6½	1.20	
5	84	75	9	...	
6	84½	74	10½	1.26	
7	80½	75	5½	07	
8	83	76	7	01	
9	81½	75	6½	1.38	
10	84	76½	7½	1.40	
11	83	77	6	01	
12	83	75	8	1.55	
13	81½	76	5½	05	
14	82	76	6	01	
15	81	75	6	...	
16	81	74	7	08	Greatest diurnal range 10.5
17	82	76	6	...	
18	82	75	7	...	
19	83	76½	6½	...	14 rainy days.
20	83	76	7	...	
21	84	76½	7½	08	
22	85	75½	9½	...	
23	84	78	6	...	
24	84	76	8	...	
25	85	77½	7½	...	
26	86½	78	8½	60	
27	86	78	8	...	
28	85	77½	7½	80	
29	84	76	8	90	
30	83	76	7	85	
31	83½	75	8½	1.00	
Means.	83.17	75.91	7.25		
			Total ...	11.33	

Highest shade Temperature 86.5 } Range 12.5
Lowest do. 74 }
Greatest rainfall in 24 hours 1.55

W. L. CONLAY,
British Agent, Trengganu.

No. 6.] JUNE, 1910. Vol. IX.

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EDITED BY

H. N. RIDLEY, M.A., F.R.S., F.L.S., F.R.H.S.
Director of Botanic Gardens, S.S.

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Printed at the Straits Times Press, Ltd., Singapore.

No. 6.] JUNE, 1910. Vol. IX.

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Director of Botanic Gardens, S.S.

From the first of January, 1910

The Price of the Bulletin will be as follows:

Annual Subscription for Straits Settlements and Federated Malay States ..	$5.00
Annual Subscription for other places in Malaya	$5.50
Annual Subscription for India and Ceylon	Rs. 9-8-0
Annual Subscription for Europe (Thirteen Shillings)	£0-13-0
Single Copy	50 cts. or s. 1/2 d.
Whole Volume	$5.00

All Subscriptions are payable strictly in advance.

To be purchased at the Botanic Gardens, Singapore, from Messrs. Kelly and Walsh, Ltd., No. 32 Raffles Place, and 194 Orchard Road, and The Straits Times Office, Cecil Street, Singapore.

Printed at the Straits Times Press, Ltd., Singapore.

AGRICULTURAL BULLETIN

OF THE

STRAITS

AND

FEDERATED MALAY STATES.

No. 6.] JUNE, 1910. [VOL. IX

HISTORICAL NOTES ON THE RUBBER INDUSTRY.

When history is written, even of such a subject as the story of discoveries and inventions connected with the rubber industry, it is advisable that it should be not only complete but accurate. We are led to this observation by reading certain articles in the recent numbers of the India Rubber Journal and India Rubber World and Dr. Willis' "Agriculture in the Tropics". In these papers the incompleteness and inaccuracy lies in the account of the so-called re-discovery of wound-response, which it was first claimed was an original discovery by Messrs. Willis and Parkin, in 1899, but later as a re-discovery of a phenomenon known to the Amazons seringueiros and some other points.

The discovery that the second and later tappings of a rubber tree produce a greater flow of latex than the first is one that no one can possibly overlook who taps a tree consecutively for a few days running and notes the result.

In the India Rubber Journal of March 21, 1910, an account is given of an article in Science Progress, by Mr. Parkin, who visited Ceylon in 1899, but unfortunately did not visit Singapore, where he would have found not only a much larger collection of rubber-producing plants, and a much greater number of Para rubber trees of good size, but also that experiments in rubber tapping had been carried on for ten years previously, and that the phenomenon of wound-response had been known for many years.

One is glad to see that he mentions the work done by Dr. Trimen, and the interest he took in the possibilities of profitable cultivation of *Hevea braziliensis*, for Dr. Trimen has not of late years received the share of credit for his work in this matter and in other agricultural, horticultural and botanical work that was due to him.

On my first coming out to the East in 1888, I stopped for a month on the way with Dr. Trimen at Peradeniya, and had an opportunity of seeing the fine Para rubber trees at Heneratgode, and talking with Dr. Trimen about their tapping and the possibilities of a future rubber industry.

On my arrival at Singapore I found in the Economic Gardens more than ten times as many Para rubber trees than there were at Heneratgode. These had been planted by Mr. Cantley, who, like his predecessor Mr. Murton, had foreseen a future for rubber.

These trees, however, had been much overgrown with secondary growth, at which no one will wonder when I say that the vote for keeping up the Economic Gardens, about 120 acres, which were almost entirely overgrown with dense secondary forest, only paid for ten coolies and a mandor.

As soon as was practicable the rubber ground was cleared of undesirable trees and shrubs, and I and my assistant commenced to examine into the tapping of the rubber trees.

In these years we had annual Horticultural Exhibitions in Singapore, the first of which, after my arrival in 1888, was held in 1889. Besides the exhibition of plants and flowers we always showed specimens of new or interesting economic products grown and prepared in the Botanic Gardens, such as tea, coffee, fibres, etc. and always with them were samples of Para rubber from the old trees in the Gardens. I am not sure if there were any on view in 1889, but there certainly were in 1890, when the Duke and Duchess of Connaught visited the show.

The trees were tapped in the herringbone method and the latex collected in cigarette-tins and allowed to coagulate naturally in the tins without the use of acid. The tins were square, and had a hinged lid which could be closed over the cup to prevent the falling in of dirt as described in the Bulletin of 1897. These tins were bought by the dozen in the bazaar, and used for a long time. One of these small blocks of rubber is preserved in the museum of the Botanic Gardens, Singapore, and though quite black it is firm, clean, sound and good though nearly 20 years of age. A piece of rubber made in a saucer, one of the first "biscuits" (made 1893) is also sound and good. But most of these samples were distributed to various institutions and to persons interested in it who sent them to their firms at home.

Needless to state we discovered what is now called "wound response" shortly after we commenced tapping in 1889, but from some Brazilian seringueiros who visited the Gardens later, I found that it was well-known to them, so did not record it as an important discovery on my part. At that time the preliminary tapping before taking the latex on the second day was called "Calling the rubber," and when samples of rubber were required for any purpose a man was sent to "call the rubber" two or three days beforehand. At this date, twenty years since I commenced tapping the rubber trees I cannot remember when I actually discovered the wound-response for myself.

Many planters and agriculturists, and Dr. Trimen himself, visited the Gardens in these early days, and the advantages of rubber as a crop was urged on them. They were shown the trees, system of tapping and specimens, and the necessity of "calling the rubber" before collecting in bulk was explained to them, and they often carried away with them samples of the prepared rubber. Many of them came from Ceylon or had intimate relations with Ceylon. All this was going on some years before Mr. Willis or Mr. Parkin came to the East at all, or had seen a rubber tree.

Mr. Wright, in talking of Mr. Willis' discovery of "wound-response", (this word indeed seems to have been invented by Mr. Parkin or Willis, but it does not occur in Parkin's first account of his experiments) says that it is of great practical importance in rubber cultivation, and also of great botanical interest. I fail to see where the great practical importance comes in, at present; we knew of it all along, and the chief value of its knowledge was that in early days a few ignorant people who attempted to tap a tree one day, and did not find the rush of latex at first that they expected thought, till they knew of it, their trees were useless. Should we, however, find out the real meaning of it we might gain some knowledge of the functions and physiology of latex which could not fail to be of value, but at present we are not much wiser to-day on this subject than we were in 1890.

Mr. Parkin's original paper, published in Ceylon circular 12-14 June, 1899, was one of considerable value, although many of the facts were already known to those who had been studying rubber for some years.

Unfortunately, in those early days of Singapore, it was almost impossible to get any agricultural research work published in any reasonable time. We had to depend on the services of the Government Printing Press, which was so full of work that papers took any time from six to eighteen months to get printed, and we had, as before remarked, too small a vote to spend a cent on printing from our funds.

Biscuits.

Mr. Willis, in his Agriculture in the Tropics, gives so odd an account of Mr. Parkin's invention of Biscuits that it is worth quoting: "Not only did Mr. Parkin work out the wound-response and thus change what appeared to be only a moderately remunerative industry into a very profitable one, but he also worked out the way of coagulating rubber into "biscuits" the form in which the bulk of the cultivated Para Rubber has hitherto appeared on the market, (for the sheets of

Malaya are simply larger biscuits). Instead of allowing the latex to run down the tree and thus become dirty and instead of allowing it to dry into a mass of dingy black rubber in a coconut shell, he showed that it could be collected in little tins placed one under each cut and then mixed together and coagulated with a certain amount of acetic or other acid". This discarded system was the one adopted by Dr. Trimen in 1888, and Ceylon had made no further progress till 1899. The coconut shell system was never, I need hardly say, used in the Botanic Gardens, Singapore, but the herringbone system of tapping and the cigarette tins and saucers were adopted in 1889, just ten years previously, and specimens of the rubber so made had been freely distributed to many parts of the world, long before Mr. Parkin made his great invention. There is absolutely no suggestion as to making biscuits, sheet or any other definite form in his paper at all!

The following is Dr. Trimen's description of his process. The method followed was to smooth the surface by scraping off a little bark to a height easily reached and then to make with a ¾ inch chisel numerous shaped incisions at the foot of the tree; coconut cups were fastened with clay and the milk conducted to them by little ridges of clay. Most of the milk dried on the tree in tears. The tapping was done in the afternoon.

The real story of the "invention" of biscuits, or "pancakes" of rubber as they were called, is this: When, in the Botanic Gardens, Singapore, we began to tap regularly we desired to get a form of rubber which dried more rapidly and kept a cleaner, brighter colour and sought about for a more suitable form of vessel to set the rubber in. As no funds were available for anything expensive and any specially made vessel, however, simple, was too costly for our experiments, we hit upon the common enamelled iron plate which is extensively sold in Singapore, and being in common use by natives was very cheap. These were found quite satisfactory, and the form that the rubber took in them was that of the well-known biscuit. Biscuits of rubber were made and most of them given away to various persons interested in rubber, and very likely found their way even to Ceylon, in about 1897.

Sheet was made soon after, at first in a photographer's developing tray of fairly large size, which we happened to find in Singapore.

In any case I cannot find anywhere that Mr. Parkin ever made or thought of a single biscuit. He gives in his paper no suggestion as to this whatever, beyond saying that commercial rubber can be freed from moisture and putrefaction by drying it in thin sheets.

Mr. Curtis writes in his annual report for 1898, about rubber taken from the Penang trees: "A sample was submitted to Messrs. Heckt, Levis and Kahn, for valuation, who reported it as beautiful rubber, very well cured, worth to-day 3/3 per lb." This was tapped and collected in tins which he describes nearly two years before Mr. Parkin discovered the method of making it in this manner, and it was by no means the first sample sent home to the rubber dealers from the Straits.

Rubber grown by Mr. Tan Chay Yan, the first practical rubber planter in the Colony, was exhibited at the Malacca show in 1898. This was the first Para rubber shown for competition from the Straits. It was grown in Malacca at Bukit Lintang.

In Mr. Derry's report of Government Plantations in Perak 1897, he says:

"Many trees have been tapped and a report on the work submitted. The rubber obtained is not yet sufficiently smoked for sending home, but samples have been valued in Mincing Lane at 2/8 and 3/- a pound and considered equal to the best Brazilian produced rubber and also worth 1/- a pound more than that usually sent home from the Straits. He gives also a number of figures of returns from trees of various ages." He sent home in 1899 the first large parcel of Para rubber from the Malay Peninsula; it realised £61. 1. 6.

Willis' "Agriculture in the Tropics," which we do not intend to review here, only gives an account of Tropical Agriculture as seen in Ceylon. Economic plants not cultivated or of importance there are scrappily and often inaccurately described (e.g. Sago, Ipecacuanha.) It is apparently not intended for a general work on Agriculture in the tropical regions, and this is doubtless the reason why the work with Para rubber done in the Straits Settlements is entirely ignored. Unfortunately it is clear from the journals which quote from it that the readers are under the impression that the account of the development of the rubber industry in Ceylon, as given by Mr. Willis, gives the whole history of the rise of the industry in the East which is far from being the case.

Practically nothing was done in Ceylon to push the industry or to experiment with the Para rubber trees from 1888 to 1897. Even the stock of trees at the Gardens seems to have been hardly increased. Meanwhile, at Singapore, as far as was possible, everything had been got ready for the development of the future industry. A large number, about 1,400 trees, had been planted to supply the stock of seed, a good many dispersed to various parts of the Peninsula, to District Officers and planters. Experiments in tapping in various forms had been made, wound-response had been re-discovered, block and biscuit rubber had been made, specimens exhibited at exhibitions, distributed to various persons and institutions interested in planting, and sent to rubber dealers who had valued it at the top price of the market (1896), while a number of experiments in growth and flow of latex had been tried. There is still in the Botanic Gardens museum a biscuit dated 1890. It was coagulated without acid and is now quite hard and stiff, though still light in colour, a pale yellowish white. The specimens dated 1893 and 1894 are black and are now showing signs of deterioration, but still fairly sound and elastic.

It will thus be seen that as a matter of history the Botanic Gardens of Singapore were just about ten years ahead of Ceylon when Mr. Parkin first conceived the plan of making respectable looking rubber instead of the messy stuff only known there till 1899. There is nothing whatever to show however that good saleable samples of rubber were made in Ceylon as early as 1899, either published or in the correspondence with Ceylon Botanic Gardens in our office.

Though Mr. Parkin was unable to visit the Singapore Gardens, he obtained a good deal of information as to our work by correspondence, as he sent a long list of questions in 1899, on the subject and asked me to perform certain experiments for him. Mr. Willis writes in answer, April 15, 1899:

> "Mr. Parkin was so busy finishing off his experiments so that he had no time to answer your kind letter about rubber in Singapore before leaving for England and he asked me to do so. We are very much obliged for the information."..........Your trees yield much better than ours, though poorly compared with those at Para, and I am inclined to think that Para rubber planting will never be a big or *lasting* industry in the East."

It must be remembered that rubber was at that date very low in price and that we were all tapping the trees very lightly and with much caution not being sure that the plant would stand the amount of cutting it gets nowadays.

Since writing the above, a copy of the Tropical Agriculturist has come to hand giving Mr. Parkin's paper in Science Progress in full. He modestly does not mention himself by name as the discoverer of wound-response and the art of making clean rubber, but gives the credit of the "discovery" to Mr. Willis and his scientific assistant. As in Mr. Willis' various works in the history of Para rubber industry no allusion is made at all to the work of the Singapore Botanic Gardens. In Willis' "Agriculture in the Tropics" the only allusion to the work done in Singapore is: "But little interest was taken in the trees for about 20 years (i.e. from about 1884) except by the heads of the Botanical departments in Ceylon, Java and Singapore." Now all that was done between 1888 and 1896 in Ceylon was to tap a single tree once a year. In Java nothing at all appears to have been done as the trees in Buitenzorg were too small and wretched to offer any prospect of their being ever likely to be worth cultivating. About 1894 Dr. Treub and Mr. Wigman, of the Botanic Gardens, Buitenzorg, came to visit the Singapore Gardens, and wished to see the rubber trees. On the first sight of the younger ones Dr. Treub turned to Mr. Wigman and said, "Wigman, did you ever see such trees." "No," said Wigman, "nothing like them." I was surprised but found that the Buitenzorg trees were, though as old, quite small and not at all encouraging in appearance. Dr. Treub took the greatest interest in all economic plants, but evidently up to that date had not thought of Para rubber as being a suitable cultivation for Java, and as far as I can gather no experiments or records of observations were made in Java till after 1899. Mr. Willis does not even mention Dr. Trimen's work, which deserves credit as he was the first, I believe, to tap the rubber tree in the East, and to record his results.

Meanwhile, the Botanic Gardens, Singapore, was at work from 1889, and was laying the foundation of the industry and indeed had submitted saleable rubber of first class quality to experts, and had proved that the industry would pay well before Mr. Willis had ever seen a rubber tree. Surely in an account of the rise of the industry purporting to be a history of the Agriculture of the World, this work should not have been entirely ignored. It was known to most of the planters of the East Indies and to many, I am sure, in Ceylon.

It would be too long to detail all the discoveries and inventions made in the Straits Settlements and F. M. S. connected with the industry. They include most of the systems of tapping (except the spiral, which proved a failure); the crepe machines, the forms of rubber known as biscuit, block, crepe and sheet, the wound-response, actual returns of the tree, best method of packing seeds, and the pests, *Fomes, Diplodia Hymenochoete, Termes Gestroi,* etc., and methods of dealing with them. To Ceylon we must credit the worm-machine (invented after the crepe machine) spiral tapping, the pricker and Biffeu's centrifugalizer and the Northway knife. Honour to whom honour is due, the Botanic Gardens of Ceylon have produced valuable papers by Trimen, Bamber, Petch, Green and others and Parkin's paper though anticipated was a useful piece of work.

The following extracts from correspondence from Sir William Thiselton Dyer will show to a small extent how far Singapore had progressed in rubber research before Mr. Parkin wrote his paper in 1899.

> Sir William Thiselton Dyer writes in answer to the Director of Gardens in Dec. 1, 1896.—"I am glad Para rubber is going ahead, I always said the Straits would be the place for it."
>
> June 19, 1897.—"There is a tremendous boom in India-rubber planting. Most of the schemes are simply insane. Your result from a nine year old tree is very good."
>
> Dec. 28, 1898.—"Para rubber seems at last fairly established in the Native States, Derry's report is very promising. Beautifully prepared is only a broker's term. It means that the rubber is clean and free from excessive moisture. I can't imagine why your Para rubber is only quoted at 3/3. I can only suppose it is because it was not smoked."

The reader is also referred to the June number of the Bulletin, 1899 but probably by the time he has read this account he has had enough evidence laid before him that the art of making saleable rubber by tapping into tins and preparing the resulting latex in a clean and pure form of Para rubber had been invented in the Singapore Gardens some years before Ceylon had got beyond the mud and coconut-shell stage and that the discovery by Mr. Parkin in 1899 of the method of making clean rubber was anticipated by nearly ten years, and was perfectly well-known as was wound-response, to hundreds of people in the Straits Settlements and other parts of the East long before Mr. Willis or Mr. Parkin ever came to the East at all.

As previously remarked history, if worth writing at all, is worth writing accurately and completely, and the stories of the origin of the industry as given by Messrs. Willis and Parkin are inaccurate and misleading.

While on the subject of the history of the rise of the rubber industry in the East, it may be as well to print here some letters dealing with the subject in its very early inception, as we think they will be found of considerable interest.

Royal Gardens, Kew,
17th April, 1878.

SIR,

I am desired by Sir Joseph Hooker to acknowledge the receipt of your letter of the 6th April, transmitting an extract from a letter from the Government of India, and requesting the transmission to Ceylon of certain stocks of Hevea and Castilloas.

In replying to this letter, Sir Joseph Hooker thinks it will be convenient that I should review the whole operations of this establishment in effecting the introduction of India-rubber plants into India.

1. Hevea brasiliensis—Para Rubber. On 4th June 1873, we received from Mr. Markham some hundreds of seeds obtained from Mr. Jas Collins. Of these seeds less than a dozen germinated and six (6) of the plants so obtained were taken out by Dr. King, Superintendent of the Botanic Gardens, Calcutta, in the same year to India. The climate of Calcutta did not prove very favourable to the Heveas which require the conditions of growth met with in hot and moist tropical forests. It was, therefore, decided in consultation with Mr. Markham that in the event of more Heveas being raised and sent out from Kew, they should be received at the Botanic Gardens in Ceylon, which should then be regarded as the depot for supplying young plants to such parts of India as were found to be suitable for its growth.

On June 14th 1876, we received from Mr. Wickham about 70,000 (seventy thousand) seeds, of which about 4 per cent. germinated.

On August 9th, we despatched 1,919 plants raised from these seeds to Ceylon in 38 Wardian cases, in charge of a gardener. Of the whole consignment 90 per cent. reached Dr. Thwaites in excellent condition. All subsequent accounts have been satisfactory, and no difficulty is found in multiplying the plants by propagation to any extent.

On August 11th, 50 plants were sent to the Botanic Gardens at Singapore. Owing to the delay in the payment of the freight these plants all perished.

On August 23rd, 50 plants were sent direct to Major Seaton in Burmah. These reached their destination in bad condition.

On September 29th, a further supply of 100 plants was taken out to Dr. Thwaites, in charge of Dr. Duthie, Superintendent of the Botanic Gardens, Saharumpore. These reached Ceylon in good order.

On June 11th, 1877,22 plants were sent to the Botanic Gardens, Singapore. The Superintendent reports that the climate appears suited to their growth.

On September 7th, 37 plants were sent to the Botanic Gardens in Mauritius, and reached the destination in good order.

On September 15th, 100 plants were again sent to Dr. Thwaites and 50 to Calcutta, in charge of Mr. Morris, Dr. Thwaites' assistant. Both consignments reached their destination safely. Of those sent to Calcutta a portion was immediately despatched by Dr. King to Major Seaton, with whom they are now doing well. It appears, therefore, that while upwards of 2,000 plants are safely established in Ceylon, smaller parcels are also growing in Burmah, Calcutta, Mauritius and Singapore. The plant is now therefore to be regarded as definitely established in the East Indies, and with ordinary horticultural skill, in the course of a few years, in raising an indefinite number of young plants.

Beyond keeping a small stock for occasional distribution it does not appear that this establishment is called upon to take any further steps for the propagation and distribution of this plant to India.

I should add that, on November 21st 1876, Mr. Cross reached Kew with about 1,000 young plants brought direct from South America. Only about three per cent. of these plants survived, and they, therefore, contributed but little to our resources for distribution.

2. Castilloa elastica—Rubber of Central America. Sir Joseph Hooker has already stated, in a letter to the India Office, dated April 1st last, what has been done with respect to this kind. I quote the following passage: "The cuttings brought home by Mr. Cross were received on October 3rd 1875 (The seeds 7,000 received previously failed to germinate). Steps were immediately taken to establish and propagate them, and on August 9th 1876 32 healthy plants were forwarded to Dr. Thwaites, 28 of which he subsquently reported were well established in Ceylon and doing well."

On September 15th 1877, a further consignment of 24 planst, was transmitted to Dr. Thwaites in charge of Mr. Morris. A few plants have also been sent to Mauritius and Singapore. The propagation of this species will for the present be continued at Kew, and during the ensuing summer a further small consignment will be sent to Ceylon. Cuttings do not strike so readily as those of the Hevea, and the multiplication of plants is therefore necessarily slower.

3. Manihot Glaziovii—Ceara rubber. Mr. Cross brought to Kew, on November 21st 1876, seeds and cutting of this plant from which a stock of 55 individuals was eventually obtained.

On June 11th of last year, four plants were sent to Singapore and on September 15th, at which date our stock had increased to 300 plants of all sizes, 50 were sent to Dr. King at Calcutta, and 50 to Dr. Thwaites in Ceylon, both in charge of Mr. Morris. All the stems collected by Mr. Cross were divided between these two recipients. At the end of the year our stock amounted to about 450 plants.

There will be no difficulty therefore in sending a supply of plants of this species to the Conservator of Forests in Madras in accordance with the wish of the Government of India. It will, however, probably be most convenient to treat Calcutta as the depot for the Ceara rubber plants, as Ceylon must be for Heveas and Castilloas.

With respect to plants of the Copaiba Balsam, nothing can be done. From the five (5) seeds brought to Kew by Mr. Cross, November 21st 1876, only two plants have been raised, and these grow with excessive slowness. Nothing can therefore be done at present in propagating them.

Recapitulating, I have therefore to state that Sir Joseph Hooker is of opinion:—

(1) That it is unnecessary to transmit any more Hevea plants to India, and that application should be made for them to Ceylon when required for experimental cultivation.

(2) That as the stock of Castilloas at Kew increases, further consignments should continue for the present to be made to Ceylon.

(3) That plants of the Ceara rubber may with advantage be forwarded to Madras, but that the principal stock of young plants should be sent to Calcutta from which they can be distributed.

(4) That for the present nothing can be done, as far as Kew is concerned, with the balsam of Copaiba.

I have, etc.,
(Sd.) W. T. Thiselton Dyer.

The Under Secretary of State for India.

Note—1. Mr. James Collins, really the first man to bring the plant from the Amazons to Europe, was afterwards Government Economic Botanist at Singapore. He only remained about a year, and retired. He was the author of a report, apparently the first real account, of the rubber industry in South America (Report on the caoutchouc of commerce by James Collins 1872).

He described and figured the herringbone system of tapping, and invented several forms of tapping knives, among which is the well-known "Farrier's knife" which was also suggested by Mr. Mann, and was used for marking timber in Hanover at that time. He suggested the use of iron vessels for catching the latex in place of the folded leaves plastered to the trunk with clay or calabashes. Clay, he says, contaminates the milk in a very objectionable manner. Yet this system was the only one in Ceylon till 1899, with a coconut shell substitute for the calabash.

2. Plants were sent to Burmah, Mauritius and Calcutta, besides Ceylon and Singapore. The plant has always failed in Calcutta, but neither Mauritius or Burmah seem to have taken any trouble to continue its cultivation. In fact, though later the plant was sent to all the other tropical gardens of the Empire, Ceylon and Singapore alone saw the importance of continuing to propagate it so that, thanks to Thwaites and Trimen, Murton and Cantley, there was a sufficient stock of plants and seeds to start the industry when the demand for cultivated rubber sprang up. But though there were upwards of 2,000 Para rubber plants sent to Ceylon in 1877, there seem to have been in 1899 only about 70 trees in the Heneratgode and Peradeniya Gardens, while in Singapore, which received 22 plants in 1877, there were over a thousand full grown trees and from the plants taken up to Perak by Murton some hundreds at least at Kuala Kangsar and Taiping Gardens, ready as stock for the expected demand.

3. It is interesting to note that Singapore had the first Ceara rubber plants in the East.—Ed.

Colonial Secretary's Office,
Singapore, 6th September, 1878.

Col. Sec. No. 4072/78.

Sir,

I am directed to transmit to you for your information a copy of a letter from H.B.M's Resident at Perak upon the subject of the

progress and state of the plants of American Rubbers which were sent to Perak from the Botanic Gardens.

I have the honour to be
Sir,
Your obedient servant,
(Sd.) J. A. SWETTENHAM,
Assistant Col. Secretary, S.S.

The Superintendent,
Botanic Gardens,
Singapore.

Residency, Kwala Kangsar,
26th July, 1878.

No. 202/78.

SIR,

In reply to your letter No. 3590 of the 20th July, 1878, requiring a report on the progress and state of the plants of American rubbers which were sent to Perak from the Botanical Gardens, I have the honour to state that the only plants of this description within my knowledge are one plant of what I suppose to be the Hevea and nine of the Manihots.

These were brought here by Mr. Murton in October last and planted at the back of the Residency and are growing very well.

They were quite small when they arrived here but the first is about 5 feet high with branches of equal length and the Manihots vary from four to eight feet and are growing vigorously.

I believe Mr. Murton left plants of some kind at Durian Sabatang and at Thaiping or Matang and I will send on your letter to those places in order that if this were the case some report of their condition may be obtained, but I did not see anything of them in either places on my last visits there, though I carefully inspected the African Coffee, Cloves, Chinese fruits, and Australian plants growing on the Residency hill at Thaiping.

There are many Districts in Perak which would, judging from what I have read of the Hevea habitat, be very suitable to the cultivation of these plants, this hill on which they are now growing well is of river gravel and I have no doubt they would have been much stronger in alluvial soil.

I have the honour to be,
Sir,
Your obedient servant,
(Sd.) HUGH LOW,
Resident.

The Hon'ble
The Colonial Secretary, S.S.,
Singapore.

From this letter it will be seen that Sir Hugh Low was not the introducer of the Para Rubber plant to Perak, but that the plants were brought to Perak by Mr. Murton. This has been proved by other letters in an earlier number of the Bulletin, but the error still frequently appears in various publications. It was probably started by a rather misleading statement in Mr. Wray's memorandum published in 1897 which begins: "The first seed of the Para rubber (*Hevea Braziliensis*) was introduced into Perak in the year 1882 by Sir Hugh Low, the then British Resident. It was sent to me to plant but did not germinate having been kept too long after picking. A second lot was received a short time after and was planted at Kuala Kangsar." These seeds were from the Botanic Gardens, Singapore, where the trees began to fruit in 1882.—Ed.

CHRONOLOGICAL TABLE OF THE PARA RUBBER INDUSTRY FROM 1873 TO 1899.

1873	....	Seeds received at Kew from Mr. Collins.
1876	....	Seeds received from Mr. Wickham First plants arrived in Ceylon.
1877	June.	First plants received alive at Singapore.
	Oct.	Mr. Murton plants the first tree in Perak.
1881	....	Trees first fruited in Singapore.
1882	....	Seeds sent to Kuala Kangsar, and planted by Mr. Wray. First seed also sent to Sarawak from Singapore.
1884	....	Dr. Trimen commences to tap the trees in Ceylon.
1885	(circ)	First fruiting of Ceylon trees.
1889	....	Trees first tapped in Singapore, tins used for catching latex.
1890	....	First biscuits exhibited at a Horticultural Show Singapore.
1891	....	Rubber sent to Messrs. Silver from Singapore Gardens pronounced of very good quality.
1892	....	Dr. Trimen sends to Kew 2lbs. of Rubber grown at Heneratgoda.
1893	....	Rubber plants and seeds distributed to all District Officers and Residents in the Federated Malay States to plant near their houses from Botanic Gardens, Singapore. (Plants had been distributed to planters for some years previously).

1895 .... Mr. Kyndersley starts the first practical Estate in the Federated Malay States.

1896 .... Dr. Willis arrives in Ceylon
Rubber block and biscuit sent home from the Gardens valued at 2/8.

1897 .... Mr. Derry sends rubber from Perak valued at 2/8 to 3 per pound.

1898 .... Mr. Curtis sends rubber from Penang alued at 3/3 per lb.

Mr. Tan Chay Yan exhibits plantation grown rubber at Malacca exhibition.

1899 .... Mr. Derry sends rubber from Perak, sold in England for £61—1—6 (3/10 per lb.) sheet.

1899 June. Messrs. Parkin and Willis publish the discovery of wound response and the method of collecting latex in tins.

COCONUTS IN PEAT SOIL.

Mr. Lermit kindly sends an instructive photograph of Coconuts cultivated in the same kind of peat soil which has been already described as utterly unsuitable for Para rubber.

The coconut palms were first planted some twenty-five years ago and at present the yield of nuts is practically nil. The depth of peat is fifteen feet. The photograph shows a number of the palms of fair size, but most with bent stems, as we are accustomed to see in soft wet ground, and a number of young ones of a fairly good habit. The ground beneath the trees is covered with a thick mat of grass and ferns, the Lamiding *Acrostichum* being the most conspicuous.

The effect on the trees seems to be that of swamp land. Coconuts grown on low lying damp soil, insufficiently drained, are bent and lie at all angles sometimes nearly horizontal and though attaining often a good size fruit little or not at all. A curious thing I observed about such trees many years ago was that they were never attacked by coconut beetles, though in some cases the surrounding trees were freely attacked. This suggests that some part of the nutriment for the nuts, which is also attractive to the beetles, is absent from the tree.—Ed.

KAPOK AS A TEXTILE.

Hitherto Kapok has been found to be unspinnable as the fibre is too short and brittle, and consequently has been only used for stuffing pillows. Now it is reported that the Germans have discovered a process of spinning it into yarn, as they have the equally short fibre of Calotropis procera, Mudar fibre. Why do not the English people discover and secure as the Germans have done so many processes such as these which would bring wealth to the nation? It is probably due to the well-known contempt for scientific research in our nation.

"By means of a process evolved by Professor Goldberg, of Chemuitz, the brittle and fragile fibre of the kapok tree is treated in such a way as to render it easily spinnable and yarn up to 12 English is now being spun from it. The yarn is of fine quality and of very soft silky tenacious character. The process in question does not necessitate the employment of any new machinery, but is based entirely on a novel and somewhat complicated system of preliminary preparation and spinning.

The process is, of course, a secret one (Queensland Agricultural Journal, April 1910, p. 174.)

Kapok lis common here and of no great value up-to-date, but this discovery may make it a very paying crop.

The Australian journal quoted finishes its article by saying: "Kapok, sisal, and cotton thrive well in Queensland but the high wages demanded by the white labourer are such a serious handicap that it will probably pay the Australian manufacturer to import the raw material produced by cheap black labour than to encourage agricultural enterprise in this direction in any of the States of the Commonwealth." Australia has a large area of tropical country which cannot be properly worked by the white labourer and what tropical work can be done by him costs out of all proportion to the profits. As long as Australian socialists talk about white labour in tropical Australia, she will have to buy the tropical produce she requires from other countries instead of producing it herself, and her valuable land will be almost worthless. Another example of the way not to do things.

RUBBER IN QUEENSLAND.

The same journal gives estimates for opening up rubber estates in Queensland by white labour. White labour costs there £8. 4s per month, and opening up a 500 acre block of rubber to the sixth year would cost £33,872, or £67.15s an acre, that of New Guinea under black labour £10,500 or £21 per acre while the same acreage in the Malay Peninsula is given at £10,500 or £21 per acre. The cost of Papuan labour is given at one pound a month, 8.57 dollars.

In the estimate for Australia with white labour, it is expected to pay off the cost of the estate and get a profit of £11,128 in the end of the seventh year and of £45,000 in the eighth and following years from which must be deducted freight, cases and some contingencies. The rubber is valued at 5 shillings a pound which for a permanent estimate price is perhaps high, and cost of collecting 1 shilling a pound, but if with native labour here the cost of collecting amounts to this price, with white labour at 8 times the cost it is hardly likely to be as low. As a set off against this, however, there is no assumption of profit for rubber taken before the sixth year, which if the trees grow well might easily be added. However, even with white labour only a good profit would probably be made, but of course nothing like what black labour would give.

ANOTHER PARA-RUBBER FUNGUS.

On two or three occasions we had observed that on dead trunks of Para rubber trees, after being untouched for some weeks the outer corky layer of bark split off in flakes and beneath appeared large black patches of a fungus.

This fungus was in the form of a crust, black, hard and rather brittle about $\frac{1}{16}$—$\frac{3}{8}$ inch thick and looking like dried tar or asphate. It formed rather irregular patches of various sizes from one to ten inches across the edges of the patches being rounded, and the mass usually longer than broad. In one tree about 25 years old and about two feet through, there were no previous signs of any disease but the tree rather suddenly died and the fungus came out on the wood some weeks later. Since then the next tree to it has died, much in the same way as if it had been killed by Fomes, but it was not attacked by that. On removing the stump we found that just below the tree was an accumulation of foul smelling water. The roots of the tree were quite dead. Several other trees in this part of the garden, but at some little distance, died in a somewhat similar manner. None of these, however, so far as I remember except the first mentioned one, showed any sign of the fungus after death, and indeed on seeing the foul putrid mass of water and decayed sticks in which the trees' roots had been living, I was more surprised that they had lived so long than that they had died.

About the end of last year, a smaller tree eight inches through in another part of the garden was overset with several others by a gale and its roots were badly broken. It was replaced in position but never recovered and remained erect, but dead for some time.

It then developed the fungus in several parts of the stem from about 5 feet downwards. I then cut it down and sent a section of the tree with the fungus to Dr. Prain, of the Royal Gardens, Kew, who asked Mr. Massee to report upon the thing. I submit his report.

Fungus on Para Rubber Tree.

The fungus proves to be an undescribed species of *Eutypa*, and will be called *E. caulivora*. It is probably a true parasite, judging from what is known respecting other species of *Eutypa*, a constant feature of which is that the fungus persistently remains in a vegetative—and thus aggressive—condition, so long as its host remains alive, and only comes to the surface to produce fruit when the host is absolutely dead. The numerous black streaks, deep in the wood of the specimen sent, are produced by the mycelium of the fungus, which in all probability permeated the whole of the wood, and had been at work for a considerahle period of time. Such a development of mycelium is unknown as a *post mortem* result.

GEORGE MASSEE.
6/iv/10.

Dr. Prain adds: " I do not like the look of the thing at all. "

My impression was that it was altogether a post mortem fungus, but it is possible that this is not the case. I cannot find any account of any species of the genus in such fungus books as we have here, so cannot add any more information about it.

As the plant does not produce fruit till the tree is quite dead and indeed not for some weeks later, there ought to be no difficulty in keeping it from doing damage by simply destroying all dead trees or timber and taking care not to leave piles of logs and sticks lying about near the plantation. But as in all other cases the planter must keep a sharp look-out for this as for any other fungus, and nip it in the mycelium.

Death from unknown cause even of one or two seedlings ought to be investigated by the planter, and if he cannot convince himself reasonably that it was due to definite accident, or is not clear as to the cause, he should at least watch to see if it is disease and is showing signs of spreading. We have seen a case of out-break of Fomes put down by the planter as due to oversetting of the trees by wind, when it was sufficiently obvious that wind could not have blown over those particular trees.

It is a matter of sound policy for the planter on finding trees dying suspiciously to call the attention of one of the scientific staffs to the fact, with a view of checking the outbreak.

A native concealing a case of cholera or small-pox in his house is properly punished and it should be made imperative that cases of such infectious diseases as *Diplodia* should be reported to the Agricultural Authorities to take measures or cause measures to be taken to stop the disease at once. Plant disease indeed should be as much under control as animal disease.

Perhaps this idea may be scouted as Utopian but there can be little doubt that the time will come when as strong regulations will be found essential and will be as rigorously enforced as those relating to cattle or human disease, and it is of importance to all from the planter to the shareholder and consumer that such regulations should be made and enforced.—ED.

CORRESPONDENCE

Tuba root for killing Termites.

April 28th, 1910.

H. N. Ridley Esq.,

Dear Sir,

I hope the few lines I am about to write you will not weary you nor be an old story.

We have a small rubber plantation here—part of it is on an old Dyak clearing, and on this we were greatly troubled with white ants. Being so far from Singapore, and having very little money, we tried what we had at hand, and which would cost the least. I need not tell you how many things we tried, but we have finally cleaned our garden of white ants with tuba. We prepare it just like the Malays do when they prepare it for fishing—by beating the tuba and mixing it with water. Strong or weak it does not affect the trees or other vegetation. If the case is not bad, pour the water around the tree, if it is bad, take the earth away from the roots a little. I hope it will work for you as it has for us, and that you will try this, as it is little trouble and no expense. I suppose the jungle on the Malay Peninsula is full of tuba as it is here. If you want any further information, I will be glad to give it. I hope you will let me know what you think of this.

Sincerely,

J. M. HOOVER.

Tuba root has often been tried for termites before, with more or less success. It will certainly eject them temporarily but it is like other liquid insecticides too easily washed out by rain, when the pest may return. I have never seen tuba really wild except on a few limestone rocks.—Ed.

ERRATUM.

H. N. Ridley Esq., April 13th, 1910.
Director of the Botanic Gardens,
Singapore.

Dear Sir,

In the issue for March 1910 of the "Agricultural Bulletin of the Straits Settlements and Federated Malay States," page 108, a note appears in which it is said that the "India Rubber World" stated that Funtumia Rubber from the Mabira Forest fetched the price of 6s. 4½d. I would like to point out that this is an error as the price the Rubber was sold at was 9s. 4¼d. per lb. this being the third highest price realised at the date on which this consignment was sold.

Yours faithfully,
For The MABIRA FOREST (UGANDA) RUBBER CO., LTD.
G. W. GAMH,
Secretary.

This is an obvious misprint which was over-looked. *Funtumia* rubber has been fetching, we are told, nearly or quite as high a price as Para rubber. It is when well prepared an excellent rubber.—Ed.

MANIHOT RUBBER TREES.

The effect of nitrate of soda upon the flow of Ceara Latex.

From the time that plantation rubber first came to the front we have been steadily advocating the necessity of adequately feeding the trees by means of fertilizers, first of all to replace that which you take away in the milk, and secondly to try and increase not only the yield of the milk, but the percentage of the rubber contained therein. To show how correct we were in our ideas, we reproduce the following from Bulletin No. 19 of the Hawaii Experimental Station. The author of this brochure, which is entitled "Experiments in Tapping Ceara Rubber Trees," is Mr. E. W. Wilcox, Special Agent in charge of the Experiment Station. The experiments were arranged by Mr. Wilcox in consultation with Mr. Hosmer, then Territorial Forester, and the actual tapping was done by Mr. Q. Q. Bradford, Assistant in Rubber Investigations, and the labourers under his direction. In his report Mr. Wilcox acknowledges the active co-operation of the directors of the four rubber plantations on Maui in allowing their trees to be experimented on, and in furnishing the labourers and accommodations for Mr. Bradford when carrying out the experiments:-

"While fertilizers have been used in rubber plantations for increasing the growth and vigour of rubber trees, we have found no record of experiments to determine the possibility of increasing the flow of latex temporarily during the tapping period. It is apparent that if the flow can be considerably increased by the application of a quick-acting fertilizer, economy will be secured in the operations of tapping and collecting latex. The first experiment with nitrate of soda was carried out at Keanae, Maui, on Ceara rubber trees averaging 14 in. in circumference. A uniform series of trees was found and divided into three groups which received ½ lb., ¼ lb., and no nitrate of soda respectively. Before applying the nitrate of soda, the yield of the whole group of trees was tested by means of uniform tapping.

The weight of dry rubber from three trees which received ½ lb. of nitrate of soda each was 2-3 oz.; from three trees which received ½ lb. of nitrate of soda 1-3 oz.; and from the three unfertilized trees 1-2 oz. The nitrate of soda was placed in the soil at a depth of 3 or 4 in. and at some distance from the trunk, around each tree, where it would most quickly become available to the roots. The weather was rainy during the experiment, which extended over a period of about two weeks, and the nitrate of soda was therefore rapidly dissolved and utilized by the tree, or washed away in the drainage water. The effect of the nitrate of soda upon the flow of latex was manifested within forty-eight hours.

"A similar experiment was made on rubber trees growing on Tantulas, averaging about 12 in. in circumference. The soil about these trees was very loose and porous, and at the time when the nitrate of soda was applied, was unusually dry. After applying the nitrate of soda the soil was thoroughly irrigated. The results from tapping these trees indicated that the nitrate of soda was almost entirely washed away by the heavy irrigation, so that little effect was noted in the amount of rubber obtained from trees to which the fertilizer had been applied. The flow of latex was, however, in all cases, somewhat more vigorous from trees which had received nitrate of soda, and coagulation of the rubber from the latex took place more promptly. In a subsequent test, in the same locality, upon other trees, the yield of rubber was doubled by the application of ½ lb. nitrate of soda per tree. In this case the soil was moist at the time of the application of the fertilizer, and no irrigation was applied during the experiment. Under ordinary conditions, on the windward side of the islands, the soil is sufficiently moist at all times to render the nitrate of soda promptly available.

"The matter of the influence of nitrate of soda upon the flow of latex was considered sufficiently important to be put to a further test on rubber trees near the station offices. These trees were about 11 in. in circumference. From one group of five trees 0–9oz. of dry rubber was obtained in three days, before applying the nitrate of soda, and 1.3 oz. from the same trees, in the three days following the application of the fertilizer. In this case each tree received ½ lb. nitrate of soda. On another group of five trees the yield of rubber during the three days the nitrate of soda was applied was 0.9, and during the three days following its application 1.2 oz. It appears from these experiments, that the flow of latex may be temporarily stimulated by applying nitrate of soda. It now remains for the planters to determine the exact economy of the method by applying it on a large scale as soon as rubber trees become mature."

Such results should, and probably will, encourage planters of all varieties of rubber, Hevea, Castilloa, Funtumia, etc., to try the effects of nitrate of soda on their yields. When they do so, we trust that they will favour us with the results of their experiments. TROPICAL LIFE, March, 1910, (P. 53).

MINUTES OF THE PLANTERS' ASSOCIATION OF MALAYA.

Annual General Meeting held at the Masonic Hall, Kuala Lumpur, on April 30th, 1910, at 2-45 P.M.

PRESENT.

Chairman:—Mr. C. M. Cumming.
Secretary:—Mr. H. C. E. Zacharias.
Legal Adviser:—Mr. G. H. Day.

For Malacca Planters' Association:—Mr. F. H. S. Staples (holding also proxies of Messrs. H. M. Darby and F. W. Collins).

For Negri Sembilan Planters' Association:—Messrs. A. Dupuis Brown, C. M. Cumming, and W. Hingston.

For Kuala Langat District Planters' Association:—Messrs. C. E. S. Baxendale, and H. L. Carter.

For Batu Tiga District Planters' Association:—Messrs. P. W. Parkinson, and C. W. Thring.

For Klang District Planters' Association:—Messrs. R. W. Harrison, and E. V. Carey.

For Kapar District Planters' Association:—Messrs. H. W. Bailey, E. W. Harvey, and C. T. Hamerton.

For Kuala Selangor District Planters' Association:—Mr. J. G. McCleod.

For Kuala Lumpur District Planters' Association:—Messrs. H. F. Dupuis, H. C. E. Zacharias, F. G. Harvey, A. McIntyre Glen, C. Burn-Murdoch, H. T. Fraser, E. W. King, and R. M. Skinner.

For Batang Padang District Planters' Association:—Mr. G. N. Stevens.

For Johore Planters' Association:—Messrs. W. A. B. Goodall and F. J. Porteous.

Mr. W. J. Gallagher, Director of Agriculture, and several other visitors were also present.

1. The Minutes of the previous meeting are taken as read and confirmed.

2. On the proposal of Mr. Harrison, seconded by Mr. E. W. Harvey, the report and balance sheet for the past financial year are passed.

3. The secretary having read out applications to that effect, the Kedah, Batang Padang and Lower Perak Planters' Associations are affiliated as Constituent Associations of the P.A.M. on the proposal of Mr. F. G. Harvey, seconded by Mr. P. W. Parkinson.

4. ELECTION OF OFFICERS.

Mr. Cumming vacating the Chair, Mr. Harrison is appointed temporarily.

Mr. Harrison says that it was the duty of the Association to record a hearty vote of thanks to the retiring chairman for his excellent work during the past year. There had been a lot of very arduous work, and Mr. Cumming, who had devoted much time which he could ill spare, was to be congratulated on the work done, notably getting the Rubber Dealers Enactment passed.

Mr. C. E. S. Baxendale seconds the vote of thanks which is carried.

Mr. Parkinson proposes that there be no ballot, and that Mr. Cumming be asked to act again. This is carried unanimously and by acclamation.

Mr. Cumming, having resumed the chair, thanks the meeting for their confidence, and expresses a hope that even better work would be done this year. He then says that much of the praise they had given him was due to Mr. Zacharias who had kept him up to the work, and suggests that he be re-appointed Secretary.

Mr. Harrison endorses Mr. Cumming's remarks, and seconds his proposition, which is carried unanimously.

5. ESTIMATES.

The Secretary having introduced the Estimates, Mr. E. W. Harvey proposes and Mr. P. W. Parkinson seconds that the item of $1,000, for the "Agricultural Bulletin" be deleted. This Motion is lost.

Mr. F. G. Harvey thinks that now was the time to put the Association on a firm financial position, and proposes that the subscription per delegate be raised to $200—.

Mr. Harrison in seconding says that the Association had proved its worth. Its influence would increase with time, but it must stand on a firm financial basis, and now was the time to build up a reserve. The motion is carried.

Mr. H. F. Dupuis proposes and Mr. F. G. Harvey seconds that the other items in the Estimates be adopted as they stand.

6. RUBBER DEALERS' ENACTMENT.

The Secretary reads the following letters to Mr. Solbe and from Mr. H. W. Bailey:

H. E. G. SOLBE, Esq., Kuala Lumpur,
Batu Tiga, *12th March, 1910.*

DEAR SIR,—Reverting to your letter of the 7th of February, same has been submitted to our legal adviser, who writes as follows:-

"I am in receipt of your letter of the 3rd instant enclosing a letter from Mr. Solbe which I return herewith. I suppose Mr. Solbe in the

letter means the Rubber Dealers' Enactment and not the Praedial Produce Enactment. As far as I can ascertain the Chinese Kedai Keeper was charged under the Rubber Dealers' Enactment for buying without a licence, for which the penalty is a fine up to one thousand dollars. If the evidence had been sufficient he could have been charged either under the Penal Code for receiving stolen porperty knowing it to have been stolen or under the Stolen Property and Habitual Criminals Enactment, in either of which case, he could have been imprisoned. I should not advise in this case that any further proceedings should be taken as it is a considerable time since the original case was tried, and I doubt whether any useful result would be obtained".

I have, etc.,
(Sgd.) H. C. E. ZACHARIAS,
Secretary.

The Secretary,
The Planters' Association of Malaya,
Kuala Lumpur.

Klang,
April 8th, 1910.

SIR,—Some time ago Estate managers were asked to report any rubber thefts which came before their notice.

On the 7th instant two Vallambrosa coolies were caught and convicted of stealing 2½ lbs. of scrap rubber, they were sentenced to three months' imprisonment or pay a fine of $50. The fine was paid at once presumably by the Chinaman who buys it. This sort of thing should not be allowed.

I have, etc.,
(Sgd.) H. W. BAILEY.

Mr. Parkinson thinks that if the receiver is let off with a small fine on a clear case, it was a direct inducement to steal rubber.

Mr. H. W. Bailey suggests that Government should be asked to amend the Enactment so as to abolish the option of a fine.

Mr. Day points out that this would be awkward as a dealer late in taking out his licence might thus have to go to prison.

Mr. Cumming thinks it was not advisable continually to harass Government on small matters, and said that people should get proper legal advice and bring their cases home.

The matter is left to rest there.

7. PRAEDIAL PRODUCE ENACTMENT.

Mr. Day remarks that it has come to his knowledge that some proceedings have been taken under the Praedial Produce Protection Enactment, which have not resulted in a conviction owing to the fact that rubber is not specifically mentioned. He would suggest that the Government be asked to amend the definition of the word 'produce' in that Enactment by adding after the word "roots" the words "and any other produce of any plant or trees".

Mr. Parkinson proposing and Mr. E. W. Harvey seconding this motion formally, same is carried unanimously.

8. RECRUITING ADVANCES.

The Secretary reads the following correspondence:

The Chairman,

Indian Immigration Committee,

Penang,

Kuala Lumpur,

3rd March, 1910.

SIR.—I have the honor to revert to my letter of December 8th in re- Recruiting Advances, to which I am as yet without a reply. As the matter is one imperatively calling for immediate action, I beg leave to enquire, whether your Committee is taking any steps in the direction suggested by our last resolution.

I have, etc.,
(Sgd.) H. C. E. ZACHARIAS,
Secretary.

Penang,

No. 1468/09. 10th March, 1910.

SIR,—I have the honor to acknowledge receipt of your letter of 3rd March calling attention to the Resolution on the subject of Recruiting Advances passed by the Planters' Association of Malaya at a meeting held on 5th December, 1910.

In reply to your enquiry, I have to inform you that no steps are being taken by the Indian Immigration Committee to vary the terms of the Resolution which it passed as recently as the 24th October last.

I have, etc.,
(Sgd.) A. S. HAYNES,
Ag. Supt. of Immigrants, S.S. and F.M.S.

Mr. Cumming gives a short resume of the situation and says that he had discussed the matter with H. E., who seemed prepared to get the matter brought again before the Indian Immigration Committee.

Mr. Stevens having endorsed from personal experience gained on a recent trip to South India the great competition going on there for Tamil cooly labor, it is resolved, that the Planting Members on the Indian Immigration Committee press for a re-consideration of the present rules concerning advances at the next meeting of the Indian Immigration Committeee.

9. BENEVOLENT FUND.

Mr. Zacharias submits the report of the Sub-Committee on this subject and proposes that it be adopted, together with the proposed new set of rules.

Mr. Parkinson, having seconded this proposition, would also like the Secretary to circularize all Managers, asking for an Annual Donation.

The Motion is carried unanimously and the Secretary is also instructed to circularize all Managers accordingly.

Voting for ten members of Committee for the Benevolent Fund (under new Rule 3) then takes place and results in the election of the following gentlemen:—

Messrs. J. F. Beddy, C. Burn-Murdoch, G. H. Day, F. G. Harvey, E. D. Bryce, P. W. Parkinson, J. Gibson, W. Duncan, A. E. Collins and N. Mansergh.

10. BRUSSELS EXHIBITION.

The Secretary reports progress.

11. CHINESE LABOR.

Mr. C. M. Cumming submits the Committee's report on this question and moves its adoption, which is agreed to unanimously.

12. PLANT DISEASES.

The Secretary states that a circular in accordance with the resolution passed at the last meeting had been sent out to all constituent associations, but that so far he had received no replies.

13. LONDON RUBBER EXHIBITION.

Mr. Harrison suggests that negotiations should be opened very early with the Governments of the Straits Settlements and Federated Malay States in order that we may have a good exhibit. At the last Exhibition in London our exhibit compared unfavourably with others. The sense of the meeting is in favour of the proposal and the Secretary is instructed accordingly.

14. ABSCONDING.

This question having been brought up by Mr. H. W. Bailey (acting for Mr. A. B. Lake), the Meeting goes into Committee to discuss the question.

Open meeting having been resumed, it is resolved to leave the matter in the hands of the Chairman.

The Meeting terminate, at 4.15 p.m.

(Sgd.) H. C. E. ZACHARIAS,
Secretary.

APPENDIX A.

SUB-COMMITTEE'S REPORT ON CHINESE LABOUR.

GENTLEMEN,

Having been appointed by you to report on the question of establishing a Labour Bureau for the importation of Chinese labor, we proceeded to make the necessary enquiries, which have resulted in the following conclusions:

1. The Chinese Labor employed at present on Estates in the Peninsula is largely free labor, locally recruited, whilst only a small percentage is labor coming in from China.

As for the free labor, this class is drawn in the last instance from the mines, and whilst we do not hear of many complaints now that the Mining Industry is somewhat depressed, it is clear that the supply of these free laborers is in any case a very limited one. The result is, that there is already competition for this class of labor with a tendency to higher prices; a position, which at any time might be very seriously aggravated by a rise in the price of tin.

The Chinese labor, entering the F. M. S. from the outside, is practically confined to indentured coolies, procured in Singapore under the Sinkeh system, an expensive and uncertain source of supply.

2. The only way of remedying this unsatisfactory and precarious state of affairs is in our opinion the direct importation of Chinese from China to Malaya.

It is a well-known fact that the present system of Tamil free labor was started by the Importation of Indian Immigrants under long indenture and whilst it seems necessary to start the Immigration of Chinese agricultural labor on the same lines, although on a shorter indenture, it is hoped that in the near future a steady and increasing influx of free labor will result.

Such direct importation of coolies from China, is, in our opinion, not one which could be undertaken by your Association, and is, we consider, distinctly a matter that had more properly be left to private enterprise; and we understand that a Company for the very purpose, mentioned above, has actually been constituted.

3. Your Committee thought it advisable, before proceeding any further, to obtain the views of H. E. the High Commissioner on the subject. H. E. was good enough to grant us an interview, and we are glad to be able to report, that his views entirely coincide with ours.

MALCOLM CUMMING.
N. S. MANSERGH.
H. C. E. ZACHARIAS.

APPENDIX B.

SUB-COMMITTEE'S REPORT ON BENEVOLENT FUND.

KUALA LUMPUR,
22nd March, 1910.

GENTLEMEN,

Having been appointed by you to report on the working of the Benevolent Fund, we have carefully considered the present constitution of this Fund and have unanimously come to the conclusion, that the Rules require a thorough revision.

We have drawn up a set of new Rules as follows:

PROPOSED RULES OF P.A.M. BENEVOLENT FUND.

1. The P.A.M. Benevolent Fund is intended to provide in deserving cases members of the Planting Community with temporary assistance in time of sickness and of impecuniosity brought about by such or by other causes to be satisfactorily explained, when the Committee may vote a sum towards the passage and/or change necessary for the applicant. The Fund shall also be available to provide a widow, wife or children, or any one dependent on the applicant, with means to return to their homes and for their support for a reasonable time.

2. The object of this fund shall in no manner be construed as intended to supersede or supplement the obligations of employers towards their employees.

3. The administration of the P.A.M. Benevolent Fund shall be at the entire discretion of the Committee which shall consist of the Chairman and Secretary of the P.A.M. and ten other members (not necessarily planters), who shall be elected annually at the Annual General Meeting of the P.A.M.

4. The Secretary of the P.A.M. shall be ex-officio Secretary of the Benevolent Fund.

5. The Committee shall have power to fill vacancies during their term of office.

6. The Meetings of the Committee shall be called by the Secretary on requisition by three members; and four members personally present shall form a quorum.

7. Ten days' notice shall be given of any Meeting, and the business to be transacted at such Meeting shall be stated on the notice paper.

8. Subscriptions shall be received and acknowledged by the Secretary.

9. The Secretary may with the sanction of two members of the Committee give temporary relief in case of emergency.

10. The funds shall be put on fixed deposit in any bank or banks, as the Committee shall direct, and cheques shall be signed by any two members of the Committee and countersigned by the Secretary.

11. Applications for relief shall be made substantially in the following form :—

Name and address for whom application is made.
Name and address of friends supporting the same.
Reasons of application.
Age of all parties for whom assistance in sought.
How long in distress.
Position of applicant, or widow and children, if for their relief.
Salary of applicant, or deceased, for the past five years.
Family dependent on him.
Cause of losing property.
Cause of losing situation.
Certificate of health of the invalid from a medical officer.
Whether of temperate habits.

The effect of your approval will be to change the Fund from a contributory, into a purely charitable, one.

We feel that this Fund is not intended to take the place of Accident and Life Assurance Companies nor is it desirable in any way even seemingly to lessen the responsibilities, devolving upon all employers of labour in respect of the health and general well-being of their employees.

We trust that the re-constitution of our Fund will be approved of by you, as we feel sure, that on its new basis, it will enlist the support of all, who are interested. either directly or indirectly, in the Planting Industry of this Peninsula.

A very liberal response has been made to an appeal generously issued by some of our leading ex-planters, now retired at Home, and the total thus far collected amounts to nearly £15,000, of which about half is to be given to our fund; and it now only remains for the local companies and men, to show their appreciation of the charitable efforts made at Home, by generously supporting the Benevolent Fund of the Planters of Malaya.

We are, Gentlemen,
Yours faithfully,
(Sd.) Edmund B. PRIOR,
„ H. R. QUARTLEY,
„ H. C. E. ZACHARIAS.

To The Members,
The Planters' Association of Malaya.

SEREMBAN.

Table showing the Daily Results of the Reading of Meteorological Observation taken at the General Hospital, Seremban, for the month of April, 1910.

Date.	Temperature of Radiation. 9 H.	15 H.	Mean.	Maximum.	Minimum.	Range.	Temp. of Radiation. Sun.	Difference Sun & Shade.	Wind Direction. 9 H.	15 H.	Temp. of Evaporation. 9 H.	15 H.	Mean.	Computed Vapour Tension 9 H.	15 H.	Mean.	Relative Humidity. 9 H.	15 H.	Mean.	Clouds 0 to 10. 9 H.	15 H.	21 H.	Cloud and Weather Initials. 9 H	15 H.	21 H.	Rain. Inches.
1	77	85	81.	87	72	15	140	53	NW	NW	73.6	76.7	75.1	.829	.922	.875	89	76	82.5	0	7	9	S	N	N	.21
2	79	79	79.	85	72	13	139	54	N	W	73.9	73.9	73.9	.839	.839	.839	85	85	85.	4	6	8	C	C	N	.04
3	78	84	81.	87	73	14	140	53	NW	NW	74.6	77.4	76.	.857	.933	.897	89	80	84.5	0	9	0	S	N	S	1.09
4	73	85	79.	86	73	13	139	53	NW	NW	73.	76.7	74.8	.812	.922	.867	100	76	88.	7	3	2	N	S	S	
5	79	88	83.5	90	74	16	149	59	N	N	72.3	76.5	74.4	.793	.913	.853	80	69	74.5	0	0	0	S	S	S	
6	78	89	83.5	90	75	15	145	55	W	NW	76.3	74.3	75.3	.906	.847	.876	94	61	77.5	6	0	0	C	S	S	
7	80	79	79.5	86	75	11	145	59	NW	NW	76.6	77.3	76.9	.916	.937	.926	90	95	92.5	0	0	6	S	S	C	.55
8	80	85	82.5	89	73	16	145	56	NW	W	75.	76.7	75.8	.867	.922	.894	85	76	80.5	0	5	0	S	C	S	
9	75	82	78.5	86	74	12	143	57	N	NW	73.3	77.	75.1	.820	.926	.873	94	85	89.5	7	3	0	N	S	S	.18
10	79	84	81.5	87	73	14	144	57	NW	NW	73.9	77.4	75.6	.839	.938	.888	85	80	82.5	0	5	10	S	C	N	.50
11	80	82	81.	84	75	9	138	54	NW	NW	76.6	78.7	77.6	.916	.978	.947	90	90	90.	6	4	4	C	C	C	
12	79	85	82.	86	75	11	136	50	S	NE	73.9	76.7	75.3	.839	.922	.880	85	76	80.5	5	5	4	C	C	C	
13	79	82	80.5	89	72	17	150	61	W	SW	73.9	78.7	76.3	.839	.978	.908	85	90	87.5	0	7	5	S	N	C	.21
14	78	83	80.5	89	73	16	150	61	NW	NW	72.9	78.	75.4	.810	.956	.883	84	85	84.5	0	0	0	S	S	S	
15	81	82	81.5	89	75	14	149	60	NE	W	74.3	78.7	76.5	.849	.978	.913	80	90	85.	0	8	6	S	N	C	.75
16	79	89	84.	91	74	17	144	53	NW	NW	75.6	74.3	74.9	.887	.847	.867	90	61	75.5	2	4	10	S	C	N	.23
17	80	84	82.	87	74	13	140	53	NW	NW	76.6	77.4	77.	.916	.938	.927	90	80	85.	0	5	2	S	C	S	
18	81	88	84.5	89	74	15	146	55	W	SW	74.3	76.5	75.4	.849	.913	.881	80	69	74.5	3	4	0	S	C	S	
19	79	78	78.5	82	75	7	125	43	NW	W	77.3	76.3	76.8	.937	.906	.921	95	94	94.5	5	6	2	C	C	S	.25
20	76	86	81.	88	73	15	143	55	NW	W	74.3	76.1	75.2	.848	.904	.876	94	72	83.	0	0	6	S	S	C	.27
21	75	84	79.5	85	72	13	140	55	NW	N	73.3	74.	73.6	.820	.840	.830	94	72	83.	0	0	0	S	S	S	
22	81	85	83.	88	73	15	145	57	NW	NW	72.6	76.7	74.6	.802	.922	.862	76	76	76.	0	6	0	S	C	S	
23	80	88	84	90	75	15	142	52	N	N	73.3	76.5	74.9	.820	.913	.866	80	69	74.5	0	0	0	S	S	S	
24	81	90	85.5	91	73	18	145	54	N	N	70.9	80.3	75.6	.757	1.036	.896	72	73	72.5	0	0	0	S	S	S	
25	82	88	85.	90	74	16	142	52	N	NW	75.3	73.3	74.3	.877	.819	.848	80	61	70.5	0	0	0	S	S	S	
26	81	88	84.5	89	73	16	134	45	N	NW	74.3	70.	72.1	.849	.733	.791	80	55	67.5	0	0	0	S	S	S	
27	81	85	83.	88	74	14	143	55	NW	NW	76.	76.7	76.3	.897	.922	.909	85	76	80.5	0	4	0	S	C	S	
28	80	84	82.	87	74	13	139	52	NW	NW	76.6	75.7	76.2	.916	.888	.902	90	76	83.	0	6	0	S	C	S	
29	81	82	81.5	88	73	15	142	54	N	N	76.	73.6	74.8	.897	.830	.863	85	76	80.5	0	5	4	S	C	C	
30	82	88	85.	90	73	17	144	54	N	N	72.	74.9	73.4	.785	.865	.825	72	65	68.5	0	0	0	S	S	S	
31																										
Mean.	79.1	84.7	81.9	87.7	73.5	14.5	142.2	54.3	NW	NW	74.4	76.2	75.3	.8 2	.906	.878	85.9	76.3	81.1							4.28

Seremban,
15th April, 1910.

Highest Temperature 91
Lowest Temperature 72

Greatest Rainfall in 24 hours 1.09

J. LUCY,
Senior Medical Officer.

PENANG.

Abstract of Meteorological Readings in the Prison Observatory, Penang, for the month of April, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°	°	°	°	°	°	°	°	%		Ins.	Ins.
Prison Observatory Penang ...	29·846	148·5	82·7	90·9	70·9	20·0	78·2	·907	75.2	81	N.-W.	4·39	1·45

Surgeon's Office,
Penang, 9th May, 1910.

M. E. SCRIVEN,
Assistant Surgeon.

A. H. KUN,
Senior Medical Officer.

NEGRI SEMBILAN.

Abstract of Meteorological Readings in Negri Sembilan Hospitals for the month of April, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Seremban Hospital		142.2	81.9	87.7	73.5	14.5	77.9	.878	75.3	81.1	NW	4.28	1.09
Mantin												7.64	2.26
Tampin												10.87	3.15
Kuala Pilah												6.00	1 56
Jelebu												6.14	1.75
Port Dickson Town												6.23	1.51
Do. Beri-Beri												5.54	1.38

Senior Medical Officer's Office,
11th May, 1910.

A. J. M. CLARK,
S. M. O.

PAHANG.

Abstract of Meteorological Readings in the various Districts of the State for the month of March, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kuala Lipis	...	...	75	93	68	18 3	73	...	...	...	...	10.46	1.97
Raub	...	...	75	89	70	15.8	73	...	...	...	...	9.93	1.76
Bukit Fraser	...	...	...	...	58	...	...	...	...	...	...	18.57	2.09
Bentong	...	...	80	91	68	18.0	75	...	...	...	...	15.17	2.41
Pekan	...	...	82	89	70	14.6	78	...	...	...	...	3.33	.81
Kuantan	...	...	82	91	69	17.2	77	...	...	...	...	7.46	2.43
Sungei Lembing	...	...	...	83	69	...	...	...	...	...	...	10.11	3.25

Office of the Medical Officer in Charge,
Kuala Lipis, 19th May, 1910.

S. C. G. FOX.
Medical Officer in Charge, Pahang.

PERAK.

Abstract of Meteorological Readings in Perak for the month of April, 1910.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Taiping	...	110	82.34	94	70	24	77.63	884	...	81	...	11.88	2.77
Kuala Kangsar	...	...	80.84	92	72	20	76.12	839	...	80	...	8.12	1.86
Batu Gajah	...	109	81.80	93	72	21	76.85	855	...	78	...	9.64	2.58
Gopeng	...	...	80.49	92	58	34	74.83	783	...	76	...	9.09	1.96
Ipoh	...	...	81.86	93	71	22	78.11	914	...	85	...	12.31	4.20
Kampar	...	...	81.42	93	70	23	76.67	857	...	80	...	14.47	3.82
Teluk Anson	...	...	81.51	92	69	23	74.11	743	...	69	...	9.38	2.74
Tapah	...	...	81.76	93	68	25	77.00	862	...	79	...	13.13	6.32
Parit Buntar	...	...	81.43	91	72	19	77.20	879	...	83	...	10.73	2.55
Bagan Serai	...	...	81.99	92	70	22	77.60	886	...	81	...	6.65	1.65
Selama	...	...	81.33	94	71	23	77.01	865	...	81	...	17.78	3.24

OFFICE OF SENIOR MEDICAL OFFICER,

Ipoh, 13th May, 1910.

G. U. GRAHAM,

Senior Medical Officer, Ipoh.

SELANGOR.

Abstract of Meteorological Readings in the various Districts of the State for the month of April, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
General Hospital, Kuala Lumpur ...	29.870	147.8	80.9	89.6	72.8	16.8	76.4	0.825	73.4	78	S. E.	5.54	1.12
Pudoh Gaol ,, ...	...	...	...	...	...	...	...	...	...	...	...	4.87	1.31
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	5.20	1.25
,, Klang...	...	...	...	89.0	70.2	18.8	...	...	...	...	...	5.11	1.37
,, Kuala Langat	...	...	...	88.4	74.2	14.2	...	...	...	...	...	6.39	2.00
,, Kajang	...	...	...	86.4	75.5	10.9	...	...	...	...	...	5.18	1.52
,, Kuala Selangor ...	...	...	...	88.9	73.1	15.8	...	...	...	...	...	2.65	0.95
,, Kuala Kubu	...	...	...	93.1	71.5	20.6	...	...	...	...	...	8.31	1.10
,, Serendah	...	...	...	92.5	70.4	22.1	...	...	...	...	...	8.31	3.55
,, Rawang	...	...	...	99.7	71.4	19.3	...	...	...	...	...	6.70	2.90
,, Sabak Bernan... ...	...	...	...	...	...	...	...	...	...	...	...	2.41	1.25

Office of the Senior Medical Officer,
Kuala Lumpur, 23rd May, 1910.

W. D. FREER,
Senior Medical Officer.

KELANTAN.

Abstract of Meteorological Readings in Kelantan for the Month of April, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Mean Maximum.	Temperature. Mean Minimum.	Temperature. Mean Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
		° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	%		Ins.	Ins.
Kota Bharu ...	..	154.4	81.9	88.9	74.8	14.1	78.4	.900	76.1	83.	...	1.44	.26
* Kuala Lebir ...	...	...	77.8	90.9	72.9	18.0	75.4	...	73.8	87.	...	5.43	.79
* Kuala Kelantan ...	...	...	...	84.6	73.5	11.1	...	...	...	...	...	1.28	.45
* Taku Plantation ...	...	...	...	...	...	...	...	...	...	...	...	6.78	1.80
* Pasir Besar ...	...	...	...	...	...	...	...	...	...	...	...	7.74	1.22
* Nenggiri ...	...	...	...	...	...	...	...	...	...	...	...	7.96	1.95

* Supplied by the courtesy of the Duff Development Coy., Ltd.

Residency Surgeon's Office,
Kota Bharu, 16*th May*, 1910.

John D. Gimlette,
Residency Surgeon, Kelantan.

APRIL 1910.

Government Hill	Lowest Minimum Temperature	61°
Prison Observatory	Do.	70°
Government Hill	Highest Do.	80°
Prison Observatory	Do. Do.	92°
Government Hill	Lowest Sun	107°
Prison Observatory	Do.	140°
Government Hill	Highest Sun	139°
Prison Observatory	Do.	168°
Government Hill	Lowest air Temperature	71°
Prison Observatory	Do.	78°
Fort Cornvallis	Do.	80°
Government Hill	Highest Do.	76°
Prison Observatory	Do.	85°
Fort Cornvall	Do.	90°

RAINFALL.

The Fort	3.60	Ins.
Prison Observatory	4.39	,,
Government Hill	5.91	,,
Balck Pulau	7.37	,,
Pulo Jerejat	7.40	,,
Lumut	5.24	,,
Pangkore	2.43	,,
Brimas	6.05	,,

M. E. SCRIVEN,
Asst. Surgeon,
Penang.

No. 7.] JULY, 1910. Vol. IX.

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EXPERIMENTAL TAPPING

Of Para Rubber Trees in the Botanic Gardens, Singapore, for the year 1909.

RETURNS.

During the year 2,056 lbs. of rubber, of all grades, were obtained; of this quantity 1,821 lbs. was sold, 161 lbs. of smoked rubber reserved for observation, and 75 lbs. supplied to different Institutions for analyses.

FINANCIAL.

The total sum by sales amounted to $6,127.51; of this amount $2,596.69 was received too late to be included in the 1909 account and is therefore credited to revenue account for 1910.

Most of the rubber was sold locally, the best sheet and biscuit obtaining the best market price. A small consignment sold in London for the highest price reached at that day's sale.

THE YEAR'S WORK AND PLAN OF RESEARCH.

Apart from some minor experiments 1,200 trees were tapped at different times throughout the year. These were arranged in 10 groups, ranging from 50 to 200 trees, and of these, 3 groups were tapped on 1 period only, 5 groups on 2 periods, and 2 groups on 3 periods (the average period being 30 days). Full details of all the work have been recorded and this record shows:– Comparative results of different methods of tapping at different seasons during the year; quantity of latex obtained and amount of resulting dry rubber; increment of growth of all the rubber trees; the ratio of growth when too closely planted; effect on bark by different methods of tapping.

It will be seen that tapping on alternate days shows an advantage of nearly 4% over tapping daily; also that we advocate the single herring-bone method of tapping following basal tappings. The disadvantage of close planting is also pointed out.

A long series of experiments were tried in curing freshly collected latex with the aid of smoke with a view to improving the quality of the raw material; a further series of experiments were conducted on the effect of smoke on freshly prepared biscuits and sheets of raw rubber, and it will be seen that the strength and appearance of such smoked rubber has been favourably reported on.

From the details recorded the following summary of the year's work has been tabulated and this statement shows the progress made in comparison with the report published in 1905 and 1906. *

It will be noted that the average yield per tree per annum is comparative only as the periods of tapping vary from 30 to 90 days for the whole year against monthly to bi-monthly periods on estates. There are many reasons for lightly tapping the garden trees, for instance (a) the yield of Para trees in Malaya has already proved better than the sanguine estimates of old days (b) the crop of seeds has been, and is still, of the first importance in the best interests of the industry in this country and heavy tapping is detrimental to seed production.

---

* An appendix is attached shewing the financial results for the years 1907 and 1908, but owing to the shortness of the staff - there being only one European Officer for most of the time - it was not possible to record complete details.

SYNOPSIS OF EXPERIMENT I.

Number of Trees Tapped.	Aggregate girth at 3ft. from ground.	Period of Tapping.	Number of days Tapped.	Mode of Tapping.	Fluid ounces of latex obtained.	Dry Rubber Obtained. Mornings	Dry Rubber Obtained. Evenings	Total amount of dry Rubber obtained.	Comparative yield of dry Rubber per inch of girth at 3 ft. from ground.	Average girth per tree.	Dry Rubber average yield per tree per annum.	Ratio of fluid ounces to ounces of dry Rubber.	REMARKS.
	ft. ins.				ozs. c/c.	lbs. oz.	lbs. oz.	lbs. oz.		ft. in.	lbs. oz.	ozs. c/c.	
						1904							
50	173 8½	July	15	Various		18–4¾	18–12¼	37–11	Over ¼ oz.	3–5			
						1905							
50	182 3¼	1st period Aug.-Sep.	25	H. B. Mornings daily	5484	58–00		58–0	Under ½ oz.			$5\frac{11}{16}$	
		2nd period Nov.-Dec.	22	H. B. Evenings daily	2402½	29–00		29–0	Under ¼ oz.	3-7½		$5\frac{3}{16}$	From July 1905 to July 1906.
						1906							
50	191 9⅞	June-July.	25	H. B. Mornings daily	3080	47–02		47–02		3–10	2–11	$4\frac{11}{16}$	
						1909							
50	209 4⅞	Ap.-May.	40	H. B. daily full. Mornings	3323	75–4		75–4	Under ½ oz.	4–2	*	2¾	† Not complete part smoked.
50	2nd Tapping	Oct.-Nov.	29	,, ,,	2709			Smoked on spindles					
									*				*Exclusive of 2nd quality & scrap.

SYNOPSIS OF EXPERIMENT II.

Number of Trees Tapped.	Aggregate girth at 3 ft. from ground.	Period of Tapping.	Number of days Tapped.	Mode of Tapping.	Fluid ounces of latex obtained.	Dry Rubber Obtained. Mornings.	Dry Rubber Obtained. Evenings.	Total amount of dry rubber obtained.	Comparative yield of dry Rubber per inch of girth at 3 ft. from ground.	Average girth per tree.	Dry Rubber average yield per tree per annum.	Ratio of fluid ounces to ounces of dry Rubber.	REMARKS.
	Ft. in.				oz. c/c.	lbs. oz.	lbs. oz.	lbs. oz.		Ft. in.	lbs. oz.	ozs. c/c.	
						1904							
120	358 4¾	July-Aug.	14-18	Various		54-5¾	49-5	103-8¾	Under ½ oz.	2-11¾			
						1905							
120	366 4¾	1st. Period Sep.-Oct. alternate days.	21	H B..	10,736	144-00		144-00	Over ½ oz.	3-0⅝		4⅝	
	2nd Period of Tapping.	December daily.	25	H. B. daily.	7,372	*37-00	*25-00	62-00	Under ¼ oz.		1-11½	7½	
						1909							
120	414 1¾	May.-June and July alternate days.	30	H. B. alternate days.	7.718½	128-7		128-7	Not complete. Under ½ oz.	3-5⅜	*	3½	*Not complete part smoked.
	2nd Period of Tapping.	Nov.-Dec. daily.	25	H. B. daily.	4,085			Smoked spindles †					†Exclusive of 2nd quality & scrap.

* Mornings 70 trees — 4502 ozs. c/c 37.
Evenings 50 trees — 2870 ozs. c/c 25.
Total 7372 ozs.

SYNOPSIS OF EXPERIMENT III.

Number of Trees Tapped.	Aggregate girth at 3 ft. from ground.	Period of Tapping.	Number of days Tapped.	Mode of Tapping.	Fluid ounces of latex obtained.	Dry Rubber obtained. Mornings.	Dry Rubber obtained. Evenings.	Total amount of dry Rubber obtained.	Comparative yield of dry Rubber to per inch of girth at 3 ft. from ground.	Average girth per tree.	Dry Rubber average yield per tree per annum.	Ratio of fluid ounces to ounces of dry Rubber.	Remarks.
	Ft. in.				ozs. c/c	lbs. oz.	lbs. oz.	lbs. oz.		Ft. in.	lbs. oz.	ozs. c/c.	
						1904							
140	333 4¼	Aug. - Sep.	15-23	Various.		40-5¼	37 10	77 15¼	Over ¼ oz.	2-4½			
						1905							
140	343 1¼	1st. Period Sep. - Oct.	18	H. B. alternate days.	6,597½	96-00		96-00	Over ¼ oz.	2-5¼		4¼	
140	2nd. Period of Tapping.	Dec - Jan.	25	H. B. daily	6039	*14-00	*29-00	43-00	Under ¼ oz.		1-00	9	
						1909							
140	387 4¾ 1st. Tapping.	May-June-July.	30	H. B. alternate days.	7,861	115-7		115-7	Over ¼ oz.	2-9	not complete.	3⅜	
140	2nd. Period of Tapping.	Dec - Jan.	28	H. B. daily.	2,922	Smoked Spindles		†					† Exclusive of 2nd quality and scrap.

* Mornings 30 Trees. * Evenings 110 Trees.

SYNOPSIS OF EXPERIMENT IV.

Number of Trees Tapped.	Aggregate girth at 3ft. from ground.		Period of Tapping.	Number of days Tapped.	Mode of Tapping.	Fluid ounces of latex obtained.	Dry Rubber Obtained.		Total amount of dry Rubber obtained excluding Scrap and Clot.	Comparative yield of dry Rubber to per inch of girth at 3 ft. from ground.	Average girth per tree.	Dry Rubber average yield per tree per annum.	Ratio of fluid ounces to ounces of dry Rubber.	REMARKS.
							Mornings.	Evenings.						
	ft.	ins.				ozs. c/c	lbs. oz.	lbs. oz.	lbs. oz.		Ft. ins.	lbs. oz.	oz. c/c	
							1904							
200	631	10	Nov.-Dec.	18	H. B. Various		91–8½	71–13½	163–06	Over ¼ oz.	3–1¾			
							1905							
200	648	5½	Oct.-Nov.	25	H. B. daily.	11746½	199–00		199–00	Under ½ oz.			$3\frac{11}{16}$	From July 1905 to July 1906.
							1906							
200			Mar.-Ap.	25	H. B. Single & Full daily	10943	154–00		154–00		3–2¾	1–12¼	$4\frac{7}{16}$	
							1909							
200	727	0⅛	Aug.-Sept.	32	H. B. daily.	11323	181–15		181–15	Over ¼ oz.	3–7½	1–4⅝	3⅞	
200	2nd Period of Tapping.		Dec.-Jan.	21	H. B. daily.	5575	75–12		75–12	Over ⅛ oz.			$4\frac{9}{16}$	
									Exclusive of 2nd quality & scrap.					

SYNOPSIS OF EXPERIMENT V.

Number of Trees Tapped.	Aggregate girth at 3ft. from ground.	Period of Tapping.	Number of days Tapped.	Mode of Tapping.	Fluid ounces of latex obtained	Dry Rubber Obtained. Mornings.	Dry Rubber Obtained. Evenings.	Total amount of dry Rubber obtained excluding Scrap and Clot.	Comparative yield of dry rubber to per inch of girth at 3 feet from ground.	Average girth per tree.	Dry Rubber average yield per tree per annum.	Ratis of fluid ounces to ounces of dry Rubber avoirdupois.	REMARKS.
	ft. ins.				ozs. c/c.	lbs. ozs.	lbs. ozs.	lbs. ozs.		Ft. in.	lbs. oz.	ozs. c/c.	
						1904							
200	608 0¾	Nov.-Dec.	15-24	H. B. Alternate days.		109 10½	85 14	195 8½	Under ½ oz.	3-0½			
						1905							
200	621 5¾	Oct.-Nov.	25	H. B. Daily full evenings.	11216½		138 00	138 00	Over ¼ oz.	3-1¼		$5\frac{1}{16}$	
						1906							From July 1905 to July 1906
200		May.	25	H. B. Daily full and single, mornings.	9747	140 0¾		140 0¾	Over ¼ oz.		1-6¼	$4\frac{5\frac{1}{2}}{16}$	
						1909							
200	712 8½	Sep.-Oct.	30	H. B. Full daily.	11957	175 8		175 8	Over ¼ oz.	3-6¾	-14 oz.	$5\frac{15}{16}$	*Exclusive of 2nd quality and scrap.

SYNOPSIS OF EXPERIMENT VI.

Number of Trees Tapped.	Aggregate girth at 3 ft. from ground.	Period of Tapping.	Number of days Tapped.	Mode of Tapping.	Fluid ounces of latex obtained.	Dry Rubber Obtained		Total amount of dry Rubber obtained excluding Scrap.	Comparative yield of dry Rubber to per inch of girth at 3 ft. from ground.	Average girth per Tree.	Dry Rubber average yield per tree per annum.	Ratio of fluid ounces to ounces of dry Rubber avoirdupois.	REMARKS.
						Mornings.	Evenings.						
	ft. in.				ozs. c/c.	lbs. ozs.	lbs. ozs.	lbs.ozs		ft. in.	lbs.ozs	ozs. c/c.	
						1904							
150	665–0½	Dec.-Jan.	21to28	H. B. daily.		110–15¼	90–2½	210–1¾	Under ½ oz.	4–5½			
						1905							
150	673–2⅛	Nov.-Dec. January.	28	H. B. alternate days.	11,446	138–00		138–0	Over ¼ oz.	4–5⅞	2–11¼	$5\frac{3}{16}$	From July 1905 to July 1906.
						1906							
150		June.-July.	25	H. B. daily Mornings.	15,280	268– 7		268–7	Over ½ oz.			$3\frac{9}{16}$	
						1909							
150	743–4⅛	Nov.-Dec.	30	H. B. daily Mornings.	18,748	251– 8		251–8	Under ½ oz.	4–11⅜	$1–10\frac{5}{6}$	4⅝	
								*					*Exclusive of 2nd quality & Scrap.

SYNOPSIS OF EXPERIMENT VII.

Number of Trees Tapped.	Aggregate girth at 3 ft. from ground.	Period of Tapping.	Number of days Tapped.	Mode of Tapping.	Fluid ounces of latex obtained	Dry Rubber obtained.		Total amount of dry Rubber obtained excluding Scrap and blot.	Comparative yield of dry Rubber to per inch of girth at 3ft. from ground.	Average girth per Tree.	Dry Rubber average yield per tree per annum.	Ratio of fluid ounces to ounces of dry Rubber avoirdupois.	REMARKS.
						Mornings.	Evenings.						
	ft. in.				ozs. c/c.	1909				ft. in.	lbs.ozs	ozs. c/o.	
						lbs. ozs.		lbs. ozs.					
90	223-1	Feb.-March	28	Double H. B. daily.	2826	21-10½		21-10½	Under ¼ oz.	2-5¾	8⅞ ozs.	8⅙	

SYNOPSIS OF EXPERIMENT VIII.

Number of Trees Tapped.	Aggregate girth at 3ft from ground.	Period of Tapping.	Number of days Tapped.	Mode of Tapping.	Fluid ounces of latex obtained.	Dry Rubber obtained. Mornings.	Dry Rubber obtained. Evenings.	Total amount of dry Rubber obtained.	Comparative yield of dry Rubber to per inch of girth at 3 ft. from ground.	Average girth per trees	Dry Rubber average yield per tree per annum.	Ratio of fluid ounces to ounces of dry Rubber avoirdupois.	REMARKS.
	ft. in.				ozs. c/c.	lbs. oz.	lbs. oz.	lbs. oz.				ozs. c/c.	
						1909							
100	276–10½	June-July.	30	Various daily.	4248			smoked.			not complete part smoked		No added water.
	2nd Period of Tapping.	Sep.	28	Various daily.	3981	48–0		48–0	Under ¼ oz.	2–9⅜		5 3/16	
													Comparative dry Rubber to yield of latex is best from basal tapping
								*					*Exclusive of 2nd quality & Scrap.

100 trees	as	30 Trees Half Herring Bone.	30 Trees 2 excisions Basal.	40 Trees chain	Total fluid ozs.
1st Tpg.	ozs. c/c.	1605	809	1834	4248
2nd do.	„	1694	716	1571	3981
Total	...	3299	1525	3405	8229

Tapped	30	Trees	Half Herring Bone	...	3299 ozs.
„	30	„	2 Basal Excisions	...	1525 „
„	40	„	Chain Method	...	3405 ozs. c/c.
Trees	100		Total	...	8229

SYNOPSIS OF EXPERIMENT IX.

Number of Trees Tapped.	Aggregate girth at 3 ft. from ground.	Period of Tapping.	Number of days Tapped.	Mode of Tapping.	Fluid ounces of latex obtained.	Dry Rubber Obtained.		Total amount of dry Rubber obtained.	Comparative yield of dry Rubber to per inch of girth at 3 ft. from ground.	Average girth per tree.	Dry Rubber average yield per tree per annum.	Ratio of fluid ounces to ounces of dry Rubber. Avoirdupois.	REMARKS.
						Mornings	Evenings						
	ft. ins.				ozs. c/c	lbs. oz.	lbs. oz.	lbs. ozs				ozs. c/c.	
120	276 10¾ 1st Tapping	Mar.-May	35	H. B. Full daily	3712	**1909**		Smok-ed		2-2¼			no added water.
120	2nd period of Tapping.	July-Aug.	29	„	2970			Smok-ed			not com-plete part smoked.		no added water.
120	3rd Tapping	Oct.-Nov.	26	„	3433	43 0		43-0	under ¼ oz.			$4\frac{15}{16}$	
				Total	10,115								

SYNOPSIS OF EXPERIMENT X.

Number of Trees Tapped.	Aggregate girth at 3 ft. from ground.	Period of Tapping.	Number of days Tapped.	Mode of Tapping.	Fluid ounces of latex obtained	Dry Rubber Obtained. Mornings	Dry Rubber Obtained. Evenings	Total amount of dry Rubber obtained Excluding scrap and Clot.	Comparative yield of dry Rubber to per inch of girth at 3 ft. from ground.	Average girth per tree.	Dry Rubber average yield per tree per annum.	Ratio of fluid ounces to ounces of dry Rubber Avoirdupois.	REMARKS.
	ft. ins.				oz. c/c.	lbs. oz.	lbs. oz.	lbs. oz.		ft. in.		ozs. c/c.	
90	220 5	May.-Jun.	34	Basal 2 excisions daily.	2411½	1909		Smoked		2-5⅓	not complete part smoked.		No added water.
90		Jul.-Aug.	31	Basal 2 excisions daily.	1261			„					
90		Nov.-Dec.	24	H. B. Single daily.	3511			37-0	Under ¼ oz.		„	$5\frac{15}{16}$ nearly	„
				Total ...	7183½			Exclusive of 2nd quality & scrap.					

TAPPING.

Daily Versus Alternate Days.

The process of tapping Para rubber trees can be carried out at various seasons and periods of time and also by different methods; but the real result of observations and experiments must be measured by averages and such analyses to be complete should be compiled from the records of two or three years. Possibly no other cultivated product exhibits so much diversity under normal conditions as is the case in the yield of latex or rubber crop.

There are many factors which may vary the yield of latex at any particular season (to be dealt with in a subsequent chapter). The following statement shows for one year's working that the quantity of latex required to produce 1 oz of dry rubber—including some added water to retard rapid coagulation—varies from 2¾ fluid ozs. in April and May to 8⅛ ozs. in February and March. These two latter months however represented the principal resting season or foliar periodicity between 1908 and 1909. Following the end of March the tapping season for 1909 began in April and continued good for the remainder of the year as follows:–

TABLE I.

Effect of Tapping at different seasons during the year 1909.

No. of Experiment.	Total fluid	Total dry rubber avoirdupois.		Comparative yield of fluid ozs. to ozs. of dry rubber.	Season 1909.
	ozs. c/c.	lbs.	ozs.	c/c.	
7	2826	21	10½	8½	February.—March.
1	3323	75	4	2¾	April.—May.
2	7718	128	7	3¼	May, June.—July.
3	7861	115	7	3⅜	May, June.—July.
4 }	1st 11323	181	15	3⅞	August.—Sept.
4 }	2nd 5575	75	12	4 9/16	Dec.—Jan.
6	18748	251	8	4⅝	Nov.—Dec.
9	3433	43	—	4 15/16	Oct.—Nov.
8	3981	48	—	5 3/16	Sept.
5	11957	175	8	5 5/16	Sep.—Oct.
10	3511	37	—	5 15/16	Nov.—Dec.

This diversity is again shewn in the following record for three years of the same group of 200 trees :—

TABLE II.

Experiment.	No. of trees tapped.	No. of times tapped.	Season.	Fluid ozs. obtained	Weight of dry rubber.	Comparative yield of fluid ozs. to ozs. of dry rubber.
					lbs. ozs.	
1905	200	25	Oct.-Nov.	11746	199—	3 11/16
1906	200	25	March-Ap.	10943	154—	4 7/16
1909	200	32	Aug.-Sep.	11323	181— 15	3 14/16

From this statement it will be seen that while there is diversity in the quantity of latex obtained at different seasons and in different years there is also variation in the composition of latex itself. This latter variation arises from different causes but no doubt the effects of rainfall is an important factor, when—so far as is known—other conditions are normal. What the variation amounts to is shewn in Table III. It will be seen that during 21 tappings almost daily from the same group of trees the volume of latex varied from 114 to 338 ozs. c/c while the weight of a sheet of rubber prepared daily from 30 ozs. of the latex varied from 6 to 8¼ ozs (avoirdupois).

EXPERIMENT 4.

TABLE III.

Variation in the weight of dry rubber prepared from an uniform quantity of latex. 30 ozs c/c. obtained daily and weighed dry sheet.

Date 1909.	Rain fall Inches	parts.	Total latex obtained Daily	Dry weight of Sheet of 30 ozs latex after coagulation daily	REMARKS.
			ozs c/c.	(ozs. avoirdupois)	
Dec. 29th.	...	60	114	6	From the latex obtaided daily 30 ozs c/c. was kept apart and weighed dry in the form of Sheet.
„ 30th.	...		187	6	
„ 31	...		145	7	
1910					
Jan. 3	...	38	210	7	
„ 4	...	85	200	6	
„ 5	...	43	252	7½	
„ 6	...	47	270	7½	
„ 7	...		291	8	
„ 8	...		304	7½	
„ 10	...		338	8¼	
„ 11	...		272	7½	
„ 12	...		276	6¼	
„ 13	...	36	268	7½	
„ 14	...		340	7¼	
„ 15	...	30	304	6¾	
„ 16	...		288	8	
„ 17	...		316	6½	
„ 18	...		326	6½	
„ 19	...	89	308	7	
„ 20	...		292	6¾	
„ 21	...		284	6¾	

Under normal conditions it would be supposed that the yield of latex would be nearly uniform, but that is to suppose that each tree is in the same physiological phase at the time of tapping, which seldom occurs, and explains the variation of groups of trees already shewn. That it is so with solitary trees, Table IV furnishes a proof. It will be noticed that the seasons of tapping were Jan - Feb; Sep - Oct; and Nov - Dec. The season of rest and complete defoliation occurred in March - April and would not affect the seasons of tapping. If the results of three tappings are reduced to 25 tappings each period, the record would then read:—

1st tapping	397 ozs c/c latex
2nd „	351 „ „ „
3rd „	395 „ „ „

which is fairly uniform.

TABLE 4.

Latex obtained from one tree without added water.

	1st Tapping 1909 Jan. 7th. to Feb 6th.	2nd Tapping 1909 Sept 6th. to Oct 4th.	3rd. Tapping 1909 Nov 11th. to Dec 6th.	REMARKS.
Daily ozs c/c of latex.	2 ozs c/c	4 ozs c/c	4 ozs c/c	Girth of tree at 3 ft. from ground:- 10′-0″½
	4 „	4 „	2 „	
	6 „	5 „	4 „	
	10 „	8 „	8 „	
	12 „	11½ „	9 „	
	14 „	12 „	16 „	
	12 „	12 „	18 „	
	13 „	12 „	16 „	
	16 „	12 „	18 „	
	10 „	13 „	20 „	
	15 „	15 „	20 „	
	20 „	15½ „	16 „	
	22 „	16 „	16 „	
	20 „	16½ „	16 „	
	24 „	16 „	20 „	
	20 „	16 „	24 „	
	22 „	15½ „	16 „	
	20 „	16½ „	20 „	
	20 „	14½ „	16 „	
	21 „	24 „	16 „	
	22 „	24 „	18 „	
	20 „	19 „	20 „	
	19 „	16 „	18 „	
	18 „	17 „	26 „	
	15 „	16 „	18 „	
	17 „	25 „		
		24 „		
		16 „		
		20 „		
Total ozs	414 ozs	436 ozs	395 ozs	

As so much variation in the yield of latex exists with groups of trees it is necessary for the purpose of establishing an advantage by any method or period of tapping that the advantage is permanent. Table 5, furnishes the result of 6 groups of trees amounting to 860 trees tapped daily and alternate daily occasions during 4 years, i,e, 1904, 1905, 1906, and 1909. From this result Table 5 has been compiled and shews an advantage of nearly 4 % on alternate days over daily tappings for four years.

TABLE 5.

Advantage of Tapping on alternate days over tapping daily.

	Tapped Daily.				Tapped alternate Days.			
No. of Experiment.	No. of Trees Tapped.	No. of Times Tapped.	Dry weight of Rubber ozs.		No. of Trees Tapped.	No. of Times Tapped.	Dry weight of Rubber ozs.	
I	50	105	217	15	...	...	...	...
II	120	43	129	12	120	67	308	3¾
III	60	20	25	2¾	140	63	264	3½
IV	200	103	673	9¾	120	18	99	7¼
V	200	80	453	8¾	200	15	195	8½
VI	150	78	680	7½	150	51	187	9½
	780	429	2180	7¾	730	214	1055	0½

Therefore:—

							lbs.	
730 trees tapped alternate days 214 times						=	1055.8	Rubber
730	„	„	„	429	„	=	2116	„
Plus 50	„	„	„	429	„	=	145	„
780	„	„	„	429	„	=	2261	„
780	„	„	daily	429	„	=	2180	„
							. .81	„

or approximately an advantage of 4 % in favour of tapping on alternate days over tapping daily.

DIFFERENT METHODS OF TAPPING.

Incisions and Excisions.

Throughout the East all plantation rubber is obtained by some method of excising the bark whereas in Brazil the process is one of incisions. This latter method has been fully tried in this Garden and discontinued for the reason of slow bark recovery of the incised wounds, combined with the poor return of latex—although in Brazil it is claimed that the amount of rubber is higher per tree. This is very doubtful and probably refers to the average of old trees compared with young trees in the East. From one of the oldest and largest tree in the Singapore Garden (see p. 252, table 4) 1245 ozs. of latex were obtained in three periods of tapping during 1909 resulting in 26 lbs. of rubber. (This tree was actually excised on 80 days only for one year), a much larger return than could be obtained by incisions and only a small area of bark operated on.

V-Shaped Method.

So far as we know there is not any difference of opinion as to what part of the tree should be tapped. It should be the trunk of the tree from the base to a height of 5 ft. In our own experiments we find that the dry weight of a biscuit of rubber is most from nearest the base, there is naturally a larger yield of latex from the single or double herring-bone excisions—being 4-5 or 8-10 excisions against 2 basal excisions—but the dry weight is slightly less from the same quantity of latex while from the upper branches the dry weight is considerably less and—with young trees—the exudation of latex soon ceases.

It is no doubt due to the fact of the richest latex being nearest the base of the tree that the V-shaped method obtains so many votaries. Where the full V is practised half of the girth of a tree is operated on or excised and the objection to this method lies in the interval of rest between completion of the first half of the area of bark and commencement of the second half. If the second half is followed on immediately the tree is only able to partially fulfil all its functions, it is really stagnated and weakened and this should be avoided, a half V would only return a scanty yield of latex, the half-herring bone would therefore be an improvement as this amounts to 4 or 5 half Vs.

Herring-Bone Method.

The double herring-bone method—something like 4 or 5 pairs of full Vs—has proved too expensive in bark excision and the single herring-bone method—a vertical channel with 4 or 5 half Vs, or oblique excisions at an angle of 45° about 1′ apart—is now adopted. This we think the most practical method, both as regards yield of

latex or economy of bark and provided the excising of bark is carefully done, i. e., the excisions are uniform and not too deep, improvement would appear to lie in the direction in which the latex is collected rather than by the method of tapping. To retard the rapid coagulation of latex on a practical basis is a problem which does not admit of an easy solution.

Basal Excisions.

Two excisions representing about one half or slightly more of the girth of the tree. The first excision is opened a few inches from the ground upwards at an angle of about 35° and the second excision on the opposite side of the tree is opened in a downward direction or reversed angle thus leaving the maximum space on the opposite sides of the tree between the excisions. As compared with the methods already cited there are two collecting cups against one, while the yield of latex is naturally less being two excisions only. It is however a method to be recommended for young trees for the following reasons :—quick bark recovery near the base, no distortion of bark ; strongest latex ; it can be followed by the single herring-bone without detriment whilst the trees have been increasing in girth. A comparison of the yield of latex with the half herring-bone method is shewn on table 6, but it should be remembered that although the gross yield is less, the weight of dry rubber is higher and as will be seen the yield per excision is more or as already stated the yield of latex is most and best nearest the base of a tree. It should be mentioned, too, that the fall off in the second period of basal tappings (vide Ex. X) is usual in all methods of tapping when there is an interval of rest between tappings.

TABLE 6.

No. of trees tapped.	No. of times tapped.	Method of tapping.	Total fluid ozs. of latex obtained.	Ratio of fluid ozs. per excision.
	Experiment IX.			
30	30	* Basal	809	2 Excisions × 30 = 13 ozs. per excision.
30	30	Half Herring Bone.	1605	5 „ × 30 = 10 „ „
	Experiment X.			
90	34	* Basal	2411	2 „ × 90 = 13 „ „
90	34	Half Herring Bone.	4973	5 „ × 90 = 11 „ „

* Without added water.

The actual yield of the half herring-bone trees (Ex. X) was 3511 ozs. for 24 times tapped, the difference being added by computation. This group of trees was tapped on three occasions during 1909 with the following result:—

TABLE 7.

No. of trees tapped.	No. of times tapped.	Method of tapping.	Total fluid ozs obtained.	
90	34	* Basal	24 11	* Without added water
90	34	* Basal	12 61	*
90	24	Half Herring-bone.	35 11	including water.

It should be pointed out that on both occasions of the basal tappings there was no water in the collecting cups as the latex was required for curing by smoke. Compared with the half herring-bone tapping the latter was plus added water and both basal tappings minus water and the further loss, at least measurable loss, of clotted latex which always occurs (with young trees) unless the latex drips in a small portion of water. It emphasises the fact however that a half herring-bone tapping can follow basal tappings with advantage. There is also a still further advantage in first tapping young trees by basal excisions in respect of uniform bark recovery. As a consequence of a vertical channel with herring-bone excisions the renewed bark is occasionally turgid, sometimes suppressed buds appear, while—so far as we have observed—this does not occur with trees first tapped at the base for the reason, we suspect, of the new bark growing upwards or downwards only while bark tension has been relieved.

It is sometimes stated that in bark renewal the new bark grows best, if not entirely, in a downward direction. It is not what actually occurs and if an excision of one, two, or more, inches wide is left intact for a sufficiently long period it will be found that the line of union between the downward and upward bark is in the centre of the excision. When, however, the tappings of the bark is being excised for a long period and the downward bark has commenced growing, the line of union will be below the centre, but the upward growing bark continues—as well as the two sides of the vertical channel in the double herring-bone tapping—towards the vertical—with the result that the renewed bark is turgid and frequently accompanied with various protuberances.

Notes on the Cultivation of Hevea Braziliensis (Para-Rubber) and the yield or Rubber crop.

Para rubber is a crop which, if the plantations in the East are carefully tended, might be continued for 60 years. The life of a tree or estate may be lengthened or shortened by the treatment accorded, but, as will be shown in these notes, the real test of successful cultivation in view of prospective crops depends entirely on the annual increment of growth of the trees. It is an indisputable fact that the ratio of yield increases with the size of a tree, both in respect of dry weight of rubber and better latex-producing rubber. The following statement illustrates both facts:—

SMALL AND LARGE TREES.

No of Trees tapped.	Aggregate girth at 3 ft. from ground.	Number of times tapped.	Fluid ozs. of latex.	Dry weight of rubber.	Ratio of fluid ozs. to ozs. avoirdupois.
		Small Trees.			
90	220′ 5″	24	3511	37 lbs.	$5\frac{15}{16}$ Nov.-Dec.
120	276′ $10\frac{3}{4}$″	26	3433	43 ,,	$4\frac{15}{16}$ Oct.-Nov.
100	276′ $10\frac{1}{2}$″	28	3981	48 ,,	$5\frac{3}{16}$ Sept.
310	774′ $2\frac{1}{4}$″	26	10925	128 ,,	(Total small trees).
			Large Trees.		
150	743′ $4\frac{1}{8}$″	30	18748	251 8	$4\frac{5}{8}$ Nov.-Dec.

It should be pointed out that the large trees have not been specially selected and the returns from the same trees were much more favourable in 1906, when these 150 trees supplied 15,280 ozs. of latex which resulted in 268 lbs. of rubber. For the purpose of this comparison, large and small trees were selected which had been tapped concurrently and the apparent facts must be convincing, viz.—310 trees of an average girth of 2′-6″ furnish more than half (slightly over 9/16) of the quantity of latex and only about half the dry weight of rubber of 150 trees of an average girth of 4′-10″, *i.e.*, the large trees were less than half the number of young trees; girth less; latex less pro rata; dry rubber nearly double.

The difference in the quantity of latex between young and old trees of nearly the same aggregate girth is not very large, although variable; it is evident, however, that the ratio of caoutchouc to the

volume of latex between young and old trees is considerably higher in old trees; thus:—

No. of Trees.	Total Girth.	Latex.	Dry Rubber.
		Young Trees.	
90	220′ 5″	3511	37 lbs.
120	276′ 10¾″	3433	43 „
100	276′ 10½″	3981	48 „
		Old Trees	
50	209′ 4⅞″	3323	75 „

In previous reports we have called attention to the necessity of wide planting as the most important factor in the annual increment of growth of rubber trees. Such increment, we consider, should not be less, for the average of an estate, than two inches per annum between the third and thirtieth years.

The increment of growth of para trees is variable according to situation, soil, humidity; but the ratio of increment also varies according to the age of the tree, thus:—

	1904	1905	1906	1909		Increment 6 years
5 years old	1′ 5⅝″	1′ 9½″	2′ 1⅞″	2′ 11⅜″	=	1′ 5¾″
5 „ „	1′ 6⅝″	1′ 11½″	2′ 3⅞″	3′ 0¾″	=	1′ 6⅛″
16 „ „	3′ 9¾″	3′ 11⅝″	4′ 3″	4′ 10¾″	=	1′ 1″
28 „ „	9′ 1½″	9′ 3¾″	9′ 5¾″	10′ 0½″	=	0′ 11″

We would estimate the ratio of growth where the general conditions are fair as follows:—

From 5 to 15 years	- - -	3 to 4 inches per annum.
„ 15 „ 20 „	- - -	2 „ 3 „ „ „
„ 20 „ 30 „	- - -	1 „ 2 „ „ „

The normal increment of growth, however, may be modified in any particular year through prolific seeding. It has been ascertained with oaks and beeches in temperate countries that the annual concentric ring of new wood may be reduced as much as 50 per cent as a result of heavy seeding.

There is a far more important cause which checks the normal growth of Para trees when overcrowded. With trees in general there is usually some excess of food assimilated which gradually accumulates until exhausted or disposed of by a heavy crop of seeds; but in rubber trees regularly tapped, the plant food formed by the tree has not only to provide the formative substance of a seed crop—as well as find nutriment for the cambium zone, but it has also to furnish material for new cell walls which are regularly formed as tapping proceeds. To meet this extra demand well developed trees with abundance of leaves—really manufacturing organs—are necessary, but as a consequence of overcrowding and the resulting struggle for existence a small crest of leaves manages to reach the light and such diminished organs are incapable of elaborating the necessary food.

It does not appear to us that such trees suffer directly as latex producers. All our observations and experiments tend to show that the lactiferous system acts as a specialised or reserve storage of water. In a previous report we have called attention to the varying dimensions of the girth of a Para tree during the course of a day. We pointed out that a tree measuring 3 feet in girth, at 3 feet from the ground, in the early morning, might contract as much as half an inch by mid-day on bright sunny days, and conversely, on sunless wet day be swollen to tension point and measure over 3 feet in girth. The tree is a true hygrophyte and is capable of absorbing and evaporating an enormous quantity of water, but—as shewn by the fall in girth on sunny days—evaporation is so much more rapid than absorption—and considering the soft outer layers and large pores of the wood—the tree would doubtless be wilted except that it does appear there is a minimum limit below which the latex never falls, and trees tapped late in the day yield very little or not at all because the pressure of water necessary to complete exudation—after the tubes or sacs have been wounded or punctured—is insufficient.

What really occurs may be expressed as wound response but in effect, and as judged by results, it is the compensating action of the tree in replacing escaped water and it would appear in excess of normal during a tapping period or season. This appears so from several phenomena, the most important being :

(*a*) the change that always takes place in the colour of prepared rubber from a yellow tint to white.

(*b*) increase of latex.

(*c*) shrinkage of prepared rubber to volume of latex.

(*d*) return from the excess of latex to normal in volume, colour, and weight after a period of rest.

The change referred to in the first three instances takes place between the fifth to the tenth tappings and appears to be entirely influenced by the number of tappings and not by the time elapsed, thus: 140 trees tapped in May on alternate days and in the following December and January daily, exhibited increase of latex on both occasions after the sixth tapping, although 12 days had elapsed in the first against 6 days in the latter instance. The increase of latex or "wound response" is variable, however, and is usually exhibited in the second and subsequent periods of tappings after fewer tappings than on the first occasion.

(*a*) Change in colour. There is always a change in colour of coagulated rubber, when the trees have been tapped periodically, and this change, from a tint of yellow to white, takes place at the time of increase of latex. It should be noted that at seasons of heavy rainfall coagulated rubber is then white as a consequence of excessive moisture.

(*b*) Increase of latex. Most noticeable after the sixth tapping and with the increase comes the change of colour referred to.

(*c*) Shrinkage. The quantity of coagulated rubber is not in exact ratio of the increased volume of latex. For some reason this is not so easily ascertained by weight as by measurement; e-g., supposing biscuits or sheets of rubber are required of uniform thickness, after the earliest tapping it is necessary to reduce the measured quantity of latex for a few mornings, and afterwards add to the quantity estimated, and a reason for this is naturally suggested as due to shrinkage owing to the higher percentage of water in the increased latex.

(*d*) Return from increased to normal. If trees are rested after a period of tapping the exceptional characteristics we have recorded disappear and such trees return to their normal condition.

We infer that a Para tree always contains a minimum supply of latex and the loss sustained by tapping is compensated for by an increased intake and stowage of water which gradually affects the colour and volume of latex exuded and although there is shrinkage or loss of weight in proportion to volume such loss is more than compensated for in the increased volume of latex. We would add that, in our opinion, coloured rubber is the strongest.

The progress or condition of an estate should not be considered from the view of yield of latex, as this may be good as long as the bark lasts and quick bark renewal can only be effected when the increment of growth is satisfactory. Overcrowded trees are the first to suffer. The cambium zone is starved and instead of an increment of growth of some inches, the annual concentric ring is scarcely perceptible and bark renewal is not only slow but the new bark is thin and very slightly latex bearing. How far growth may be checked, or rather the alarming extent to which growth may be checked, is shewn by the following figures in which trees closely and widely planted are compared. The closely planted trees are now 24 years old planted on a triangular piece of ground measuring 1 Rd., 34 Pl., and contains 322 trees. There is an out-side row of 38 trees which were planted a little earlier and are some-what better spaced and have a much larger supply of light, air, and root room. The increment of growth for the past 6 years is as follows:—

38 outside trees increment for 6 years = $8\frac{3}{4}$ inches or $1\frac{1}{4}$ inches per annum
284 inside " " " " = $4\frac{1}{2}$ inches or $\frac{1}{2}$ inches per annum

In other parts of the garden where the spacing of trees has been better the increment of growth amounts to $13\frac{1}{2}$ inches for 6 years or $2\frac{1}{2}$ inches per annum.

Trees at 20 years old should be 30 feet apart. Estates therefore intended to last for a full period of life, say 60 years, should be spaced well apart or they will not continue to yield fully for the whole time, a hundred and fifty large trees planted far apart and allowed to attain their full development are actually more valuable than five hundred smaller crowded trees of the same age, though these have a larger tapping area of bark. It may be noted too that not only would they actually produce a large and better quality of caoutchouc but they would also be cheaper to tap.

CLOSE PLANTING I.

Increment of Growth for 6 Years.

No. of Tree.	Girth at 3 ft. from ground. 1904.		Girth at 3 ft. from ground. 1905.		Girth at 3 ft. from ground. 1906.		Girth at 3 ft. from ground. 1909.		TOTAL Increment for 6 years.	
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
* 23	4	9	4	11	5	$1\frac{7}{8}$	5	$7\frac{1}{4}$		$10\frac{1}{4}$
* 24	5	3	5	$5\frac{3}{8}$	5	$9\frac{3}{4}$	6	$7\frac{3}{4}$	1	$4\frac{3}{4}$
* 25	2	$11\frac{1}{2}$	3	$1\frac{1}{4}$	3	3	3	$6\frac{3}{4}$		$7\frac{1}{4}$
* 26	3	10	3	$11\frac{1}{8}$	4	$1\frac{3}{4}$	4	$3\frac{3}{4}$		$5\frac{3}{4}$
* 27	4	$8\frac{1}{4}$	4	$9\frac{3}{4}$	5	$0\frac{1}{4}$	5	2		$3\frac{3}{4}$
* 28	5	2	5	$4\frac{1}{2}$	5	$7\frac{1}{2}$	6	0		10
* 29	3	$2\frac{1}{2}$	3	$2\frac{1}{2}$	3	$5\frac{3}{8}$	3	$9\frac{3}{4}$		$7\frac{1}{4}$
* 30	2	10	2	$10\frac{1}{2}$	3	$0\frac{3}{4}$	3	$4\frac{1}{4}$		$6\frac{1}{4}$
* 31	3	$11\frac{1}{2}$	4	$0\frac{3}{4}$	4	$2\frac{3}{4}$	4	5		$5\frac{1}{2}$
* 32	3	$3\frac{3}{4}$	3	5	3	7	3	$11\frac{3}{4}$		8
* 33	3	8	3	10	4	$0\frac{3}{8}$	4	$6\frac{1}{2}$		$10\frac{1}{2}$
* 34	3	3	3	$5\frac{1}{2}$	3	$6\frac{1}{8}$	3	$11\frac{1}{4}$		$8\frac{1}{4}$
* 35	4	$7\frac{3}{4}$	4	$10\frac{7}{8}$	5	$1\frac{1}{8}$	5	$6\frac{1}{4}$		$10\frac{1}{2}$
* 36	3	$7\frac{1}{2}$	3	$8\frac{3}{4}$	3	$11\frac{5}{8}$	4	5		$9\frac{1}{2}$
* 37	3	2	3	4	3	$4\frac{5}{8}$	3	$6\frac{1}{4}$		$4\frac{1}{4}$
* 38	5	$0\frac{1}{4}$	5	$1\frac{5}{8}$	5	3	5	$9\frac{1}{4}$		9
* 39	4	8	4	$9\frac{1}{4}$	5	$0\frac{1}{2}$	5	4		8
* 40	4	$1\frac{3}{4}$	4	4	4	6	4	$9\frac{1}{2}$		$7\frac{3}{4}$
* 41	4	$0\frac{1}{2}$	4	3	4	5	4	$9\frac{3}{4}$		$9\frac{1}{4}$
* 42	3	$7\frac{1}{2}$	3	10	4	$0\frac{3}{4}$	4	$5\frac{3}{4}$		$10\frac{1}{4}$
* 43	3	$4\frac{3}{4}$	3	$6\frac{1}{2}$	3	$9\frac{5}{8}$	4	2		$9\frac{1}{4}$
* 44	3	$5\frac{3}{4}$	3	$6\frac{3}{8}$	3	$7\frac{3}{4}$	4	$1\frac{1}{4}$		$7\frac{1}{2}$
* 45	3	0	3	3	3	$5\frac{1}{2}$	3	$10\frac{1}{2}$		$10\frac{1}{2}$
* 46	2	$11\frac{1}{4}$	3	$0\frac{1}{2}$	3	$2\frac{1}{2}$	3	6		$6\frac{3}{4}$
* 47	2	$10\frac{3}{4}$	2	$11\frac{1}{2}$	3	4	3	$10\frac{1}{2}$		$11\frac{3}{4}$
* 48	2	10	2	$10\frac{1}{2}$	3	2	3	$8\frac{1}{4}$		$10\frac{1}{4}$
* 49	3	11	4	0	4	3	4	9		10
* 50	3	7	3	$7\frac{3}{8}$	3	11	4	4		9
* 51	3	$2\frac{1}{4}$	3	$2\frac{1}{4}$	3	6	3	$9\frac{1}{4}$		7
									20′	10″

* These are an outside row of trees on the triangular block facing a road and were planted earlier than the trees from 67 to 350.

CLOSE PLANTING II.

Increment of Growth for 6 Years.

No. of Tree.	Girth at 3 ft. from ground. 1904.		Girth at 3 ft. from ground. 1905.		Girth at 3 ft. from ground. 1906.		Girth at 3 ft. from ground. 1909.		TOTAL Increment for 6 years.	
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
* 52	4	3½	4	4	4	7⅞	5	2		10½
* 53	2	9¾	2	10½	3	1	3	4½		6¾
* 54	3	8½	3	9½	4	0¼	4	4¾		8¼
* 55	3	3¼	3	4⅝	3	6¾	3	10¼		7
* 56	3	9¼	3	10½	4	2	4	6¾		9½
* 57	3	9	3	10¾	4	3	4	9¼	1	0¼
* 58	3	8¼	3	10¼	4	1⅝	4	4		7¾
* 59	4	2	4	2¾	4	3⅞	4	8		6
* 60	4	10	4	10½	5	3¾	6	0¾	1	2¾
67	1	10	1	11	2	0¼	2	1½		3½
68	3	10	3	10⅞	4	0⅞	4	4		6
69 forked	3 3	5½ 3	3 3	5¾ 3¼	3 3	8⅜ 4⅛	3 3	10 5		4½ 2
70	1	8¼	1	8½	1	10⅛	2	1½		5¼
71	1	11½	2	0	2	1⅝	2	4⅞		5⅜
72	2	6	2	6¾	2	9¾	2	10¾		4¾
73	2	1¾	2	3¼	2	4½	2	8½		6¾
74	5	6	5	6¾	5	9	5	11		5
75	3	4¾	3	5½	3	6¾	3	8¾		4
76	2	4¼	2	6⅜	2	7½	3	0⅞		8⅝
77	2	3½	2	4¼	2	6¼	2	9¾		6¼
78	1	8¼	1	9¼	1	9⅝	1	11		2¾
79	2	9¼	2	9⅝	2	10⅝	3	0		2¾
80	3	4½	3	5¾	3	8½	4	0¾		8¼
81	4	9½	4	10¾	5	0¾	5	3¼		5¾
82	2	0	2	1⅝	2	2⅜	2	6½		6½
83	3	3	3	4¼	3	4⅞	3	7		4
84	2	8¼	2	9¼	2	11½	3	1		4¾
85	1	10½	1	11	1	11⅛	2	0¾		2¼
86	3	7	3	7½	3	8⅞	4	1¼		6¼
									8′	9″¼

2′0-10″, 6-10¾ = 27′8″¾

WIDE PLANTING II.

Increment of Growth for 6 Years.

No. of tree	Girth at 3 ft. from ground. 1904		Girth at 3 ft. from ground. 1905		Girth at 3 ft. from ground. 1906		Girth at 3 ft. from ground. 1909		Total Increment. 6 years.	
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
1	6	1	6	1¾	6	3½	6	8½		7½
2	9	1½	9	3¾	9	5¾	10	0½		11
3	4	7½	4	7⅝	4	8¾	5	0¼		4¾
6 Seedling	1	11½	2	3	2	5⅜	3	0¾	1	1¼
7	7	3¾	7	5	7	8	7	11		7¼
8 Seedling	2	5	2	6¾	2	9⅝	3	5¾	1	0¾
9	4	8½	4	10½	4	10½	5	3½		7
10	4	6	5	0	5	0¾	5	2		8
12 Seedling	1	11½	2	2¾	2	7	3	5¼	1	5¾
13	5	4	5	4½	5	7⅜	5	7⅜		3⅜
14	4	1	4	3	4	7	5	4	1	3
15 Seedling	3	2	3	5¼	3	7⅞	4	4½	1	2½
16 Seedling	2	2½	2	6¼	2	9⅝	3	10	1	7½
17 Seedling	3	3¾	3	7	3	11¼	4	7½	1	3¾
20 Seedling	2	11½	3	4	3	5⅞	3	6		6½
22 Seedling	2	6¼	2	10	3	0¼	3	5		10¾
353	3	1¼	3	2¾	3	6¾	4	0⅞		11⅝
354	5	3¼	5	5¼	5	8½	5	11		7¾
355	3	5½	3	7	3	8¼	4	0¾		7¼
356	5	10½	6	1	6	3½	6	8¾		10¼
									17	7½

Seedling = self sown seedling.

CLOSE PLANTING III.

Increment of Growth for 6 years.

No. of Tree.	Girth at 3 ft. from ground. 1904.		Girth at 3 ft. from Ground. 1905.		Girth at 3 ft. from ground. 1906.		Girth at 3 ft. from ground. 1909.		TOTAL. increment for 6 Years.
	ft.	in.	ft.	in.	ft.	in	ft.	in.	in.
87 Forked	3 2	4 9½	3 2	4½ 10⅞	3 2	4½ 11⅜	3 3	4¾ 1	¾ 3½
88	2	9	2	9⅞	2	10½	3	1	4
89	1	11	2	0½	2	1	2	2¾	3¾
90	1	9	1	9½	1	10¾	2	0⅛	3⅛
91	1	8¼	1	9½	1	9½	1	10½	2¼
92	2	11½	3	0	3	1½	3	4	4½
93	2	0¾	2	2	2	2¾	2	6¾	6
94	2	11½	3	0½	3	3	3	9¼	9¾
95 Forked	2 1	5 6¾	2 1	5½ 8	2 1	5½ 9	2 1	6 11½	1 4¾
96	2	0	2	1	2	2⅝	2	4⅝	4⅝
97	2	4	2	4⅞	2	6⅜	2	10½	6½
98	1	10	1	10½	1	10¾	2	0¼	2¼
99	1	10¾	2	0⅛	2	1¼	2	5¾	7
100	2	1	2	1⅜	2	2¼	2	4¼	3¼
101	1	7	1	7¾	1	7⅞	dead		nil
102	2	5	2	5½	2	6⅝	2	7½	2½
103	3	5¼	3	6½	3	7½	3	9⅜	4⅛
104	4	0½	4	1	4	1¼	dead		nil
105	3	3	3	4⅛	3	4¾	3	6¾	3¾
106	3	2¼	3	4⅜	3	6½	3	10¾	8½
107	2	10¼	2	11	3	0½	3	3	4¾
108	1	7	1	7	1	8⅜	1	11⅛	4⅛
109	1	9¾	1	10	1	10¾	2	0¼	2½
110	3	0	3	0	3	2	3	5¾	5¾
111	3	7½	3	10	3	11⅛	4	1⅞	6⅜
112	3	11	3	11½	4	0½	4	1¾	2¾
113	3	6	3	6	3	6⅞	3	7¾	1¾
114	2	9½	2	11	3	0¾	3	2¾	5¼
115	2	3¼	2	3⅝	2	4¼	2	6⅝	3⅜
									10 2½

WIDE PLANTING III.

Increment of Growth for 6 years.

No. of Tree.	Girth at 3 ft. from ground. 1904.		Girth at 3 ft. from ground. 1905.		Girth at 3 ft. from ground. 1906.		Girth at 3 ft. from ground. 1909.		TOTAL. Increment for 6 Years.
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	in.
357	5	8½	5	9½	6	0⅜	6	5½	9
358	4	4½	4	6	4	8¾	5	2½	10
359	5	4½	5	4½	5	6¾	5	9½	5
360	5	10¼	6	1¾	6	5	6	9	10¾
687	4	8	4	10¾	4	11	5	0¼	4¼
688	3	10½	4	0⅛	4	1½	4	5⅞	7⅜
689	2	7	2	8¾	2	9¾	3	2	7
690	5	1½	5	2⅜	5	3¾	6	5¾	4¼
691	5	5½	5	9	5	10½	6	4	10½
692	2	10¼	2	11	2	11⅛	3	3⅜	5⅛
693	5	9½	5	10⅛	5	11½	6	0½	3
694	2	5¾	2	6¾	2	10⅝	3	4⅜	10⅝
696	4	6¼	4	7½	4	10¾	5	1¼	7
702	4	0¼	4	2½	4	3⅞	4	5½	5¼
703	2	6½	2	8⅛	2	9½	3	3¼	8¾
704	2	7¾	2	9⅜	2	10	3	2⅞	7⅛
705	2	7½	2	9⅛	2	10	3	2⅛	6⅝
712	3	1¼	3	2⅝	3	4	3	10½	9¼
713	2	5½	2	6	2	9⅓	3	2	8½
714	1	6¾	1	9	1	10½	2	4¾	10
715	4	2¼	4	4½	4	5⅝	5	1	10¾
716	3	0¼	3	1½	3	3⅞	3	8¼	8
717	4	1¼	4	2⅞	4	5⅝	5	2⅜	1 1⅛
718	2	5¾	2	6⅜	2	9⅓	3	1¾	8
719	3	9¾	3	11⅝	4	3	4	10¾	1 1
720	1	10¾	1	11¼	2	1⅛	2	3⅞	5⅛
721	3	4¾	3	5¾	3	7	3	9¾	5
722	3	0½	3	2⅓	3	3¾	3	5¼	4¾
723	5	2	5	3¾	5	5⅛	5	9	7
									18 8⅛

CLOSE PLANTING IV.

Increment of Growth for 6 years.

No. of Tree.	Girth at 3 ft. from Ground. 1094.		Girth at 3 ft. from Ground. 1905.		Girth at 3 ft. from Ground. 1906.		Girth at 3 ft. from Ground. 1909.		TOTAL. Increment 6 Years.
ft. in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	in.
116	3	6	3	8⅜	3	9¼	3	10½	4½
117	2	6¾	2	8	2	8⅞	2	10	3¼
118	4	0	4	1⅜	4	3⅜	4	5½	5½
119	3	1¼	3	2½	3	4¼	3	6⅛	4⅞
120	2	5¾	2	6⅝	2	7⅝	2	8⅜	2⅝
121	3	1	3	1	3	2¼	3	4¾	3¾
122	3	10¼	3	11	4	1¾	4	6¾	8½
123	2	11½	2	11⅞	3	1¼	3	5¼	5¾
124	2	1¼	2	1¼	2	1⅞	2	4⅞	3⅝
125	2	9	2	9½	2	11	3	0⅞	3⅞
126	3	1¼	3	2¼	3	4	3	6¾	5½
127	4	7½	4	7½	4	9¼	4	11⅛	3⅝
128	2	10½	2	11⅛	3	1	3	1½	3
129	1	5¼	1	6¼	1	7⅛	1	9¼	4
130	3	2¾	3	3¼	3	4⅜	3	4¾	2
131	3	1	3	1¾	3	2¼	3	4	3
132	2	9¾	2	9¾	2	11⅝	3	2¾	5
133	4	2	4	2	4	3	4	8½	6½
134	1	10	1	10⅛	2	0⅜	2	3	5
135	3	5½	3	5⅞	3	6¼	3	7¾	2¼
136	1	8¾	1	8⅞	1	8⅞	Dead.		Nil
137	2	7	2	7⅞	2	9⅛	3	0	5
138	3	10¼	3	10¼	3	11¼	4	1½	3¼
139	2	11½	2	11½	3	1	3	3	3½
140	2	2¾	2	3½	2	4¾	2	6¾	4
141	2	6¾	2	6⅞	2	8½	2	10½	3¾
142	3	6¼	3	6½	3	7⅝	3	9	2¾
143	3	10	3	10	3	10¼	3	11¼	1¼
144	2	2¼	2	2¼	2	2¾	2	5	2¾
									9′ 4″⅜

WIDE PLANTING IV.

Increment of Growth for 6 years.

No. of Tree.	Girth at 3 ft. from Ground, 1904.		Girth at 3 ft. from Ground. 1905.		Girth at 3 ft. from Ground 1906.		Girth at 3 ft. from Ground. 1909.		TOTAL. Incremunt. Years.	
ft. in.	ft.	in.	ft.	in.	ft.	in.	ft.	in	ft.	in.
724	3	1¾	3	4⅜	3	7¾	4	0⅜		10⅝
803	3	5¾	3	11¼	4	2¾	5	2¼		8½
804	2	4½	2	10⅛	3	1¾	4	0⅛	1	7⅝
1285	3	8¼	4	0½	4	1¾	5	0	1	3¾
806	3	3⅛	3	8½	4	0⅝	5	0	1	8⅞
807	1	7⅝	1	9⅞	1	10⅝	2	10	1	2⅜
808	2	1½	2	6⅛	2	10¾	3	8	1	6½
809	2	2	2	7⅞	3	1½	4	2¾	2	0¾
810	4	1	4	3⅝	4	7⅝	5	0¼		11¼
811	1	10	2	3⅛	2	9½	3	8⅞	1	10⅞
812	1	10¾	2	2¼	2	6⅜	3	5⅞	1	7⅛
1284	4	0⅞	4	6⅞	4	10⅝	6	0⅛	1	11¼
815	5	8¾	6	1	6	4¼	6	11½	1	2¾
817	2	6½	3	0¾	3	7	4	10¼	2	4
818	2	6	3	0	3	5¼	4	7⅝	2	1⅝
819	1	11½	2	2⅞	2	6¼	3	2	1	2½
821	3	3	3	7⅜	3	11¼	4	9¼	1	6¼
822	2	9	3	0⅞	3	2⅞	3	10	1	1
823	4	7½	5	2⅛	5	6⅜	6	8¼	2	0¾
824	2	3⅛	2	7⅜	3	0⅜	3	10½	1	7⅜
825	2	5½	2	11½	3	3⅝	3	4⅞		11⅜
826	5	2½	5	4½	5	7⅝	6	4½	1	2
827	5	9½	6	0	6	2⅞	6	8⅜		10⅞
828	1	9¾	2	2⅝	2	8	3	6⅜	1	8⅝
829	4	3¼	4	4¼	4	8⅝	5	2⅞		11⅝
830	6	4¼	6	8½	7	0½	7	9½	1	5¼
831	2	1½	2	7½	3	0½	4	3¼	2	1¾
832	5	5	5	7⅝	5	8⅛	6	1		8
833	4	4½	4	5½	4	7½	4	11		6½
									41′	1¾″

CLOSE PLANTING V.

Increment of Growth for 6 Years.

No. of Tree.	Girth at 3 ft. from ground. 1904		Girth at 3 ft. from ground. 1905		Girtn at 3 ft. from ground. 1906		Girth at 3 ft. from ground. 1909		Total Increment. 6 years.
145	2ft.	10½in.	2ft.	11 in.	2ft.	11¾in.	3ft.	0¾in.	in. 2¼
146	2	9½	2	10¼	3	0	3	3⅞	6⅜
147	2	5	2	6⅛	2	7⅛	3	1¾	8¾
148	3	3	3	4	3	4⅝	3	9¾	6¾
149	3	3	3	3½	3	4⅝	3	7½	4½
150	2	3½	2	4⅛	2	5⅛	2	10½	7
151	2	7½	2	7½	2	8⅞	2	10¼	2¾
152	2	6½	2	7¼	2	8⅜	3	0½	6
153	3	5¼	3	7½	3	9½	4	2¾	9½
154	4	2	4	2¼	4	2⅜	4	5¼	3¼
155	2	3	2	3½	2	3⅞	2	5	2
156	2	8½	2	9¾	2	9¾	3	1⅛	4⅝
157	1	7½	1	8	1	9	1	11¾	4¼
158	3	7¼	3	7¾	3	10⅛	4	1⅜	6⅛
159	3	10½	3	10½	3	10½	4	1¾	3¼
160	2	5¼	2	5⅝	2	7	2	11¾	6½
161	3	6½	3	10	3	11½	4	3¼	8¾
162	3	6	3	6¾	3	8¾	3	10⅝	4⅝
163	2	5½	2	6¾	2	6¾	2	10	4½
164	2	1	2	1	2	2	2	5	4
165	3	3¾	3	4	3	5¼	4	0¼	8½
166	2	9¼	2	9¼	2	10	3	0½	3¼
167	2	4¼	2	4¼	2	4⅞	2	7	2¾
168	2	5¾	2	5¾	2	6½	2	8⅜	3
169	2	9	2	9¾	2	9¾	2	11¾	2¾
170	1	8¾	1	8¾	1	8⅞	1	10	1¼
171	2	10	2	10⅝	3	0⅜	3	2¼	4¼
172	3	5¾	3	5¾	3	7¾	3	9½	3¾
173	3	11¾	4	0	4	1¼	4	3⅝	3⅞
									11′ 7⅛″

WIDE PLANTING V.

Increment of Growth for 6 Years.

No. of Tree.	Girth at 3 ft. from ground. 1904		Girth at 3 ft. from ground. 1905		Girth at 3 ft. from ground. 1906		Girth at 3 ft. from ground. 1909		Total Increment 6 years.	
1212	4ft.	2⅛in.	4ft.	6⅛in.	4ft.	8⅜in.	5ft.	3¼in.	1ft.	1⅛in.
1213	2	10	2	11½	3	3⅛	3	6⅜		8⅜
1214	3	0⅞	3	4¾	3	9	4	6⅝	1	5¾
1215	4	2½	4	4	4	7	5	1		10½
1281	5	2⅜	5	8⅛	5	11⅜	7	0⅞	1	10½
1282	1	10¼	1	10¾	2	0	2	2¼		4
1283	2	8⅞	3	0⅞	3	2	3	11	1	2⅛
1219	1	7½	2	2	2	8⅛	4	1½	2	6
1220	1	9	2	1⅞	2	7¼	3	8	1	11
1221	2	10⅝	3	3⅜	3	8⅛	4	10⅜	1	11¾
1222	1	5⅝	1	9½	2	1⅞	2	11⅜	1	5¾
1223	1	11⅛	2	3¼	2	8⅝	3	6⅞	1	7¾
1224	1	6⅝	1	11½	2	3⅞	3	0¾	1	6⅛
1225	1	9¾	2	3¼	2	8⅜	3	6	1	8¼
forked low ,,	1	4⅝	1	8¼	2	0	2	10	1	5⅜
,,	1	7⅛	2	0	2	4½	3	4¾	1	9⅝
1226	1	11⅞	2	4⅜	2	10⅛	3	6¾	1	6½
1227	1	9⅞	2	2⅜	2	6¾	3	4¾	1	6½
1228	2	7	3	2½	3	9⅝	4	6	1	11
1229	2	1	2	4⅝	2	7½	3	2½	1	1½
1230	1	8⅜	2	0¾	2	4⅜	3	1⅛	1	4¾
1231	2	1¼	2	4⅜	2	5⅝	2	11¾		10½
1232	1	2⅞	1	6⅜	1	10⅛	2	5⅞	1	3
1233	2	2½	2	9½	3	3⅝	4	4⅛	2	1⅝
1234	1	10¾	2	2⅝	2	6⅝	3	2⅞	1	4⅛
1235	1	10½	2	3⅛	2	7⅜	3	5⅜	1	6⅞
1236	2	5⅛	2	7¾	2	11	3	3¾		10⅝
1237	1	5	1	6⅞	1	10⅞	2	4⅞		11⅞
1238	1	9⅝	2	2	2	6	3	5⅞	1	8¼
									41′	9⅛″

CLOSE PLANTING VI.

Increment of Growth for 6 Years.

No. of Tree.	Girth at 3 ft. from ground. 1904.		Girth at 3 ft. from ground. 1905.		Girth at 3 ft. from ground. 1906.		Girth at 3 ft. from ground. 1909.		TOTAL Increment for 6 years.	
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
174	3	6	3	6	3	6⅝	3	8½		2½
175	2	3½	2	3½	2	4	2	6⅛		2⅝
176	3	10	3	11	4	2⅛	4	7½		9½
177	1	10½	1	10½	1	11⅜	2	1½		3
178	2	4¼	2	4½	2	5½	2	8		3¾
179	1	11¾	1	11¾	1	11¾	2	1⅞		2⅛
180 forked	2 1	5 5¾	2 1	6 6⅛	2 1	6¾ 6⅛	2 1	10½ 7½		5½ 1¾
181	3	6	3	6¼	3	8	4	0		6
182	1	11	1	11	2	1	2	3⅝		4⅝
183	2	5	2	5¼	2	6⅞	2	11½		6½
184	1	9½	1	9½	1	10	1	11½		2
185	3	1½	3	1½	3	1¾	3	4½		3
186	2	4½	2	4½	2	4½	2	5⅞		1⅜
187	3	0½	3	0⅞	3	2	3	3		2½
188	1	8	1	8	1	8½	1	11		3
189	2	10¾	2	10¾	2	11⅞	3	3		4¼
190	2	9¾	2	9¾	2	11¾	3	2		4¼
191	3	0	3	0	3	1⅛	3	1¾		1¾
192	1	6½	1	6½	1	6½	1	7½		1
193	3	7¾	3	7¾	3	9¼	4	0½		4¾
194	2	6¾	2	7⅛	2	7¼	2	10¾		4
195 forked	1 2	3¼ 6¾	1 2	3¼ 7⅜	1 2	4 8	3	7¾		—
196	2	11¾	3	0	3	1½	3	4½		4¾
197	3	6¾	3	6¾	3	9½	4	0⅜		5⅝
198	3	0¼	3	1	3	2	3	5		4¾
199 forked	3 1	1¾ 6½	3 1	2¼ 6½	3 1	3 6½	3 1	9 6⅞		7¼ ⅜
200	1	7	1	7	1	8½	1	11		4
201	4	0	4	0½	4	1	4	3½		3½
292	5	0½	5	1	5	1¾	5	4¼		3¾
									9′	5¾″

WIDE PLANTING VI.

Increment of Growth for 6 Years.

No. of Tree.	Girth at 3 ft. from ground. 1904.		Girth at 3 ft. from ground. 1905.		Girth at 3 ft. from ground. 1906.		Girth at 3 ft. from ground. 1909.		TOTAL Increment for 6 years.	
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
1239	1	$8\frac{1}{4}$	2	$0\frac{1}{2}$	2	5	3	$4\frac{3}{4}$	1	$8\frac{1}{2}$
1240	1	8	1	$10\frac{3}{4}$	2	$2\frac{3}{4}$	2	10	1	2
1241	1	4	1	$6\frac{1}{2}$	1	$11\frac{7}{8}$	3	$0\frac{1}{4}$	1	$8\frac{1}{4}$
1242	1	5	1	$7\frac{7}{8}$	1	$10\frac{7}{8}$	2	8	1	3
1243	1	$5\frac{5}{8}$	1	$8\frac{3}{8}$	1	$10\frac{1}{2}$	2	$8\frac{3}{4}$	1	$3\frac{1}{8}$
1244	1	11	2	$1\frac{3}{8}$	2	$4\frac{1}{2}$	3	$2\frac{7}{8}$	1	$3\frac{7}{8}$
1245	1	$6\frac{1}{2}$	1	10	2	$0\frac{5}{8}$	2	$10\frac{7}{8}$	1	$4\frac{3}{8}$
1246	1	$6\frac{1}{4}$	1	$7\frac{5}{8}$	1	$8\frac{7}{8}$	2	$9\frac{5}{8}$	1	$3\frac{3}{8}$
1247	1	$10\frac{1}{4}$	2	$1\frac{1}{4}$	2	$5\frac{1}{4}$	3	$3\frac{7}{8}$	1	$5\frac{5}{8}$
1248	1	$2\frac{1}{4}$	1	$5\frac{3}{8}$	1	$8\frac{1}{2}$	2	$7\frac{5}{8}$	1	$5\frac{3}{8}$
1249	1	4	1	$7\frac{7}{8}$	1	$11\frac{3}{8}$	2	10	1	6
1250	1	$7\frac{1}{8}$	1	11	2	3	3	1	1	$3\frac{7}{8}$
1251	1	7	1	$9\frac{3}{4}$	2	$1\frac{3}{8}$	2	$11\frac{1}{8}$	1	$4\frac{1}{8}$
1252	1	$7\frac{1}{8}$	1	$11\frac{1}{8}$	2	$1\frac{7}{8}$	3	0	1	$4\frac{7}{8}$
1253	1	$8\frac{1}{4}$	1	$11\frac{1}{8}$	2	$1\frac{1}{2}$	3	$1\frac{1}{8}$	1	$4\frac{7}{8}$
1254	1	9	2	1	2	$6\frac{3}{8}$	3	8	1	11
1255	2	$2\frac{7}{8}$	2	$5\frac{1}{8}$	2	$7\frac{3}{8}$	3	$3\frac{5}{8}$	1	$0\frac{3}{4}$
1256	3	$9\frac{7}{8}$	4	0	4	$3\frac{1}{4}$	4	$11\frac{3}{4}$	1	$1\frac{7}{8}$
1257	2	6	2	$9\frac{5}{8}$	3	$1\frac{1}{2}$	3	$10\frac{3}{8}$	1	$4\frac{3}{8}$
1258	2	$6\frac{3}{4}$	2	$9\frac{3}{4}$	3	$1\frac{3}{4}$	3	$9\frac{1}{2}$	1	$2\frac{3}{4}$
1259	2	7	2	$11\frac{5}{8}$	3	$4\frac{5}{8}$	4	$2\frac{5}{8}$	1	$7\frac{5}{8}$
1260†	2	$4\frac{5}{8}$	2	$4\frac{5}{8}$	2	$4\frac{5}{8}$	2	$4\frac{5}{8}$	Nil	
1263	3	$9\frac{1}{8}$	4	$0\frac{1}{2}$	4	6	4	$10\frac{3}{8}$	1	$1\frac{1}{4}$
1267	1	$9\frac{3}{8}$	1	11	2	$1\frac{1}{8}$	2	$11\frac{1}{4}$	1	$1\frac{3}{8}$
1268	1	5	1	$7\frac{1}{4}$	1	$9\frac{1}{2}$	2	$4\frac{3}{4}$		$11\frac{3}{4}$
1269	1	5	1	$6\frac{5}{8}$	1	$8\frac{5}{8}$	2	$1\frac{1}{2}$		$8\frac{1}{2}$
1270	1	$7\frac{1}{2}$	1	$9\frac{3}{8}$	1	11	2	$5\frac{3}{4}$		$10\frac{1}{4}$
1271	1	$11\frac{1}{2}$	2	$2\frac{1}{8}$	2	$5\frac{1}{8}$	3	$0\frac{3}{8}$	1	$0\frac{7}{8}$
1272	3	$2\frac{1}{2}$	3	$4\frac{1}{2}$	3	$6\frac{5}{8}$	4	1		$10\frac{1}{2}$
									36′	$0\frac{1}{8}$″

† Damaged.

CLOSE PLANTING. VII.

Increment of Growth for 6 years.

No. of Tree.	Girth at 3 ft. from Ground, 1904.		Girth at 3 ft. from Ground. 1905.		Girth at 3 ft. from Ground 1906.		Girth at 3 ft. from Ground. 1909.		TOTAL. Incremunt. 6 Years.	
	ft.	in.	ft.	in.	ft.	in.	ft.	in	ft.	in.
203	3	1½	3	2	3	4⅜	3	8½		7
204	2	11	2	11	3	0	3	0⅞		1⅞
205	1	8¾	1	9¾	1	11½	2	2½		5¾
206	1	6½	1	6⅝	1	7¾	1	8½		2
207	1	8¾	1	8¾	1	10¼	2	0⅞		4⅛
208	2	9¾	2	11½	3	1	3	5½		7¾
209	1	8¾	1	9½	1	9⅞	2	0¾		4
210	2	8	2	8	3	4⅞	3	6⅜		10⅜
									3	6⅞
211	2	7¾	2	9	2	10⅞	3	0¼		4½
212	1	6½	1	6⅝	1	8⅝	2	0¾		6¼
213	3	2	3	3½	3	6	3	11½		9½
214	2	3¼	2	3¾	2	4	2	5⅜		2⅛
215	3	4	3	4	3	4¼	3	5⅜		1⅜
216	2	4¾	2	4¾	2	5½	2	7⅝		2⅞
217	1	10¾	2	0¼	2	2	2	5⅝		6⅞
218	2	11	2	11	3	1⅝	3	3½		4½
219	1	10½	1	10¾	1	11¼	2	1⅝		3⅛
220	3	7	3	7	3	8	3	9¼		2¼
221	2	2	2	2¾	2	4	2	7¼		5¼
222	4	9	4	9½	4	10⅛	5	1¾		4¾
223	3	1	3	1⅝	3	2¾	3	4⅞		3⅞
224	2	11½	3	0	3	0⅞	3	4		4½
225	2	5½	2	6	2	8	2	11⅜		5⅞
226	3	9	3	10¼	3	11⅝	4	2½		5½
227	3	10¾	3	11	4	0¾	4	5¼		6½
228	2	6½	2	6½	2	7⅝	2	9¾		3¼
229	1	8½	1	8¾	1	9½	1	10¾		2¼
230	2	6¼	2	7½	2	9	3	3		8¾
231	2	9¾	2	10¾	3	0	3	3¼		5½
									12′	8¼″

WIDE PLANTING VII.

Increment of Growth for 6 years.

No. of Trees.	Girth at 3 ft from Ground. 1904.		Girth at 3 ft. from Ground. 1905.		Girth at 3 ft. from Ground. 1906.		Girth at 3 ft. from Ground. 1909.		TOTAL. Increment. 6 Years.	
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
1273	2	7	2	8	2	10¾	3	4½	1	9½
1274	1	8¼	1	9½	1	10	2	1½		5¼
1275	2	0	2	0½	2	2	2	4¾		4¾
1276	4	5¾	4	9⅞	4	10	5	0⅜		6⅝
1277	5	0½	5	2⅞	5	5⅜	6	3	1	2½
1278	2	10	2	11	2	11⅝	3	2¼		4¼
1279	2	10¼	3	0½	3	2	3	6½		8¼
1280	2	9½	3	0⅞	3	5⅜	3	11¼	1	1¾
									6′	6⅞″

CLOSE PLANTING VIII.

Increment of Growth for 6 Years.

No. of Tree.	Girth at 3 ft. from ground. 1904		Girth at 3 ft. from ground. 1905		Girth at 3 ft. from ground. 1906		Girth at 3 ft. from ground. 1909		Total Increment 6 years.
232	4ft.	11in.	4ft.	11in.	5ft.	0in.	5ft.	6½in.	7½ in.
233	1	11¾	2	0¾	2	1	2	3	3¼
234	3	2¾	3	3⅛	3	4⅝	3	7⅞	5⅛
235	3	10½	3	11½	4	2¾	4	8⅜	9⅞
236	2	8¾	2	8¾	2	9	Dead		—
237	3	3¾	3	4½	3	6⅜	3	8¾	5
238	2	2	2	2⅞	2	3	2	7	5
239	3	4½	3	4⅞	3	6½	3	10	5½
240	2	2¾	2	2¾	2	3	2	5⅜	2⅝
241	3	1¾	3	2⅝	3	4⅝	3	7½	5¾
242	1	11½	2	0	2	0¾	2	1¾	2¼
243	2	6¼	2	6¼	2	7½	2	10½	4¼
244	2	5½	2	5¾	2	6⅜	2	9⅞	4⅜
245	2	6½	2	6¾	2	7⅜	2	10¾	4¼
246	2	6¾	2	8⅜	2	10½	3	2⅞	8⅛
247	2	7¼	2	8	2	8⅜	2	11¼	4
248	3	10½	3	11¼	4	0¼	4	2¼	3¾
249	2	4¼	2	4¼	2	4½	2	6⅞	2⅝
250	1	8	1	8	1	8½	1	9¾	1¾
251	2	9¾	2	10⅜	3	0¼	3	4⅜	6⅝
252	1	9¾	1	9¾	1	10⅞	2	0⅞	3⅛
253	2	8¼	2	8⅜	2	10⅜	3	2⅜	6⅛
254	3	7	3	7	3	9¼	4	1⅞	6⅞
255	1	9¼	1	10⅜	1	11⅛	2	0	2¾
256	2	10½	2	10½	3	0⅛	3	3⅞	5⅜
257	2	5	2	5½	2	6⅝	2	10⅛	5⅛
278	1	9¾	1	10¼	1	11¾	2	1⅞	4⅛
259	2	7¼	2	8	2	10	3	0½	5¼
260	2	2¼	2	2⅝	2	3⅞	2	6⅝	4⅜
									11′ 2″¾

CLOSE PLANTING IX.

Increment of Growth for 6 years.

No. of Tree.	Girth at 3 ft. from ground. 1904.		Girth at 3 ft. from ground. 1905.		Girth at 3 ft. from ground. 1906.		Girth at 3 ft from ground. 1909.		TOTAL. Increment for 6 Years.
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	in.
261	3	10		10	4	0	4	$3\frac{1}{4}$	$5\frac{1}{4}$
262	3	$6\frac{1}{2}$	3	$6\frac{1}{2}$	3	$7\frac{1}{4}$	3	$8\frac{1}{2}$	2
263 Forked	2 2	$2\frac{1}{2}$ $8\frac{1}{4}$	2 2	$3\frac{1}{2}$ 9	2 2	$4\frac{1}{8}$ $10\frac{1}{2}$	2 3	5 $2\frac{3}{8}$	$2\frac{1}{2}$ $5\frac{3}{8}$
264	2	4	2	4	2	$6\frac{5}{8}$	3	$1\frac{5}{8}$	$9\frac{5}{8}$
265	2	$6\frac{1}{2}$	2	$6\frac{7}{8}$	2	$7\frac{7}{8}$	2	$8\frac{7}{8}$	$2\frac{3}{8}$
266	2	$7\frac{3}{4}$	2	8	2	$9\frac{1}{8}$	3	3	$7\frac{1}{4}$
267	1	$8\frac{1}{2}$	1	$9\frac{5}{8}$	1	$9\frac{7}{8}$	1	$10\frac{7}{8}$	$2\frac{3}{8}$
268 Forked	2 1	$11\frac{3}{4}$ 11	2 1	$11\frac{7}{8}$ 11	3 1	1 11	3 1	$1\frac{1}{4}$ 11	$1\frac{3}{8}$ 1′ 11
269	2	$9\frac{1}{2}$	2	$9\frac{1}{2}$	2	$9\frac{7}{8}$	2	$11\frac{3}{8}$	$1\frac{7}{8}$
270	1	$4\frac{1}{4}$	1	$4\frac{5}{8}$	1	$5\frac{1}{8}$	1	7	$2\frac{3}{4}$
271	3	0	3	1	3	$3\frac{1}{4}$	3	$8\frac{1}{4}$	$8\frac{1}{4}$
272	3	3	3	$4\frac{1}{8}$	3	6	3	10	7
273	3	1	3	1	3	$2\frac{5}{8}$	3	$4\frac{1}{4}$	$3\frac{1}{4}$
274	2	$0\frac{1}{4}$	2	$0\frac{7}{8}$	2	$1\frac{3}{4}$	2	$3\frac{1}{4}$	3
275	2	$9\frac{1}{2}$	2	$9\frac{7}{8}$	2	$11\frac{1}{2}$	3	$2\frac{1}{8}$	$4\frac{5}{8}$
276	3	$3\frac{1}{4}$	3	$3\frac{5}{8}$	3	$4\frac{5}{8}$	3	$6\frac{3}{4}$	$3\frac{1}{2}$
277	1	$11\frac{1}{4}$	2	$0\frac{1}{4}$	2	$1\frac{1}{2}$	2	$2\frac{3}{8}$	$3\frac{1}{8}$
278	2	$2\frac{1}{2}$	2	$4\frac{1}{8}$	2	6	2	$9\frac{3}{4}$	$7\frac{1}{4}$
279	1	$9\frac{1}{2}$	1	$10\frac{1}{2}$	1	$11\frac{1}{2}$	2	$0\frac{3}{4}$	$3\frac{1}{4}$
280	2	$6\frac{3}{4}$	2	$9\frac{3}{8}$	3	$3\frac{1}{2}$	*4	$9\frac{3}{4}$	—
281	3	$3\frac{1}{2}$	3	4	3	$5\frac{3}{8}$	3	$9\frac{1}{8}$	$5\frac{5}{8}$
282	3	$1\frac{1}{4}$	3	$1\frac{7}{8}$	3	$2\frac{3}{4}$	3	$5\frac{1}{8}$	$3\frac{7}{8}$
283	2	$1\frac{1}{4}$	2	$1\frac{5}{8}$	2	$2\frac{3}{4}$	2	$4\frac{7}{8}$	$3\frac{5}{8}$
284	2	$7\frac{1}{4}$	2	$7\frac{1}{4}$	2	$8\frac{1}{2}$	2	10	$2\frac{3}{4}$
285	3	$7\frac{1}{4}$	3	$7\frac{1}{2}$	3	$9\frac{1}{2}$	4	$1\frac{1}{2}$	$6\frac{1}{4}$
286	3	$9\frac{1}{4}$	3	10	3	$11\frac{1}{2}$	4	$5\frac{1}{4}$	8
287	2	$0\frac{1}{2}$	2	1	2	$2\frac{1}{8}$	2	$5\frac{1}{2}$	5
288 Forked	1 1	$10\frac{1}{2}$ $10\frac{1}{2}$	1 1	$10\frac{7}{8}$ $10\frac{1}{2}$	2 1	$0\frac{3}{4}$ 11	2 2	$2\frac{7}{8}$ $0\frac{1}{2}$	$4\frac{3}{8}$ 2
289	2	$8\frac{1}{2}$	2	9	2	$10\frac{1}{8}$	3	$1\frac{7}{8}$	$5\frac{3}{8}$
									11′ 1″7/[illegible]

Due to protuturances of the bark.

CLOSE PLANTING X.

Increment of Growth for 6 Years.

No. of Tree	Girth at 3 ft. from ground. 1904.		Girth at 3 ft. from Ground. 1905.		Girth at 3 ft. from Ground. 1906.		Girth at 3 ft. from Ground. 1909.		TOTAL Increment 6. Years.
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	in.
290	1	7¼	1	7¼	1	8⅜	1	9	1¾
291	1	8¾	1	8¾	1	9⅜	1	10	1¼
292	1	11¾	1	11¾	2	1¼	2	4⅝	4⅞
293	1	11	1	11	1	11¾	2	0⅜	1⅜
294	2	2½	2	3⅛	2	4⅜	2	6	3½
295	3	6½	3	7¼	3	9¾	4	0½	6
296	5	0½	5	0⅞	5	3¼	5	5⅝	5⅛
297	2	2	2	2⅜	2	3⅜	2	5¾	3¾
298	2	6¼	2	6¼	2	7½	2	8⅜	2⅛
299	1	9½	1	9⅞	1	10¾	1	11	1½
300	2	3¼	2	3½	2	4⅜	2	7⅝	4⅜
301	1	10	1	10	1	11¾	2	2	4
302	3	2	3	2	3	4⅛	3	9	7
303	3	8	3	8⅜	3	10⅜	4	3⅛	7⅛
304	2	4¼	2	5½	2	7	2	10⅛	5⅞
305	1	10	1	10¼	1	11½	2	0¾	2¾
306	2	3	2	3½	2	5½	2	10⅜	7⅜
307	1	7½	1	7½	1	8	1	8¾	1¼
308	1	10½	1	10½	1	11½	2	2¼	3¾
309	2	7½	2	7½	2	8	2	8⅝	1⅛
310	2	0½	2	1⅛	2	2	2	4⅝	4⅛
311	1	10¼	1	10¼	1	10¾	2	1⅝	3⅜
312	2	10	2	10	2	11⅛	3	2	4
313	3	3¼	3	3½	3	4½	8	6¾	3½
314	2	5¼	2	5¼	2	6	2	8	2¾
315	3	3¼	3	3¼	3	5⅛	3	7	3¾
316	2	4½	2	4½	2	4½	2	4½	Nil
317	2	9½	2	9½	2	10½	3	0	2½
318	2	11¼	3	0	3	1⅞	3	7⅛	7⅞
									8′ 11″¾

CLOSE PLANTING XI.

Increment of Growth for 6 years.

No. of Tree	Girth at 3 ft. from ground 1904.		Girth at 3 ft. from ground. 1905.		Girth at 3 ft. from ground. 1906.		Girth at 3 ft. from ground. 1909.		TOTAL Increment for 6. Years.
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	in.
319	3	4	3	5	3	7	3	10¼	6¼
320	1	11¾	1	11⅞	2	1½	2	3	3¼
321	2	4	2	4	2	4¾	2	6¾	2¾
322	2	3½	2	3⅝	2	4¼	2	5½	2
323	2	2½	2	2⅝	2	3⅜	2	5½	3
324	1	8½	1	9½	1	9¾	1	11⅞	3⅜
325	2	6¾	2	6¾	2	7⅛	2	9	2¼
326	3	3¾	3	4⅜	3	6¾	3	11⅞	8⅛
327	1	6½	1	6⅝	1	7⅛	1	9	2½
328	3	0½	3	1	3	3⅞	3	7¼	6¾
329	2	4½	2	4½	2	6	2	8⅛	3⅝
330	2	6¼	2	6¼	2	7½	2	8¼	2
331	1	11¼	1	11½	2	1⅛	2	3½	4¼
332	1	10¾	1	10¾	1	11⅝	2	1⅛	2⅜
333	1	10¾	1	11⅛	2	0	2	4	5¼
334	3	11	3	11⅞	4	1⅜	4	7¼	8¼
335	2	0½	2	0½	2	1	2	2⅛	1⅝
336	2	4	2	4⅜	2	6	2	9½	5½
337	1	11	1	11½	2	0½	2	3⅜	4⅜
338	3	0¾	3	1¾	3	4¾	3	6⅞	6⅛
339	3	9	3	9½	4	0½	4	6⅜	9⅜
340	3	5	3	6⅛	3	10⅛	4	2½	9¼
341	1	9½	1	9½	1	9½	1	9⅞	0⅜
342	1	11¼	1	11⅞	2	0½	2	3⅜	4⅛
343	2	7	2	7⅜	2	8¼	2	9½	2½
344	2	1¾	2	2½	2	4½	2	7⅝	5⅞
345 forked	3 1	0 6½	3 1	0 7	3 1	1½ 7⅛	3 1	3½ 8½	3½ 1½
346	2	10	2	10¾	3	2¼	3	6	8
347	1	9¼	1	10¼	2	0	2	3⅜	6⅛
348	1	9¾	1	9¾	1	11¾	2	5½	7¾
349	3	5	3	6	3	7½	3	10	5
350	2	11	2	11	3	1⅞	3	4⅝	5⅝

NOTES ON THE EXPERIMENTS OF COAGULATING AND CURING RUBBER.

Several experiments were made in curing latex by smoking as is done in Brazil, the aim being to test whether the coagulated latex from plantation trees would be improved or deteriorated by such process.

The process consists of coagulating latex in the shape of spindles, or bottles, or balls, by exposure in smoke. An ordinary-sized stick (about 2″ diameter) is suspended at one end over a volume of smoke and slowly turned by an operator holding the stick in one hand until a film of smoke has adhered to the stick. The stick is then switched over an empty vessel while another operator carefully pours some latex all over the smoked v area; this is continued as fast as film on film of latex coagulates and continued daily until the spindle becomes unwieldy.

In this process all the latex is coagulated although the latex may contain 50 to 60 % of water per se and from young trees, or on wet days, even more. During the process of smoking—and storing while curing—there is a gradual exudation of water, but the rubber is always very wet. The samples we submitted for analysis exhibited 17-25 % of moisture against 15-18 % from Brazil. This higher percentage of moisture is most probably explained by the shorter time our smoked rubber was stored, whereas Brazilian smoked balls are sometimes 12 months old by the time they reach their market. This higher percentage of moisture too, very probably also explains the execss of resin as the resin in plantation rubber as ordinarily coagulated is about 2 % only.

Due allowance must be made for the inexperience of the operators which is pointed out in the following reports on samples submitted for analysis and it should be observed that of the two samples reported on, sample I was prepared from the latex of trees 25 years old and not 12 years old as stated in the reports.

Reports on two samples of smoked rubber:—

Imperial Institute of the United Kingdom, The Colonies and India.

1st November, 1909.

Dear Sir,—With further reference to your letter of the 2nd ultimo, I now forward the results of the examination of the two small samples of smoked Para rubber. The specimens were labelled No. 1 and No. 2.

The rubber was moist and had a strong odour of creosote; physical properties appeared to be very satisfactory.

The analyses gave the following results:—

		Rubber as received.		Composition of dry rubber.	
		No. 1.	No. 2.	No. 1.	No. 2.
Moisture,	per cent	9.0	8.8	—	—
Caoutchouc	„ „	80.2	82.0	88.1	89.9
Resin	„ „	4.7	4.7	5.2	5.2
Proteids	„ „	5.3	3.4	5.8	3.7
Ash	„ „	0.8	1.1	0.9	1.9

The percentages of moisture recorded above are probably much lower than the amounts actually presented in the balls, as the paper in which the samples were wrapped had evidently absorbed a considerable amount of liquid during transit. You will observe that the percentage of resin is a little high in both specimens and that the amount of proteid in No. 1 is greater than usual in plantation rubber.

I shall be interested to learn the results of the sale of this small consignment of rubber.

I am, Yours faithfully,
(Signed). THE DIRECTOR.

The India Rubber, Gutta Percha and Telegraph Works Co., Ltd.

London, 30th June, 1909.
E.C.

H. N. RIDLEY ESQ.,
Director, Botanic Gardens,
Singapore.

SIR,—In further reply to your letter of 21st April, headed "Economic" 035/09, and acknowledged on the 20th ult., I have now received from our Works an analysis and report on the two samples of rubber which you submitted. When I examined the samples I formed an opinion of them which has been borne out by our Works' report. They had an appearance which did not do them justice, but even making allowance for this you will see that they are not considered equal to Fine Para by 8 to 15%. Of the two, No. 2 is the weaker and softer, which may be due to the latex being collected from younger trees, because it seems strange that while the No. 1 is undoubtedly overheated in the process of smoking, yet it is superior to the No. 2 sample.

Chemical Test.

	Loss in Washing.	Resin.	Organic Matter.	Ash.	India Rubber.
	%	%	%	%	%
Sample No. 1	23.6	3.41	2.19	0.62	93.78
Sample No. 2	16.1	4.65	3.23	0.45	91.67

For comparison's sake quite a large number of chemical tests give.

	Rubber.	Resin.	Loss.
	%	%	%
Fine Para	96.6	3.4	17
Medium Para	95.2	4.8	17
Ceylon	97.5	2.5	say 3 %

Yours faithfully,
ROBERT KAY GAY,
Managing Director.

Harburg and Vienna India Rubber Works.

Harburg-on-Elbe, June 19th, 1909.

HENRY N. RIDLEY, Esq.,
Director.
Botanic Garden Singapore,
Straits Settlements.

DEAR SIR,—As promised you by our Mr. Hoff, in his letter to you of 25th ult., we have the pleasure to give you the following report on the examination and tests made with the two samples of Eastern Para rubber cured by the Brazilian method of smoking.

We received the following samples:—

Sample 1.—The rubber is of very good elastic, and tough quality, dark yellow in colour, with a smell like hard cured Para.

Loss by washing	21, 8 %
Extracted with alcohol	4, 4 %
" " alcoholized potash ...	2, 1 %
Ash	0, 6 %
Melting point	155° C.

Sample 2.—The rubber is of good elastic and tough quality somewhat yellower in colour than No. 1, however, not so good as the same, with smell the same.

Loss by washing	13, 0 %
Extracted with alcohol	4, 1 %
" " alcoholized potash ...	2, 1 %
Ash	0, 42 %
Melting point	155° C.

For comparison in the examination, Fine hard cured Para, Ceylon Crêpe of light colour, Ceylon Crêpe of darker colour, and Prime Congo were used. We beg to remark, however, that the name of the Estate and the age of the trees, from which the Ceylon sorts were obtained were unknown to us, and we are of opinion that the materials at hand for comparison do not represent really first class Ceylon Para. It would be desirable to obtain from the Botanic Gardens, Para, which through careful coagulation by chemical means of the latex gathered from trees of corresponding age, and by careful washing, would give an authentic table for comparison.

Test for viscosity according to Axelrot.—10 grammes of the rubber were steeped and disolved in 300 cb. cm. henzol, and the period taken to run through of 100 cb. cm. of the solution taken by an Axelrot viscosimeter, whereby benzol, the running through period of which was taken as 1 for comparison.

Singapore 1	... 21, 4
„ 2	... 21, 9
Light Ceylon	... 35, 6
Dark „	... 30, 4
Fine hard Para	... 59, 8
Congo	... 31, 6

Breaking Strain and Stretch.—For this test the different kinds of rubber were always mixed in the same proportions, the mixtures vulcanized, and after being cut into rings of the same diameters, they were tested by a Schopper Apparatus for breaking strain and stretch. The results were as follows per square cm.

	Breaking Strain.	*Stretch.*
Hard cured Para	... 21, 0 Ks. ...	... 362, 5 %
Singapore sample 1	... 32, 5 „ ...	... 350, 0 %
„ „ 2	... 20, 0 „ ...	... 328, 75 %
Light Ceylon Para	... 14, 6 „ ...	... 257, 50 %
Dark „ „	... 17, 3 „ ...	... 366, 25 %
Congo ...	... 14, 0 „ ...	.. 347, 50 %

Adhesiveness.—A suitable mixture was coated on one side of a piece of cloth. The coated sides vulcanized together under pressure and tested for the amount of weight necessary to break strips 5 cm. broad. The results were:—

Fine hard cured Para	... 10, 0 Ks.
Singapore 1	... 9, 0 „
„ 2	... 9, 5 „
Light Ceylon	... 5, 0 „
Dark „	... 5, 5 „
Congo	... 9, 0 „

The results are highly satisfactory for the samples sent us, and prove that the material of the Botanical Garden is quite equal to Fine hardcured Para.

We cannot give at the present moment a definite opinion if the smoking of the rubber is a great advantage, as we have already mentioned we are not sure if the materials used for comparison taken from the Hevea trees in Ceylon have been so carefully handled and the latex taken from trees of the same age.

This latter point seems to us to be of much importance, as sample 1 from 12 year old trees gives a better result against sample 2 from 8 year old trees, although it is specially remarked that this sample has been perhaps slightly overheated in the process of smoking.

The unapproachable light colour, which is so much valued by many manufacturers, and which differs from all other sorts would be affected by the process of smoking.

We beg to remark that we will refer again to the tests for breaking strain, stretch, and viscosity, as we will repeat these tests after the materials made have been kept for some time.

Should you desire to have further tests made for an exact comparison, please send us further samples, say about 10 lbs. each, gathered from trees the same age and under the same conditions, smoked, and unsmoked, and we shall be very pleased to make the tests and give you a report on same.

We are,
Yours truly,
VEREINIGTE GUMMIWAAREN-FABRIKEN HARBURG-WIEN
VORMALS MENIER-J. N. REITHOTTER.
LE NOZ.
W. KULLUNAY.

Continental Scientific Laboratory.

(Translation.)

DEAR SIR,—The sample of smoke cured Rubber of Mr. Ridley, the receipt of which I acknowledged already has been tested here and you will find the results under. I beg to state that the examination has been made by Dr. Weill of the "Continentals" scientific laboratory. The Rubber looked quite the same as Brazilian Rubber, even the smell was alike. The colour was almost black externally, like the Brazilian, the cut was white.

On cutting the sample quite a quantity of water ran out and it appeared that the different films of the Caoutchouc were much thicker than is the case with the Brazilian Rubber. Further several spots showed considerable quantities of a somewhat spongy, yellow-white matter, which is also found in the Brazilian "Extrafine." This is the consequence of insufficient careful smoking. With a longer experience this can be easily avoided. I am inclined to believe that too much latex has been put on at a time.

The quality of the Rubber is an excellent one, the loss in washing and drying was 18, 9 %, the dry rubber contained 5 % of resin. As to the percentage of 18, 9 % water, fresh imports of SOFT FINE PARA show the same loss, whereas HARD FINE, from the upper Amazonas, should not have more than 17 % on account of the longer transport. However, it is sometimes more than 17 %.

The proportion of resin is higher than with Brazilian, this may be due to overheating during the smoking process, which, as you mention, was the case.

I send you a sample of washed and dried Caoutchouc and a cake of the manufactured article made of the same material, marked "S." A second cake marked "P." is made of Brazilian Rubber. As you will see the quality marked "S" is just as good as the other one.

Kindly communicate to Mr. Ridley and Mr. Derry the above mentioned results.

I am,
Yours etc.,
(Signed.) AD. PRINZHORN.

As already remarked, the inexperience of our operators was against the preparation of good marketable samples but the reports agree that the rubber prepared by smoking is only a little below fine hard para which, we suspect, is the produce of a species of Hevea which is local and is not the common Para tree of Eastern Brazil. These reports confirm the opinion we hold of the importance of developing well-matured trees. The difference in the physical tests and appearance of rubber from young or old trees coagulated with such re-agents as Acetic acid is not, or scarcely, perceptible, but under the smoking process the superior strength and elasticity of the resulting rubber from old trees is manifest.

It should be referred to in conclusion—that so far, (and probably is will be so for the next few years), plantation rubber has not had to stand the test of its keeping qualities in the crude state. This, we are convinced, will be improved by creosoting or smoking. Unsmoked rubber of any grade perishes much earlier than smoked samples.

In smoking biscuits or sheets such rubber should be surface-dry before smoking as smoke quickly darkens wet rubber but if surface-dry, the light pale colour is still retained provided that the smoke is dry, and the curing house thoroughly well ventilated so that the smoke escapes freely. Retained smoke soon becomes overcharged with moisture. The following reports have been received on rubber smoke cured in the Singapore Garden :—

(*To H. N. Ridley, Esq., Singapore Botanic Gardens*).

DEAR SIR,

We now have pleasure in enclosing report and valuations of the two cases lightly smoked sheet rubber ex S.S. "Egypt."

You will notice from this report that we have formed a high opinion of the rubber, but it is a new grade on the market, being different from the ordinary smoked sheet, and it would therefore require larger quantities to establish its proper value. We are rather doubtful whether it would be generally recognised by the trade that the rubber is smoked, as the smell is not very distinct on the samples.

It is very satisfactory, however, that the smoking seems to have had no deteriorative effect on the colour or appearance of the rubber; this we consider a great point in its favour, and we would suggest further efforts be made in this direction. We also think it would be advisable to stamp each sheet as "smoked," as this would form a sort of guarantee.

If you could send us a larger shipment, we think we might arrange for valuable experiments to be carried out with it. The parcel at present to hand is really too small for many of our manufacturers here to base definite calculations upon.

In conclusion, we consider that the rubber is one of the best samples that we have seen from the East of this grade, especially as regards strength, which, judging by the ordinary crude tests, appears to be very materially above the average of plantation rubber, and to compare favourably with hard para.

The consignment will be included in the public auction to be held on the 1st February, and we will forward you account sales and proceeds in due course.

In the meantime, with compliments.

We are, Dear Sir,
Yours faithfully,
for, Gow, Wilson & Stanton, Ltd.,
SPENCER BRETT,
Director.

(To H. N. Ridley, Esq., Botanic Gardens Singapore).

DEAR SIR,

Herewith we have the pleasure to hand you our report and valuations of two cases Rubber marked $\frac{\text{B. P.}}{\text{TR. IG.}}$ ex S.S. "Egypt."

1 CASE SHEET No. 1.

DESCRIPTION.—Fine pale and amber sheet. The rubber is clean, of exceptionally good strength and in excellent condition. The sheets have been carefully prepared and have a slight smell of smoke. It wonld perhaps be better if the smell were more pronounced, if this could be done without affecting the colour. The rubber requires testing in commercial quantities in order to place an exact estimate of value upon it. As a small sample consignment it is unlikely to realise what we should consider its proper price in quantity. We make it worth about 8s. 6d. per lb. very uncertain.

1 CASE BISCUITS No. 2.

DESCRIPTION.—Similar to above in all respects except shape. The rubber has arrived in splendid condition, and the samples have an attractive appearance.

for Gow, Wilson & Stanton, Ltd.,
SPENCER BRETT,
Managing Director.

(To H. N. Ridley, Esq., Botanic Gardens, Singapore).

DEAR SIR,

Herwith we have the pleasure to hand you contract for the sale of the 2 cases Smoked Sheet and Biscuit ex S/S "EGYPT,"—which you will be pleased to hear we disposed of at last Tuesday's sale, realising the highest price in the auction, viz 9/- per lb.

We think you will agree that, considering that many of the buyers were very doubtful as to the smoking of the rubber and also taking into account the very small quantity, this was a highly satisfactory result, and we trust it may have the effect of producing further efforts in this kind of manufacture.

Account/sales and nett proceeds will be forwarded to you in due course, and in the meantime with compliments.

We are, Dear Sir,
Yours faithfully,
for, Gow, Wilson & Stanton, Ltd.,
SPENCER BRETT,
Director.

EXPORTS TELEGRAM TO EUROPE AND AMERICA.

1st to 15th May.

	Steamers.		Tons.	Tons.
Tin	Str Singapore & Penang to	U. Kingdom &/or	2401	1243
Do.	do	U.S.A.	390	350
Do.	do.	Continent	255	358
Gambier	Singapore	Glasgow	—	—
Do.	do.	London	85	75
Do.	do.	Liverpool	50	—
Do.	do.	U.K. &/or Continent	—	—
Cube Gambier	do.	United Kingdom	100	40
Black Pepper	do.	do.	15	20
Do.	Penang	do.	30	—
White Pepper	Singapore	do.	15	—
Do.	Penang	do.	—	—
Pearl Sago	Singapore	do.	60	50
Sago Flour	do.	London	200	120
Do.	do.	Liverpool	2,000	—
Do.	do.	Glasgow	50	—
Tapioca Flake	Singapore	United Kingdom	320	25
T. Pearl & Bullet	do.	do.	240	35
Tapioca Flour	Penang	do.	175	150
Gutta Percha	Singapore	do.	120	130
Buffalo hides	do.	do.	65	35
Pineapples	do.	do. cases	9750	4750
Gambier	do.	U.S.A.	15	10
Cube Gambier	do.	do.	10	10
Black Pepper	do.	do.	85	30
Do.	Penang	do.	—	—
White Pepper	Singapore	do.	65	5
Do.	Penang	do.	—	—
Tapioca Pearl	Singapore	do.	50	60
Nutmegs	Singapore & Penang	do.	14	10
Sago Flour	Singapore	do.	80	—
Pineapples	do.	do. cases	1500	4000
Do.	do.	Continent	1250	2750
Gambier	do.	S. Continent	100	25
Do.	do.	N. Continent	350	360
Cube Gambier	do.	Continent	15	55
Black Pepper	do.	S. Continent	80	140
Do.	do.	N. Continent	160	60
Do.	Penang	S. Continent	35	10
Do.	do.	N. Continent	—	—
White Pepper	Singapore	S. Continent	15	—
Do.	do.	N. Continent	35	25
Do.	Penang	S. Continent	10	—
Do.	do.	N. Continent	10	10
Copra	Singapore & Penang	Marseilles	800	120
Do.	do.	Odessa	—	540
Do.	do.	Other S. Continent	460	50
Do.	do.	N. Continent	2200	2700
Sago Flour	Singapore	Continent	1150	725
Tapioca Flake	do.	do.	50	20
Do. Pearl	do.	do.	10	5
Do. Flake	do.	U.S.A.	100	—
Do. do.	Penang	U.K.	—	25
Do. Pearl & Bullet	do.	do.	110	—
Do. Flake	do.	U.S.A.	—	25

	Steamer.		Tons.	Tons.
Do. Pearl	do.	do.	125	150
Do. Flake	do.	Continent	—	65
Do. Pearl	do.	do.	80	360
Copra	Singapore & Penang	England	—	75
Gutta Percha	Singapore	Continent	150	325
Cube Gambier	do.	do.	400	500
T. Flake & Pearl	do.	do.	40	40
Sago Flour	do.	do.	—	—
Gambier	do.	S. Continent	—	—
Copra	do.	Marseilles	—	—
Black Pepper	do.	S. Continent	—	—
White Pepper	do.	do.	—	—
Do.	do.	U.S.A.	—	—
Pineapples	do.	do.	—	—
Nutmegs	do.	do.	—	—
Black Pepper	do.	do.	—	—
Do.	Penang	do.	—	—
White Pepper	do.	do.	—	—
T. Flake & Pearl	do.	do.	—	—
Nutmegs	do.	do.	—	—
Tons Gambier			600	300
Do. Black Pepper			410	375

SINGAPORE MARKET REPORT,

May, 1910.

Articles.	Quantity sold.	Highest price.		Lowest price.	
	Tons.	$	c.	$	c.
Coffee—Liberian	21	29			
Copra	5470	11	50	10	40
Gambier Bale	770	12		11	60
„ Cube No. 1 and 2 ...	165	15	10	14	65
Gutta Percha 1st quality	...	350	00	300	00
„ Medium	...	240	00	120	00
„ Lower	...	100	00	26	00
Gutta Jelutong	...	23	00	15	00
Nutmegs, 110 s.	...	18			
„ 80 s.	...	26	00	24	00
Mace, Banda	...	85	00		
„ Amboina	...	77	00	67	00
Black Pepper	664	14	00	12	75
White Pepper	305	26	00	23	00
Sago, Pearl Small	15				
Sago Flour, No. 1	3,165	3	97½	3	52½
„ 2		1	00		97½
Tapioca Flake, Small	438	6	55	6	10
„ Medium	31				
„ Pearl, Small	153	8	75	7	10
„ Medium	313	7	30	7	02½
„ Bullet	15	8	75		
Tin	2,370	75	87½	74	60

PAHANG.

Abstract of Meteorological Readings in the various Districts of the State for the month of May, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Mean Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kuala Lipis	...	...	76.6	94	68	20.3	75.3	0.897	74.4	93	...	4.81	2.50
Raub...	...	...	83.7	93	68	19.9	72.1	1.128	64.4	54	...	2.17	.92
Bukit Fraser	...	...	...	...	59	...	...	...	...	...	...	6.83	.98
Bentong	...	...	81.3	92	70	18 32	76	1.057	72.4	75	...	2.80	1.10
Pekan	...	...	83	92	71	16	79	1.128	76.3	80	...	4.60	1.40
Kuantan	..	...	84.5	93	71	17.1	78.4	1.165	74.4	73	...	5.42	1.41
Sungei Lembing	...	...	...	87	68	...	...	...	...	...	...	15.60	3.24

Office of the Medical Officer in Charge,

Pahang, 8th July, 1910.

S. C. G. FOX,

Medical Officer in Charge, Pahang.

No. 8.] AUGUST, 1910. VOL. IX.

Agricultural Bulletin

OF THE

STRAITS

AND

FEDERATED MALAY STATES.

EDITED BY

H. N. RIDLEY, M.A., F.R.S., F.L.S., F.R.H.S.

Director of Botanic Gardens, S.S.

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Annual Subscription for other places in Malaya	$5.50
Annual Subscription for India and Ceylon	Rs. 9-8-0
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ERRATUM.

Bulletin 7. July 1910. Vol. IX. Page 259.
For 1 rd. 34 pl. and contains 322 trees, read
1 acre, 1 rd., 34 pl., and contains 322 trees.

AGRICULTURAL BULLETIN

OF THE

STRAITS

AND

FEDERATED MALAY STATES.

No. 8.] AUGUST, 1910. [Vol. IX

THIRD REPORT

ON

Experimental Tapping of Para Rubber Trees in the Botanical Gardens, Singapore, Continued:—

PESTS.

We have little additional information on the subject of *Fomes semitostus*. The fungus seems still to be pushing its way, but it appears more slowly than at first among the trees at the place at which it first appeared. There is no doubt that it is difficult to deal with in ground where the trees are close together, and where the ground cannot be effectively drained. It seems to be getting weaker in its growth, but of this I am not sure, as several trees of late have not succumbed before the fruit appeared, which formerly was at least unusual, and to be moving more slowly. By the destruction of its sporophores, it is prevented from reproducing by spores, and this by forcing it to produce by mycelial threads only may in time cause it to die out. The fungus is now so well-known to all planters, and seems to occur in all parts of the peninsula, Borneo, etc., and the extirpation of stumps and roots now almost everywhere the rule seems to be the most successful preventive measure. It is rather interesting to note that in ground where there are other trees than Para rubber it does not seem to destroy these. Thus in the infected ground are young trees of *Cananga,* and *Afzelia* which are quite unaffected by it.

In the garden jungle, some time ago, I found the dying stump of some tree bearing a large fructification of *Fomes in actual contact* with a gutta percha tree, but this latter was not injured by the fungus, nor do I see any other trees near the old stumps affected at all. Fomes, as a parasite, is not by any means confined to Para rubber, and I have seen it attacking other living trees, in forest, but in the case of mixed trees it does not seem to spread in the steady way it does in a plantation of *Hevea.*

This suggests that when the mycelium of a saprophytic fungus takes on a parasitic nature and as a parasite attacks any particular kind of tree, its attacks are confined to that species.

It is certainly rare to find a fungus destroying all the trees and shrubs around its centre of infection in a mixed forest. But more observations and experiments are wanted on this subject.

DIPLODIA RAPAX.

This fungus seems to be widely spread in the peninsula and is, we are informed, being kept in check, where it appears, by amputating infected branches which it is found to be attacking. The fungus is undoubtedly a dangerous one, as it is very quick in its life-history reproducing its spores in a week after infection, and in great quantity. The parasite is a wound-fungus and does not seem able to attack uninjured epidermis, except in the case of young leaves as mentioned below, so that thumb nail pruning, or topping, is dangerous if the fungus is in the vicinity.

The following notes in its behaviour under cultivation will be of interest.

On May 10th, we received portions of a Para rubber tree from Sarawak, which had been killed by disease. Our correspondent writes "this disease has attacked our 2 year old and four months trees. The first sign is a small quantity of gummy latex which sticks to the trunk. All the trees seem to start the attack, above the branches or high up if there are no branches. The leaves wither and the tree looks as if it was attacked by *Fomes semitostus,* but there is nothing wrong with the root. The leaves fade away rapidly. The bark outside appears quite fresh and healthy but inside, on the cambium, it is a pale dull red colour; there is practically no latex in the bark. If the tree is left a few days "bubok" (beetles) get in and start boring. The trees seem to die in a few days when once attacked." The stem sent was three inches through in the thickest parts, and was perfectly dead, all the cambium being black and rotten. On the upper green part of the shoot and for some way down were brown discolorations covered with raised black dots from which I could not obtain any

spores. Nothing else was noticeable except a trace of young *Corticium* here and there and a considerable number of the elevated cracks suspiciously like those of Diplodia as figured in the Kew Bulletin.

I examined these but could find nothing beneath the elevations to suggest that they were due to this fungus. After keeping the sticks, part in my house and part in the office till May 17, nearly all the portions of stem suddenly produced black soot-like masses of spores. The previous night had been very rainy and in the morning the fungus was found to have fruited both in the office and in my house simultaneously. The spores were produced in strings standing erect or curled, or in irregular masses, of considerable size. There could be no doubt of there being those of the fungus called by Massee *Diplodia rapax.*

Mr. Petch, in his circular, on the die-back of *Hevea braziliensis* Jan, 1910, describes a disease in Ceylon as caused by two fungi. A *Gloeosporium* which attacks the top shoot and kills it. Then appears a secondary fungus called *Botryodiplodia elasticae.* This, he says, does not enter the tree till the top shoot has been destroyed. It is the only fungus observable in cases of die-back and causes the death of the tree.

I cannot say I have seen anything to suggest that the top shoots in the trees affected are attacked by anything but *Diplodia,* nor do my investigations in this point show this at all.

Possibly our plant is not identical with the *Botryodiplodia* of Ceylon, but it seems likely that the two plants are the same. It will be remembered that *Diplodia rapax* appeared in Western Africa simultaneously with its first record in the Malay peninsula. Mr. Petch writes that in 1908 a consignment of Hevea stumps was forwarded from Ceylon to German West Africa, via Hamburg. They were examined there and found to be attacked by a Diplodia which was called *Lasiodiplodia nigra.* This, he thinks, must be the *Botryodiplodia* of Ceylon.

Now, as far as we are aware, no stumps have been sent from the peninsula, certainly not from the Singapore gardens, to Western Africa, so that it looks as if the *Diplodia rapax* Massee was the same thing as *Botryodiplodia, or Lasiodiplodia nigra,* and that it got to Africa from Ceylon.

The *Botryodiplodia* of Ceylon has not been found to cause serious damage in the cocoa on which it grows in Ceylon, for it seems there to live only on dead stems, but it is otherwise in the West Indies. It has, however, attacked seriously the roots of the tea.

Mr. Petch's circular on the subject is excellent and important and well worth reading.

There can be no doubt but that *Diplodia* is a most dangerous pest whether it requires the assistance of the *Gloeosporium* to invade the rubber tree or not. This indeed is a matter of little importance to the planter. If the fungus can get into the terminal bud of a rubber tree of considerable size, and kill it to the ground in a few days, it is sufficiently serious to make it requisite that steps should be taken against it by every planter.

The following experiments with spores of the Diplodia sent from Borneo, though not yet completed, are of some interest. I attempted to infect seven plants of *Hevea braziliensis* with the spores in different ways.

A. A young plant of some age which had sprung up from a seed placed at the foot of a tree and had been once or twice cut down; from the stump a shoot six feet tall was growing. I made a small tear about ¼ inch long about half way up the stem and puta number of spores on the wound. The wound had exuded a little latex in which I put the spores. June 1, 12 p.m.

On the next day, at the same hour, I removed some of the spores and examined them, several had commenced to germinate emitting a short mycelial process from just below one end of the spore. Other spores showed at the same spot a small conical process which had not by then had time to rupture and let out the mycelial thread.

This experiment showed the rapidity with which these spores germinate on reaching a suitable spot for growth. The wound dried, and looked brown for some days, but though it has not healed at present it has not enlarged.

B. Seedling about a foot tall, in a pot. The bud was pinched off and spores placed on the wound.

C. It is a similar plant, the bud not removed but rubbed with spores.

D. A similar plant, slightly bigger. A small piece of cortex removed, about half way up and spores put on the wound

E. A similar plant with young leaves just expanding still soft and pendulous. These were rubbed with spores.

F. A seedling about a foot tall, bud pinched off and spores put on the wound.

G. A similar plant, the bud was not cut off but spores were placed, on it, May 28th.

I may say at once in the cases of C., G. and A, in all of which spores were put on the uninjured bud, no results at all followed, and it seems clear the bud cannot be infected except through a wound.

B. On June 2nd. The uppermost leaf is dead and a small portion of the stem a quarter of an inch long is black and mouldy, by June 6 no further progress of the disease was visible. On examining the dead portion, I found the petiole covered with a mycelium of very fine threads.

D. Stem wound. June 2. The two lower leaves are yellow, the two upper ones lighter green than normal. June 6th. The two yellow leaves have fallen off. These are the two just above the wound, but do not show any signs of fungus. The fall may be normal. The wound seems to be commencing to heal the, edges curving in, but the centre portion looks dead.

E. Young leaves smeared with spores. June 2. One of the young leaves wilted and turned black. June 6, the other young leaf was wilting. It fell a day or two later. The first mentioned had, by June 6, developed a number of black pustules. I examined these and found a number of pale spores not transversely divided and a few black spores exactly like those of typical *Diplodia*. Eventually it was attacked and destroyed by mildew.

F. Bud cut off. June. 2. The uppermost leaf is yellow and falling. June 6. This leaf has fallen and the petiole is covered with conical black pustules, scattered all over it.

A few days later, they commenced to produce spores in exactly the same way as in the original stem, in the form of strings of sooty black Diplodia spores quite typical.

In plant A., on June 20, I observe that the wound has not yet healed. The centre has sunk and three longitudinal cracks extending into the otherwise healthy bark have appeared. There is no sign of repair along the edges of the wound, but on the uninjured portion below and above the wound there is a blackish colouring. One of the cracks contained a minute quantity of black substance from which by scraping I obtained one Diplodia spore. The fungus appears to be progressing, but slowly.

In the others in which the cut bud was infected, the disease has apparently quite stopped. The plant D has not yet healed the wound. On June 20th. I cut off the tops of the two check plants which were perfectly healthy, C and G, and placed a quantity of spores, from the same specimen with which the other experiments had been conducted on the cut end. On July 2, I find both affected. In C, about half an inch of the top below the cut is dry and brown.

In G. the top is dry and brown for one inch and is producing fully developed pustules in abundance. Thus the life history of the plant is not more than a week long.

Several points are noticeable about these few observations. In the first place the rapidity of the growth of the fungus is remarkable. It commenced to germinate in twelve hours, and a leaf stalk infected through the wound in the bud, in six days is killed, May 28 to June 2, and in about 4 days more produces spores.

Secondly. No preliminary infection by Gloeosporium is necessary.

Thirdly. It cannot attack healthy uninjured buds, but is in fact a wound parasite only. It can attack young imperfectly developed leaves.

Fourthly. In such attacks as on a leaf or wounded bud the plant defends itself from further injury by throwing off the infected dead portion, whether infected leaves or internode. This indeed is one of the great defences of the Para rubber tree, its deciduousness, and it is from this power of shedding its leaves and their actual short life, that the leaf-fungi *Pestalozzia* etc., do it so little harm. Before the fungus has been able to spread over the leaves of the tree so as to cause a serious injury to the foliage, the tree sheds its leaves. Many of the spores must be lost on the ground, and the infection of adjoining leaves is naturally slower. Compare with this the infection of long lived nondeciduous leaves, such as Coffee with *Hemileia* or Cloves with *Cephaleuros*. Each leaf is infected at several different spots and the spread of the fungus, or in the second case the Alga, is much larger and more continuous. The life of the Hevea fungus is practically shortened with the short life of the leaf, and often it has apparently hardly time to produce spores before the leaf falls.

In Borneo a lot of sixty trees together were attacked and killed besides isolated trees here and there in the plantations. It does not seem likely that all of these sixty were wounded, unless by topping, so that it is possible that it may be able to attack at a weak point, such as the young leaves as seen in Experiment E.

Much probably depends on the power of the plant to cut off the infected dead portion as in the case of the leaf stalk in F. and in the cases where after destruction of the bud the next internodes died and were isolated by a growth below the dead portion. This would not be possible in a thick stem of a two year old tree, as the shoot would be too thick.

It must be noticed that the length of the life cycle in the case of the petiole in F. was very short, especially when compared with that of the trunk of the tree sent from Borneo. The latter had been sent from a considerable distance to Singapore and remained for a week in the office before it produced spores. The upper part of this tree must have been diseased for a long time before it was sent as the cambium was destroyed for nearly its whole length. Possibly the development of the fruit requires the complete death of the portion attacked, or its almost complete deprivation of water, which would naturally take longer in the case of a thick stem than in a slender leaf stalk, which indeed had become detached before the spores were matured, or it might depend on the humidity of the air, for as has been mentioned, the fall of a heavy shower of rain after a long dry spell on the night of May 16 was followed immediately by development of spores. The rain ceased about 7 a.m. and the stems were seen to be covered with masses of spores about 8 a.m. There were none on the previous evening. In the case of the young leaf and

petiole, there had been rain in showers some day or two previously and the little plants were out of doors exposed to it.

EUTYPA CAULIVORA MASSEE.

This fungus was found first on dead trees of Para rubber, the black asphalte-like fructification appearing on the trunk some time after the death of the tree, and was described by Massee and his account published in the Bulletin Vol. IX. p. 217.

In both cases, I believe, and certainly in one, the death of the tree was caused by its being overset in a storm and nearly all its roots broken. Mr. Massee thought that the plant was certainly parasitic on the living tree. Of this, however, I was myself doubtful. I have since found it on a broken portion of a rubber tree, and on a stem of *Macaranga Griffithii* cut down and used for bridging a ditch. In this case I have no reason to suppose it was not a post mortem attack. There were no Macarangas attacked by any disease apparent on the ground befcre they were felled in clearing.

In the case of the Hevea too everything points to the fungus being saprophytic. The tree had been blown over and lay prostrate throwing up stems from near the butt. The end of the tree was cut away, and about six feet of the trunk was cracked across. This portion died and eventually became detached lying on the ground in contact with the living portion. Decay set in and the first fungus to appear was the common *Schizophyllum commune,* a fungus which only attacks dead wood, and is one of the commonest causes of decay of timber here. This fungus had fruited and decayed away before the appearance of *Eutypa.* Some black patches however did appear before the *Schizophyllum* was actually decayed, but did not fruit till later. The wood in fact was decayed to a considerable extent before *Eutypa* made its appearance at all. Now though the detached portion bearing the *Eutypa* is in actual contact with the still living portion of the tree, there are no signs anywhere on this portion of *Eutypa* or any other fungus. It is confined to the long-dead detached bit, though this is actually touching the living tree. This seems to confirm the theory that *Eutypa caulivora* is a saprophytic fungus only.

A NEW HEVEA FUNGUS FROM SURINAM.

We add the following notes on new fungi from recent publications. In the Bulletin of the Surinam department van der Landlbouw for April 1910, there is an account and figure of a leaf disease of Hevea which does not seem to be the same thing as the common leaf disease here. The paper is written in Dutch, but there is a summary in English to the effect that.

" At the end of 1908 the Heveas in the nursery of the Botanic Gardens of Surinam were attacked by a leaf-disease. The leaves took spots which spread over them in concentric circles. The disease is caused by a fungus living at the under side of the leaves. Only young leaves are attacked. Though the disease is a very infectious one, trees, in favourable circumstances are probably little susceptible to it. The fast spreading in the above mentioned case must be ascribed to various accidental circumstances especially to too close planting." A figure of infected leaves and the mycelium is given. Fruit does not seem to have been obtained.

The ordinary treatment for leaf fungus, either spraying with weak solution of bordeaux mixture or powdering with flowers of sulphur, would probably check this fungus. But prevention is better than cure and as Mr. Van Hall remarks in the paper, too close planting is the main cause of an outbreak of this and other leaf fungi in the nursery and this can and should be avoided. Make the nurseries big enough and do not have each block too large. Watch for fungi and presence of mites and destroy the fallen leaves which are or may be affected and become sources of further infection.

MITES.

It is not uncommon to find in the nursery beds that many of the leaves of the seedlings are irregularly twisted, bent to one side or otherwise deformed; frequently one side of a leaflet is much smaller than the other, and the leaflet is curved to one side. On examining the underside of the leaf, it is noticeable that the tissue between the nerves is swollen and the finer reticulations cannot be seen, the main nerves standing out green on a greyish back-ground. With this appearance is associated a number of mites (acari) which live on the underside of the leaves. The young ones are very minute white, and elliptic and very slow in motion, the adult is larger semi-transparent, with three brownish marks in the back. They do not appear to be very abundant in a leaf, certainly in proportion to the alteration they cause in it. The injury caused by these mites was first pointed out by Mr. Arden in his report published in 1902.

The damage seems to be practically confined to seedlings or at least young plants, especially such as are weakly owing to bad soil or excessive wind exposure. On well grown adult trees one rarely if ever sees any injury caused or sees the presence of the mite. Overcrowding in the nursery bed, a very common error, is responsible for a good deal of injury to the seedlings from mites and also from leaf disease.

Frequently one sees the lowest three or four leaves attacked, and spoilt, and no damage done to the next output of leaves, the mites apparently disappearing. The number of mites visible is never very large, but the irritation they cause to the leaf is considerable. The youth of a tree is its most important period of life. The young plant is unbranched and has formed only a few buds to take the place of any injured. Its leaf area is small and on its leaf area depends its root growth. Any weakening of the seedling is apt to cause weakness in the adult, slow growth and poor development.

It is therefore advisable to see that the nursery beds are not overcrowded, and that the plants are free from mites. Perhaps the best treatment for these is the old one of flowers of sulphur. The finely powdered sulphur is put in a bag of cloth of not too thick texture and this is tied to the end of a stick. Holding this in one hand among the seedilings, it is beaten with a switch so that the fine sulphur dust flies on the breeze through the bed beneath the leaves.

H. N. RIDLEY,
Director.

R. DERRY,
Curator.

MALAY CAMPHOR.

BY A. SANGER DAVIES.

Dryobalanops Camphora, known to the Malays as 'Kayu Kapur.'

General Appearance.

A very large evergreen tree attaining a height of 150 feet and a girth up to 35 feet. In the smaller girths the tree is not buttressed but when it attains a girth of 5 feet it puts out fairly strong buttresses. In places where this tree is found it towers above the surrounding jungle and may be recognized miles off by its greyish looking foliage and the shape of its crown, which is best described as being like an umbrella.

The branches are small for the size of the tree. Bark 1 in. to 2 ins. thick, greyish brown, uneven, in older aged trees peeling off in large flakes. When the tree flowers in September, the whole jungle presents the appearance of having been through a snowstorm, even the rivers carry away thousands of fallen blossoms.

Distribution in Pahang.

The Camphor tree is found growing along all the lower slopes of the dividing range between the Rompin and Endau watersheds. It is also found to a small extent on low hills lying to the North of the Rompin river.

In the Kuantan district it is found on the slopes of the Bukit Sar range which forms the dividing line between the Jabboh, a branch of the Kemaman river and the Baloh river which flows into the sea some 10 miles north of Kwala Kuantan, but the area here is not of much account. In the Rompin district I would estimate that the total area containing Camphor is not far short of 200,000 acres.

Habitat and Sylvicultural Notes.

Camphor is always found growing on low steep hills or on the lower slopes of high hills. I should say that 800 feet above sea level would be its limit. I have never seen it on low-lying flat ground.

In the places where it is found it forms at least 50 % of the growing stock, all age classes are usually represented, though, as is generally found in evergreen virgin jungle, the mature trees outnumber the younger age classes.

I have seen places where there were no intermediate age classes between the mature tree and a fine crop of young natural regeneration.

Camphor I would class as a 'light demander' and as the tree is usually associated with Bertam undergrowth many of the seedlings do not get a chance of surviving.

Under proper treatment I have no doubt that natural regeneration would yield a very full crop of seedlings.

An attempt to transplant seedlings to a different place in the jungle met with no success, but I did not see this operation performed myself. In the Rompin district improvement clearings in favour of Camphor have been carried out and the young freed seedlings had put out a leading shoot up to 2′ in length in 8 months.

Products.

Timber.—The primary use of the Camphor tree is for its timber.

From measurements extending over a few years it has been calculated that a Camphor tree will reach a girth of 6 feet in 100 years. The timber will float and if the Rompin district was opened up by roads an export trade up to 30,000 tons of timber per annum would be possible, allowing for the forests being managed under a proper system of sustained yields.

I might mention here that the Forest Department have reserved 2,000 acres and that a further 60,000 acres is being demarcated this year, containing at least two mature trees per acre.

Camphor.—The Camphor which is obtained from the tree is known to the Malays by the name of 'Isi Kapur.' From enquiries made it appears that about one tree in every 200 trees, both big and small, has this 'isi' and the amount obtained varies from a few ounces to three catties. The method of extracting the Camphor is to split up the wood and pick the crystals out of small cavities which are found. I have also heard of it being found in the stumps of dead trees.

In connection with this 'isi' there is a superstition that if the men who are looking for 'isi' do not talk a peculiar language while on the search, they will have no luck. I was unable to pick up any of the words used but it was quite different from Malay and known to only a few old men. It should be noted here that no Camphor trees in Pahang are being worked for either their timber or their contents, though I must admit that several trees bore recent marks of having been tapped probably by sakeis or raiders from the Johore boundary. In former days Rompin was noted for its Camphor export.

I am informed that there are men who, by the sound the tree gives out when beaten with an axe, can tell whether it has isi or not.

Oil of Camphor, known to the Malays by the name of 'Minyah Kapur' is obtained by making a small cut penetrating into the wood about 4 inches. There is usually no doubt about the trees which contain the oil, as a curious ridge-like swelling up to 3 feet long is noticeable on the trunk about 6 feet off the ground. At the foot of this swelling there is a discoloured patch on the bark which looks and feels oily. By tapping this place up to 5 gallons of oil is obtained. No heat is apparently necessary as in the case of Minyah Kruin.

I would estimate that 1 tree in every 20 has this 'minyah' and it is a small portion of these 'minyah' containing trees which also contain isi.

Bark.

The bark is used for walls of houses and becomes so hard that they say it can be planed like a plank.

Damar.

A sort of damar smelling very strongly of turpentine and camphor oozes out of any cut made in the trunk. I have heard of no use being made of it.

A. Sanger-Davies,
Asst. Conservator of Forests.

FURTHER NOTES ON MALAY CAMPHOR.

The Malay Camphor tree is known as *Dryobalanops Camphora,* Colebrook. *D. aromatica* Gaertn, belonging to the resinous order of *Dipterocarpeae,* and is found wild in the Malay Peninsula, Borneo and Sumatra. It is curiously omitted from the Materials for a flora of the Malay Peninsula, though it has long been known as a native of this country.

Mr. Sanger Davies has sent an interesting account of the tree which we here publish, and take the opportunity of giving as full an account of the plant as possible to supplement his description and notes.

The tree is a large one, with coriaceous ovate acuminate leaves three inches long, of which the distinct point is half an inch and 1¼ inch wide. They are coriaceous, polished green and have a leaf stalk half an inch long. The flowers are in terminal panicles about 2 inches long, white and fragrant, the sepals fine, lanceolate acute, nearly ¼ inch long, rubbed and scurfy on the back. The petals thin lanceolate acute white as long as the sepals. Stamens 35-45 with short filaments and long narrow yellow beaked anthers. The fruit is an oblong conic nut about an inch long with the five sepals elongated for about 3 inches oblong, obtuse and reddish brown joined by a cup at the base.

Distribution: In the Malay Peninsula the Camphor tree grows on the Endau river in Johore, at Rawang in Selangor, at Kuantan and on the Rompin river, as described by Mr. Sanger Davies.

In Sumatra, Marsden says that it grew in the North of the Island only. Garcia da Orta says much Camphor is produced in Borneo (Baros), Sumatra and Pacen.

I have met with it in Santubong, in Borneo, where it does not, however, form forests as it does in the Malay Peninsula, but grows sporadically in the mixed forests. It also occurs in Labuan and Lingga.

The Camphor.

The Camphor of this tree was the first kind of Camphor known, and it was from the Malay word Kapur that the word Camphor was derived. It was very early known and is mentioned in an Arabian poem of the 6th century. It is mentioned by Marco Polo, as being more superior than any other and named the Camphor of Fanfur (supposed to be Kampar in Sumatra) and worth its weight in gold. Its cost has always been very high. The price of Camphor in Borneo in 1851 was 3 dollars a catty (95 shillings a pound), in Canton 80 shillings a pound.

The quantity actually shipped from Borneo was stated by Motley, in 1851, to be about 7 piculs. In 1813 (Milburne's Oriental Commerce), Sumatra exported 50 piculs and Borneo 30 piculs.

It is chiefly used, it appears, in funeral rites by the Chinese and Battaks. Several attempts have been made to manufacture the valued Camphor from the oil but without success.

In young plants the leaves are more lanceolate, and in a specimen sent by Mr. Craddock, from Baloh forest, Kwantan in Pahang, as much as five inches long by 1½ inch wide. The nerves are very fine and horizontal. The twigs are slender and black.

Accounts of the plant have been published in the Bulletin, vol. I., p. 61, II, 163, and the Straits Branch of the Royal Asiatic Society vol. 26, p. 35, where there is given an account of the Camphor language referred to by Mr. Sanger Davies.—Ed.

AGRICULTURAL PRODUCE.

Trade in Singapore for 1909.

We give below a reprint of the official returns of the trade in various agricultural products in the Colony for the past year. Of course the first striking feature is the immense increase of late years in the rubber industry; and the consequent demand for jungle rubbers. Willoughbeia, Jelutong, etc., as well. There was some fear that other products would be neglected in favour of a boom like that of rubber. This has not, however, been altogether the case. Gambier increased in Johore, but at the same time decreased in the Rhio and Lingga Archipelago, where rubber cultivation is rapidly spreading. Pepper again decreased a little in Johore, and everywhere else, except Dutch Borneo. These two products are sure to go down before rubber till at least the demand gets high and brings about an increase of price. Tapioca increased somewhat, but as Mr. Keun points out, with the increase of the rubber industry this is likely to decrease considerably. Tapioca is an important requisite in cloth manufacture, and a few years ago considerable alarm was excited among the English manufacturers on account of the falling off of the supply, which threatened to interfere very seriously with the factories.

Pineapples experienced a collapse in price last year and the early part of this owing to over-production. They are now steadying again. The diminution of this cultivation which appears to be very injurious to the soil is more a cause of satisfaction than of regret.

It is satisfactory to see that the Copra industry is increasing. We have heard of some foolish planters who destroyed good coconut trees to make way for rubber, but on the whole the opening up of rubber estates may increase the Copra industry as many estates have portions of land suitable for coconuts and unsuitable for rubber, which in order to utilize them they put under coconuts.

The whole report shows a steady progress in cultivation and trade in agricultural produce.—ED.

Exports.

Preserved Pineapples.—Exports totalled 642,033 cases valued at $2,150,946 as against 717,216 cases valued at $2,654,152 in the preceding year, the decrease being 75,183 cases and $503,206 value, prices having experienced a heavy fall. Large decreases in exports appear in the first three quarters of the year but the fourth quarter showed improvement. The decrease could only be attributed to overstock in the United Kingdom and to the protective tariff in America which favoured Hawaiian pines. The export decreases to the United States of America amounted to 90,749 cases, to the Continent of Europe 8,473 cases, and to the United Kingdom 5,412 cases, but exports to Hongkong, Canada and China showed increases.

The prices during the early part of the year were such as to barely admit of the crop being packed to cover cost but the shortage occasioned by abandonment of lands caused and advance in price towards the latter part of the year which is now at a profitable level and which it is expected will be well maintained.

Sago Flour.—Exports reached 1,130,995 pikuls = tons 67,321 valued at $3,484,133, the increase being 177,821 pikuls = tons 10,584 and $598,544 value. For the first few months the market was steady but during the remaining months it was very erratic. The demand from Europe was exceptionally good. Prices advanced.

Arecanuts.—Exports recorded pikuls 949,796 = tons 56,535 and $4,315,147 value, an increase of 150,548 pikuls = tons 8,961 and of $833,994 value.

Nutmegs.—Exports amounted to 23,197 pikuls = tons 1,381 valued at $411,346, the increase on the previous year's figures being only 356 pikuls = 21 tons.

Sugar Candy.—The exports of sugar-candy manufactured in Singapore reached 166,070 pikuls =tons 9,885 and $1,266,845 value, an increase of pikuls 46,300 = tons 2,756 and $288,847 value. Exports to Hongkong increased by 42,672 pikuls = tons 2,540 and to China by 1,929 pikuls = tons 115 besides smaller increases to other places. The sugar-candy industry shows improvement.

Tapioca Flake.—Exports totalled 151,988 pikuls = tons 9,047 and $845,460 value, showing a decrease of 48,888 pikuls = tons 2,910 and $435,000 value.

Tapioca Flour showed 247,954 pikuls = tons 14,759 exported, valued at $722,679, an increase of 92,998 pikuls = tons 5,536 and $157,918 value.

Tapioca Pearl was sent out to the amount of 434,313 pikuls = tons 25,852 valued at $2,245,808, an increase of 33,046 pikuls = tons 1967.

Tapioca has been planted on several rubber estates as a catch crop but with the advancement of the rubber industry there is every likelihood of a decrease in production.

B.—**Raw Materials.**

Gum Benjamin.—Exports reached 21,402 pikuls = tons 1,274 valued at $458,266, an increase of pikuls 489 = tons 29 and of $7,760 value.

Para Rubber.—Exports showed 33,807 pikuls = lbs. 4,507,600 valued at $9,483,553, an increase of 6,344 pikuls = lbs. 845,867. The United Kingdom received 6,416 pikuls = lbs. 855,467 more, but Belgium and Ceylon received less by 412 pikuls = lbs. 54,933 and 756 pikuls = lbs. 100,800 respectively. The other increases and decreases being small are not given in detail.

Phosphate of Lime.—The export of Phosphate of Lime by the Company operating at Christmas Island recorded 105,481 tons valued at $2,260,307, a decline of 3,616 tons but an advance of $390,073 value due to enhanced prices. To Australia 10,700 tons more were sent, to Denmark 14,096 more, to Germany 18,932 more, and to the Netherlands 2,450 more but to Japan 46,662 tons less were sent, to Sweden 1,782 tons less, and to New Zealand 1,350 tons less. The United Kingdom received nothing.

A.—**Food, Drinks, and Narcotics.**

Coffee.—Total of exports amounted to 46,618 pikuls = tons 2,775, valued at $1,055,362. Exports fell by 7,072 pikuls = tons 421.

The following countries showed decreases in their imports to the Colony:—

	Pikuls.		Tons.
Selangor by	3,518	=	209
Bali by	6,969	=	415
Negri Sembilan by	268	=	16
Java by	830	=	49
Johore by	78	=	5

On the other hand an increase is shown from Sumatra of 5,334 pikuls = tons 317.

Rice.—Imports totalled 9,538,107 pikuls = tons 567,744 valued at over 37 million dollars, an increase of 804,310 pikuls = 47,876 but a decline in value of $171,725 due to a fall in prices.

Exports amounted to 8,791,316 pikuls = tons 523,293, an increase of 609,680 pikuls = tons 36,290 inclusive of rail traffic or 92·2 per cent. of the total quantity received.

Increases are seen in the imports from French Indo-China Colony which amounted to 403,066 pikuls = tons 23,992 and from Burma 456,591 pikuls = tons 27,178 but a decrease is seen from Siam, Siam East Coast, and Siam West coast amounting to 193,373 pikuls = tons 11,510. Average quotations have declined from $4.26 to $3,89 per pikul.

Wheat Flour.—Pikuls 537,623 = tons 32,001 were received valued at $3,256,895, an increase of pikuls 50,213 = tons 2,989 and of nearly $448,000 value. Australia imported 86,510 pikuls = tons 5,149, an increase of 59 pikuls = tons 3, while Hongkong and the United States of America Pacific Coast sent 417,470 pikuls = tons 24,849, an increase of 42,909 pikuls = tons 2554. Australian Flour is still in fair demand but the larger quantity of business done is still in the American artical. Australia was handicapped in the imports of Flour owing to the coal strike. Prices for both Australian and American Flour have advanced due probably to the failure of the Argentine crop.

Black Pepper exported reached 333,860 pikuls = tons 19,873 and $4,082,372 value, a decrease of 161,779 pikuls = tons 9,630 and of $1,883,522 value.

The imports from Johore decreased by 25,256 pikuls = tons 1,503, from Java by 49,194 pikuls = tons 2,928, from Sumatra by 18,012 pikuls = tons 1,072, from Siam West Coast by 9,884 pikuls = tons 588. from Acheen by 23,530 pikuls = tons 1,401, and from Sarawak by Pikuls 1,689 = tons 101, while imports from Dutch Borneo showed an increase. Prices advanced.

White Peper.—Exports totalled 115,024 pikuls = tons 6,847 valued at $2,267,872, showing a decrease of 18,932 pikuls = tons 1,127 and of $218,841 value. Prices advanced towards the last few months of the year.

Imports from Sarawak showed a decrease of 8,773 pikuls = tons 522, and from other Dutch Islands pikuls 1,408 = tons 84 but Dutch Borneo and Rhio and Lingga Archipelago showed increases in imports.

Sugar.—Imports amounted to 1,059,976 pikuls = tons 63,094 and $6,621,183 value, an increase of 237,833 pikuls = tons 14,157 and $1,699,976 value.

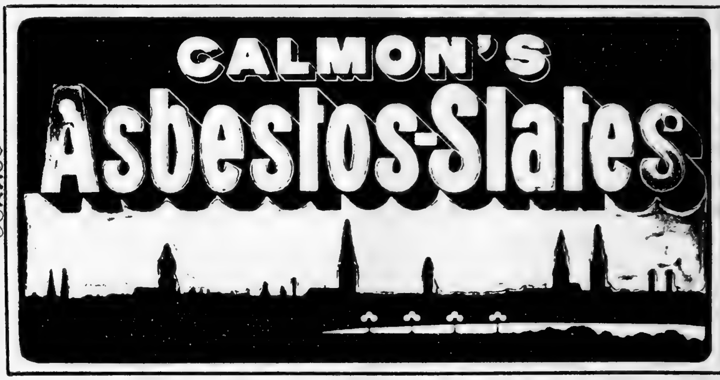
From Java Ports 254,326 pikuls = tons 15,138 more were received during the year and from Perak the imports decreased by 9,756 pikuls = tons 581.

Austria-Hungary imported 3,360 pikuls = tons 200 and Germany 2,286 pikuls = tons 136 in 1908 but contributed nothing towards imports in 1909.

Exports to Perak and Selangor were less by pikuls 6,996 = tons 416 which would be greater if the rail traffic for 1908 were taken into account and pikuls 5,924 = tons 353, respectively, while to Siam, Hongkong and China they increased by 9,913 pikuls = tons 590, 7,277 pikuls = and tons 433, 10,347 pikuls = tons 616 respectively.

Copra.—Exports totalled pikuls 1,201,310 = tons 71,507 and $9,958,903 value, a decrease of 99,518 pikuls = tons 5,924, but an increase of $759,265 value, prices having advanced. Dutch Borneo imported 28,966 pikuls = tons 1,724 less, Natunas 58,773 pikuls = tons 3,498 less, Sumatra 23,908 pikuls = tons 1,423 less, Sarawak 13,500 pikuls = tons 804 less, other Dutch Islands 7,037 pikuls = tons 419 less, and Celebs 10,030 pikuls = tons 597 less, Minor decreases are not detailed.

Increases are seen from Acheen by from 24,350 pikuls = tons 1,449, from Johore by 11,439 pikuls = tons 681, Selangor by 5,213 pikuls = tons 310, and from Perak by 3,365 pikuls = tons 200 or excluding the rail traffic for 1909, 2,046 pikuls.


CALMON'S
Asbestos-Slates

To Belgium 54,451 pikuls more were sent and to Germany 160,051 more.

The United Kingdom received 22,601 pikuls less, France 229,034 less, Italy 82,978 less, and Russia 41,225 less.

The price of copra advanced from about $8 per pikuls in January, 1909, to $10.40 per pikul towards the close of the year. The high prices obtainable will no doubt have the effect of stimulating production.

Gambier.—Exports totalled 508,332 pikuls = tons 30,256 valued at $5,569,683, a fall of pikuls 29,961 = tons 1,783 but a rise in value of $1,043,104 owing to advanced prices.

Imports from Johore increased but from Rhio and Lingga Archipelago decreased. There was a fall of pikuls 46,091 = tons 2,744 to the United States of America, and of pikuls 608 = tons 36 to the United Kingdom, but to France there was an increase of 15,873 pikuls = tons 945, to Calcutta pikuls 3,969 = tons 236, and to Belgium 2,463 pikuls = tons 147. Prices have advanced.

The cultivation of gambier is being hampered by the rubber boom which is likely to cause a reduction in supplies.

Borneo Rubber.—exported totalled pikuls 20,519 = tons 1,221 valued at $1,872,236, giving an increase of pikuls 623 = tons 37 and of $157,890 value.

Sarawak imported 924 pikuls = tons 55 less while Sumatra and Dutch Borneo imported more by 1,015 pikuls = tons 60 and pikuls 634 = tons 38 respectively.

The United Kingdom received 963 pikuls = tons 57 more, but France received 447 pikuls = tons 27 less & Japan 301 pikuls = tons 18 less.

Gum Copal.—Exports reached 139,840 pikuls = tons 8,324 valued at $1,783,253, a decrease of 19,417 pikuls = tons 1,156 and of $344,756 value.

Imports from Celebes declined by 2,195 pikuls = tons 131, from Philippine and Sulu Archipelago by 2,591 pikuls = tons 154, and from Moluccas by 300 pikuls = tons 18.

Gutta Percha.—Was sent out to the amount of 38,849 pikuls = tons 2,312 valued at $2,228,958, the increase being 10,820 pikuls = tons 644 and $845,060 value.

Dutch Borneo sent 4,540 pikuls more, and Sumatra 8,371 pikuls more into the Colony.

Exports to the United Kingdom recorded 4,251 pikuls more, to Germany 2,382 pikuls more and to the United States of America 3,998 pikuls more.

Gutta, Inferior.—Exoprts amounted to 320,591 pikuls = tons 19,083 valued at $2,539,107, showing an increase of 217,441 pikuls = tons 12,943 and of $1,935,928 value.

Exports to the United Kingdom increased by 7,076 pikuls, to Germany by 61,325 pikuls, and to the United States of America by 148,974 pikuls.

Increased imports were from Sarawak by 118,162 pikuls, Dutch Borneo by 43,762 pikuls, and Sumatra by 40,739 pikuls.

India Rubber.—Imports reached 4,224 pikuls = tons 251 valued at $423,851 including the Labuan trade, an increase of 1,303 pikuls = tons 78 and of 143,263 value. Excluding the 1909 Labuan trade the following statement compares the figures of imports between 1908 and 1909:—

INDIA RUBBER.

	1908.		1909.	
	Pikuls.	$	Pikuls.	$
Singapore ...	2.772$\frac{2}{10}$	258,681	3,125	307,953
Penang ...	149$\frac{3}{10}$	21,907	660	83,210
Total ...	2,921½	280,588	3,785	391,163
			Pikuls.	$
Increase ...	...	...	863½	110,575

Sarawak sent 551 pikuls more and Sumatra 1,075 pikuls more but Dutch Borneo sent less by 637 pikuls. Exports to the United Kingdom increased. The large advances were Para Rubber by $3,930,000, India Rubber by $850,000, Gutta Percha by $363,000, Gambier by $274,000, White Pepper by $135,000, and Tapioca Flour by $201,000.

The chief decreases were seen in Tin by $7,933,000, Gum Copal by $280,000, Sugar by $232,000, Tapioca Flake by $224,000, and Preserved Pineapples by $167,000.

Rattans.—Exports showed a total of 446,335 pikuls = tons 26,568 valued at $3,914,775, a decrease of 5,390 pikuls = tons 321.

From Sumatra 38,768 less pikuls were received but an increase is seen from Sarawak by 3,725 pikuls, from Dutch Borneo by 3,747 and from Celebes by 6,578 pikuls. To Germany 16,508 more pikuls were sent, and to the United States of America 8,359 more pikuls, but the quantity sent to the United Kingdom and Hongkong fell off by 17,475 and 11,104 pikuls respectively.

Rubber.

As matters stand, the rubber outlook is bright with promise in the extreme. The Registrar of Imports & Exports (Mr. STUART) in his Annual Report for the year 1904 writes in paragraph 60 as follows:—

"For the first time Para rubber finds a place in the returns and judging from the prices obtained, the industry, which has been largely cultivated in the Malay Peninsula, seems to have a future before it."

The forecast has been more than fully realized. On reference to the returns for the year 1904 the imports of para rubber into the Straits Settlements from the Malay Peninsula and elsewhere (most of which merely passed through to other markets) amounted to 104 pikuls = 13,867 lbs. only, Johore contributing 21 pikuls, Perak about 3 pikuls, Selangor 44 pikuls, and Sungei Ujong 35 pikuls, while the exports to the United Kingdom, Ceylon, and Belgium amounted to 88 pikuls = 11,733 lbs. The years following show great expansion both in imports and exports. The imports in the year 1908 amounted to 24,505 pikuls = 3,267333 lbs. and the exports 27,463 pikuls = 3,661,733 lbs., the exports exceeding the imports by nearly 3,000 pikuls. Perak exported 1,453 pikuls exclusive of rail traffic into the Colony and Selangor 17,084 pikuls. while Johore exported 1,279 pikuls. Negri Semblian 4,008 pikuls, Pahang 72 pikuls and Sumatra East Coast 586 pikuls. These figures demonstrate clearly the enormous strides that this industry has taken in these parts within the last few years. In spite of the increased output this rubber, or as it is generally called plantation rubber, still forms a very small proportion of the world's supplies.

In May, 1909, Port Swettenham became for the fist time a port of call for the homeward bound P. & O. Company's intermediate steamers and the steamers of the China Mutual Steam Navigation Company, Limited, and of the Ocean Steamship Company, Limited, which call there especially for rubber. Prior to this date, rubber was shipped to Europe *viä* the Straits Settlements at a through freight of 75 shillings per ton, but by the new arrangement referred to above, the freight on rubber was reduced from 75/- to 60/- from Port Swettenham as well as the Ports of the Straits Settlements, which, of course, met with the wishes of the planters, as it saved the extra cost for freight and the unnecessary delay involved in the transhipment of rubber at Singapore or Penang. The reduced freight did not, however, remain permanent. Towards the close of the year it was again raised by the Shipping Conference from 60 to 70 shillings per ton of 50 cubic feet either by direct steamer from Port Swettenham or when transhipped at Singapore or Penang.

Turning again to imports and exports of rubber the returns show that in 1909 the imports into the Straits Settlements amounted to 23,948 pikuls = 3,193,067 lbs., and the exports 33,807 pikuls = 4,507600 lbs., the exports exceeding the imports by nearly 10,000 pikuls. Perak exported 6,121 pikuls inclusive of rail traffic, Selangor 8,223 pikuls, Johore 2,030 pikuls, Negri Sembilan 6,464 pikuls, Pahang 4 pikuls, Acheen 2 pikuls and Sumatra East Coast 1,102 pikuls.

The following statement which gives the quantity and value of para rubber exported from Selangor to various countries excluding Singapore and Penang during 1909, shows what quantity of transhipment trade in rubber was lost to the Colony during 1909, owing to Port Swettenham being made a port of call for ocean-going steamers:—

Countries to which exported.	*Quantity Pikuls.*	Lbs.	*Value* $
United Kingdom ...	21,598$\frac{9}{10}$	2,879,853	6,853,059
British Possessions ...	3,205$\frac{6}{10}$	427,413	1,028,439
Other Foreign Countries ...	5,165$\frac{1}{4}$	688,700	1,655,623
Total ...	29,969$\frac{3}{4}$	3,995,966	9,537,121

Prices.

Since 1902 the prices of rubber have maintained an upward tendency from 3/- in that year to 5/8 in 1905. The highest price of para rubber in 1906 was 6/3 and that for 1907 was 5/9. In February, 1908, the price of para sank to 2/9 per lb. which was the result of the American financial crisis, but in November, 1908, it rose to 5/6¾ owing to a strong European demand and a revival of American orders and it further advanced to as high a rate as 9/7¾ in October, 1909. In November, 1909, the price dropped by about 2/- per lb. owing to large supplies from South American Ports, but towards the close of December the market has been more active with a strong recovery of prices.

Rubber Companies.

As a result of the rubber boom a large number of rubber companies sprang into existence in the Straits Settlements and Malay Peninsula. Rubber cultivation in the Colony and the Malay Peninsula advanced by leaps and bounds, and the payment of high dividends is an indicative of the fact that besides being an important field of investment at the present time, the industry bids fair to make steady progress in the near future. There is every reason to believe that for many years to come rubber will continue to swell our trade returns.

Statement showing the average annual quantities of the principal articles of produce exported for the five years ended 1906, also the exports for the years 1907, 1908 and 1909:—(Thousands of pikuls.)

Articles.	Average for the five Years 1902-1906.	1907.	1908.	1909.
Coffee	87	49	54	47
Sago Flour	696	856	953	1,131
Sago, Pearl	104	139	137	135
Spices:—				
Arecanuts	672	883	799	950
Cloves	5	3	6	4
Cubebs	2	2	2	1
Mace	3	3	3	3
Ginger	4	6	10	9
Nutmegs	16	23	23	23
Black Pepper	250	328	496	334
White Pepper	95	111	134	115
Long Pepper	4	7	13	10
Tapioca, Flake	206	167	201	152
Tapioca Flour	305	81	155	248
Tapioca, Pearl	367	413	401	1,434
Copra	818	954	1,301	201
Gambier	650	574	538	508
Gums:—				
Benjamin	21	22	21	21
Camphor	2	2	3	2
Copal	123	176	159	140
Damar	45	62	60	65
Gutta-percha	42	52	28	39
Gutta Inferior, including Jelutong	178	251	103	321
India Rubber	7	6	3	9
Borneo Rubber	22	29	20	21
Sticklac	10	3	3	4
Rattans	452	465	452	446
Tin ...	951	949	1,064	1,030
Preserved Pines (cases) ...	Not stated	846	717	642
Para Rubber (pikuls)	Not stated	16	27	34

Average Annual Export Value per pikul declared in Singapore of the principal articles of produce for the five years ended 1906, and also for 1907, 1908 and 1909:—

Principal Articles.		Average for the five years ended 1906		1907.		1908.		1909.	
		$	c.	$	c.	$	c.	$	c.
Coffee	... ...	21	72	21	68	22	36	22	97
Sago Flour	... ...	3	45	2	93	3	00	3	07
Sago, Pearl	... ...	4	91	4	71	4	22	4	08
White Pepper	... ...	42	61	24	80	18	77	19	90
Tapioca, Flake	... ...	5	93	9	37	6	60	5	42
Tapioca, Pearl	... ...	5	66	9	22	6	33	5	58
Tapioca Flour	... ...	5	50	6	40	5	25	5	03
Borneo Rubber	... ...	103	28	98	82	86	15	91	09
Sticklac	... ...	51	09	67	93	36	80	24	14
Rattans	... ...	11	11	9	56	8	64	8	75
Gambier, including Cube	...	11	78	7	90	8	37	10	93
Black Pepper	... ...	28	43	17	69	11	92	12	15
Gutta-Percha	... ...	135	06	54	18	49	37	57	36
Copra	... ...	8	62	9	63	7	12	8	31
Gum Copal	... ...	15	55	15	66	13	36	12	75
Para Rubber	... ...	*339	00	266	70	191	48	300	54

* Two years only.

PROGRESS IN MALACCA.

In the Annual Report on Malacca, Mr. Evans, the Resident Councillor, writes: "The year 1909 has been the most prosperous year known in Malacca since the Settlement came under the British Crown, and there appears every prospect of the year 1910 being even better." He might, we think, have gone even further and said that Malacca was now in a state of prosperity greater than any of its records have ever shown from the earliest days of the Portuguese.

"Malacca is essentially an Agricultural Settlement and a steady increase in the revenue from land and a strong demand for land is a sure sign that those who are engaged in agricultural operations are prospering and are confident of the future of the Settlement."

This progress is of course entirely due to rubber cultivation. The actual area under this crop is not given, but the Malacca lands are valued at 50,000,000 dollars. Tapioca cultivation, as was to be expected, is decreasing as the rubber wave covers the whole country, and as the trees grow the use of tapioca as a catch crop gradually disappears.

Gambier being high in price is still keeping up in its output, being used as a catch crop by small planters.

In former years in travelling through Malacca vast fields of lalang were one of the most prominent features of the landscape. No planter would take up such ground as the expense of extirpating the grass was too great, and meanwhile this useless area was extending. Now, however, circumstances have changed and this land, on which there has been no timber for many years, has been found to be free of the underground fungi injurious to Hevea trees, and is being taken up on account of this advantage.

The clause in Statutory grants requiring permanent cultivation on land taken up has stopped the development of new areas of lalang, and as the old lalang fields are succumbing to the wave of rubber cultivation, the lalang grass will end in becoming a rare plant in Malacca.—ED.

AGRICULTURE IN THE NATIVE STATES IN 1909.

The Annual Government Report for 1909 gives an interesting and important account of the progress of Agriculture in the Federated Malay States during the year, out of which we extract the following statistics and notes:

AGRICULTURE.

Area under Cultivation.

The Director of Agriculture puts the area under cultivation in the Federated Malay States at 353,389 acres, divided as follows:—

Perak	133,950	acres.
Selangor	125,623	„
Negri Sembilan	75,204	„
Pahang	18,612	„
Total ...	353,389	acres.

an increase of 33,667 acres.

This acreage, which excludes padi and horticulture, was planted as follows:—

Coconuts	123,815	acres.
Rubber	196,953	„
Coffee	5,885	„
Other Cultivation	26,736	„
Total ...	353,389	acres.

The acreage under coconuts has increased by 5,118 acres, under rubber by 28,905 acres, and other forms of cultivation by 2,190 acres, while that under coffee was further reduced by 2,546 acres.

Coconuts.

The area given up to coconut cultivation increased by 2,139 acres in Perak, 2,649 acres in Selangor, 258 acres in Negri Sembilan, and 72 acres in Pahang.

Rubber.

The increase in the Rubber acreage was made up of 11,572 acres in Perak, 11,607 acres in Selangor, 4,640 acres in Negri Sembilan, and 1,086 acres in Pahang. The area opened during 1909 is very much less than that opened in the previous year, but it is confidently anticipated that a very marked activity will be shown in 1910 as the result of recent high prices.

The number of rubber estates in the Federated Malay States is returned as 377, their acreage being 500,431 acres, of which 196,953 acres has been planted up.

The output of rubber is recorded as 6,083,493 lbs. (= 2,692 tons) as against 3,190,000 lbs. (= 1,425 tons) in 1908: the percentage of increase works out as follows:—

Perak	177 per cent.
Selangor	100 "
Negri Sembilan	40 "

The lands under rubber in the several States were:—

Perak	68,278 acres.
Selangor	93,853 "
Negri Sembilan	31,945 "
Pahang	2,877 "
Total ...	196,953 acres.

Rubber Prices.

There was a steady upward movement in price from 5*s.* 0½*d.* per lb. in January to 9*s.* 8½*d.* in November: as it is estimated that it costs from 1*s.* to 1*s.* 3*d.* per lb. to place the rubber on the market, the prices quoted give a phenomenal profit.

Rubber Pests.

There was no serious amount of disease on estates, though root disease is still troublesome and costly. A fungal disease attacking the branch and stem of the tree appeared, but was quickly overcome; white ants still give trouble, but are no longer a serious pest.

Tapping Experiments.

A number of tapping experiments were commenced in Kuala Lumpur in September; these are concerned with quantity only, and the results will be published when the first six months are completed,

At the Batu Tiga Experiment station, tapping experiments were commenced in November with a view to testing the effect of certain chemical manures on the latex.

Native Cultivation.

Apart from some treatment of pests very little was done for native cultivation.

Labour.

The labour employed on estates is estimated at 77,524, divided as follows:—

Perak	27,673
Selangor	36,498
Negri Sembilan	12,321
Pahang	1,032
Total ...	77,524

Of these, 55,732 were Tamils, 6,170 Javanese, 12,402 Chinese, and 2,778 Malays.

Coconuts.

The Inspector of Coconut Plantations reports that about two-thirds of the area (123,815 acres) is probably in bearing, and he estimates the value of the whole to be 25,000,000; of the area opened during the year (5,118 acres) about 1,500 acres is to be credited to Europeans.

Distribution of Coconut Lands.

The area under cultivation is distributed as follows:—

Perak	63,225	acres.
Selangor	25,818	"
Negri Sembilan	19,037	"
Pahang	15,735	"
Total ...	123,815	acres.

Copra.

The copra exported was:—

Perak	56,560	pikuls	valued at	$395,466
Selangor	46,826	"	"	323,193
Negri Sembilan	781	"	"	6,123
Pahang	302	"	"	2,102
Total ...	104,469	pikuls	valued at	$726,884

In spite of the efforts of the department to induce the natives to adopt sound methods of collecting and treating the nuts, there are still many complaints of the inferior quality of the native-copra.

The inspector considers that the increase in coconut cultivation, in all the circumstances, is by no means disappointing, and he is hopeful of a further extension of this profitable industry.

Coffee.

The area under coffee has again further decreased, being now only a little over 5,000 acres. It is not improbable that, except as a catchcrop to some more profitable form of permanent cultivation, this industry will shortly die out entirely.

Experiment Plantations.

The stations at Kuala Lumpur and Batu Tiga were kept in good order, the land at the former place being nearly all planted up.

Weeding Experiment.

The results of the weeding experiments at Batu Tiga show that the plants on the clean-weeded plot have made a much greater advance during the year than those on the other plots.

Other Rubbers.

The purple Manicoba has made very little progress during the year, but other kinds of Manihot are doing fairly well; Castilloa did not do very well, but it has been planted in a new position and promises better. Seeds of Ecanda rubber (*Raphionacme utilis*), a rubber received from Kew, failed to germinate.

Camphor.

The camphor trees at Batu Tiga and Kuala Lumpur continue to do well, and the growth is considered by experts, acquainted with the Japanese camphor plantations in Formosa, to be quite equal to the growth in that island.

A series of distillations were undertaken during the year, the results of which are said to be very encouraging.

West African Oil Palm.

Several plants of the West African oil palm are now in fruit in the Public Gardens and at Batu Tiga: samples of oil of good quality were prepared for the Agri-Horticultural Show. Seeds of two of the best varieties were obtain from Lagos: some were retained and planted, the rest were distributed among planters in the Federated Malay States who had expressed their willingness to give the cultivation a trial.

Cover Plants.

Various experiments in connection with cover plants as aids to weeding have been carried out, including *Abrus precatorius*, first brought under notice for this purpose in 1908,

Rubber.

The quantity and value of cultivated rubber exported give the wonderful increase of 92.31 per cent. and 217.15 per cent., respectively —the figures being 6,087,815 lbs., valued at $14,455,982, as compared with 3,165,600 lbs., with a value of $4,558,026, in the preceding year: the value of this export in 1905 was $529,126. About two-thirds of the rubber exported comes from, or passes through, Selangor, 53,103 lbs. of the rubber produced in Perak and 609,840 lbs. of that produced in Negri Sembilan being exported *via* Port Swettenham.

Copra increased to 104,469 pikuls, valued at $726,884.

Syiviculture.

The seeds of the best timber trees and of rotan sega were collected and planted in nurseries.

Para Rubber.

The Para Rubber Plantations at Pondok Tanjong and Taiping produced, respectively, 22,438, and 7,383 lbs. of dry rubber.

Chengal.

Far more satisfactory from the Government point of view is the cultivation of chengal at Bikum and of taban (gutta percha) at Trolak.

At Bikum 420 acres were planted with chengal, 80 trees to the acre, and at the close of the year there was a nursery of 44,000 trees.

Gutta Percha.

At Trolak 1,098 acres were dealt with by improvement fellings, and 566 acres, of the area so treated in previous years, was gone over again. The reserve has a very healthy and satisfactory appearance.

At the small Waterfall reserve experiments were made in tapping taban (Palaquium):

> "Two hundred pounds of clean gutta were sent to England for sale, but the results of the sale have not yet been received. The taban merah (red) appears to be excellent quality, but the taban puteh (white) is inferior. One hundred and thirty trees were tapped, their girth measurement ranging from 18″ to 60″: the average tree was 30″ at a height of 3′ from the ground. The average yield per tree was 1 lb. of well-cleaned gutta, which may be roughly valued at 3*s.* per lb. The cost of tapping may be put at 80 cents per tree of average size, exclusive of the cost of tools. The average yield of the ten largest trees was 2¾ lbs. each, and the cost of tapping was approximately $2 per tree. It was satisfactory to find that trees which were tapped in 1908 yield freely in 1909 partly by the re-opening of the old cuts and partly by new cuts."

Rubber.

The rubber industry is thoroughly established in the district, the area under rubber has been extended, and a decided improvement in the methods of cultivation is to be seen.

Mr. Stonor writes:

> "The best results, from a casual observer's point of view, are to be seen in a group of estates near Sungkai, which show excellent progress, and will bear comparison with anything I have seen elsewhere. Some seven or eight of these estates are served by an admirably designed and well-ordered estate hospital, erected at their joint expense, and centrally situated, near Sungkai village."

Very nearly 10,000 acres were alienated for coconuts and rubber.

Agriculture.

The District Officer gives a short account of 21 estates which cover an area of no less than 42,000 acres.

The cultivation of padi up the Perak river was better: some trouble arose at Kampong Gajah regarding the fencing of padi fields and some of the raiats were stiff-necked and insubordinate. I went up river with the District Officer and the Dato' Sri Adika Raja and settled the matter.

AGRICULTURE.

Padi.

It was a good padi season throughout the State and the Government has spent money in irrigation and will, I sincerely hope, not grudge further expenditure. The increased rent, by water-rate, may not yield the stipulated interest on the money spent, and it certainly will not yield it at once, but a rigid calculation of that kind is not a true criterion of the value of these works to Government: for, without such help, the land would remain unoccupied altogether.

Influx of Foreign Malays.

At the present moment foreign Malays are coming over to Perak in great numbers. Until the 1911 census is taken their numbers will not be known, but every Land Officer knows that they are coming. These people cannot be expected to stay unless they can get padi land, for no Malay Settlement is permanent without padi. Malays plant rubber and coconuts (*per se*) and sell to Chinese and Europeans: but Chinese and Europeans do not seek to buy padi land and fruit gardens, and it is only in those conditions that we shall find the immigrant Malays settle, till in the next generation they call themselves the people of the country.

We welcome them, and our Land Officers do all in their power for them, but there are no special officers of the Public Work Department to devise systems of irrigation, small as well as large; and the

Survey staff is not augmented to avoid the long waiting for settlement, which discourages those who have come and may deter those who contemplate coming.

Krian Irrigation Scheme.

The Krian Irrigation Scheme continues to be a great success. The Department of Agriculture is paying more attention to the cultivation of rice: it is hoped that a branch of the department, with Native Inspectors, will be formed, such as has been so usefully placed in charge of the cultivation of coconuts. The padi borer is an ever present pest, and it is clear that more effectual drainage is required in some of the cultivated parts of Krian. The Government bunds will do good and, as land is more and more taken up, the undrained and uncultivated swamps will disappear. The Irrigation Scheme is quite young yet: it has been nagged at far too much. The proof of its value lies in the establishment of the Krian Rice Mill, and I invite attention to the few and brief facts which I have written down under the headings of Trade and Hospitals.

I desire to endorse the views expressed by Messrs. Hale and McLean in the following extracts from their reports:

Mr. Hale—

> "I think that padi planting should be encouraged before rubber, and one way to do this is to appoint an expert in entomology to stay in Krian for a year or two. The outlay is justified, because rice is the food of the people, and our population must increase if all our rubber trees are to be tapped: the improvement in the produce of the rice fields, and thereby the ability of the people to pay rent and water-rate, will quickly reimburse the Government."

Mr. McLean writing of padi pests—

> "No remedy is likely to be devised unless a member of the Agricultural Department spends the greater part of a year in Krian. Experiments under the personal supervision of a scientist are obviously the only way in which the extermination of padi pests can be successfully attempted."

The output of rubber approximated one million pounds in weight, or 435 tons. The planted area exceeds 68,000 acres.

Para Rubber.

The cultivation of rubber has made wonderful strides. The appearance of the country is transformed. Numerous companies have been floated. Most of the Government loans have been repaid. All nationalities are acquiring land in various qualities to plant it with rubber by varied methods.

Mr. Winstedt has the following interesting tale to tell:

> "The example of one Malay here (Matang), who sold twelve acres of clean rubber for $8,000, has brought home the importance of diligent supervision to his whole mukim with most salutary results. Another Malay, the headman of some 50 partners, got an offer, on almost the same scale, for 100 acres but refused it, and is spending the hundreds of dollars a month he wins from his old trees on white-ant killer, fungus cures and clean weeding, and looks forward to making soon his thousands of dollars a month."

These things have afforded food for thought to Government officers, and some have expressed their thoughts in the reports before me. One officer, who admits that

> "Malays are among the first people who should be allowed to reap any benefit that is to be derived from the planting of rubber,"

has given small area to Malays, on the special condition that they shall each year for five years plant five permanent fruit trees on their lands.

He has done this because:

> "The ghosts of coffee and tapioca are still in every mukim in the shapes of abandoned patches waving their warning blades of lalang. Moreover, one cannot but feel that, whatever be the future price of rubber, the danger to the industry in the Peninsula will be very great when the large estates are surrounded by patches of native-grown rubber, ill-kept as, in the absence of any special legislation on the lines of that for the planting of coconut trees, the majority are likely to be. Clean weeding will appeal only in theory to the average raiat. Any infectious disease that may come will almost certainly find its source in a native kampong."

These words might have been written by a planter. They look so entirely at one side of the picture. They have evidently been written by an officer who has the Negri Sembilan in his mind's eye, for I know of only one mukim, or it may be two, in Perak, which have been spoiled by tapioca. Clean weeding has certainly not appealed to the average planter. Many planters have planted up more land than they could ever have properly upkept, and it is fair to admit that the formation of companies has given men and money to the country to enable that which was bitten off to be chewed. This speculation has had its effect on the Malay. He has sold patches of rubber at enormous prices, and his appetite is whetted to plant more for the demented foreigner to buy. If it makes him rich and makes him happy, I, as one of his friends, look on in perfect complacence. I see no reason to jump at the conclusion that disease will spring up in his land, for the coffee blight did not begin in the Malay kampong: but I heartily endorse the suggestion that legislation be promptly adopted to ensure the treating of all cultivated lands according to the methods of good husbandry.

The Agricultural Department has issued a pamphlet of instructions regarding the cultivation of rubber.

Coconuts.

Mr. L. C. Brown estimates that the approximate area of land under coconuts in Perak exceeds 63,000 acres. There has been a steady increase and the cultivation is expanding. Native plantations are better kept, and lalang is being eradicated.

Europeans have applied for large areas of land for coconuts and the natives are turning their attention to the Bernam river.

Copra.

The export of copra from Perak, valued at £52,000, shows an increase of 7,500 pikuls. The price was considerably higher.

The Gapis Estate, on the way from Taiping to Kuala Kangsar, obtained from 25,000 nuts the fine average of one pikul of copra from 188 nuts.

General.

The Agricultural Department issued two useful circulars in the Malay language giving hints on this form of cultivation.

Mr. Brown recommends the cultivation of coconuts as a sound and profitable investment, and advises interplanting coconuts with Coffea robusta as a catchcrop.

LAND AND AGRICULTURE.

While the gross land revenue for the year under review shows some diminution as compared with the figures for 1908, it is with satisfaction that I am again able to record that the decrease is due solely to a further reduction in the amount realised by land sales, and that receipts under other headings show a substantial advance. The total amount collected under all heads was $514,867 as compared with $532,608 in 1908 and an estimated amount of $418,225.

The amount brought to credit in respect of land sales receded from $158,592 in 1908 to $122,975 in 1909. This reduction is wholly due to the fact that whereas a large sum was realised in the earlier year by the sale of town lots in Kuala Lumpur, only one such lot was alienated in 1909. The difference in the amounts received on this account only in the two years was over $56,000. While receipts from sales of agricultural land show a diminution of about $17,000, those in respect of mining lands advanced from $41,900 to $75,370.

Turning to land revenue exclusive of sales we find that on an estimate of $332,745 the collections amounted to $391,892. The steady advance of land revenue proper during the past five years is so encouraging as to be worth setting out in detail as follows:

1905	$257,263
1906	335,815
1907	366,781
1908	374,016
1909	391,892

Land rents, the item which exceeds in importance all other sources of land revenue, have continued to make steady and substantial advance in a manner which is very gratifying.

Rubber.

As this report is being prepared at a time when the attention of the press and the public in most parts of the world is rivetted upon the progress of the rubber industry and when the published observations, recommendations and criticisms of those who are in a position to speak with authority upon all phases of the absorbing topic are within the reach of every one who cares to read them, it seems unnecessary that I should deal with the subject here further than to place on record available figures relating to cultivation and production, together with brief comment upon the steps which have been taken locally to assist and conserve the industry by scientific and legislative precautions.

An approximation of the area estimated to have been under rubber in Selangor at the end of 1909 is summarised in the table below:

Kuala Lumpur	18,000	acres.
Klang	36,087	,,
Kuala Langat	10,230	,,
Ulu Langat	16,000	,,
Kuala Selangor	14,320	,,
Ulu Selangor	6,000	,,
Total ...	100,637	acres.

The estimated area twelve months previously was 87,321 acres.

I think that there can be little doubt that the actual figures are in excess of those given above, because while this table probably provides a near approximation to facts so far as those properties are concerned on which rubber constitutes the only or the principal feature, it is necessary to remember that the desire to share in so profitable a form of cultivation has so permeated all classes of native landholders that there is hardly a garden or orchard at the present time, however diminutive its dimensions and however unkempt its condition, which does not contain amidst its tangle of miscellaneous growth a certain proportion of rubber trees in varying stages of development or decrepitude. So far indeed has the eagerness of some persons outrun their discretion that our officers continually find rubber being planted by occupiers who hold their lands by virtue of temporary licenses only and are liable to removal at the end of every year. In such cases it is of course neither the intention nor the wish of the Government that the land should be planted with products of a permanent nature, and some difficulty is being experienced in impressing upon these people that their endeavours to join the ranks of the rubber estate proprietors are not justified by the conditions of their tenure.

On the whole therefore it may be assumed that there are a very large number of rubber trees growing all over the State which have not been and cannot well be taken into account inframing the above estimates.

The arrival of additional areas at a tappable age and the unprecedented rise in the market value of the product have continued to largely augment the amount of rubber exported.

The figures relating to the past four years are these:

1906	681,040 lbs.
1907	1,198,751 „
1908	2,128,176 „
1909	4,209,733 „

The duty received was $76,553 in 1908 and $250,530 in 1909.

There are those who hold the opinion that it would have been preferable in some instances if young trees had been allowed another year of growth before being operated on, but the market value of the article has been a powerful factor in convincing proprietors and managers that early tapping is stimulating to future development.

With the assistance of the Director of Agriculture much valueable work has been done in the direction of combating and restricting pests and diseases, and no enemy to the rubber tree has made such headway as to cause serious alarm. The white ant and the fungus known as "fomes semitostus" have their origin in the decaying stumps and roots of the jungle timber which preceded the rubber —their presence is usually discovered in time by careful periodical examination, and the damage, if any, is of local incidence only, but the radical and somewhat expensive remedy of extracting and removing all such timber is now being not uncommonly resorted to.

The attention of planters has been directed to diseases of the shoots and branches, and a knowledge of the appropriate remedies promulgated by means of pamphlets and lectures by the Director of Agriculture.

At the instance of the United Planters' Association an important measure was enacted at the close of the year providing for the licensing and supervision of all persons dealing in rubber and for the registration in the land offices of the rubber trees growing in t h different divisions of every district. As the measure came into force only at the commencement of the present year, observations upon its practical application cannot yet be made.

Coffee.

There has been some futher diminution in the area of land under coffee, and this form of cultivation is now hardly of sufficient importance to merit special notice. Its removal has continued on many estates, on the other hand it continues to be planted on some of the more recently opened properties, presumably in order to afford some return pending the maturity of the rubber. The total estimated area is rather over 10,000 acres, of which but all a thousand acres is in the districts of Klang and Kuala Langat. I believe, however, that over a large proportion of this area it is merely interplanted with other products.

The amount exported was 13,180 pikuls, on which $13,398 was paid as duty.

Coconuts.

Particulars relating to the cultivation of coconuts are contained in the subjoined extracts from the report of the Inspector—

> "I estimate 25,818 as the approximate acreage under coconuts in the State at the end of 1909, an increase of 2,649 acres as compared with the year before. Of this acreage nearly 2,000 acres were opened up in the Klang and Kuala Langat districts. The extension of European-owned estates was over 1,000 acres.
>
> "Beetles, on the whole, gave very little trouble during the year, and in every case where they made their appearance in anything like unusual numbers the outbreak was traced to the breeding place which was destroyed.
>
> "The estates where the trees are in bearing obtained satisfactory results and the young plants on the more recently opened estates are coming on very well indeed and show excellent growth.
>
> "The crops have not been so heavy as last year perhaps due to the heavy rain at the commencement of the year, on the other hand the increased price of copra has made up for the falling off in the yield.
>
> "The export of copra from the State during the year was 46,826 pikuls, value $323,193, an increase of 25,947 pikuls as compared with the year before.
>
> "The price all round was considerably higher than last year and was never below $7.50 while it touched as high as $10.50 towards the end of the year.

"The copra produced on the European estates again maintained its good name and commanded top prices in the market, but great complaints are still made of that manufactured by the natives. This is especially the case in the Kuala Selangor district where the Chinese dealers who buy from the natives have a habit of soaking the bags which contain the copra in order to make it heavier.

"I regret to state also that the natives are still picking immature nuts. My staff on their inspections are continually informing the owners of the folly of this procedure and circulars have been issued to this effect.

"PRICES.—The price of coconuts in the various district during the year was as follows:

Kuala Lumpur, Ulu Selangor and Ulu Langat ...	5 to 8 cents each
Klang and Kuala Langat	3 to 4 "
Kuala Selangor and Bernam	2 to 5 " "

The Malays are also beginning to plant rubber-trees on their holdings.

The cultivation of tapioca and gambier is being gradually supplanted by that of rubber.

The Inspector of Coconut Plantations estimates the area under coconut cultivation in the State at 19,037 acres—an increase of only 258 acres as compared with the previous year. He attributes the insignificance of this increase to the fact that rubber cultivation is more popular and more profitable at the present time. Doubtless this is so. Coconuts are, however, a very safe investment, and I anticipate that some of the coast rubber estates will plant some of their reserve lands with coconuts. The Malay kampong is also a source of increase to the area under this cultivation. But coconuts thrive best near the sea, and the area for the extension of this form of planting is rather limited in this State.

Land and Agriculture.

The total land revenue for the year was $103,275 and was satisfactory, being a record for the State. Rents from town and agricultural lands amounted to $49,326, being an increase over the amount collected in 1908 of $3,714. Mining rents amounted to $20,552, being an increase of $2,903.

Many complaints are made of the laziness and inefficiency of the Pahang "raiat." Those who sit in judgment on him are apt to forget that only within the last twenty years has a Pahang kampong Malay had any security that he would enjoy the fruits of any industry he displayed; generations of a rule, under which the weak man's freedom from molestation depended upon his poverty, have naturally discouraged habits of industry, already sufficiently discouraged by the ease with which the low prevalent standard of comfort could be attained. That the Pahang Malay is incapable of sustained and exhausting effort no one will maintain who has ever hired him to pole a boat up stream, and now that he is incited to labour by the wish to obtain the new and attractive luxuries which the development of the country has brought within his reach, and is assured in the possession of any property he may acquire, there is no reason to doubt that he will progress as fast as have his fellow-countrymen in the other States.

Lipis.

The land rents collected in the Lipis district in 1909 amounted to $10,704, an increase of $1,486 over the amount collected in 1908. The mining rents were $106 only.

There was a decrease in the total number of applications for lands to be held by entry in the mukim register, but a notable increase in those received from the most backward mukim in the district—the Ulu Tembeling.

The padi crop is reported as poor, and loans of money and rice had to be granted to the raiats in some mukims. There is little wet padi land in the district, and the cultivation of upland rice is very dependent on the chances of weather.

The number of applications and incomplete titles awaiting registration in the mukim register on the 1st January, 1909, was 3,339; the smimlar number on the 1st January, 1910, was 3,047. The progress made was poor.

Raub.

The land rents collected in the Raub district in 1909 (other than mining rents) amounted to $11,900, and differed little from the amount collected in the previous year.

The padi harvest is reported to have been good. Some 500 acres of young Para rubber trees are under cultivation by natives: few have as yet been tapped.

The alienated areas at the end of the last two years have been as follows:—

	1908. Acres.		1909. Acres.
Town, village, and agricultural lands	20,436	...	20,788
Mining lands	30,856	...	32,243

In the area of mining lands are included nearly 4,000 acres which are being worked on mining licenses by the approved applicants.

The number of applications and of incomplete titles awaiting registration on the mukim register on the 1st January, 1909, was 1,998; the similar number on the 1st January, 1910, was 1,240. The progress was satisfactory.

Temerloh.

The total land revenue, exclusive of land sales, was $13,305, being $1,343 more than in the previous year. No arrears of rent were carried forward to the present year.

The rice crop was, as a whole, satisfactory.

Pekan.

The land rents collected in the Pekan district amounted (including $1,540 mining rents) to $10,987, practically the same amount as in 1908. The arrears due—viz., $377—are too large.

The areas held on permanent and incomplete titles, respectively, are as follows:—

	Town and village lands.			Agricultural.			Mining.	
	Lots.	Acres.		Lots.	Acres.		Lots.	Acres.
Held on permanent title	74	3	...	781	5,125	...	41	2,131
Held on incomplete title	36	3	...	4,123	10,209	...	15	460

About 1,700 acres, mostly of plough-land, held on temporary licence, are not included in the above return.

The new applications received for lands to be held by title of entry in the mukim register numbered only 180, the smallest number received during the last five years.

The padi harvest 1908-1909 is reported to have been fairly good in quantity and quality: the yield was estimated at 400,000 gantangs from 4,000 acres.

The number of applications and incomplete titles awaiting registration in the mukim register on the 1st January, 1909, was 4,051; the similar number on the 1st January, 1910, was 4,093. In the all-important work of registering native holders, this district, so far from progressing, has accumulated further arrears.

Kuantan.

In the Kuantan district, land rents, other than mining rents, increased by $1,200 to $7,564.

Agriculture is not of great importance in Kuantan, although a considerable extension in estate cultivation of rubber is probable.

The number of applications and incomplete titles awaiting registration in the mukim register on the 1st January, 1909, was 1,649; the corresponding number on the 1st January, 1910, was 1,581. Progress is unsatisfactory.

Coconut Cultivation.

The Inspector of Coconut Plantations estimated a total area of 15,735 acres as being under cultivation in Pahang at the end of 1909. The increase over the previous year is negligible.

Buffaloes and Cattle.

The number of buffaloes in the State increased from 28,116 to 28,551, the two large agricultural districts of Pekan and Temerloh both show satisfactory increases, but Kuantan lost 350 head by an outbreak of rinderpest. The number of buffaloes in the State has increased by nearly 6,000 head in the last five years.

CORRESPONDENCE.

Manihot Dichotoma.

SENGAT ESTATE,
Ipoh, 30th May, 1910.

DEAR SIR.—It is just a year since you kindly sent me the seedlings of Manihot Dichotoma for experimental purposes, and I think you would be interested to know the results here.

The plants were 12 in number. Their respective heights and girths are as follows (3 feet from ground girth).

1.	16 ft. 8 ins.	6 ins.	7.	16 ft.	6¼ ins.
2.	13 „ 6 „	4 „	8.	13 „ 9 ins.	5½ „
3.	13 „	4½ „	9.	17 „ 6 „	5¾ „
4.	14 „ 6 „	5½ „	10.	12 „ 3 „	7½ „
5.	13 „	6 „	11.	14 „ 3 „	7½ „
6.	14 „ 6 „ Forked at 2 ft. from ground		12.	14 „	5 „

Nos. 6, 10, 11. All commenced to branch rather earlier than the others, which accounts for their greater girth, but none have branched very long.

All those that have branches have had flowers but come to nothing.

These trees have received no manure, neither have they been disturbed by tilling. They seem to be doing better during the last 6 weeks when we have hardly had any rain.

They are inclined to be top heavy, but as the branches all seem to run up straight, close planting would obviate that.

The next few months should make a great difference to their girth.

I remain,
Yours truly,
W. H. TYRDEN-PATTENSON.

Curator,
Botanical Gardens,
Singapore.

Manurial Experiments With Rubber.

Malacca, 30th June, 1910.

H. N. Ridley, Esq.,
Director of Agriculture,
Singapore.

Dear Sir.—It may interest you to learn the results of some manuring experiments tried on one of our Estates. The rubber trees were in four different parts of the Estate—15 trees in each place and ½ lb. of manure was used for each tree.

The results of a 3 months' trial, as shown in the accompanying statement, are not encouraging to the use of either bone-meal or fish manure; perhaps a longer trial will prove the bone-meal to be more efficacious.

Yours faithfully,
F. Rielli,
Financial Manager.

MALACCA RUBBER PLANTATIONS, LIMITED.

Abstract of Experiments with Manures on Umbei Rubber Estate.

Cultivation.	No. Trees.	Total Girth 19-3-10.	Total Girth 19-6-10.	Total Increase.	Average Girth 19-3-10.	Average Girth 19-6-10.	Average Increase.
Bone-meal	60	380.5	437.5	57	6.34	7.20	.95
No. Manure	59	337.5	395.5	58	5.72	6.70	.98
Fish Manure	60	375.5	438	62.5	6.25	7.3	1.05

All measurements in inches taken at three feet above the surface of the ground.

A Scrap-Bag.

27th May, 1910.

(To the Editor, Agricultural Bulletin, Singapore.)

Dear Sir.—I have lately started and found most efficacious a system with my Tappers, of each coolie collecting his scrap in an old rice sack, cut at the mouth with a semi-circle to fit the base of a tree, *i.e.*, a fairly big cut or small cut as age of trees demand. This sack is fitted to the tree on the ground, and all shavings fall on it and *all* can easily and clearly be picked up and put in the sack, which is taken from tree to tree. Is this a new idea or is it done elsewhere?

Yours faithfully,
H. B. MOLLETT,
Sungei Gadut.

RETIREMENT OF MR. GALLAGHER.

All will regret that Mr. W. G. Gallagher is retiring from the position of Director of Agriculture of the Federated Malay States.

Mr. Gallagher succeeded Mr. J. B. Carruthers in March 1909, having originally been employed as Government Mycologist to the Federated Malay States. His lectures on the cultivation of rubber given in all parts of the peninsula were well known and have been recently published in one of the F. M. S. Bulletins of Agriculture. He published also some useful pamphlets on, Root diseases in Para Rubber, Branch and Stem Diseases, Coffea robusta, Extermination of Rats in Ricefields and two in Malay on rubber cultivation. Mr. B. J. Eaton, the Agricultural Chemist, succeeeds him as acting Director of Agriculture.

This year has seen a great change in the staff of Botanists and agriculturists employed officially in the Colony and Malay States.

We have lost, besides Mr. Gallagher, Mr. Long, Mr. Main, Mr. Fox and we hear now Mr. Campbell is leaving and last year we lost Mr. Carruthers. With the immense rise and importance of agriculture nowadays we can ill-afford the loss of so many keen hard workers.—ED.

OBITUARY

A. D. MACHADO.

We very much regret to have to record the death of Mr. A. D. Machado on June 12th, from pneumonia caught in getting chilled while crossing the island from visiting an estate in Singapore. Mr. Machado had spent most of his life in the Malay peninsula, at one time as a police-officer, later as a miner and afterwards as a planter

He was employed as assistant in the Botanic Gardens, Singapore, temporarily, from June 1, 1902, to July 1903, and conducted a number of experiments in rubber tapping and preparing in these days, adding a great deal to our knowledge. He left to take charge of the Kamuning Estate at Sungei Siput, and in 1909 took charge of the United Rubber Estates in Singapore.

He had a very good knowledge of rubber work and was very ingenious in inventing various improvements, and was frequently a correspondent to the Bulletin. He possessed also some knowledge of, and interest in, ethnology and botany, and his name has been associated with the grand palm *Borassus Machadonis*, the only really indigenous palm of that group *Borassineae* in Asia, and *Saccolabium Machadonis*, etc.—ED.

MR. J. B. CARRUTHERS.

It is with the deepest regret that we have to record the sad death of Mr. J. B. Carruthers in Trinidad on July 21st from, it is said, Septicpneumonia.

The loss of so excellent an agriculturist at so early an age as fortyone is a serious loss to the whole world of tropical Agriculture.

Mr. John Bennett Carruthers was the second son of Mr. William Carruthers, formerly head of the Botanic Department of the British Museum, a botanist well-known for his palaco-botanical and agricultural work.

Mr. J. B. Carruthers was educated at Dulwich College and the Royal School of Mines and at Greifswald University in Prussia. He became demonstrator of Botany in the Royal Veterinary College, London, in 1892, and Professor of Botany at the College of Dowton, Wiltshire, 1894, and in 1898 went to Ceylon to investigate the disease of cocoa under the joint auspices of the Government and Ceylon Planters' Association, and was appointed Mycologist to the Government of Ceylon and assistant director of the Peradeniya Gardens. While here he did good work in research into diseases of cocoa and in other agricultural work.

In 1905 he was appointed Director of Agriculture and Government Botanist in the Federated Malay States and founded the Kuala Lumpur Experimental Gardens. He was co-editor of this Bulletin and contributed papers to it, besides publishing extensive annual reports on the work in agriculture in the F.M.S.

He resigned this position to go to Trinidad last year, and commenced work there in the matters of rubber and cocoa, when his untimely death cut him off in his prime.

H. N. RIDLEY.

MINUTES OF THE PLANTERS' ASSOCIATION OF MALAYA.

Meeting held at the Masonic Hall, Kuala Lumpur, on July 2nd, 1910, at 10.15 a.m.

PRESENT:

For Kuala Langat District Planters' Association:—
Mr. R. W. Munro.

„ Kuala Langat District Planters, Association:—
Mr. F. J. Dupuis.

„ Kuala Lumpur District Planters' Association:—
Mr. H. F. Dupuis.

„ Kuala Lumpur District Planters' Association:—
Mr. H. C. E. Zacharias.

„ Batang Padang Planters' Association:—
Mr. H. E. Darby.

„ Kuala Selangor District Planters' Association:—
Mr. W. Towgood.

„ Kapar District Planters' Association.—
Mr. C. T. Hamerton.

„ Kapar District Planters' Association:—
Mr. E. W. Harvey.

„ Batu Tiga District Planters' Association:—
Mr. H. L. Jarvis.

„ Klang District Planters' Association:—
Mr. W. H. Trotter.

„ Klang District Planters' Association:—
Mr. J. Gibson.

Visitors:—Messrs. Eaton and Morgan.

1. In the absence of Mr. M. C. Cumming, Mr. J. Gibson is voted into the chair.

2. The Secretary reads out the following Resolution proposed by the Batu Tiga District Planters' Association:

"That this Association desires to put on record its deep sense of loss caused by the death of His Majesty King Edward VII and that this Resolution be entered on the minutes."

The Chairman, in putting the resolution to the meeting, says planters yielded to no one in their loyalty to the throne.

The resolution is passed in silence.

3. On the motion of Mr. E. W. Harvey, seconded by Mr. H. F. Dupuis, the Minutes of the Meeting of April, 30th and of the Emergency Meeting of May, 24th are taken as read and confirmed.

4. PRAEDIAL PRODUCE ENACTMENT.

The Secretary reads the following letter, to which no reply had as yet been received:

The Federal Secretary,
Kuala Lumpur. *5th May, 1910.*

SIR,—I have the honor to inform you, that at the last meeting of this Association it was resolved to submit to you a suggestion for an amendment of the Praedial Produce Enactment, to the effect, that the words "and any other produce of any plant or tree" be added after the words "roots."

This would seem necessary, as rubber is not at all specifically mentioned in the said Enactment.

I have etc.,
Your obedient servant,
(Sgd.) H. C. E. ZACHARIAS.
Secretary.

5. RECRUITING ADVANCES.

In the absence of Mr. M. C. Cumming, it is decided to place this subject on the agenda of the next meeting.

6. CHINESE LABOR.

The Secretary reads the following letters received:

No. 2819/1910. *2nd June, 1910.*

SIR,—I am directed to inform you that His Excellency the High Commissioner has been in communication with the Governor of Hongkong on the subject of a proposal to establish an agency in Hongkong for the purpose of recruiting Chinese Labor for work on the plantations in the Malay Peninsula.

2. In the course of this correspondence the Registrar General, Hongkong, has suggested that arrangements should be made for the coolies to be repatriated at the end of the contract. He states that where this is done a very good class of laborer is obtained, that it is a great inducement to a laborer to know that if he wishes he will be sent home at the end of his contract, and that repatriation would remove one of the greatest objections, if not the greatest objection, that the Chinese have to contract emigration.

3. The Acting Resident-General will be obliged if he can be favoured with the views of your Association upon this proposal.

I have etc.,
Your obedient servant,
(Sgd.) E. C. H. WOLFF,
for Federal Secretary.

The Secretary,
The Planters' Association of Malaya.

Mr. H. E. Darby says there was already a firm in Ipoh contracting for the supply of coolies in large numbers. The charges, he believes, are \$80–. for Swatow coolies (\$50–. recoverable) and \$50–. for Khehs and Cantonese (\$20–. recoverable) on a three years' contract.

Mr. H. C. E. Zacharias, speaking as Secretary of the Kitlang Co., Ltd., gives an outline of the arrangements made by his company for the importation of Chinese coolies.

Mr. Gibson points out that Government merely wishes an expression of opinion from them on a point of principle, and that the principle of facultative repatriation was a sound one in every way.

Mr. H. E. Darby proposes:

"That this Association is in favour of the principle of repatriating Chinese coolies provided the indenture entered into makes the importer and not the employer liable for the cost thereof."

This proposition is seconded by Mr. E. W. Harvey and carried unanimously.

7. LONDON EXHIBITION.

The Secretary reads the following correspondence:

The Federal Secretary,
Kuala Lumpur. *5th May, 1910.*

SIR,—As you are doubtless aware, another Rubber Exhibition will be held next year in London.

As it must be agreed that our exhibit on the last occasion suffered considerably through the lateness on the part of this country to prepare for same, I am directed to enquire, what steps the Governments of the S. S. and F. M. S. intend to take in connection with the said exhibition, that there may be no undue delay in getting prepared and ready in good time.

I have etc.,
Your obedient servant,
(Sgd.) H. C. E. ZACHARIAS,
Secretary.

No. 37/1910, *13th May, 1910.*

SIR,—With reference to your letter dated the 5th May, 1910, I am directed to inform you that the Government of the Straits Settlements will contribute \$2,000, and the Government of the Federated Malay States \$4,000, towards a combined exhibit at the International Rubber and Allied Trades Exhibition to be held in London in June, 1911.

2. It is also proposed that the Director of Agriculture, Federated Malay States, and the Director of Gardens, Straits Settlements, should jointly confer with the various Planters' Associations in the Federated

Malay States and the Colony in order that their co-operation may be obtained with a view to making the section devoted to Malaya a success.

I have etc.,
Your obedient servant,
(Sgd.) E. C. H. WOLFF,
for Federal Secretary.

The Secretary,
The Planters' Association of Malaya,
Kuala Lumpur.

D. A. No. 1836/1910. *22nd June, 1910.*

International Rubber and Allied Trades Exhibition, 1911.

SIR,—I have the honor to inform you that the Government of the Straits Settlements will contribute $2,000, and the Government of the Federated Malay States $4,000, towards a combined exhibit at the forthcoming International Rubber and Allied Trades Exhibition to be held in London in June, 1911.

2. The Director of Gardens, Straits Settlements and the Director of Agriculture, Federated Malay States have been instructed to confer jointly with the Planters' Associations in the Straits Settlements and the Federated Malay States in order that the Malaya section may be a success.

3. I think a suitable opportunity for a preliminary meeting in connection with this, would be afforded on one of the dates of the Agricultural Show to be held in Singapore from August 17th to 20th inclusive, and I should be glad to have your opinion, as to the suitability of this date or any other suggestion you may have to offer.

I have etc.,
Your obedient servant,
(Sgd.) B. J. EATON,
Ag. Director of Agriculture, F.M.S.

H. C. E. ZACHARIAS, Esq.,
The Secretary,
Planters' Association of Malaya,
Kuala Lumpur.

H. C. E. ZACHARIAS, Esq.,
Planters' Association of Malaya,
Kuala Lumpur. *London, 20th January, 1910.*

DEAR SIR,—I shall be glad if you will make known the fact that the next International Rubber and Allied Trades Exhibition will be opened at noon on Thursday 9th June, 1911, and will close on Saturday 25th–15 days. The support from all directions is considerable. I understand that Brazil are going to make a mammoth show. I hope the F. M. S. will make a large and attractive exhibit.

Might I make the suggestion that the F. M. S. should have a small exhibition beforehand, and give prizes, and then forward the whole of this preliminary exhibition to the London Show with any additional attractions.

The rates for space will be 4s/- per square foot. I am reserving the two positions by the main entrance, one side for the F. M. S. and the other for Ceylon, as at the previous Exhibition. Brazil and several other countries are anxious to get well forward this time. It will be necessary for me to know early what amount of space the F. M. S. will require.

It is again proposed to hold a Conference during the Exhibition. I have many promises of support from manufacturers both in England and Germany, also America and Holland, and no doubt Italy and other countries will be represented.

I shall be glad if you will give me any advice and suggestions and also the names of any firms and persons to whom I should send letters and matter with reference to the Exhibition.

May I again include your name amongst the list of the Advisory Committee? Sir Henry A. Blake, G.C.M.G. will again be the president.

Yours faithfully,
(Sgd.) A. STAINES MANDERS.

H. C. E. ZACHARIAS, Esq.,
Planters' Association of Malaya.
Kuala Lumpur. *London, 24th February, 1910.*

DEAR SIR,—I am sending you herewith a proof of the Plan of the next International Rubber and Allied Trades Exhibition by which you will see that I have reserved two blocks, one on the right and the other on the left at the beginning of the Main Avenue. The right hand side for the Straits Settlements and Federated Malay States, and the left for Ceylon. Each of these blocks measures 122 × 23 giving a total area at 2,806 square feet, and it is at the option of your Colony to take the whole or part of the block and I am reserving the space mentioned until such time as your Colony has decided what amount will be required.

On each side of the positions mentioned a space will be reserved for commercial exhibits from private firms for each respective colony (Machinery excepted.)

Yours truly,
(Sgd.) A. STAINES MANDERS.

On the proposition of Mr. E. W. Harvey, seconded by Mr. Gibson, it is resolved to secure a space of 2,806 square feet at 4s/-; stand marked No. 1/2 on the plan, if possible; if not, No. 3/4.

8. ABSCONDERS.

In the absence of Mr. M. C. Cumming, it is decided to place this matter on the Agenda of the next Meeting.

9. RETURNS OF SICKNESS.

The Secretary reads the following correspondence:

No. 1165/1910. *6th May, 1910.*

SIR,—I am directed to inform you that it has been suggested that monthly returns should be furnished by Managers of the sick on their Estates, in order that the Medical Officer may be able to take the steps to deal with epidemies at the outset, and may remove where possible the cause of such sickness.

2. It may be possible to attain the object in view by some simpler and less laborious means than the preparation of elaborate monthly returns, and I am to say that the Acting Resident-General would be glad to be favoured with the views of your Association as to the best means of attaining the object desired.

I have etc.,
Your obedient servant,
(Sgd.) E. C. H. WOLFF,
for Federal Secretary.

The Secretary,
Planters' Association of Malaya,
Kuala Lumpur.

The Federal Secretary,
Kuala Lumpur. *7th May, 1910.*

SIR,—I have the honor to acknowledge receipt of your letter No. 1165 dated yesterday and am circularising our various constituent Associations for an expression of their views.

On receipt of these I shall immediately communicate with you again.

I have etc.,
Your obedient servant,
(Sgd.) H. C. E. ZACHARIAS,
Secretary.

The Secretary,
Planters' Association of Malaya,
Kuala Lumpur. *21st May, 1910.*

SIR,—At a general Meeting of this Association, held on the 21st May, 1910, the following Resolution was passed:

"That this Association suggest that detailed monthly returns be furnished to Government by the Estate Hospitals on behalf of the

Estates concerned, instead of returns being supplied by each estate; the returns to consist of copies of the Indoor Admission and Outdoor Attendance Books."

Yours faithfully,
(Sgd.) H. C. E. ZACHARIAS,
Hon. Secretary,
Kuala Lumpur Dist. P. Ass.

H. C. E. ZACHARIAS, Esq.,
The Secretary, P.A.M.,
Kuala Lumpur.

Tapah, 15th June, 1910.

DEAR SIR,—I have to acknowledge receipt of your letter regarding monthly returns of sick coolies.

At a meeting of this Association, held last Sunday, the feeling was that a lot of unnecessary trouble will be given to estate Managers, and, obviously, as far as epidemics are concerned the returns will not serve the purpose for which the returns are said to be intended.

This Association desires to have all estates visited by a British Medical Officer, and I have written, as directed to the Secretary to Resident to ask his approval of an arrangement to be made with our District Medical Officer to undertake these duties.

I am,
Yours faithfully,
(Sgd.) A. J. BOASE,
Secretary to Batang Padang,
District Planters' Association.

The Secretary,
Planters' Association of Malaya,
Kuala Lumpur.

26th May, 1910.

DEAR SIR,—In reply to your letter of 7th May, 1910, re-monthly return of sickness, it appears to my Committee that, as most of the Estates belong to some Association or other, and that as most of these Associations employ a Doctor, it is giving unnecessary trouble to the Planters to fill in such returns and all that is needed is that the Government shall instruct each Association that their Doctor must report all cases which might lead to an epidemic to the nearest Government Surgeon.

Yours faithfully,
(Sgd.) W. H. TATE,
Hon. Secretary,
to Taiping Planters' Association.

The Secretary, P. A. M.,
Kuala Lumpur. *Kapar, 31st May, 1910.*

DEAR SIR,—In reply to your letter dated May, 7th.

At a Meeting of my Association held on May, 26th the following resolution proposed by Mr. Bosanquet and seconded by Mr. Walker was carried unanimously.

"That in the event of Government requiring returns to be sent in of sick coolies greater facilities be given superintendents for punishing Canganies who do not report cases of sickness."

Yours faithfully,
(Sgd.) N. C. S. BOSANQUET,
Hon. Secretary, Kapar Dist. P. Ass.

On the motion of Mr. Trotter, seconded by Mr. Hamerton, the Kuala Lumpur District Planters' Association's Resolution is adopted.

10. APPRAISER'S LICENSES.

The Secretary reads the following two letters:

No. 1943/1910. *19th May, 1910.*

SIR,—I am directed to inform you that the attention of the Government has been called to the fact that various persons have been acting as appraisers and valuers of land without having taken out a license under "The Appraisers' Enactment."

2. In future, steps will be taken to prosecute any persons infringing the Enactment in this manner, and I am to request that you will be so good as to bring the matter to the notice of members of the Planting Community, whose notice it would hitherto appear to have escaped.

I have etc.,
Your obedient servant,
(Sgd). E. C. H. WOLFF,
for Federal Secretary.

The Secretary, P. A. M.,
Kuala Lumpur. *2nd May, 1910.*

DEAR SIR,—The enclosed is a copy of letter sent by my Association to the Resident and I am asked if you will put it before your Committee and ask them if possible to take some action in the matter.

Yours faithfully,
(Sd.) W. H. TATE,
Hon. Secretary.

The British Resident,
Taiping,
Perak. *2nd May, 1910.*

Sir,—I have the honor to inform you that at a General Meeting of the Taiping Planters' Association, it was decided to write and ask you, if some steps cannot be taken under the Appraiser's Enactment to prevent valuations and estimates being made by so called planters for Companies, floated in China and London. I shall be glad if I may come and see you about the matter if you consider that steps can be taken.

I have etc.,
(Sd.) W. H. Tate,
Hon. Secretary.

After some discussion a resolution is passed that this Association approves the steps taken by Government in checking irresponsible appraisement.

11. RUBBER MARKS.

A private letter to the Secretary from the Deputy Commissioner of Police, Ipoh, suggesting that specimens of each Estate's chop on its rubber should be supplied to the Police who would distribute copies to licensed dealers, is laid on the table.

12. AGE OF RUBBER.

The Secretary reads the following letter :—

The Secretary, P. A. M.,
Kuala Lumpur. *6th April, 1910.*

Dear Sir,—We shall be very glad if you could consider a difficulty which is experienced by people in England now in dealing with the Reports on Rubber Estates for purposes of sale or purchase made by European Planters. The difficulty arises especially in connection with statements of age of the rubber : there seem to be several distinct practices. In the majority of cases, the ages are reckoned from the date of planting out in the field, whether seed at stake, basket plants or stumps are used. In other cases the age has been reckoned from the date at which the seeds were planted out in the nurseries, and the stumps from these nurseries subsequently planted out have had their ages reckoned from the time of germination of the seed. In still other cases that have come to our notice, plants have been stumped and then through not being immediately wanted for use, have been re-planted in the nurseries, and at some later date again pulled up, stumped and planted out in the field, and the age of such rubber planted in the field has still been reckoned from the date of the first germination of the seed. It is quite obvious that in this way, rubber of vastly different degrees of growth are all grouped together as being the same age.

If it be possible for your Association to use its influence in establishing some precise and universal system of reckoning ages, it would be of great assistance to all interested in the rubber industry in England and Europe.

The system we would suggest and recommend would be to reckon the age of the trees from the date at which the stumps are put in the ground, and at the same time to state how long such stumps have previously been in the nursery.

Yours faithfully,
THE RUBBER ESTATE AGENCY, LTD.

After discussion it is decided that the Secretary should write and state that the usual practice among members of the Association was to count from the date of planting in the field, and that the Association much regretted its inability of checking reprehensible practice of unscrupulous outsiders.

13. ENFORCEMENT OF ENACTMENTS.

Mr. Munro reads out the following correspondence:

20th July, 1910.

DEAR SIR,—At the last Meeting of the Kuala Langat District Planters' Association I was instructed to ask you to be good enough to inform the Association whether any numerical limit of coolies employed entitles an employer of Tamil coolies to exemption from the provision of hospital accomodation; if so what the limit may be; and whether exemption may be granted on any other grounds whatsoever.

Yours faithfully,
(Sd.) E. MACFADYEN,
Hon. Sec. K. Langat, D. P. A.

No. 392/02 *Klang, 20th July, 1910.*

SIR,—With reference to your letter of the 20th July, on the subject of exemption for any particular estate from providing hospital accomodation, I have the honor to inform you that the Resident with the approval of the Resident-General may, under section 56 of the Indian Immigration Enactment, exempt any estate.

2. It is not my practice to advise exemption in any case where the labour force is considerable, the conditions otherwise than perfectly healthly, and the distance from the nearest Government hospital sufficiently great to place obstacles in the way of prompt and easy transport for coolies in need of treatment.

I have etc.,
Your obedient servant,
(Sgd.) G. A. SMITH-STEINMETZ,
Ag. Assist. Supt. of Immigts., F.M.S.

The Hon. Secretary,
Kuala Langat Dist. P. Ass.,
Jugra.

21st September, 1910.

SIR,—In reply to your letter dated 29th July, No. 392/09, I am instructed to enquire whether any exemptions have been granted in Kuala Langat District to any employers of Tamil Labour?

I have etc.,
Your obedient servant,
(Sgd.) E. MACFADYEN,
Hon. Secretary.

No. 392/09. *Klang, 6th October, 1910.*

SIR,—With referance to your letter of the 21st September, and previous correspondence including my No. 392/09, I have the honour to inform you that I am not aware that any estate in the Kuala Langat District has been exempted.

I have etc.,
Your obedient servant,
(Sgd.) G. A. SMITH-STEINMETZ,
Ag. Assist. Supt. of Immigts., F.M.S.

12th September, 1910.

SIR,—I have the honour to acknowledge, with thanks, receipt of your letter of 6th instant, No. 392/09, in reply to my letter of the 21st ultimo.

I regret that in my previous letter I apparently failed to make myself clear. The information I was instructed to ask you as to be so good as to supply, was to whether exemption has been granted to any employer of Tamil labour in the district. I should not have restricted my enquiry to the owners of European Estates.

I have etc.,
Your obedient servant,
(Sgd). E. MACFADYEN,
Hon. Secretary.

No. 392/09. *Klang, 12th October, 1910.*

SIR,—In continuation of my letter No. 392/09 of the 6th October, on the subject of exemption from hospital accomodation in the Kuala Langat District, I have the honour to inform you that I am not aware that any exemption whatever has been granted.

I have etc.,
Your obedient servant,
(Sgd.) G. A. SMITH-STEINMETZ,
Ag. Assist. Supt. of Immigts., F.M.S.

12th February, 1910.

SIR,—With reference to your letter of 20th October, last, I am instructed to forward for your information the following list of employers prepared by a sub-committee of my Association, and to enquire whether none of these employers have been granted exemption, as it appears certain that not all of them comply with the Enactment.

ESTATES.

Jugra Land & Rubber Co.	Serdang Balah Estate
Teluk Estate	Brooklands Estate
Dusun Durien Estate	Sungei Manggis Estate
Tongkah Estate	Teluk Datoh Estate
Permatang Estate	Bateng Estate
Klanang Estate	Sungei Buaia Estate
Jugra Estate	Lunderston Estate
Sungei Sedu Estate	H. H. the Sultan's Estate
Telok Gong Estate	

CONTRACTORS.

Messrs. Vaitlingam, Kataiah, and the Post-cart contractor.

I have etc.,
Your obedient servant,
(Sgd). E. MACFADYEN,
Hon. Secretary.

No. 84/1910. *Klang, 10th March, 1910.*

SIR,—In reply to your letter of the 12th February, I have the honour to inform you that I am not aware that any of the Estates therein mentioned have been granted exemption.

2. I must point out that I cannot enter into further correspondence with you on this subject, unless you will clearly state the object of these enquiries.

I have the honour to be,
Sir,
Your obeient servant,
(Sgd.) G. A. SMITH-STEINMETZ,
Ag. Assist. Supt. of Immigts., F.M.S.

Mr. Munro, point out that this was most inconclusive and that the Enactment ought to be enforced in all cases.

Mr. Jarvis says, if the Goverment made contractors conform, they will have to look around for their labour. At present they were probably not even paying the cess.

Mr. Zacharias remarks that Government did not enforce the Enactments. Under these conditions legislation became a perfect farce. The administration should provide the machinery to carry it out. It is absurd that one assistant Superintendent of Immigrants should have to deal with the whole Tamil population of three States. Under the Rubber Dealer's Enactment, all Land Officers were asked to keep the records. Either these Officers have previously had nothing to do, or else it was impossible for them to do this now. The job would take up a man's whole time. They ought to press for the enforcement of Enactments.

It is then proposed by Mr. Harvey and seconded by Mr. Towgood, that the Secretary write to Government and press for the enforcement of Enactments.

Carried unanimously.

14. The next Meeting of the Association is fixed for August, 18th at Singapore.

The Meeting terminates at noon.

(Sgd.) H. C. E. ZACHARIAS,
Secretary.

APPENDIX G.

Abstract of Thermometrical and Rainfall Observations taken at six Stations of the State of Pahang during the year 1909.

Month.	Kuala Lipis.				Raub.				Bentong.				Pekan.				Kuantan.				Temerloh.			
	9 a.m.			6 a.m. & 6 p.m.	9 a.m.			6 a.m. & 6 p.m.	9 a..m			6 a m. & 6 p.m.	9 a.m.			6 a m. & 6 p.m.	9 a.m.			6 a.m. & 6 p.m.	9 a.m.			6 a.m. & 6 p.m.
	Thermometer.			Rain-fall.	Thermometer.			Rain-fall.	Thermometer.			Rain-fall.	Thermometer.			Rain-fall.	Thermometer.			Rain-fall.	Thermometer.			Rain-fall.
	Maximum.	Minimum.	Range.	Rainfall during the month.	Maximum.	Minimum.	Range.	Rainfall during the month.	Maixmum.	Minimum.	Range.	Rainfall during the month.	Maximum.	Minimum.	Range.	Rainfall during the month.	Maximum.	Minimum.	Range.	Rainfall during the month.	Maximum.	Minimum.	Range.	Rainfall during the month.
	°	°	°	Inches.	°	°	°	Inches.	°	°	°	Inches.	°	°	°	Inches.	°	°	°	Inches.	°	°	°	Inches.
January ...	92	66	17	11.59	90	66	19.22	21.55	91	69	16.83	22.12	88	69	12.9	32.33	89	70	13.5	21.60	95	72	15.3	5.44
February ...	93	63	17.5	11.57	90	63	19.8	9.89	91	70	15.64	9.12	88	69	11.5	23.67	88.5	70	12.8	18.90	90	71	15.6	5.82
March ...	92	66	20	9.39	93	67	21.67	2.86	92	70	17.58	14.44	93	69	15.1	4.75	91	70	16.8	2.45	92	72	19	4.09
April ...	96	68	20	2.29	93	67	19.8	6.58	92	70	18.56	7.23	91	69	14.6	13.07	92.5	66	19.2	7.79	95	71	16	2.69
May ...	92	67	19	8.18	93	68	19.26	5.11	93	70	19.19	5.01	92	71	15.5	9.56	92	68	19.9	6.62	95	72	18	3.98
June ...	93	67	17.6	6.46	91	68	18.8	9.16	91	69	18.9	9.16	91	70	14.8	6.28	92.5	68	18.2	4.12	93	72	19.9	3.01
July ...	94	65	19.3	3.31	92	68	20.51	1.42	92	68	20.35	1.48	94	70	17.4	5.16	94	67	19.7	5.23	92	70	18.3	1.50
August ...	94	60	20.5	13.05	93	69	18.87	7.13	92	69	20.25	5.24	93	70	16.4	9.85	93	68	21.6	5.08	95	70	17.6	5.90
September ...	92	65	20.4	2.45	91	69	19.23	2.52	92	68	19.63	4.25	92	69	17.3	6.88	95	69	19.1	5.51	95	70	16.9	6.89
October ...	93	69	18.3	10.58	93	69	18.70	6.97	92	69	18.41	8.80	93	71	16.3	8.74	94	70	19.4	9.31	95	72	17.4	10.17
November ...	93	66	18.7	12.98	92	68	17.93	5.56	92	68	17.8	4.88	93	70	14.4	16.14	93	70	16.1	10.58	92	71	16.9	7.42
December ...	90	66	15.7	5.50	89	68	17.48	3.58	90	68	16 51	6.09	89	70	13.3	22.32	91	69	11.4	16.80	95	73	17.3	5.03
Mean ...	92	65	18.6	...	91.6	67.5	19.24	...	91.66	69	18.30	...	91.4	69.7	13.29	...	92	68	17.3	...	93.4	71.3	17.3	...
Total Rainfall ...				97.35				82.33				97.82				158.75				113.99				61.91
Average Monthly Rainfall ...				8.11				6.86				8.15				13.23				9.49				5.15
Mean temperature	78.5				79.5				80.33				80.55				80.41				82.3			

TEMPERATURE AND RAINFALL.

Abstract of Mean Meteorological Readings of the Pahang Observatory for the seven years from 1903 to 1909.

Year	Temperature of Air.							Temperature of radiation.					Temper : of evaporation.				Rainfall.	Highest temperature.	Lowest temperature.	Greatest rainfall in 24 hours.
	9 a.m.	3 p.m.	9 p.m.	Mean.	Maximum.	Minimum.	Range.	Sun.	Difference sun and shade.	Grass.	Difference sun and radiation.	Sun in vacuum.	9 a.m.	3 p.m.	9 p.m.	Mean.				
1903	...	...	...	82.1	94.3	69.6	19.6	...	...	...	...	...	...	...	...	...	97.64	96.5	68.0	9.70
1904	...	...	...	80.8	94.0	68.4	19.1	...	...	...	...	...	...	...	...	...	84.42	99.5	67.0	10.86
1905	...	...	...	80.4	92.6	68.7	17.7	...	...	...	...	...	...	...	...	...	76.21	95.0	67.0	10.02
1906	...	...	...	80.1	94.3	66.0	16.4	...	...	...	...	...	...	...	...	...	125.68	100.0	60.0	12.24
1907	...	...	...	79.8	91.9	69.0	16.9	...	...	...	...	...	...	...	...	...	81.15	103.0	60.0	15.05
1908	...	...	...	80.1	91.6	68.5	17.6	...	...	...	...	...	...	...	...	...	104.09	98.0	65.0	13.86
1909	...	...	...	80.6	91.0	69.2	17.6	...	...	...	...	...	...	...	...	...	102.02	96.0	60.0	6.76

Abstract of Thermometrical and Rainfall Observations taken at eight Stations of the State of Negri Sembilan during the year 1909.

Month.	SEREMBAN.				P. DICKSON BERI-BERI.	P. DICKSON TOWN.	JELEBU.				KUALA PILAH.				TAMPIN				MANTIN.	AYER KUNING.
	9 a.m.			6a.m & 6 p.m.	6 a.m.& 6 p.m.	6 a.m.& 6 p.m.	9 a.m.			6a.m & 6 p.m	9 a.m.			6a.m & 6 p.m.	9 a.m.			6a.m& 6 p.m.	6 a.m.& 6 p.m.	6 a.m.& 6 p.m.
	Thermometer			Rain-fall	Rainfall.	Rainfall.	Thermometer			Rain-fall	Thermometer			Rain-fall.	Thermometer			Rain-fall.	Rain-fall.	Rain-fall.
	Maximum	Minimum	Range.	Rainfall during the month.	Rainfall during the month.	Rainfall during the month.	Maximum	Minimum	Range.	Rainfall during the month.	Maximum	Minimum	Range.	Rainfall during the month.	Maximum	Minimum	Range.	Rainfall during the moht.	Rainfall during the month.	Rainfall during the month.
	°	°	°	Inches	Inches	Inches	°	°	°	Inches	°	°	°	Inches	°	°	°	Inches	Inches	Inches.
January	87	69	18	4.35	4.07	5.06				7.07				6.84				6.31	6.14	13.76
February	86	70	16	8.62	6.73	5.86				6.76				6.83				4.30	9.94	6.60
March	88	70	18	8.68	3.84	3.66				10.21				8.74				6.24	11.35	5.18
April	88	71	17	14 98	8.75	11.06				6.60				8.78				8.74	15.24	6.23
May	89	72	17	4.63	3.68	4.91				7.06				3.38				5.59	4.55	2.55
June	86	70	16	13.79	6.96	6.53				4.89				7.29				5.58	6.38	4.33
July	86	69	18	4.83	4.27	4.13				3.19				2.46				1.66	3.64	*
August	87	69	17	7.03	13.40	10.05				5.03				5.63				6.75	12.92	*
September	89	70	19	3.99	5.29	4.19				1.74				3.40				5.56	2.50	*
October	89	70	19	6.86	14.99	11.09				3.88				5.47				9.36	4.14	*
November	86	69	17	6.89	8.89	7.92				7.41				7.64				8.42	12.23	*
December	85	65	20	5.31	5.63	5.32				3.42				6.39				7.96	3.04	*
Men ...	87	69	17																	
Total Rainfall ..				89. 96	86.50	79.78				67.26				72.85				76.47	92.07	38.65
Average Monthly Rainfall ..				7.49	7.20	6.64				5.60				6.07				6.37	7.67	6.44
Mean Temperature ..		78°			...			...				...				...			...	

TEMPERATURE AND RAINFALL.

Abstract of Mean Meteorological Readings of the Seremban Observatory for the last seven years from 1903 *to* 1909.

	Temperature of Air.							Temperature of Radiation.					Temperature of Evaporation.							
	9 a.m.	3 p.m.	9 p.m.	Mean.	Maximum.	Minimum.	Range.	Sun.	Difference sun and shade	Grass.	Difference sun and radiation.	Sun in vacuum.	9 a.m.	3 p.m.	9 p.m.	Mean.	Rainfall.	Highest temperature.	Lowest temperature.	Greatest rainfall in 24 hours.
1903	81.1	82.8	*	81.9	89.8	69	20.8	...	67.2	65	...	157	73.8	74.6	...	74.2	59.79	92	68	2.39
1904	79.1	81.2	*	80.1	89.3	69.8	19.5	...	72.7	64.9	...	162	73.4	73.9	...	73.6	70.67	91	68	3.35
1905	79.4	82.8	*	81.1	90.5	74.3	16.2	...	67.5	...	...	158	73.3	73.7	...	73.5	110.58	94	73	3.36
1906	79.9	84.3	*	82.1	92	69.8	22.5	...	58	66.5	...	150	74.2	74.9	...	74.5	95.16	97	68	4.36
1907	79.5	84.3	*	81.9	85.3	71	14.3	...	51.7	...	...	137	73.3	74.1	...	73.7	79.34	94	68	8.70
1908	77.8	84.4	*	81	86	70	16	...	52	...	...	139	73	79.9	...	74.4	65.11	93	68	2.52
1909	77.7	84.2	*	80.9	88	69	19	...	50.2	...	...	138	73.3	74.9	...	74.1	89.96	94	62	3.10

* Not recorded.

Abstract of Thermometrical and Rainfall Observations taken at six Stations of the State of Selangor during the year 1909.

Month.	Kuala Lumpur.				Klang.				Ulu Langat.				Kuala Langat.				Kuala Selangor.				Ulu Selangor.			
	9 a.m.			6 a.m. & 6 p.m.	9 a.m.			6 a.m. & 6 p.m.	9 a.m.			6 a.m. & 6 p.m.	9. a.m.			6 a.m. & 6 p.m.	9 a.m.			6 a.m. & 6 p.m.	9 a.m.			6 a.m. & 6 p.m.
	Thermometer.			Rain-fall.	Thermometer.			Rain-fall.	Thermometer.			Rain-fall.	Thermometer.			Rain-fall.	Thermometer.			Rain-fall.	Thermometer.			Rain-fall.
	Maximum.	Minimum.	Range.	Rainfall during the month.	Maximum.	Minimum.	Range.	Rainfall during the month.	Maximum.	Minimum.	Range.	Rainfall during the month.	Maximum.	Minimum.	Range.	Rainfall during the month.	Maximum.	Minimum.	Range.	Rainfall during the month.	Maximum.	Minimum.	Range.	Rainfall during the month.
	°	°	°	Ins.	°	°	°	Ins.	°	°	°	Ins.				Ins.				Ins.				Ins.
January ...	89.1	71.1	18.0	8.73	88.1	70.9	17.2	8.63	86.1	74.5	11.6	6.05	89.7	74.6	15.1	1.82	*	*	*	9.40	90.9	69.7	21.2	16.59
February ...	89.3	71.7	17.6	12.09	88.5	71.1	17.4	14.18	86.4	74.9	11.5	6.92	87.6	74.6	13.0	7.60	88.2	77.3	10.9	11.65	90.8	70.0	20.8	9.80
March ...	90.0	72.0	18.0	14.03	89.7	71.5	18.2	2.92	87.3	75.2	12.1	13.49	88.9	75.5	13.4	2.40	88.0	77.7	10.3	3.12	92.4	71.1	21.3	6.41
April ...	89.9	72.6	17.3	9.56	90.6	71.7	18.8	9.63	88.2	75.6	12.6	12.99	91.8	74.9	16.9	3.00	89.1	76.2	12.9	6.54	92.1	71.5	20.6	14.34
May ...	90.2	73.1	17.1	4.98	90.2	72.1	18.1	7.05	†	†	†	7.34	*	*	*	5.29	88.8	75.8	13.0	6.36	92.6	71.9	20.7	11.48
June ...	89.1	72.7	16.4	6.12	89.6	71.4	18.2	2.76	†	†	†	7.29	*	*	*	2.15	88.2	75.4	12.8	3.94	92.2	71.5	20.7	11.14
July ...	89.3	70.4	18.9	3.67	*	*	*	1.59	†	†	†	2.72	89.8	73.5	16.3	4.74	88.1	75.3	12.8	5.56	91.1	69.2	21.9	5.52
August ...	88.1	72.1	16.0	6.70	*	*	*	13.37	†	†	†	12.52	87.1	72.0	15.1	11.03	88.4	75.9	12.5	8.50	89.5	69.9	19.6	22.23
September ...	88.8	72.1	16.7	3.68	89.0	72.0	17.0	3.82	86.4	75.4	11.0	4.41	88.4	74.5	13.9	6.31	88.1	75.3	12.8	3.22	90.3	71.1	19.2	4.64
October ...	89.1	72.5	16.6	2.97	89.1	72.1	17.0	3.57	82.7	72.5	10.2	5.67	89.5	74.7	14.8	3.70	88.7	75.6	13.1	6.16	89.3	71.4	17.9	8.32
November ...	88.1	71.4	16.7	6.41	87.8	70.8	17.0	10.62	84.5	75.0	9.5	8.13	85.9	73.2	12.7	14.65	88.3	74.9	13.4	9.54	88.1	70.7	17.4	14.31
December ...	88.0	72.2	15.8	5.41	87.8	70.0	17.8	5.96	83.9	74.0	9.9	8.29	85.7	73.2	12.5	3.79	88.9	74.3	14.6	5.64	87.5	69.9	17.6	7.73
Mean ...	89.0	71.9	17.1	...	89.0	71.4	17.6	...	85.6	74.6	11.0	...	88.4	74.0	14.4	...	88.4	75.7	12.6	...	90.5	70.6	19.9	...
Total Rainfall ...	84.35				84.10				95.82				66.48				79.63				132.51			
Average Monthly Rainfall ...	7.03				7.01				7.98				5.54				6.63				11.04			
Mean temperature	80.4				80.2				80.1				81.2				82.0				80.5			

* Instruments broken. † Instruments forwarded to Kuala Lumpur for verification.

TEMPERATURE AND RAINFALL.

Abstract of Mean Meteorological Readings of the Kuala Lumpur Observatory for the last ten years from 1900 to 1909.

	Temperature of Air.							Temperature of Radiation.					Elastic Force of Aqueous Vapour.				Rainfall.	Highest temperature.	Lowest temperature.	Greatest rainfall in 24 hours.
	9 a.m.	3 p.m.	9 p.m.	Mean.	Maximum.	Minimum.	Range.	Sun.	Different sun and shade.	Grass.	Difference sun and radiation.	Sun in vacuum.	9 a.m.	3 p.m.	9 p.m.	Mean.				
1900	81.8	86.1	76.4	81.4	90.4	71.8	18.5	150.6	60.2	120.0	30.6	150.6	0.844	0.827	0.849	0.840	65.69	94.0	67.0	2.53
1901	81.3	85.4	76.3	81.0	90.4	71.8	18.6	148.3	57.9	121.1	27.2	148.3	0.824	0.834	0.834	0.830	94.35	95.0	68.0	4.82
1902	80.9	85.0	77.3	81.0	89.6	71.5	18.1	150.3	60.7	123.9	26.4	150.3	0.809	0.839	0.827	0.825	116.40	69.0	69.0	4.96
1903	80.2	83.7	76.5	80.1	89.6	70.1	19.5	146.3	56.7	120.5	25.8	146.3	0.830	0.862	0.823	0.838	89.89	93.0	68.0	2.47
1904	79.5	84.2	75.9	79.8	89.4	69.7	19.7	146.4	57.0	120.4	26.0	146.4	0.813	0.836	0.822	0.823	108.01	94.0	66.0	4.25
1905	80.4	84.6	75.8	80.3	89.9	71.1	18.8	148.7	58.8	120.0	28.7	148.7	0.819	0.838	0.822	0.826	98.96	94.0	66.0	2.75
1906	80.6	85.1	75.7	80.4	90.2	71.7	18.5	148.5	58.3	120.7	27.8	148.5	0.830	0.846	0.824	0.833	86.74	94.0	68.0	3.60
1907	80.2	85.1	75.6	80.3	90.1	71.1	19.0	146.4	56.3	119.6	26.8	146.4	0.818	0.837	0.822	0.825	93.77	95.0	68.0	3.65
1908	80.4	85.2	75.6	80.4	89.7	71.7	18.0	145.5	55.8	118.6	26.9	145.5	0.814	0.839	0.822	0.825	89.29	94.0	67.0	5.20
1909	80.8	85.4	76.1	80.7	89.0	71.9	17.1	145.6	56.6	117.1	28.5	145.6	0.820	0.831	0.824	0.828	84.35	94.0	66.0	3.15

Abstract of Thermometrical and Rainfall Observations at six Stations of the State of Perak during the year 1909.

Month.	Taiping. 9 a.m. Thermometer Maximum.	Taiping. 9 a.m. Thermometer Minimum.	Taiping. 9 a.m. Thermometer Range.	Taiping. 6 a.m. to 6 p.m. Rain-fall. Rainfall during the month.	Kuala Kangsar. 9 a.m. Thermometer Maximum.	Kuala Kangsar. 9 a.m. Thermometer Minimum.	Kuala Kangsar. 9 a.m. Thermometer Range.	Kuala Kangsar. 6 a.m. to 6 p.m. Rain-fall. Rainfall during the month.	Batu Gajah. 9 a.m. Thermometer Maximum.	Batu Gajah. 9 a.m. Thermometer Minimum.	Batu Gajah. 9 a.m. Thermometer Range.	Batu Gajah. 6 a.m. to 6 p.m. Rain-fall. Rainfall during the month.	Tapah. 9 a.m. Thermometer Maximum.	Tapah. 9 a.m. Thermometer Minimum.	Tapah. 9 a.m. Thermometer Range.	Tapah. 6 a.m. to 6 p.m. Rain-fall. Rainfall during the month.	Lenggong. 9 a.m. Thermometer Maximum.	Lenggong. 9 a.m. Thermometer Minimum.	Lenggong. 9 a.m. Thermometer Range.	Lenggong. 6 a.m. to 6 p.m. Rain-fall. Rainfall during the Month.	Telok Anson. 9 a.m. Thermometer Maximum.	Telok Anson. 9 a.m. Thermometer Minimum.	Telok Anson. 9 a.m. Thermometer Range.	Telok Anson. 6 a.m. to 6 p.m. Rain-fall. Rainfall during the month.
	°	°	°	Inches	°	°	°	Inches	°	°	°	Inches	°	°	°	Inches	°	°	°	Inches	°	°	°	Inches
January ...	91	70	21	25.17	91	69	22	9.61	91	73	18	10.99	92	65	27	13.48	90	67	23	6.71	92	69	23	10.63
February ...	91	70	21	20.87	91	69	22	4.69	93	70	23	6.12	92	67	25	11.21	90	67	23	3.96	93	69	24	8.86
March ...	92	71	21	29.28	93	71	22	10.65	93	72	21	10.18	93	68	25	11.24	93	69	24	5.65	93	69	24	8.14
April ...	93	71	22	32.65	94	71	23	10.95	93	72	21	11.32	93	69	24	10.38	93	71	22	7.43	93	68	25	11.72
May ..	94	72	22	8.73	93	72	21	9.46	93	73	20	7.39	93	70	23	7.66	92	72	20	4.82	92	69	23	6.42
June ...	94	72	22	5.65	93	72	21	2.51	93	72	21	2.86	93	65	28	7.29	91	70	21	2.37	93	68	25	4.75
July ...	94	69	25	2.64	94	70	24	3.17	96	70	26	1.26	92	62	30	6.93	92	68	24	5.40	93	69	24	2.72
August ...	93	71	22	15.74	93	70	23	7.94	93	71	22	11.90	91	64	27	14.12	90	69	21	5.87	93	69	24	10.52
September ...	93	70	23	7.76	92	70	22	2.31	92	71	21	5.53	92	66	26	7.43	91	69	22	6.81	93	70	23	4.54
October ...	92	71	21	14.61	92	70	22	9.51	92	70	22	8.22	92	68	24	10.04	92	70	22	5.00	92	70	22	8.08
November ...	92	72	20	9.80	92	70	22	3.39	91	72	19	5.64	92	68	24	12.97	90	69	21	8.77	92	70	22	4.06
December ...	92	70	22	8.60	93	68	25	3.82	90	71	19	6.42	90	68	22	12.65	90	66	24	4.33	92	69	23	6.45
Mean Rainfall ...				181.50				7801.				87.83				125.40				67.12				86.89
Average Monthly Rainfall Mean...	15.12				6.50				7.32				10.45				5.59				72.42			
Mean temperature	79.63				78.49				78.78				77.85				77.56				7.78			

TEMPERATURE AND RAINFALL.

Abstract of the Meteorological Readings of the Taiping Observatory for the last seven years from 1903 *to* 1909.

Year.	Temperature of Air.							Temperature of Radiation.					Temperature of Evaporation.				Rainfall	Highest temperature.	Lowest temperature.	Greatest rainfall in 24 hours.
	9 a.m.	3 p.m.	9 p.m.	Mean.	Maximum.	Minimum.	Range.	Sun.	Difference sun and shade.	Grass.	Difference sun and radiation.	Sun in vacuum.	9 a. m.	3 p. m.	9 p. m.	Mean.				
1903 ...	81.77	85.65	78.67	79.83	89.44	73.23	16.21	105.87	16.34	67.57	38.30	143.67	76.82	78.44	75.85	77.03	146.55	95	68	5.53
1904 ...	81.27	85.54	78.01	79.34	89.08	72.57	16.51	106.26	17.18	70.29	35.97	145.54	76.59	78.21	75.10	76.63	154.81	94	68	5.83
1905 ...	81.60	85.39	78.50	79.70	89.41	73.31	16.10	106.53	17.12	72.56	34.07	145.01	77.11	78.73	75.87	77.23	158.48	94	68	4.03
1906 ...	81.53	85.95	78.92	80.06	89.30	73.83	15.47	107.61	18.31	75.65	31.96	142.23	77.47	79.32	76.22	77.67	176.20	96	70	5.89
1907 ...	80.43	85.91	78.76	79.56	88.92	73.16	15.76	109.23	20.31	71.05	38.18	143.46	76.59	79.48	76.56	77.54	158.89	95	68	5.15
1908 ...	80.49	85.67	78.38	79.41	89.30	73.10	16.20	105.96	16.66	69.83	36.13	143.29	76.55	79.22	76.20	77.32	182.48	94	68	5.76
1909 ...	80.48	86.17	78.77	79.63	89.19	73.09	16.10	107.23	18.04	69.84	37.39	143.52	76.34	79.04	76.23	77.20	181.50	94	69	8.35

RUBBER.

MONTHLY RETURNS 1910.

NAMES.	JAN.	FEB.	MAR.	APR.
	lb.	*lb.*	*lb.*	*lb.*
Anglo-Malay	49,306	49,718	53,167	48,839
Ayer Kuning	200	200	160	273
Balgownie	8,607	7,596	9,028	8,673
Batu Caves	6,100	10,124	13,611	10,952
Batu Tiga	5,357	5,200	6,300	6,323
Bertam	12,500	10,000	9,588	10,000
Bukit Rajah	36,324	37,362	41,687	30,960
Castlefield	3,374	2,128	2,800	2,700
Cicely	10,000	8,556	9,625	...
Consolidated	23,832	20,242	24,112	...
Damansara	14,795	19,022	20,854	...
Edinburgh	4,650	5,800	6,900	...
Golden Hope	2,398	3,748	6,101	6,836
Golconda	10,528	10,981	12,228	...
Glenealy Plant.	850	1,045	1,663	2,671
Highland & L.	43,176	40,274	47,273	42,265
Inch Kenneth	13,137	11,144	13,182	12,646
Kalumpong	7,695	7,025	...	...
Kamuning	6,400	5,609	6,332	6,293
Kapar Para	7,866	8,599	9,878	...
Kuala Lumpur	45,135	42,175	47,000	38,600
Labu	12,863	9,344	16,112	14,720
Lanadron	28,657	20,558	27,717	29,808
Ledbury	8,048	8,020	8,552	8,234
Linggi	58,600	57,500	63,500	60,500
London Asiatic	8,912	7,555	9,851	9,574
Malacca Plant.	27,000	27,000	27,000	24,000
Pataling	14,190	23,542	31,368	28,144
Perak Plant.	11,632	7,730	8,850	...
Pegoh	2,528	2,043	3,314	3,400
Ratanui	726	665	1,026	1,222
Ribu	5,000	4,314	5,304	4,396
Sandycroft	9,848	6,438	6,800	5,000
Selaba	3,000	2,500	4,423	5,025
Selangor Rub.	33,593	33,188	34,716	...
Seremban	23,377	17,820	37,540	31,445
Shelford	4,000	5,700	6,000	5,800
Sengat	4,890	4,168	5,369	5,593
S. & Johore	8,166	6,356	8,327	8,156
Singapore Para	5,000	4,300	4,200	5,300
Sungei Kapar	17,100	16,900	19,000	...
Sungei Way	2,293	2,392	2,862	...
Sungei Salak	1,376	1,500	1,895	2,435
Vallambrosa	36,000	29,000	25,237	30,000

Times of Malaya.—June 2, 1910.

PENANG.

Abstract of Meteorological Readings in the Prison Observatory, Penang, for the month of May, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°	°	°	°	°	°	°	°	%		Ins.	Ins.
Prison Observatory Penang ...	29·851	153·8	82·9	91·4	72·9	18·5	78·2	·906	75.3	80	N.-W.	11·08	1·88

Surgeon's Office,
Penang, 18th June, 1910.

M. E. SCRIVEN,
Assistant Surgeon.

Senior Medical Officer.

PENANG.

Abstract of Meteorological Readings in the Prison Observatory Penang for the month of June, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
Prison Observatory Penang ...	29.835	151.4	82.9	90.3	72.2	18.1	78.1	.901	57.0	.80	N.E.	7.27	2.16

SURGEON'S OFFICE,
Penang Prison, 8th July, 1910.

M E. SCRIVEN,
Assistant Surgeon.

B. DANE.
Senior Medical Officer, Penang.

PAHANG.

Abstract of Meteorological Readings in the various Districts of the State for the month of April, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Mean Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity. %			
Kuala Lipis	...	...	77	93	68	20.5	73	.927	70.2	80	...	6.36	1.68
Raub	...	...	82	93	68	19.36	74	1.092	68.6	64	...	5.12	3.32
Bukit Fraser	...	...	...	...	59	...	...	...	...	...	...	11.63	2.81
Bentong	...	...	81	94	68	18.63	76	1.057	72.6	75	...	9.02	2.42
Pekan	...	...	83	92	71	16.2	79	1.128	76.3	80	...	7.28	2.25
Kuantan	...	...	81	94	70	18.60	77	1.057	74.2	80	...	5.51	2.30
Sungei Lembing	...	...	...	88	68	...	...	...	...	...	...	18.17	3.18

Office of the Medical Officer in Charge,
Pahang, 8th June, 1910.

S. C. G. FOX,
Medical Officer in Charge, Pahang.

PAHANG.

Abstract of Meteorological Readings in the various Districts of the State for the month of June, 1910.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Mean Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
										%			
Kuala Lipis	...	...	75.7	93	68	19.33	74.4	0.897	73.5	91	...	11.96	3.54
Raub...	...	...	77.6	92	66	19.93	70.6	0.958	65.7	68	...	11.90	2.41
Bukit Fraser	...	...	...	...	59	...	...	...	...	...	...	8.26	2.07
Bentong	...	...	80.6	92	69	17.63	75.7	1.057	72.4	75	...	5.75	1.53
Temerloh	...	...	...	96	70	19.06	...	...	...	...	...	8.60	1.75
Pekan	...	...	82	92	71	15.6	77	1.092	73.7	77	...	10.94	3.86
Kuantan	...	...	82.6	93	70	17.30	75	1.128	70	66	...	6.93	3.82
Sungei Lembing	...	...	...	88	68	...	...	...	...	...	...	6.88	1.87

Office of the Medical Officer in Charge,

K. Lipis, 19th July, 1910.

CECIL F. NICHOLAS,

for Medical Officer in Charge, Pahang.

PERAK.

Abstract of Meteorological Readings in Perak for the month of May, 1910.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
Taiping	...	109	83.04	95	72	23	77.89	871	...	75	...	8.04	2.15
Kuala Kangsar	...	...	81.29	93	71	22	76.81	862	...	80	...	4.10	2.30
Batu Gajah	...	104	81.32	92	72	20	76.97	865	...	80	...	6.25	4.00
Gopeng	...	...	81.56	92	62	30	75.99	822	...	76	...	11.22	2 20
Ipoh	...	...	82.32	93	71	22	78.69	930	...	85	...	5.90	2.06
Kampar	...	...	82.04	93	70	23	77.00	862	...	79	...	7.70	2.50
Teluk Anson	...	...	83.11	92	71	21	77.68	900	...	77	...	4.05	1.74
Tapah	...	...	81.82	93	70	23	77.01	862	...	79	...	9.62	2.63
Parit Buntar	...	...	82.40	91	72	19	77.90	895	...	81	...	8.87	3.00
Bagan Serai	...	...	82.21	91	71	20	77.94	900	...	83	...	8.52	2.44
Selama	...	...	81.90	92	73	19	77.97	902	...	83	...	11.78	3.10

Office of Senior Medical Officer,

Ipoh, 15th June, 1910.

S. Lucy,

Senior Medical Officer, Ipoh.

PERAK.

Abstract of Meteorological Readings in Perak for the month of June, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Taiping ...	...	100	82.70	94	72	22	77.59	876	...	79	...	12.16	3.10
Kuala Kangsar	...	...	80.62	93	69	24	76.58	921	...	82	...	12.08	2.90
Batu Gajah	...	106	81.24	92	73	19	76.98	963	...	82	...	10.93	2.67
Gopeng ...	...	..	80.56	91	61	30	76.08	838	...	80	...	16.29	2.58
Ipoh	...	...	81.94	92	71	21	77.57	880	...	83	...	8.40	2.63
Kampar ...	...	...	81.02	93	71	22	76.68	853	...	82	...	17.64	4.05
Teluk Anson	...	...	82.41	92	70	22	77.89	892	...	81	...	10.09	1.98
Tapah	...	...	81.54	92	69	23	76.84	860	...	80	...	14.86	3.15
Parit Buntar	...	...	82.14	91	71	20	77.26	868	...	79	...	8.82	4.61
Bagan Serai	...	...	82.27	91	71	20	77.87	892	...	81	...	10.50	4.12
Selama	...	...	81.38	92	72	20	77.22	880	...	83	...	10.46	2.40

Office of Senior Medical Officer,
Ipoh, 15th July, 1910.

Ag. Senior Medical Officer, Perak.

SELANGOR.

Abstract of Meteorological Readings in the various Districts of the State for the month of May, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
General Hospital, Kuala Lumpur ...	29.859	149.3	81.1	90.3	72.8	17.5	76.4	0.824	73.6	76	S. W.	5.29	1.28
Pudoh Gaol "	...	...	...	...	...	...	...	...	...	...	...	4.84	1.31
District Hospital "	...	...	...	...	...	...	...	...	...	...	...	2.22	0.90
" Klang...	...	...	...	89.7	70.2	19.5	...	...	...	...	...	5.68	1.30
" Kuala Langat	...	...	...	88.0	74.4	13.6	...	...	...	...	...	4.63	0.80
" Kajang	...	...	...	85.0	75.7	10.3	...	...	...	...	...	4.39	1.57
" Kuala Selangor ...	...	...	...	88.8	74.4	14.4	...	...	...	...	...	2.10	1.20
" Kuala Kubu	...	...	...	92.3	71.8	20.5	...	...	...	...	...	7.04	2.19
" Serendah	...	...	...	92.6	70.7	21.9	...	...	...	...	...	2.90	1.20
" Rawang	...	...	...	90.9	71.7	19.2	...	...	...	...	...	2.41	0.95
" Sabak Bernam ...	...	...	...	...	...	...	...	...	...	...	...	1.95	1.20

Office of Senior Medical Officer,
Kuala Lumpur, 21st June, 1910.

W. D. COOPER,
Senior Medical Officer, Selangor.

SELANGOR.

Abstract of Meteorological Readings in the various Districts of the State for the month of June, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
General Hospital, Kuala Lumpur ...	29.840	145.9	81.6	88.0	72.9	15.1	76.7	82.7	73.5	76	Calm.	5.97	1.48
Pudoh Gaol " "	...	...	...	...	...	...	...	...	...	...	...	7.93	1.62
District Hospital "	...	...	...	...	...	...	...	...	...	...	...	7.91	3.27
" Klang	...	...	...	90.7	69.8	20.9	...	...	...	...	...	7.14	1.30
" Kuala Langat ...	...	...	...	88.8	74.1	14.7	...	...	...	...	...	5.32	1.58
" Kajang	...	...	...	86.5	76.0	10.5	...	...	...	...	...	3.04	0.63
" Kuala Selangor ...	...	...	...	88.3	75.8	12.5	...	...	...	...	...	4.75	1.20
" Kuala Kubu	...	...	...	92.0	71.0	21.0	...	...	...	...	...	12.33	2.60
" Serendah	...	...	...	92.1	70.6	21.5	...	...	...	...	...	6.31	1.39
" Rawang	...	...	...	91.3	71.5	19.8	...	...	...	...	...	6.46	1.60
Sabak Bernam	...	...	...	...	...	...	...	...	...	...	...	4.88	0.97

Office of the Senior Medical Officer,
Kuala Lumpur, 20th July, 1910.

G. D. FREER,
Senior Medical Officer, Selangor.

NEGRI SEMBILAN.

Abstract of Meteorological Readings in Negri Sembilan Hospitals for the month of May, 1910.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Seremban Hospital		137.9	81.7	87 3	73.4	14.1	77.7	.872	75.0	80.8	NW	3.22	.80
Mantin												4.53	1.42
Tampin												4.88	1.00
Kuala Pilah												4.29	.79
Jelebu												4.95	1.63
Port Dickson Town												5.45	2.38
Do. Beri-Beri												3.66	1.35

SENIOR MEDICAL OFFICER'S OFFICE,
10th June, 1910.

A. J. M. MOSLEY,
S. M. O.

NEGRI SEMBILAN.

Abstract of Meteorological Readings in Negri Sembilan Hospitals for the month of June, 1910.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Seremban		140.9	80.4	86.8	72.4	14 3	76.6	.846	74.1	81.7	W	9.87	2.45
Mantin												8.07	2.22
Tampin												5.89	1.65
Kuala Pilah												6.19	1.69
Jelebu												6.06	1.84
Port Dickson Town												2.74	.52
Do. B. B.												5.03	.75

Senior Medical Officer's Office,
12th July, 1910.

A. J. M. MOSLEY,
Senior Medical Officer.

KELANTAN.

Abstract of Meteorological Readings in Kelantan for the Month of May, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature. Mean Dry Bulb	Temperature. Mean Maximum.	Temperature. Mean Minimum.	Temperature. Mean Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
		° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	%		Ins.	Ins.
Kota Bharu ...	..	151.3	83.5	89.9	75.6	14.3	79.9	1.060	81.1	82.	...	3.49	.80
* Kuala Lebir ...	...	...	79.2	90.4	74.0	16.4	76.3	.854	74.5	86.	...	6.22	3.28
* Kuala Kelantan ...	...	...	...	84.8	75.4	9.4	...	...	...	...	...	4.20	1.90
* Taku Plantation ...	...	...	...	...	...	...	...	...	...	...	...	4.96	2.37
* Pasir Besar ...	...	...	...	...	...	...	...	...	...	...	...	7.78	2.36
* Nenggiri ...	...	...	...	...	...	...	...	...	...	...	...	7.12	2 63

* Supplied by the courtesy of the Duff Development Coy., Ltd.

Residency Surgeon's Office,
Kota Bharu, *20th June, 1910.*

John D. Gimlette,
Residency Surgeon, Kelantan.

KELANTAN.

Abstract of Meteorological Readings in Kelantan for the month of June, 1910.

District.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	%		Ins.	Ins.
Kota Bharu ...	...	150.4	82.5	87.4	75.2	12.2	78.2	.891	75.00	78	...	9.19	2.32
* Kuala Lebir ...	...	...	78.4	88.4	73.6	15.1	75.7	.834	73.8	85.8	...	3.79	1.40
* Taku Plantation ...	...	...	...	...	...	...	...	...	...	...	...	3.88	1·68
* Pasir Besar ...	...	...	...	...	...	...	...	...	...	...	...	5.30	2.05
* Nenggiri ...	...	...	...	...	...	...	...	...	...	...	...	13.12	2.82
* Kuala Kelantan ...	...	...	...	83.53	74.73	8.08	...	...	...	...	...	5.20	1.20
* Kuala Pahi. ...	...	...	...	84.57	73.0	11.57	...	...	...	...	...	3.50	1.45

* Supplied by the courtesy of the Kelantan Planters' Association.

Residency Surgeon's Office,
Kota Bharu, 2. 8. *1910.*

John D. Gimlette,
Residency Surgeon, Kelantan.

SEREMBAN.

Table showing the Daily Results of the Reading of Meteorological Observation taken at the General Hospital, Seremban, for the month of May, 1910.

Date.	Temperature of Radiation. 9 H.	15 H.	Mean.	Maxi-mum.	Mini-mum.	Range.	Temp. of Radiation. Sun.	Differ-ence Sun & Shade.	Wind Direction. 9 H.	15 H.	Temp. of Evaporation. 9 H.	15 H.	Mean.	Computed Vapour Tension 9 H.	15 H.	Mean.	Relative Humidity. 9 H.	15 H.	Mean.	Clouds 0 to 10. 9 H.	15 H.	21 H.	Cloud and Weather Initials. 9 H	15 H.	21 H.	Rain. Inches.
1	80	85	82.5	88	75	13	144	56	NW	N	71.6	73.4	72.5	.775	.826	.800	75	68	71.5	0	8	5	S	N	C	.46
2	78	85	81.5	87	73	14	141	54	N	NW	74.6	76.7	75.6	.857	.922	.889	89	76	82.5	0	0	0	S	S	S	
3	80	90	85.	92	73	19	152	60	NW	SW	75.	73.7	74.3	.867	.833	.850	85	59	72.	0	0	0	S	S	S	
4	81	90	85.5	92	72	20	145	53	N	SW	76.	73.7	74.8	.897	.833	.865	85	59	72.	0	0	0	S	S	S	
5	78	88	83.	89	75	14	151	62	N	SW	72.9	74.9	73.9	.810	.865	.837	84	65	74.5	3	0	0	S	S	S	
6	82	80	81.	90	73	17	147	57	NW	NW	73.6	73.3	73.4	.830	.820	.825	76	80	78.	0	8	0	S	N	S	.03
7	81	82	81.5	84	73	11	140	56	NW	NW	76.	75.3	75.6	.897	.877	.887	85	80	82.5	6	10	5	C	N	C	.80
8	76	80	78.	85	74	11	129	44	NW	NW	72.6	78.3	75.4	.801	.968	.884	89	95	92.	4	5	6	C	C	C	.18
9	78	81	79.5	85	73	12	132	47	NW	NW	74.6	76.	75.3	857	.897	.877	89	85	87.	3	4	2	S	C	S	.38
10	78	84	81.	85	74	11	134	49	NW	NW	74.6	75.7	75.1	.857	.888	.872	89	76	82.5	0	0	0	S	S	S	
11	81	86	83.5	89	74	15	142	53	NW	W	72.6	76.1	74.3	.802	.904	.853	76	72	74.	0	0	0	S	S	S	
12	80	88	84.	89	73	16	149	60	NW	W	75.	78.2	76.6	.867	.964	.915	85	73	79.	0	0	0	S	S	S	
13	80	86	83.	87	76	11	142	55	W	NW	73.3	74.5	73.9	.820	.855	.837	80	68	74.	0	0	0	S	S	S	
14	79	87	83.	89	74	15	132	43	NW	NW	75.6	75.5	75.5	.877	.884	.880	90	69	79.5	0	0	0	S	S	S	.16
15	80	85	82.5	87	74	13	122	35	NW	NW	75.	75.1	75.	.867	.873	.870	85	72	78.5	0	0	0	S	S	S	
16	78	86	82.	88	74	14	141	53	NW	N	76.3	74.5	75.4	.906	.855	.880	94	68	81.	0	5	6	S	C	C	
17	75	81	78.	82	74	8	105	23	N	N	73.3	76.	74.6	.820	.897	.858	94	85	89.5	9	6	4	N	C	C	.41
18	77	85	81.	85	73	12	125	40	N	SW	75.3	73.4	74.3	.877	.826	.851	94	68	81.	3	4	0	S	C	S	
19	80	85	82.5	85	74	11	130	45	W	SW	76.6	78.4	77.5	.916	.973	.944	90	80	85.	2	5	6	S	C	C	
20	76	84	80.	87	72	15	142	55	N	N	72.6	77.4	75.	.801	.938	.869	89	80	84.5	3	0	0	S	S	S	.54
21	72	85	78.5	87	71	16	141	54	N	N	72.	76.7	74.3	.785	.922	.853	100	76	88.	4	0	6	C	S	C	.04
22	79	87	83.	89	72	17	145	56	NW	N	73.9	77.1	75.5	.839	.933	.886	85	73	79.	0	5	5	S	C	C	
23	79	84	81.5	88	72	16	142	54	N	SW	75.6	75.7	75.6	.877	.888	.887	90	76	83.	0	4	0	S	C	S	
24	76	82	79.	85	74	11	131	46	N	NW	74.3	75.3	74.8	.848	.877	.862	94	80	87.	0	5	5	S	C	C	
25	79	85	82.	87	71	16	137	50	NW	NW	73.9	76.7	75.3	.839	.922	.880	85	76	80.5	0	4	4	S	C	C	
26	80	87	83.5	88	73	15	140	52	NW	SW	75.	75.5	75.2	.867	.884	.875	85	69	77.	0	0	0	S	S	S	
27	81	81	81.	85	73	12	130	45	W	NW	74.3	77.7	75.	.849	.947	.898	80	90	85.	0	6	0	S	C	S	
28	78	82	80.	86	72	14	132	46	NW	NW	74.6	78.7	76.6	.857	.978	.917	89	90	89.5	0	0	0	S	S	S	
29	78	88	83.	90	73	17	145	55	NW	W	76.3	74.9	75.6	.906	.865	.885	94	65	79.5	0	0	0	S	S	S	
30	80	85	82.5	89	74	15	142	53	SW	SW	75.	75.1	75.	.867	.873	.870	85	72	78.5	0	0	0	S	S	S	
31	80	87	83.5	90	73	17	147	57	NW	W	76.6	75.5	76.	.916	.884	.900	90	69	79.5	0	0	0	S	S	S	
Mean.	78.7	84.8	81.7	87.3	73.4	14.1	137.9	50.5	NW	NW	74.4	75.7	75.	.853	.892	.872	87.1	74.6	80.8							3.22

Seremban,
10th June, 1910.

Highest Temperature 92
Lowest Temperature 71

Greatest Rainfall in 24 hours .80

A. J. M. CLOVELY,
Senior Medical Officer.

PRISON OBSERVATORY PENANG.

		Deg.
Highest	Maximum	92°
Lowest	do.	85
Highest	Minimum	75
Lowest	do.	68
Highest	Air Temperature	89
Lowest	do.	77
Highest	Sun	166
Lowest	Sun	137

GOVT. HILL, PENANG.

Highest	Maximum	79°
Lowest	do.	73
Highest	Minimum	66
Lowest	do.	61
Highest	Air Temperature	80
Lowest	do.	69
Highest	Sun	140
Lowest	Sun	119

METEOROLOGY OF PENANG.

For JUNE, 1910.

RAINFALL.

Prison Observatory	Ins.	7.27°
Fort Cornwallis	,,	9.05
Govt. Hill	,,	11.79
Balik Pulau	,,	6.58
Pulau Jerejah	,,	7.57
Pangkore	,,	1.42
Bruas	,,	7.16
Lumut	,,	6.33

The rainfall during June has been comparatively small as is always the case in June, Government Hill having the greatest and Pangkore the smallest fall.

M. G. Scriven,
Meteorological Observer.

9th July, 1910.

No. 9.] SEPTEMBER, 1910. VOL. IX.

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Director of Botanic Gardens, S.S.

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No. 9.] SEPTEMBER, 1910. [Vol. IX

ESTATE SANITATION.

By Dr. Brooke.

An interesting lecture on estate sanitation was delivered by Dr. Brooke, Port Health Officer, before a large audience of planters in the Volunteer Drill Hall, on August 19th.

He explained at the outset that he did not propose to give instruction regarding hospital buildings or the treatment of the sick. They had their medical officers for that. He was only going over two or three points regarding the surroundings and dwellings of coolies and a few points on the sicknesses amongst them. The coolie lines were the most important item to consider. What they wanted to secure was constructional cheapness with sanitary efficiency. Disease arose from dirt, and it was on the floor of buildings that the majority of the dirt was held, being not only brought in by the feet of people, but continually deposited from the air by gravity, so the most important part to consider in construction of coolie lines was to have some sort of floor that could be properly cleaned. They could have a floor made of all sorts of things, beaten mud, sand, wood, or some more permanent structure. A sand floor would be quite the worst because there they had a floor that would absorb all sorts of dirt and would be hard to keep clean. In a wood floor they had very much the same disadvantages; they had a material which soaked in the mess. The dirt would not only get into the face of the wood, but in the cracks between the boards, and germs were very hard to dislodge. Probably for the tropics the best thing of all was a concrete floor with a smooth cement facing. If this was raised up in the middle and graded off to the sides they had the best floor they could get. The walls should not come down right to the floor; there ought to be a space of two inches so as to get at the floor and so that no germs could collect round the walls. The keeping clean of this floor became an easy matter. The material for the rest of the house did not matter so much. Iron, of course, was best but wood was good if the boards were dressed and whitewashed at least three times a year with a disinfectant in the whitewash, inside undressed board or scantling would provide too much rough surface for the collection of dirt. With regard to ventilation Dr. Brooke recommended that if they secured two open doors and windows so as to admit air and sunlight, it was ample. Provided that the eaves were sufficiently large to keep the rain from beating in, then expanded metal should be used instead of shutters for all windows.

The Coolies' Surroundings.

The actual surroundings of the coolies depended on local circumstances. In the first place the jungle and undergrowth all around should be cut down sufficiently far away to allow of plenty of air and light reaching the barracks. The immediate surroundings should be properly level and drained and kept scrupulously clean. It was most important that rain water should not be allowed to collect. No refuse should be allowed to lie about because it was by means of it that the distribution of disease, through flies and mosquitoes, was helped on. The best method for the disposal of refuse was trenches three feet deep, the reason for this being that nitrifying bacteria exist in the upper three feet of soil, which are capable of quickly converting nitrogenous waste material into harmless compounds. The trenches should be closed when within a foot of the surface. These trenches should be screened, and fresh earth should be frequently applied.

The three diseases most dangerous on estates were then dealt with—malaria, ankylostomiasis and beri-beri. Speaking of the first Dr. Brooke described the process of the generation of the parasite in the blood and the reproduction of the germ by mosquitoes. To have an outbreak of malaria there must be three factors—an infected person, a special variety of mosquito and a healthy person. The first point in the exclusion of the disease was to exclude coolies showing signs of malaria or to isolate and treat them till they are healthy. The malaria carrying mosquitoes were found in most parts of the Peninsula. They bred in stagnant water and they could be removed by filling up the places or temporarily dealt with by putting some kerosene oil on the surface. Another point was that they had a splendid specific in quinine. It was a distinct poison to the parasites in the blood and a small dose of 2½ grains would kill a generation of these.

Disease through The Skin.

Until recently it was thought that the only way of introducing ankylostomiasis was by way of the mouth, and mainly by eating green vegetables. But some time ago it was discovered that the larvae

were able to get through the pores of the skin. Natives walking about with bare feet were most likely to pick them up. For years on plantations what was called coolie itch was seen and treated and no one knew that it was in any way connected with ankylostomiasis. Increased cleanliness in the habits of the coolies would do much to prevent the spread of the disease.

The cause and means of spreading of beri-beri, which was so often fatal, were still rather mysterious. The idea now was that the disease was a nutritional one and depended on the removal of some substance by over-milling the rice, possibly some Phosphorus compound. In some instances it was apparently spread amongst coolies by the introduction of an actual case. Par-boiled rice had some good curative effect when given to those suffering from the disease, coolies should be medically examined before going to work, suspicious cases excluded, lines should be put in as sanitary a condition as possible and coolies should have a sufficiently varied and generous diet—not too much rice, and other things in the way of dried fish and vegetables. Cases should be promptly isolated and bunks should be disinfected as if the case were infectious.

Dealing with epidemics, the lecturer explained that cholera could only be introduced by the mouth. One could go into a cholera room and breathe the same air as a patient without infection. It was therefore highly important to ensure that both food and water supply were free from suspicion. If they got a suspicious case of a man vomitting and suffering from diarrhoea, isolate him and properly disinfect his place at once. As a rule smallpox did not spread very rapidly or widely and if they had their coolies lately and safely vaccinated they need not fear about the introduction of smallpox. The lecture concluded with some remarks about the nature and practical requirements of a good disinfectant. It should be readily capable of killing germs. It should be sufficiently cheap to be used ungrudgingly in large quantities, and it should if possible be non-poisonous.

Many metallic salts and mineral acids might fulfil the first condition, but seldom the second, and never the last.

Perhaps the most widely useful disinfectant was Formalin, which was a solution of Formal dehyde gas in water. This could be used to disinfect valuable articles such as oil paintings or fabrics such as silks, etc., which could not be disinfected by any other known disinfectant. It had a further advantage in that it could readily and simply be used both as a liquid and as a gaseous disinfectant—for the gas was given off by simply boiling the liquid or by throwing some Potassium permanganate into it, or by letting the liquid drop slowly on to quick-lime.

The coal-tar disinfectants whose name was legion were mostly of one type—a mixture of Cresol with a liquid soap. Jeye's Fluid was an example. They all formed a milky white emulsion when mixed with water. Their emulsion was spoilt, however, when they came in contact with Chlorides—consequently they could not be mixed with sea-water, and their disinfecting power was impaired when used to disinfect urine, etc. A better type of coal-tar disinfectant was represented by *Izal* or by *Sanitas-Okol* both of which were already emulsified and their power was unimpaired by any admixture of water or liquids containing Chlorides. Sanitas-Okol, being of a stronger germicidal value than Izal, it could consequently be used in greater dilution and was therefore cheaper. *(Straits Times, 19th August, 1910).*

INSTRUCTIONS TO MANAGERS AND ASSISTANTS ON RUBBER ESTATES.

BY C. ALMA BAKER.

A. The first, last, and only reason for Managers, Assistants, and coolies being employed on the Estate is the production of latex. The one aim and object of all the expenditure of money and labour is the production of the greatest quantity of rubber of the best kind at the lowest possible cost.

CULTIVATION.

B. Whatever kind of cultivation and tree sanitation is best for the locality, and tends to produce the best possible trees and latex, will be found the cheapest in the end—be it clean weeding, growing selected weeds, or growing everything to be turned in at certain fixed periods.

The cultivation I am strongly in favour of is changkoling everything in once every three months from time of planting. This system has the following advantages :—

1. It prevents all surface wash from the beginning.
2. It enables the land to retain more moisture.
3. The land does not only retain all the plant food it originally had, but has in addition the humus derived from the vegetable matter turned in four times a year. Also, the turning up of the under soil renders readily available, through exposure to the atmosphere, a portion of the otherwise unavailable salts.
4. It forces the tree, by cutting the small surface laterals, to root firmer and lower, and to take its nourishment from cooler, damper, and richer soil.
5. It greatly helps in the eradication of Formes and white ants, as it clears the land of all small pieces of timber, at the same time opening up the soil for the air and sunlight to penetrate.

I feel certain that this system of cultivation will give a larger percentage of tappable trees at a given age than any other. Trees growing in land thus treated must have a more vigorous, healthy and longer life than trees grown in clean weeded, undulating soils denuded year after year of all surface soil and humus.

The cost of changkoling four times a year is not more than ordinary clean weeding. The one thing that must be absolutely certain in this class of cultivation is your labour supply. This must be sufficient to come back on the area changkoled once every three months for certain.

Approximate cost of changkoling in average land, not big lalang:—

A fairly low average for this work per man is 2½ acres per month of 25 days work. 100 coolies with an out-turn of 80% (very low), constantly at work, will changkol 200 acres per month, i.e., 600 acres per 3 months.

COOLIES.

C. The argument put forward above for the utmost well being of each individual rubber tree apply with still greater force to each individual coolie on the Estate. No expense or trouble is too great that will ensure a well housed, healthy and contented labour force.

WORK IN RETAIL.

Daily Muster and Distribution of Coolies.

D. All coolies on the Estate of whatever description, men, women, and children, indentured and free, married and single, watchmen, cartmen, &c., are to be turned out for muster every morning, including Sundays, by the Manager, or European Assistant, and the Apothecary, counted, medically inspected, and treated.

All coolie lines, drains, water installations, and latrines, are to be inspected daily by the Manager or one of the European Assistants.

HOURS OF MUSTER.

Free.

Free coolies to be mustered and medically inspected at 5.30 morning muster only. Sundays excepted.

Indentured.

All Indentured coolies, together with their wives and children living on the Estate, are to mustered twice daily in their respective gangs;

Once every evening in the presence of the night guard before being handed over to them, and the number recorded and certified by the Manager or European Assistant in Night Muster Book.

Once every morning at 5.30, when taking over from the night guard, the number recorded and certified by the Manager or European Assistant in Muster and Distribution Book.

Lights out at 9 p.m. in all Kongsis.

MUSTER AND DISTRIBUTION BOOK.

All fit coolies after muster and medical inspection are to be told off for work not later than ¼ to 6, and the details as set out in Muster and Distribution Book recorded.

An inspection of changkols, parangs, or whatever implements are used, is to be made daily, either at evening or morning muster, by the assistant in charge of each gang. The coolies must be taught to keep all tools in good working order. It is impossible for coolies to do their work easily and well with blunt or damaged implements.

FIELD WORK AND DAILY ROUTINE.

E. After muster, if the work is not too far off, the coolies are to be taken to the field and set their task by the Manager or Assistants who return for breakfast at 7. At 7.30 they go to their gangs and remain with them till 11 a.m., when they return for tiffin. They go again to the field at 1 p.m. and remain with the coolies till the day's work is finished. On returning from the field the work for the day is to be recorded. A price book is to be kept by the Manager and Assistants of all work, whether task or not, and the cost per acre of the work of each gang per acre or job is to be recorded, together with field and square number, day by day, and submitted to the Manager. One of the most important duties of the Manager is to see that good work is done as cheaply as possible, and that the value of the wage of every individual on the Estate is got in good work.

TREE SANITATION.

F. Each individual tree is to be thoroughly and minutely inspected for the three following diseases:—

White ants	... ...	"Termes Gestroi."
Root disease	... ...	"Fomes Semitostus."
Stem and branch disease	...	"Diplodia rapax."

This work is of the utmost importance, as on it depends the successful development of the Estate, and it is impossible for me to impress upon you too strongly its vital importance.

WHITE ANTS, "TERMES GESTROI," THEIR DETECTION AND REMEDY:—There are a great many different species of white ant in this country but it is accepted that "Termes Gestroi" is the harmful one. The two species Termes Gestroi and Termes Lacessitus both

throw up earthy runs on Para trees. The Lacessitus merely eats portions of the dead bark, but the Gestroi bores in and destroys the tree.

Detection.

The Gestroi can be distinguished from the Lacessitus by the following peculiarities:—The nippers of the large soldier ants are red, and a white milky fluid will exude from the front and top of the head if pressed: the soldier ant of Gestroi will always attack when molested.

Remedy to be Applied.

When the runs of "Gestroi" ascend the tree, either partially or entirely, encasing it with mud, the following method should be adopted:—

At the base of the tree where the collar touches the ground, remove with a broad straight pointed knife a portion of the mud encasement. This will reveal several small tunnels. Insert the knife into one of these, and by gently levering the earth away from the tree the aperture is enlarged. When sufficiently widened to admit the nozzle of the fume pump, gently insert it: press clay round nozzle to prevent any escape of fumes. Pump fumes into the tunnel. Take great care not to block the tunnel when widening the aperture, and do not push the nozzle in too far. Where fumes escape stop the hole with earth. When a field is being treated instruct the coolies not to remove the mud encasements on the outside of the tree, as they reveal the tunnels. The fumes used are those obtained from 9 parts of Arsenic Oxide to 1 powdered Sulphur on red hot charcoal.

Pumping should be continued for 6 minutes. The nozzle of pump should be occasionally withdrawn to ascertain whether pump is in working order.

The tree has also to be pumped into: this is done as follows:— With an auger slightly larger than the pump nozzle, bore a hole in the trunk of the tree to its centre at the collar; pump into this hole for 6 minutes, or until the pump ceases to work from back pressure of fumes; plug up all holes in tree or surrounding ground emitting smoke; and, finally, when the tree and runs are full of smoke, plug the bored hole in the tree with a well fitting sound wooden plug, tarred. This plug must be driven into the tree level with the wood (not bark). The ant runs are frequently 100 yards and more in length. Open the runs in about three days and see if the operation has been successful; if not, repeat. Thoroughly inspect all tree stumps and logs for ants, and if any are found, carry out the same operations as above.

Temporary Preventive Measures.

The eradication as above set out, i.e., pumping, takes a considerable time, and as there may be many trees on the Estate scattered over a large area requiring immediate attention, a flying inspection gang with a rapid remedy must be used. The best remedy for this purpose is Carbon Bisulphide applied as follows:—

A small gang under an assistant or reliable head man capable of recording the trees treated, must treat any area or tree that is reported affected. If no special area or tree is reported, the Estate is to be taken square by square ahead of the main inspecting gang, and the Carbon Bisulphide (or Tuba, as set out below) applied to every tree found to be affected by white ants, in the following manner:—

Scrape the earth away from the collar of the tree, and pour about a pint af Carbon Bisulphide on the tree right round the collar and up as far as the ants have made their runs. Fill in the hole quickly to keep in the fumes. Bore a hole at the collar and, with a piece of wire or stalk of grass, find out how far up the tree the hole runs. Where the hole ends, bore a small hole and pump or pour into the tree half a cigarette tin of the Carbon Bisulphide and plug hole.

This application will drive the ants away for a sufficient time to allow the main pumping gang to attend to it. Carbon Bisulphide will in no way harm the rubber even if large quantities are used; it has valuable manurial properties.

All trees treated for white ants are to be tarred with an x on two sides of tree about three feet up. Do not let tar run down trees.

Where white ants are present, examine also for "Fomes" as white ants usually attack after "Fomes."

Malay Tuba,

Another very good thing for driving away white ants is Tuba root applied as follows:—

Pound the root up in water, say a handful of the fresh root to 2 quarts of water. Pour this milky liquid round the collar and over the part attacked; pump, or pour, some of the milky juice into the tree as directed for Carbon Bisulphide, also bury the pounded root round the tree close to the bark. The rain will wash out the Tuba juice and kill the ants it touches and keep any others away. The Tuba can be bought in any village at 30 cents a bundle, which is sufficient for 3 or 4 trees. Live roots of Tuba are easily procured, and 1,000 or so should be planted in damp, good soil.

BRANCH DISEASE.

G. This can be detected by the unhealthy appearance of the leaves in the first stage, and by the dead branches in the second. This appearance is similar to that produced by root disease, but with this difference, that the tree suffering from branch disease is firm in the ground. Patches of black latex will probably be seen on the trunk and branches.

Remedy.

The only thing to be done is to cut back the unhealthy portions of the tree some 3 inches into the healthy wood, and spray with Bordeaux mixture, made as follows:—

Copper Sulphate	...	...	3 lbs.
Lime ...	...	...	3 lbs.
Water ...	...	...	45 gallons.

Dissolve copper sulphate in 1 or 2 gallons of hot water in a wooden or earthen vessel, stir until thoroughly dissolved, then add about 2/3 of the 45 gallons. Slake the 3 lbs. of lime slowly in the remaining 1/3 of water; strain the lime water to get rid of all grit. Add the milk of lime to the copper sulphate slowly, stirring well. Do not mix more than is required for immediate use, as it will not keep. *Be careful not to use metal vessels for this mixture.*

Spray the affected tree, together with the surrounding ones, 3 separate times at intervals of about 3 days.

Another equally good application (kept at all chemists) is Arsenate of Lead mixed 1 to 99 of water. Spray the tree affected thoroughly three times at intervals of 3 days each. This preparation is in a paste in bottles and very easily mixes with the water. A weak solution of Sulphate of Copper in the proportion of 1 to 20 of water is to be added to the above mixture. All solutions containing Sulphate of Copper must be mixed and carried in wooden or earthen vessels.

Root Disease: Fomes Semitostus. Detection.

H. As far as I know, there are three signs of this disease:—

(1). The dried-up appearance of the tree, caused by the cobweb threads round the roots cutting off supplies.

(2). The loose hold the tree has in the ground, which can be detected by shaking the tree.

(3). A sunken-in appearance on one side of the stem low down on the side attacked.

Remedy.

The only thing to be done, if the tree is not already dead, is to remove carefully all the earth from the roots with a pointed stick (do not allow changkols to be used) right down to the end of the tap-root, and cut into the roots with a knife to see if they are healthy or not. The affected roots, when cut, will be found to have rotten bark, discoloured wood, and will give no latex. Cut off the diseased portions with about 4 to 6 inches of the healthy root, and apply tar to cut. Then apply all round the roots about 10 lbs. of lime and powdered blue-stone, finely sifted and well mixed in the proportion of one kerosene tin of lime to 4 cigarette tins of the finely powdered blue-stone.

The trees immediately surrounding the diseased tree are also to be inspected, and the above dressing of lime and blue-stone applied, if necessary. Should the tree affected be found too far gone to be saved, dig it out right away in the following manner:

Start from the diseased tree as a centre and dig 2 feet deep outwards all round to within 2 feet of the surrounding trees. All sticks and timber of every description is to be removed from this area and at once burnt. The lime and blue-stone dressing is to be freely applied over the area, and dug in. The affected area is to be dug over and limed three separate times, at intervals of about a week, before supplying.

Another remedy spoken very highly of in Java and Sumatra for "Fomes" is Carbolineum Plantariam, used in a solution of 1 to 4 of water.

Method of Using.

Scrape the earth away round the tap root the whole way down and pour in a pint of the 1 to 4 solution right round the root. Do the same with the affected laterals; leave the holes open for a day or two, then fill in with earth.

The above preparation can be obtained from the Planters' Stores, Kuala Lumpur, in casks.

Mark all trees treated for "Fomes" with a small tarred circle round tree 3 feet up. Do not let tar run down tree.

Every rubber tree on the Estate must be suspected of being diseased, and inspected accordingly.

Each rubber tree is to be treated as if it were the only tree on the Estate.

All trees treated for "Fomes" (with whatever remedy) must have a trench dug 2 feet 6 inches deep right round the tree, and at least 10 feet from its trunk, so as to intercept the contagion.

BADLY AFFECTED AREAS.

Trees that are Down.

Trees treated for Fomes that are down, on account of diseased tap roots, but with laterals entact, treat in the following manner:—

Scrape away with the back of a knife the decayed and affected parts of the remaining portion of the tap root attached to the tree before applying the "Carbolineum Plantarium." The application of the Carbolineum must be very thorough; it must be rubbed in well with a scrubbing brush or coconut husk, two separate times at intervals of three days as follows:—

2. Dig out with a chop the whole of the old tap root left in ground taking as much earth as possible, which must be burnt together with every portion of the old tap root and pieces of wood found in ground; clean the hole right out as far as possible in every direction without disturbing the laterals, and spray the hole thoroughly with the Carbolineum mixture (1 part Carbolineum to 2 water). Ascertain if the trunk of the tree is hollow or not, as it lies on the ground, and if hollow, squirt up as much Carbolineum as possible, then scrub the trunk from two feet up down to the collar with the solution, together with remaining sound tap root. Do not cut off the top of the tree at this stage.

3. Now attend to the laterals. Scrape away the earth with a stick, do not allow changkols to be used, examine for Fomes and if found, scrape off gently the decayed affected portions of bark with back of knife, or blunt stick and remove and burn every particle of removed bark, and well rub in the Carbolineum on remaining sound parts. Especially attend to junctions of side roots, holes, cracks, &c., &c., and when completed pack tightly round with good burnt earth saturated with the Carbolineum mixture.

4. Leave the holes open and the tree as it lies for three days. In three days come back on the tree, saturate the ground in and round the sides of the old tap root hole again, with the Carbolineum Solution and fill up with thoroughly burnt earth. Saw the top of the tree off obliquely within eight feet of the ground and tar out; do not let tar run down tree, plug the hollow, if any, at bottom with a handful of burnt clay well saturated with the solution, then bore a hole into the trunk as far up as the hollow runs, and pour the Carbolineum mixture into the hollow through this hole till it is full if the tree is small, or spray in at least half a pint if tree is large, *as Fomes may have crept up inside.* Prop the tree, now a stump, back in position with three props, and ram it firm with burnt earth saturated with the Carbolineum mixture. Plug all bore holes with well fitting hard wood pegs tarred, and drive peg level with wood.

5. The last operation is to dig a trench at least two feet deep round the affected tree, or round the group affected, ten feet from the nearest trunk or trunks affected. This trench is to be left open.

6. The trees should be inspected within five days to see if white ants have attacked, if they have, pump arsenic and sulphur into runs.

Standing Trees Affected.

7. If trees are standing, saw off 8 feet up and tar as directed; scrape away the earth round the tap root right down to the end, then cut and scrape away all decayed portions and burn with

surrounding earth and wood; tar end of tap root if cut. Scrub Carbolineum all round trunk 2 feet above collar down to end of tap root and leave all exposed for three days. Examine for hollowness and if any hollow is found, bore, and pour Carbolineum into tree as above directed. Now treat laterals as above directed. Return in three days and repeat application of the Carbolineum mixture, ram the tree firm with burnt earth and dig trench. Return in five days and inspect for white ants; if any are found, treat as directed above.

8. If after two months the trees treated shew no signs of life dig them out as directed in my "Instructions pages 7, 4."

9. Please record the following:—

1. Date of treatment.
2. Method of treatment.
3. Extent of disease treated.
4. Cost of treatment per tree and per acre.

10. Be sure to see the Carbolineum used is "Carbolineum Plantarium" not "Carbolineum Avenarius" as the latter would kill the trees.

Pruning.

I. Prune all branches that are within 12 feet of the ground. All branches must be cut as close to the stem as possible, and tarred at once. No tar to be allowed to run down stem. The branches are to be sawn off. If the branch is a large heavy one, it will break away and wound he tree when about half cut through. To avoid this, slash off at least half of the branch with a parang and then saw off the remainder.

WOUNDED TREES.

J. All trees wounded are to be tarred directly wounds are made, or discovered in any part of the Estate. If there is no tar handy, send for it at once, and see the tree tarred. Do not merely order it to be done. Also see that tar is not allowed to run down the tree. Tar for this work, and also for marking trees requiring attention, must be taken by every working gang together with saws and pruning knives.

REMOVING TIMBER.

K. Remove all timber from the trees and stack in the middle of the lines of rubber for burning.

Burn as much wood as possible in long, low narrow heaps, not more than 3 feet high, between the lines. It is a good plan to cover the heaps of wood with earth, make air holes and fire the heaps: it will smoulder away without scorching the rubber.

Stumps of big trees can be burnt out without damage to the rubber, if a trench 4 feet wide and 3 feet deep is dug right round the stump, and the trench filled with logs, &c. Cover the wood with earth, leaving air holes, and fire: the stump will smoulder away. This will also destroy the ants.

TOPPING TREES.

L. No trees are to be topped.

Measuring Trees, for Ultimate Tapping.

M. Measure all trees 8 inches and over, 18 inches from the ground.

LEANING TREES.

N. All trees leaning over are to be propped up straight, with three props; bind grass between tree and props.

RECORDS.

O. The following information is to be recorded in the Tree Inspection Treatment Book, taking square by square:—

1st, Date.

2nd, Particulars of manuring, if any.

3rd, Total number of trees in each line in square. and total in square, numbering lines in squares E. to W., and trees in lines from N. to S.

4th, Trees diseased and nature of disease, line by line, and tree by tree.

5th, Particulars of treatment	do.
6th, Measurements of trees	do.
7th, Vacancies	do.
8th, Supplies	do.
9th, Recommendations re-disease, drains, etc.	do.

DRAINS.

P. Have drains put in all low, wet localities where rubber is planted.

OPENING UP AND PLANTING.

Jungle Felling.

When felling contracts are let, see that the following details are carried out:—

1. That all undergrowth is cut ahead of the felling. This will ensure a good burn.
2. See that all branches are lopped, either after each day's work, or immediately after the contract is completed. If branches are left sticking up in the air they will not burn.

3. See that dead standing trees are felled before any planting is done.

Burning.

At least 3 months after felling is completed should be allowed for the jungle to dry before burning.

Lining, Holing, Changkoling, after Burn.

Pickets for lining must be put in carefully and deep, and lines must be straight in every direction. Dig planting holes immediately behind pickets, and on the same side in every case, to ensure straight lining. Do not allow pickets to be removed till planting is finished.

Holing.

The holes be must dug 2 feet square and 2 feet deep in every case, whether for stumps, baskets, plants or seeds. A heap of good earth is to be stacked at side of each hole for planting. Dig out all timber in holes.

Planting.

When stumps are planted, they are to be planted in the empty hole, and earth, in half baskets only, tramped in very firm round the tap root till the hole is full. The great secret in stump planting is to have the earth round the entire depth of the tap root stamped firmer than the surrounding earth. Do not plant deeper than the collar of the stump. Immediately stumps are pruned at nursery, tar 2 inches top and bottom.

Baskets or Seeds at Stake.

In planting these, see that the hole is first filled with the good soil and the baskets or seeds planted firmly in it. Three seeds to every basket or hole.

Plants.

When planting small plants, first fill the hole with firmly stamped good soil: make a hole with a stick and drop the tap root of the plant straight into it up to the collar, and then firmly press soil round plant.

Great care must be taken to see that the coolies do not plant with a bent tap root.

If time sufficient and labour available, dig over whole area, either before or immediately after planting. If there is any lalang in the area, dig it out. All lalang on the boundary line should be likewise treated.

The Manager is to have whether whatever is going on directly under his Personal Supervision.

Under no circumstances whatever is the Estate to be left without the Manager or one European Assistant.

I wish to insist on the whole of the foregoing instructions being implicitly carried out by the Manager and those under him.

C. Alma Baker,

To come into force 1st July, 1910.

Exhibit A.

1. Quinine 10 grains in solution should be given to every working and non-working cooly three mornings every week at muster roll.

2. Coolies suffering from malarial fever should receive 10 grains of quinine twice daily. Continue for one month, then give 10 grains every morning for a month. Then 3 times a week as above.

Water.

3. The water supply should be carefully protected and examined from time to time.

4. When a new well is opened, or an old well has been in use for some time, purify the water by Permanganate of potassium.

Latrines.

5. The Latrines should be at a distance from the water supply and not lead to any stream or course of drinking water.

   Open trenches away from the coolie lines are best, to be filled with earth and wood ashes, lime, &c.

Mosquito Curtains.

6. If there are many cases of malarial fever on the Estate, Mosquito curtains, good large ones capable of holding a married couple or 2 or 3 single men, should be insisted upon.

Provisions

7. The manager with the Estate Doctor must inspect the shop and provisions provided for the coolies from time to time. The tariff charges are to be conspicuously exhibited at the shop at all times in the language of the coolies. The Manager is to have a copy of such tariffs and should test the scales and measures from time to time.

RUBBER FUNGI.

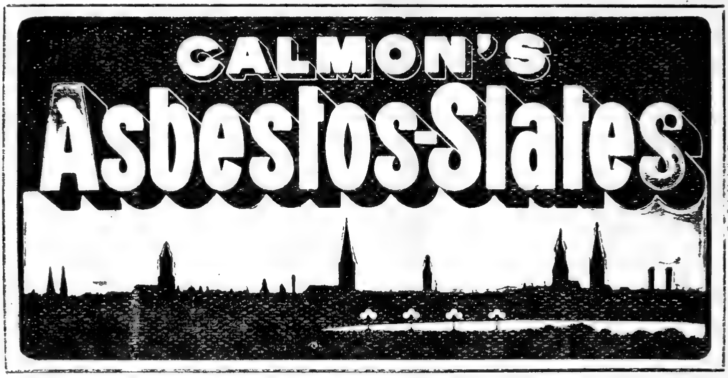
A lecture delivered by Mr. H. N. Ridley at the Exhibition, on August 20.

The lecture delivered by Mr. H. N. Ridley to the planters at the Agri-Horticultural Show on Saturday forenoon had for its subject certain tree pests that afflict the planter.

Mr. Ridley said:—When I was asked to initiate a discussion at this meeting, the subject of Fomes semitostus was suggested as a suitable one but it occurred to me that we should get some valuable suggestions on the treatment of fungi if I did not confine myself to Fomes only but touched also on some of the other fungus-pests of Para rubber, and what steps are practicable for minimising the injury caused by them. In every form of cultivation the attacks of some animal or vegetable pest must be looked for. As in places where men or animals are crowded together diseases must be expected, so in plants, when we take them from their normal isolated position in the forest and put a vast number together without any separation from each other, an essential of cultivation, we must expect disease of some sort to make its way in. In the early days of cultivation, the planter was content to take no notice of the pests of his plants till they forced themselves on his notice by nearly ruining the estate. But we have got beyond that stage of early ideas and now realise that it is advisable to attack a disease on its first appearance and keep it in check before it gets unmanageable. The chief diseases of plants are due to attack of fungi, as those of animals are due to Bacteria. In treating of fungus pests generally we can most easily sort them into classes according to the parts of the plant they attack, as the treatment of the disease depends largely on this. Thus we may group them as (1) Root or under ground Fungi, as Fomes. (2) Stem and bud Fungi as Diplodia or Dieback. (3) Leaf-fungi as Helminthosporiun. The two last being of course above-ground fungi.

Now with the last class, Leaf-fungi, we need not trouble much, as Para rubber being a leaf shedder is guarded to a large extent by the falling of the leaves at intervals, from serious injury by the fungi of this group. Any leaf attacked by a fungus falls soon and the progress of disease is checked. It can never be as serious as the coffee leaf disease which attacked the long-lived thick leaves of the evergreen coffee. In Para rubber it is the root and stem diseases that are most serious and to which it is important that attention must be paid. The chief is Fomes semitostus. I suppose every one here knows the fungus by sight, and knows too approximately its life history, as far as that is known. I will give an account of its appearance in the Botanic Gardens, as an illustration of the way it attacks. The ground on which rubber trees had planted in about 1886, had grown to some extent in secondary jungle, other trees had got mixed in, and these had been cut out, their roots more or less removed. One day a careless cooly piled up some rubbish near one of the trees and fired it so that two trees got badly burnt. I thought they would recover but they did not, and fungus attacks destroyed them; one of these fungi was Fomes and this gradually spread through the adjacent trees, killing them one by one on each side of the first injured ones.

Now I call your attention to the fact that there had been old scrub trees on the ground on which probably Fomes had been growing and that the burning of the rubber trees started the outbreak. The fungus attacked not dead, but dying trees. Is not this what practically happens in a new clearing? We fell the forest and burn it. This leaves just under ground, stumps of trees of different sizes in an injured and slowly dying state. The Fomes common in all woods, is in one of these trees and begins to develop on the dying stumps. The


CALMON'S
Asbestos-Slates

roots of the planted rubber come into contact with those of the infected stump and the mycelium spreads to the living root of the rubber covering it with its white strands and killing it, spreading from root to root. Where they are in contact it kills all the roots of the tree, and down comes the rubber tree. When the tree is dead or almost so the fruit, in the form of the well known yellow brackets appears and from the well known yellow brackets appears and from the under side of these are produced spores which can be carried by the wind to another injured tree and attack it. Now it is obvious that in a case like this the spore brackets could be destroyed even before they are ripe and the plant prevented from carrying on its destruction by spores and if this was the only danger from it, it would not trouble us much. The danger lies in the under ground mycelium which may be hid in the ground for some years creeping on the dying roots of trees and showing no signs of its presence till the death of a rubber tree is noticed.

It is probable that by destroying the brackets before the spores are produced, continuously, that is to say preventing its reproducing itself by spores on the living trees, the mycelium would die out, that it could not go on indefinitely growing mycelium. But this is too slow and before this happens much damage may occur, and it is necessary to destroy the mycelium itself. We have attempted to do this by soaking the ground with bordeaux mixture, copper sulphate and lime, and by digging solid copper sulphate and lime into the ground, but neither of these methods has had the desired result. This is due I think to the roots of the rubber being too deep underground for the liquid in sufficient quantity to soak in to reach the affected roots. An aid to cleaning infected ground lies in the use of bananas, or some such plant. The Fomes is unable to attack the roots of the bananas which aid by destroying with their roots the small dead bits which harbour, so to say, the mycelium.

Liquid Fungicides.

Failing any direct method of reaching the underground mycelium by Liquid Fungicides, the only thing that appears to be practicable is the thorough cleaning out of the ground of all stumps and dead roots of jungle trees. The mycelium I find remains on very small pieces of dead roots, in an active condition, and the ideal way to destroy it utterly, of course, would be to plough the ground thoroughly to expose and break up these little pieces, but this is I fear in the present state of our agriculture impossible. I have no reason to believe that the spores of this fungus can attack a Para rubber tree which is uninjured or even wounded say by tapping. I have seen the brackets in actual contact with living trees of different kinds, with no evil results. I believe it only attacks dying and decaying stumps at first and that its mycelium spreads along the roots in contact with the infected portion. In this way it can pass under paths, but deep drains seem to act as a barrier. There is much therefore to be said for blocking out the estate by good wide drains at no very great distance apart, so that if by accident the fungus should be in one block it cannot spread

to another. Seedling rubbers do not seem to be attacked by this fungus if left in the infected ground, but I would not advise an immediate replant. It would be better to fallow the infected ground, or as I have suggested to run bananas or some such plant through the spot to clean it up.

Diplodia.

I will now say a few words about the more troublesome fungus *Diplodia.* This pest has been called Dieback, but as I am by no means certain that all the diseases here and in Ceylon which have been called Dieback are the same thing for fear of mistakes I prefer to use the scientific name of *Diplodia* which, unlike many scientific names, is easy to pronounce and remember. This fungus is very small and inconspicuous. Its spores are very minute and produced in immense abundance after rain. When these spores reach a wounded rubber tree, they germinate in twelve hours, putting out a minute thread which enters the cambium layer and commences to grow. It generally, if not always, attacks a cut or broken shoot and deseending kills the cambium layer. The growth is rapid and it has been known to kill a four year old tree in about three weeks after its first being noticed. All that is visible at first is that the top of the branch is dead; it generally exudes a little latex which runs down and turning black makes fairly conspicuous streaks, but this is not always visible. On the bark are to be seen little raised pustules with a crack across the centre, these are black within. As soon as rain falls the fruit ripens and a substance like soot appears in strings and irregular masses, from these pustules. This substance consists of myriads of minute spores, elliptic and divided transversely in two and black in colour. In the case of a seedling the disease pushes down the stem killing it as it goes, but in a strong plant, its course is checked. The seedling throws out a beed, below the dead and dying end, the disease stops and the dead portion falls off. You will see at once the danger of this pest. It starts almost out of sight in big trees, at the end of a shoot, it is difficult to get at, it is readily dispersed to great distances by the wind, its spores are produced in unusually large amount, and it is very rapid in growth and development.

When detected it can be checked by cutting off the infected bough and burning it, at the same time spraying liberally with bordeaux mixture. Still a tree may be badly injured and at least its output of latex restricted by the necessary amputation. However, in carefully watched plantations the injury may be minimised. But are all plantations carefully watched? Para rubber is planted all over the country by all sorts of people, little patches of half a dozen trees here and there, native plantations which the owner perhaps hardly looks at once a week, and then only cursorily. Any one will see that a patch of trees may be infected, neglected, and form a focus for the dispersal of spores in every direction. One large-sized badly infected tree could produce enough spores to thoroughly infect a large area. It is to this danger that I would call your attention. Rapid as is the development of the disease, and quickly fatal as it is, the loss could be minimised if it is attacked immediately on its appearance, but like all these pests if allowed to gain head it might prove unmanageable when thoroughly established, like a small flame easily extinguished at first, soon becoming, if neglected, a vast conflagration. I would suggest that it would be advisable that a mycologist, or some one who is competent to detect this disease should regularly inspect Para rubber trees wherever cultivated, and especially the little lots planted by natives, from time to time, in much the same way as the coconuts are inspected by our friend Laurie Brown, and that he should be empowered to order the destruction and disinfection of diseased trees.

Destroy Infected Portions.

The disease is one of considerable importance and might easily become very troublesome. At present it appears to be sporadic, occurring in little patches here and there, and by watching for it, it can be readily checked. In most cases I have seen it attack trees 2½ to 4 years old, and the death of the tops of these was clearly seen by the manager. The top infected should be cut well back, that is well below the dead part, and the cut disinfected with tar. Where possible it would be advisable to spray the adjoining trees with copper sulphate solution to kill any stray spores. As the fungus has only recently been met with we have still much to learn about it and I do not yet know from what plant it originally came to infect the Hevea. It is said by Mr. Petch to be identical with a fungus on Chocolate, but in the cases I have had under my eyes there was no chocolate anywhere near. I am convinced that where planters are on the watch for this pest they will be able to detect its attacks in an early stage and by cutting off the affected shoot prevent any harm being done, at the same time I would suggest that where there are irregular neglected patches of rubber trees, with no very responsible manager, the use of an inspector to insist on infected portions being destroyed at once, would be a very desirable move.

THE PINE-APPLE AS A CATCH CROP IN RUBBER CULTIVATION.

By Dr. Lim Boon Keng.

What a planter may obtain from the *cultivation* of his land has long ago been aptly compared with his banking account, upon which he must not expect to draw perpetually without sometimes paying in. This principle should never be lost sight of with reference to the raising of a catch-crop in the early years of rubber or coconut cultivation.

A little consideration will suffice to show that for the pioneer and the planter with a moderate capital, some form of catch-crop raising is indispensable. Years ago, Mr. Tan Chay Yan, of Malacca, planted rubber on an extensive scale in the midst of tapioca. At that time, so little was known of the possibilities of Hevea that no one would have ventured to clear four thousand acres and plant them with Hevea on the clean-weeding system. Even the astute Chinese of Malacca ridiculed the pioneer, but six years later they saw through their folly, and wildly imitated what they had previously condemned. It can safely be said that without the aid of Tapioca not 10% of the rubber land of Malacca could have been brought into existence. It is only necessary to mention the Malacca Rubber Plantations, Pegoh, and Merlimau estates, among a host of others. In this connection I like to mention the name of Sir Walter Egerton, to whom the Chinese of Malacca are greatly indebted for sympathy and encouragement in the early years of rubber planting. The colony owes to his foresight and commonsense what success we have achieved in rubber cultivation in Malacca. I have purposely digressed a little in order to show that agricultural critics are not always correct, especially when they form opinions on mere theory.

In a special article in the Straits Times of August 16th, 1910, the writer absolutely condemns pine-apples as a catch crop. "They ought never to be interplanted" is his dictum. Now, it is clear he was prejudiced against pine-apples because he believed "this form of culture is a heavy drain upon the soil." But, curiously, he mentions gambier and pepper as suitable catch-crops and apparently approved of coffee. His reference to the Chinese planting tapioca as catch-crop, "since the boom" is scarcely correct. In my opinion, pine-apples constitute a very convenient, suitable and excellent catch-crop under certain well-defined conditions. It is pure absurd nonsense all this talk of a drain upon the soil. Every kind of growth is a drain upon the soil. Perhaps clean weeding is as great a drain upon the soil as anything that can be done to the land. It is the same with coconuts. Cultivators remove everything and replace nothing and then cry "coconuts must be heavily manured!" But a little knowledge is enough to show that if only copra is made and taken away—we have removed from the plantation only a form of oil or hydro-carbon, which the palm has manufactured from the water and the carbonic acid gas—substances equally inexhaustible and abundant both in the soil and the air. Likewise, in the case of pine-apples, the fruit is mainly a mass of water and saccharine matter—the solid substance of the soil taken up being used chiefly to form the root-stock and leaves. Comparatively speaking, weight per weight, we take away much more from the soil in the case of gambier, pepper, coffee theobroma, peas, beans, indigo, cardamoms and ginger than in the case of pine-apples, bananas or tapioca. Therefore, provided we restore back the ash containing parts of the plants such as the leaves, trunks, and branches, we cannot be said to drain the land.

Under ordinary circumstances, pine-apples are planted on hill slopes, often densely packed together and the ground is kept clean weeded. In a couple of years, the surface of the land is quite denuded of humus, the loss due more to rain than to the action of the pine-apple plants. Little more than cutting off the fruit is done by the cultivator, and no wonder the land is impoverished in six years. When properly cultivated, and the surface of the soil is duly attended to pine-apples are good as catch-crops to be inter-planted with Hevea Braziliensis. What are the essentials of a good catch-crop?

A plant suitable as catch-crop must have the following qualities:—

(1) It can grow without interfering with the rubber or retarding the growth of the latter.

(2) It must mature and fruit early.

(3) It must not have woody roots, which may become liable to be the sites of disease.

(4) It can be easily removed without much cost and without doing harm to the roots of the rubber trees.

(5) It must not harbour diseases of an infective character. When properly planted, pine-apples fulfil the above particulars. But it is advisable not to use this form of catch-crop, unless the plantation is close to a canning factory or to a town, where the fruit can be sold at a good price. Far away in inaccessible localities, the high cost of transport makes it unprofitable to use pine-apples as catch-crop and this question alone should guide the planter in deciding whether pine-apples are suitable or not, apart from other considerations—especially as pine-apples will flourish in all localities suitable for the planting of rubber.

When a planter has decided to use pine-apples, he must determine the system of spacing his rubber trees. On the whole one must recommend wide planting, allowing for avenues 30 feet wide and trees 15 feet apart to form the sides. Thus planted 30 by 15 the Hevea trees will develop to the best advantage both their root and leaf systems.

The pine-apples should be planted 3 feet away from each rubber plant, and the lines should be so arranged on hill slopes that they serve as terraces to prevent too much wash from rain water. In this way, we can get in say about 2,000 pine-apple plants in an acre. They flower in 15 to 18 months and thus a first crop is certain in the second year. In the third year, a large and a secondary crop may be expected. After the fourth year, the crop begins to deteriorate unless the plants are properly looked after. The main cause of the deterioration is that the pine-apple is purely a surface feeder, and as usually the soil on which it grows has been allowed to become completely denuded, and no attempt is made to restore to the ground the decayed leaves, which in the case of pine-apples will take a long time to become humus.

Financially we may reckon the cost of cultivation up to the time of bearing, i.e., during 2 years, at $75 per acre in Singapore. This includes clearing jungle, cost of pine-apple seedlings, holing and planting the rubber and clean weeding during two years. Of this amount, the contractor must make a profit of from 15 to 20 dollars. It is useless to attempt this cultivation except through contractors, unless good supervision—which cannot be had cheap—is available. The receipts can be put down in a tabular form :—

2nd year	...	2000 pines	@	2 cents	each	... ...	$40
3rd ,,	...	3000 ,,	,,	2 ,,	,,	... ...	60
4th ,,	...	2000 ,,	,,	1½ ,,	,,	... ...	30
							$130

This means that the planter recovers the cost of planting plus $55 to the good, out of which, if he will spend $25 on a ton of a fertilizer such as the Perlis guano or similar substance, he will surely find that his Hevea trees will grow as well as they can possibly do. If one had the leisure and time, one could easily prove all these assertions by figures of measurements and by photographs. But, of course, if you allow an ignorant yokel to cram 3,300 pine-apple plants within one acre and in addition thereto stick in 250 rubber seedlings, and during five years do nothing but take away pine-apples and clean weed, you must expect that the soil becomes impoverished and the rubber trees are retarded in their growth.

At the end of the 3rd or at the latest at the end of the 4th year, the pine-apple plants should be removed. The root stocks should be pulled up and piled in heaps till the leaves are dried. *On no account bury them in trenches,* such as some rubber experts have recommended, for within a month they will be infected with white ants. The heaps, when properly dried, should be lightly covered with earth, and set on fire and allowed to smoulder away. Care should be taken that the heaps are not too large, and that the fire should not burst into flame. *The debris becomes excellent manure, and should be broadcasted but not buried.* The root-stocks of the pine-apples will resist burning in the first instance and they should be collected and reburned. The operation should be repeated time after time till every bit is reduced to cinders. If any planter will carry out these operations faithfully he will find that pine-apples are an ideal catch-crop, especially in the vicinity of Singapore or any big town, where the fruit can be sold at a profit. The fear that the pine-apples will do harm is quite imaginary and arises solely out of ignorance of the actual conditions that obtain in ordinary pine-apple culture. The harm done is due to the abuse of a catch-crop and not at all to the proper inter-planting of the pine-apples in the midst of the rubber.

In valuing an Estate, where pine-apple is used as a catch-crop, it is fair and proper to take its value into consideration if the pine plants are 3 feet from the rubber and not more than 4 years old. Of course only the expected crops should be valued—a reasonable reduction being made for the cost of harvesting and upkeep.

RUBBER CULTIVATION IN COCHIN-CHINA.

M. Morange sends us an interesting little paper on the cultivation of rubber in Cochin-China. The first plants were introduced to Saigon Gardens about 1880 and grew well, but disappeared in four or five years. In 1891 M. Seligmann, after travelling in the Malay Peninsula, brought some more but soon after these also disappeared. Finally, in the end of 1897, M. Raoul brought seeds from Ceylon, and they were established plants by 1899. At present there are about twenty four plantations of different sized areas and more are being opened. There were in round numbers about 750,000 trees planted by December 31, and reckoning those which will be planted this year at 250,000, there should be a million trees in Cochin-China by the end of 1910.

The soil in many parts is good and the growth of the plants equal to that of Ceylon, but inferior to that of Malaya. This, suggests the author, is due to the absence of the continuous rains of the Malay Peninsula, for in Cochin-China there is a dry season of three or four months, from January to April.

The planters are quite up-to-date as to stumping the ground, using a stump extractor which is worked by six men and which removes 25 to 30 stumps of all sizes a day. The labour is chiefly Annamite, but Javanese have been imported. The first ton of Para Rubber was exported from Saigon by M. Belland in 1908.

All the other well-known kinds of rubber have been tried, Rambong, Ceara Rubber, Castilloa, and Funtumia besides, but these have not given encouraging results. Jungle rubber from the forests is almost negligible and has never paid the natives to collect.

There is another article on the same subject by E. Deleurance, in Le Caoutchouc et la Gutta Percha, in which the author considers Cochin-China a very suitable country for the cultivation. He considers the dry season of six months is advantageous in arresting the development of fungi. The young plants develop most rapidly in the early part of the dry season at the time that the adults shed their leaves and put out fresh buds. A concession of 16,000 trees near Saigon gave an average of 1 kil, 200 grams saleable rubber (about 2½ lbs.) a year.

The average returns of trees of different ages are given as

7th year ...	20 % tapped gives	...	200 grammes
8th „	40 „ „ „	...	400 „
9th „	80 „ „ „	...	700 „
10th „	200 „ „ „	...	1 kilo

The cost of collection and preparation is given at 2 to 3 francs a kilo. One coolie can tap 150 trees:—ED.

RUBBER IN JAVA.

The Consular Report for 1909 gives the following: "The Rubber production of Java is still inconsiderable, and will remain so for some years to come. A great deal of clearing and planting of new ground has been done during the past 12 months and the demand for land suitable for rubber cultivation has been very strong. Numerous estates which have not proved successful under coffee have been disposed of and in cases where rubber had been planted for a year or two the prices paid were very high. No figures are so far procurable showing the acreage under rubber in Netherlands Indies, but an attempt has been made to ascertain the amount of capital sunk in rubber estates in Java, Sumatra and Dutch Borneo at the end of 1909, with the following result:—

British	£2,500,000
Dutch	1,500,000
Franco-Belgian	145,000
German	18,500
Total	£4,163,500

These figures are, however, merely approximate.

RUBBER NOTES.

Effect of Hurricanes.

Mr. Everard Fm. Thurn, in his report of the hurricane which struck Fiji in March, 1910, writes:—

"I had always supposed that the one danger which would probably attend rubber growing in Fiji would be the breaking of these somewhat brittle trees by hurricane winds. I am glad therefore to report that our young rubber trees suffered very little on the occasion of the recent blow. The leaves, as was practically the case with all leaves throughout the storm area, were entirely stripped, but the branches, probably because of the stripping of the leaves and the main-stems, were very little broken. It is remarkable though I am not satisfied that any sequence of cause and effect is thereby indicated that almost the only rubber trees which were broken were certain trees at the Government Station at Nasimu, which had been tapped at an early stage of their growth. This treatment resulted in an increase in the size of their heads as well as of these stems and possibly a correlative greater liability to damage from wind."

SYNTHETIC RUBBER.

The discoveries of Professor Harries, of Kiel in synthetic rubber, making turn out to be onlya new method of making it from isoprene-in which is polymerised on heating in a closed tube to above 100c with glacial acetic acid. The produce, it is noted, is "very expensive" and only of scientific interest at present, but IF IT COULD BE PRODUCED CHEAPLY its purity is such that it would compete with natural rubber. "It is rumoured that a company is to be formed with a capital of a million to start the manufacture." (Ext. Chemist and Druggist, April 23, p. 121).—ED.

TOXINS.

In the annual report of the Board of Scientific Advice for India from 1908-1909 on the subject of Mr. Fletcher's article of Toxins produced by plant roots, we read that Dr. Russell criticizes this work and says that with regard to the field of experiments, the falling off in yield which Mr. Fletcher ascribes to the excretion of toxin substances by other plants is no proof that toxin substances are excreted and it is generally explained as due to lack of food or water.

With reference to the water culture experiments it may be stated here that Mr. Fletcher obtained a solution of excreta by growing plants in water culture and then used this solution as a medium for plant growth. He found the medium to be toxic. Dr. Russell says that Mr. Fletcher took no precaution to prevent the development of bacteria and that there is no evidence to show that the toxic substance was excreted by the plant. It might equally well have been a bacterial product. Mr. Fletcher's contention is at present not proved.

Articles on this question of toxins have already appeared in the Bulletin.—ED.

RUBBER TREES AND GREEN MANURING.

Mr. R. D. Anstead, B.Sc., late Agricultural Superintendent in Grenada, under the Imperial Department of Agriculture, gives an account of an experiment, having connexion with the same subject which was carried out by him recently in South Travancore. In this, two samples of soil were taken, one from under a very poor covering of *Passiflora* sp., and one from a patch which had been kept clean weeded, and which was exposed to the sun. Equal weights of the samples were dried in an oven for five or six hours, and the weights taken again, when it was found that, although the *Passiflora* was of poor growth and gave a minimum of shade, the soil beneath it contained 11 per cent. more moisture than that of the area which had been kept clear of weeds.

Mr. Anstead points out that this experiment is a strong argument in favour of keeping the ground covered with a growing cover crop, even during the dry season, at any rate in some kinds of cultivation, and suggests that leguminous weeds, such as *Cassia mimosoides*, may well be used in the place of plants like *Passiflora*. He also draws attention to the usefulness of plants grown in this way, in the prevention of the loss of surface soil by washing during heavy rains.—The Agricultural News, Vol. IX, p. 185.

CORRESPONDENCE.

CHRONOLOGY OF RUBBER.

20, Eastcheap,
London, E.C. 18th July, 1910.

DEAR MR. RIDLEY,

I have just been reading your interesting Historical Notes on Rubber in the Agricultural Bulletin. I have referred to my papers on the subject and the following I find are dates of interesting events you have omitted on your chronological table :

1883. First fruiting of trees at Heneratgoda, 260 seedling plants raised at Heneratgoda

1884. 1,000 Do. Do.

1884. First fruiting of Ceylon trees at Peradenia.

1888. 11,500 seeds sent to Straits from Heneratgoda.

1894. Dr. Trimen reports: "I do not think it desirable or indeed of any use, to commence bleeding the trees before they are at least 10 years old."

1898. Mr. J. C. Willis in his tapping operations used "a clay "gutter made round the tree about six inches above the "ground so arranged as to catch the milk," the other "requisites" were "a ¾ in. chisel a wooden mallet, and "a number of clean coconut shells."

Yours truly,
H. K. RUTHERFORD.

RAPID DEVELOPMENT OF DIPLODIA.

A planter writes as follows:—

"DEAR MR. RIDLEY,

This morning I have sent you a case containing a dead Hevea tree. On the 6th inst. I found on the Estate a patch of about ½ acre on which *all* the trees—about 40, 2½ years old Hevea trees—were dead or dying. The trees had apparently been attacked by a disease taking its rise in the fresh shoots and spreading downwards through the branches and the stems. I saw the same trees a week before I discovered them attacked and know surely that they did not show any sickness then. The attack has thus been very sudden and severe. I eradicated all the sick trees and burned them.

Perhaps this is the branch and stem disease, mentioned in the Bulletin No. 6 of the Department of Agriculture, at any rate it appears to be a serious one."

No doubt this is the *Diplodia*, but the specimen never came to hand.

COCONUT CULTIVATION IN THE F.M.S.

Mr. L. C. Brown has brought out an useful article on this subject as one of the F.M.S. department of Agriculture Bulletins. Though only consisting of nine pages, it contains in a few words a considerable amount of information as to selection of sand, cultivation returns and expenses in a handy form for any would-be planter to get an idea of what is to be done and how he can start his plantation.

There is a large opening for a complete and up-to-date volume on the subject of this most important industry. The only work of the kind is the last edition of Ferguson's all about coconuts and this useful little work might be ten times larger with the general information on the Coconut tree and its produce that we now possess.—ED.

PERSONAL.

Mr. T. Main left the Botanic Gardens Department on the 20th of June last to take charge of a Rubber Estate near Ching, Malacca. He had been in the Gardens Department of the F.M.S. when he joined the Botanic Gardens, Singapore, on April 1st 1908. He is succeeded by Mr. J. A. Anderson, formerly employed in Kew Gardens, who was appointed on July 29th, 1910.—ED.

MINUTES OF PLANTERS' ASSOCIATION OF MALAYA.

General Meeting Held at the Volunteer Drill Hall, Singapore, on August 18, 1910, at 10 a.m.

PRESENT.

For Kuala Lumpur District Planters' Association:—Messrs. F. G. Harvey, H. F. Dupuis, C. Burn-Murdoch and H. C. E. Zacharias.

For Malay Peninsula Agricultural Association:—Messrs. W. Duncan and Geo. Stothard.

For Malacca Planters' Association:—Hon F. W. Collins and Mr. H. M. Darby.

For Klang District Planters' Association:—Messrs. J. Gibson and W. H. Trotter.

For Kapar District Planters' Association:—Mr. H. W. Bailey.

For Johore Planters' Association:—Messrs. R. Pears and H. M. Morschell.

For Batu Tiga District Planters' Association:—Messrs. H. E. G. Solbe and H. L. Jarvis.

For Kuala Langat District Planters' Association:—Messrs. F. J. Dupuis and R. W. Munro.

For Kuala Selangor District Planters' Association:—Messrs. O. Pfenningwerth and W. Towgood.

For Kelantan Planters' Association:—Mr. E. D. Cameron.

For Batang Padang Planters' Association:—Mr. H. E. Darby.

Visitors:—Messrs. E. D. Bryce, A. McKenzie, S. H. Burgess, R. F. Lamb, T. W. Main, E. G. Watts, R. M. Mitchell, G. Pfenningwerth, G. N. Stevens, B. J. Eaton H, N. Ridley, C. H. Niven, W. M. Muller, C. M. Bell, J. S. Cooper, A. H. S. McGuy, M. De Coispellier, Baron J. Issaverdens, C. E. Cunningham, W. J. Peters, J. G. Hubback, W. P. Pinckney and W. H. T. Pattensow.

Chairman:—Mr. C. M. Cumming.
Secretary:—Mr. H. C. E. Zacharias.

1. The Notice convening the Meeting having been read, the Hon. F. W. Collins rises to congratulate Mr. Malcolm Cumming on his election to the Federal Council, for they would all agree that a better selection could not have been made. All knew what he had done for the Rubber Industry, and the Council would find he was a very solid factor.

2. Mr. Malcolm Cumming thanks the meeting for its good wishes and assures them he would do his best in their interests and for the Rubber Industry generally.

Before proceeding with the business that had called them here, to-day, he expected they would wish him to say a few words. They would have either heard or read His Excellency's speech on opening the Agricultural Show and they must be gratified to find how much of it was taken up by Rubber in posse, and in esse. They had to record their thanks to the Government for what had been done in the past year in their interests, i.e. the strengthening of the agricultural department and the passing of the Rubber Dealers' Enactment; which although framed to protect their interests, would need alteration and an adequate staff to carry out its provisions. He thought they would all endorse His Excellency's remarks with regard to the loss sustained by the planting community by the resignation of Mr. Gallagher; but they would be gratified to hear that the agricultural department was still further to be strengthened in the near future.

From what His Excellency had said it would be inferred that six years hence we would be turning out rubber equal to the world's production to-day. If his estimates are realized, this may be so, but they must not forget that the consumption of rubber was said to be increasing in an almost equal ratio, so that he hoped they need not be in despair,

With reference as to what had been said and written with regard to labour in the F. M. S., there were no doubt many people at home and elsewhere who would infer from numerous news-paper articles that the planters are an inhuman body of persons. Apart from all moral obligations, it would not pay them, in view of their future labor requirements, to allow any hardship or cruelty and he would most emphatically and publicly deny on their behalf all such allegations.

That in times of depression it must be acknowledged they were not in a position to study their own health or that of their coolies, he was prepared to admit; but generally throughout the Peninsula to-day he affirmed that every effort was being made to improve the health of the Asiatic and the European employees and he purposely put the coolies first.

He must apologize for taking so much of their time and he felt sure they would wish to place on record a very hearty vote of thanks to the Executive of the Agricultural Show for the splendid arrangements they had made and their thanks for the hospitality accorded to them in Singapore.

3. The Minutes of the previous Meeting are taken as read and confirmed.

4. The Secretary reads the following letter to hand from the Federal Secretary:—

No. 2365/1910, *4th July, 1910.*

SIR,—With reference to your letter dated the 5th May, 1910, suggesting an amendment to "The Praedial Produce Protection Enactment," I am directed to point out that by the amending Enactment of 1907 the definition of 'plantation' was extended to include rubber estates, and the definition of 'produce' was extended to include latex and seeds.

There does not therefore appear to the Acting Resident General to be any necessity for the suggested amendment.

I have, etc.,
(Sgd). E. C. H. WOLFF,
for Federal Secretary.

The Secretary informs the Meeting that he has consulted their legal Adviser, and that it would seem, that the Federal Secretary had missed the point altogether. By a recent decision the law read that latex meant only the latex as long as it was in a fluid state and that as soon as it became rubber it was outside that definition. Therefore, it had been suggested that they should have the words "and any other produce of any plant or tree" inserted in the Enactment.

The Secretary is instructed to take steps in this direction.

5. RECRUITING ADVANCES.

The Chairman says that was a matter which had had their attention on several occasions and the members of the Association were by no means unanimous on the point. In view therefore of the very large influx of Indian and other labour under the existing conditions, he thought they would agree that the least said in the meantime on the matter, the better.

Resolved to let the matter rest there.

6. ABSCONDING COOLIES.

The Chairman says this was a very important point and no doubt would lead to some amount of discussion. Most of them recruited coolies from India: they came over here to their estates and then very often they walked off the estate without giving the Manager any notice. The coolies were then arrested and brought before a magistrate. Some magistrates recognised that the coolies should be punished and inflicted small fines, but other magistrates would not recognise the offence and simply ordered that the coolie be taken back to the estate, from which he often absconded again the very next day. There was no desire whatever on their part to force the labourer on to an unhealthy estate, from which he wished to get away, their object being merely, to prevent large numbers of coolies walking off without giving the managers any opportunity of replacing them. Steps should be taken to protect their interests in the matter.

Mr. Jarvis, asks whether it would not be possible to arrange for a bonus scheme by which a coolie if he worked on an estate for two or three years would have his passage paid home again.

The Chairman said he knew several places where that was done but he did not think they could get legislation on that point. It was more a matter for individual arrangement.

Mr. Gibson says the matter was a serious one and was growing in importance every day. It was not only the unhealthy but the healthy estates which suffered. They got their coolies over from India and as a rule they were an unhealthy lot, suffering from cholera, small-pox and other diseases. There were a certain number in the planting industry, not associated with their association, who quietly kept in the background and after they had got their coolies fit and healthy and skilled to tap, their efficiency made them valuable, they immediately left the estate and got into a kampong or some chinese place where the planters did not recruit, and there instead of getting their ordinary 30 cents, they were paid 35 or 40 cents. They hunted round for the coolie, after paying their registration fee, and after finding the coolie brought them before a magistrate, and, as the Chairman had said, some would not recognise that a coolie who had left his employer without giving a month's notice had committed an offence. The magistrate would simply order the coolies back to the estate, they took them back, and the next morning they would find the coolies had gone again. The Enactment was not adequate to meet the case and there should be something introduced to prevent the coolies leaving in that way. He moved that the Labor Enactment be amended so as to make it a criminal offence for a free laborer to leave his emyloyer without giving a month's notice.

Mr. Jarvis asks, whether it was not a criminal offence already, for coolies to leave without notice.

The Chairman says that was just the point in dispute. The interpretation of the law was uncertain amongst various magistrates. What they wanted was a law so that all the magistrates could be of one mind on the subject.

Mr. Bailey seconds the motion and mentions that in Ceylon if a coolie left without a month's notice he got three months in gaol.

The motion is carried and the Secretary is instructed to consult with the Association's solicitor.

7. LONDON RUBBER EXHIBITION.

The Secretary lays on the table conditions for Silver Shield presented by The India Rubber Journal and reads the following correspondence:—

A. Staines Manders, Esq.,
London. *6th July, 1910.*

DEAR SIR,—In reply to your letters of January 20th and February 24th, we agree to bespeak 2806 sq. ft. of space at the forthcoming International Rubber and Allied Trades Exhibition, to be held in London during June 1911, at the rate of 4s/- per sq. ft.

The stand marked by you in blue is No. 3/4 and we will take this, if necessary; but would prefer No. 1/2, if you could still secure same for us.

I have, etc.,
(Sgd.) H. C. E. ZACHARIAS,
Secretary.

The Federal Secretary,
Kuala Lumpur. *6th July, 1910.*

SIR,—I have the honor to acknowledge receipt of your letter No. 37 of May 13th and in reply to thank you for the grants promised.

A meeting of the Director of Agriculture, F. M. S., and the Director of Gardens, S. S. with representatives of this Association during the forthcoming Agri-Horticultural Show in Singapore has been arranged.

In the meantime I have secured 2806 sq. ft. of space at the rate of 4s/- per sq. ft. in the most commanding position of the Show.

I have, etc.,
(Sgd.) H. C. E. ZACHARIAS,
Secretary.

A Sub-Committee, consisting of the Chairman, the Secretary and Mr. W. Duncan is elected to carry out all necessary arrangements in conjunction with the Director of Agriculture, F.M.S., and the Director of Gardens, S.S.

8 RETURNS OF SICK.

The Secretary reads the following correspondence:—

The Federal Secretary,
Kuala Lumpur. *6th July, 1010.*

SIR,—In further reference to your letter No. 1165 of May 6th, I am instructed to suggest, that detailed monthly returns be furnished to Government by the Estate Hospitals on behalf of the estates concerned, instead of returns being supplied by each estate; the returns to consist of copies of the Indoor Admission and Outdoor Attendance Books.

I have, etc.,
(Sgd.) H. C. E. ZACHARIAS,
Secretary.

No. 1165/1910. *16th July, 1910.*

SIR,—With reference to your letter dated the 6th July, 1910, I am directed to forward a form for monthly returns of sick recommended by the Committee which recently sat to consider the question of sanitation on estates, and I am to enquire whether this form meets with the approval of the Association. (Vide Appendix).

I have, etc.,
(Sgd.) E. C. H. WOLFF,
for Federal Secretary.

Resolved that the form submitted be approved.

9. ENFORCEMENTS OF ENACTMENTS.

The Secretary reads the following letter:

The Federal Secretary, F. M. S.,
Kuala Lumpur. *11th July, 1910.*

SIR,—I have the honor to submit that the staffs of those departments, which are specially charged with matters closely affecting the Planting Industry, do not seem to have been increased in proportion with the growth of the latter.

I would instance the registration of all Tamil Coolies, which though legally incumbent on every employer of Tamil Labor. is to all practical intents and purposes a dead letter, since the Department in charge, viz., the Indian Immigration Department, has apparently not got a sufficient number of Officers, to see that the law is carried into effect.

Similarly the enforcement of the Hospital Rules in the case of large contractors does not seem to have been attempted, notwithstanding the notoriously insanitary manner, in which these employers house their coolies.

As a further instance I would mention the registration of rubber trees under the Rubber Dealers' Enactment. At present these records are kept at the various Land Offices, although it must be obvious that these Officers have not the time, to check and scrutinize the returns received by them in the manner intended by the Enactment.

Under the circumstances, the Members of this Association feel that the attention of the Government should be called to the present very unsatisfactory and undignified state of affairs and to submit that the staffs concerned be strengthened by an immediate and adequate increase in the number of officers.

I have, etc.,
(Sgd.) H. C. E. ZACHARIAS,
Secretary.

The Chairman remarks that steps were being taken already to establish coolie registration offices throughout the F.M.S.

10. COMPULSORY GRADING OF AGRICULTURAL EXPORTS.

The Secretary reads the following letter:

No. 3379/1910. *14th July, 1910.*

SIR,—I am directed to inform you that it has been represented that a large amount of the copra exported from the Federated Malay States is of an inferior description, and that it is desirable that some restrictions should be imposed.

2. It appears not unlikely, in view of the large number of immature trees tapped by native owners, that a similar question may arise with regard to rubber.

3. It is clear that where there is a considerable export of produce of inferior quality, the particular district or country concerned acquires a bad reputation which has its effect on produce of good quality from the same area; and it has been suggested that provision should be made by legislation to compel grading and classification of agricultural produce exported, and the declaration of such grade or class on the package.

4. The subject is one of considerable importance and the Acting Resident-General would be glad to learn the views of the Planters' Association on the desirability of defensive legislation.

I have etc.,
(Sgd.) E. C. H. WOLFF,
for Federal Secretary.

The Chairman says the matter was most important, but, as the letter had only just come before them, he thought it would be better if they had time to confer with business men, and amongst themselves, as to what steps it was advisable to take. They should come to no hasty conclusion that day.

The Secretary is instructed to place this matter on the next meeting.

11. COMPENSATION RELEASE INDENTURED TAMILS.

At the request of the Chairman, B. Padang District Planters' Association, this matter is withdrawn.

12. DRAINAGE. KAPAR.

The Secretary reports of various letters from the R. G. A. on this subject and is instructed to hand same to the Chairman of the Kapar District Planters' Association.

Resolved that the next Meeting be held at Kuala Lumpur on October 30th.

With a vote to the Chair, the Meeting terminates at 11.15 a.m.

(Sgd.) H. C. E. ZACHARIAS.
Secretary.

SINGAPORE MARKET REPORT.

June, 1910.

Articles.	Quantity sold.	Highest price.		Lowest price.	
	Tons.	$	c.	$	c.
Coffee—Liberian	45	29	75	29	50
Copra	8,213	10	30	9	00
Gambier Bale	2,140	11	80	11	45
,, Cube No. 1 and 2 ...	270	14	90	14	50
Gutta Percha, 1st quality	...	350	00	300	00
,, Medium	...	240	00	120	00
,, Lower	...	100	00	26	00
Gutta Jelotong	...	15	00	10	00
Nutmegs, 110 s.	...	18	00	17	50
,, 80 s.	...	25	00	24	00
Mace, Banda	...	98	00	90	00
,, Amboina	...	82	00	78	00
Black Pepper	1,305	13	87½	13	37½
White Pepper	252	26	00	24	75
Sago, Pearl small	60	5	25	...	
Sago Flour, No. 1	4,625	3	42½	2	95
,, 2	45		90		80
Tapioca Flake, small	611	6	10	5	70
,, Medium	42	...		...	
Tapioca Pearl, small	149	6	60	5	90
,, Medium	479	6	75	6	05
,, Bullet	...	8	75	...	
Tin	2,525	75	70	74	37½

SINGAPORE MARKET REPORT,

July, 1910.

Articles.	Quantity sold.	Highest price.		Lowest price.	
	Tons.	$	c.	$	c.
Copra	6,820	10	10	9	25
Gambier Bale	1,775	11	72½	11	40
„ Cube No. 1 and 2 ...	240	14	85	14	02½
Gutta Percha 1st quality	...	350	00	300	00
„ Medium	...	240	00	120	00
„ Lower	...	100	00	26	00
Gutta Jelotong	...	14	00	10	75
Nutmegs, 110 s.	...	17	50	17	00
„ 80 s.	...	24	50	23	50
Mace, Banda	...	100	00	90	00
„ Amboina	...	82	00	78	00
Black Pepper	143	13	50	...	
White Pepper	430	26	25	24	87½
Sago Pearl Small	270	4	60	4	25
„ Medium	40	...		...	
Sago Flour, No. 1	4,485	3	60	3	00
„ 2	25		80		77
Tapioca Flake, Small	825	6	45	6	00
„ Medium	85	...		...	
„ Pearl, Small	392	6	40	6	00
„ Medium	507	6	45	6	25
Tin	2,632	75	55	74	32½

EXPORTS TELEGRAM TO EUROPE AND AMERICA.

15th to 30th June.

		Steamers.		Tons.	Tons.
Tin	Str	Singapore & Penang to	U. Kingdom &/or	767	1391
Do.		do.	U.S.A.	640	806
Do.		do.	Continent	333	180
Gambier		Singapore	Glasgow	—	—
Do.		do.	London	25	50
Do.		do.	Liverpool	100	—
Do.		do.	U.K. &/or Continent	—	50
Cube Gambier		do.	United Kingdom	150	20
Black Pepper		do.	do.	10	5
Do.		Penang	do.	—	—
White Pepper		Singapore	do.	110	20
Do.		Penang	do.	—	—
Pearl Sago		Singapore	do.	45	120
Sago Flour		do.	London	575	125
Do.		do.	Liverpool	1,800	—
Do.		do.	Glasgow	—	—
Tapioca Flake		Singapore	United Kingdom	95	110
T. Pearl & Bullet		do.	do.	160	90
Tapioca Flour		Penang	do.	150	225
Gutta Percha		Singapore	do.	140	130
Buffalo hides		do.	do.	160	—
Pineapples		do.	do.	30,000	15,000
Gambier		do.	U.S.A.	50	400
Cube Gambier		do.	do.	120	15
Black Pepper		do.	do.	85	260
Do.		Penang	do.	—	140
White Pepper		Singapore	do.	35	70
Do.		Penang	do.	—	5
Tapioca Pearl		Singapore	do.	25	85
Nutmegs		Singapore & Penang	do.	15	18
Sago Flour		Singapore	do.	280	230
Pineapples		do.	do.	1250	3500
Do.		do.	Continent	3750	3000
Gambier		do.	S. Continent	210	75
Do.		do.	N. Continent	340	350
Cube Gambier		do.	Continent	40	70
Black Pepper		do.	S. Continent	175	120
Do.		do.	N. Continent	150	150
Do.		Penang	S. Continent	25	10
Do.		do.	N. Continent	—	—
White Pepper		Singapore	S. Continent	5	5
Do.		do.	N. Continent	80	30
Do.		Penang	S. Continent	10	10
Do.		do.	N. Continent	5	10
Copra		Singapore & Penang	Marseilles	360	700
Do.		do.	Odessa	—	1175
Do.		do.	Other S. Continent	150	100
Do.		do.	N. Continent	1750	2850
Sago Flour		Singapore	Continent	1150	550
Tapioca Flake		do.	do.	110	20
Do. Pearl		do.	do.	—	—
Do. Flake		do.	U S.A.	—	75
Do. do.		Penang	U.K.	50	75
Do. Pearl & Bullet		do.	do.	50	180
Do. Flake		do.	U.S.A.	—	—

	Steamer.		Tons.	Tons.
Do. Pearl	do.	do.	—	210
Do. Flake	do.	Continent	10	40
Do. Pearl	do.	do.	45	250
Copra	Singapore & Penang	England	660	500
Gutta Percha	Singapore	Continent	50	75
Cube Gambier	do.	do.	—	—
T. Flake & Pearl	do.	do.	—	—
Sago Flour	do.	do.	—	—
Gambier	do	S. Continent	—	—
Copra	do.	Marseilles	—	—
Black Pepper	do.	S. Continent	—	—
White Pepper	do.	do.	—	—
Do.	do.	U.S.A.	—	—
Pineapples	do.	do.	—	—
Nutmegs	do.	do.	—	—
Black Pepper	do.	do.	—	—
Do.	Penang	do.	—	—
White Pepper	do.	do.	—	—
T. Flake & Pearl	do.	do.	—	—
Nutmegs	do.	do.	—	—
Tons Gambier			1200	800
Do. Black Pepper			750	450

PENANG.

Abstract of Meteorological Readings in the Prison Observatory Penang for the month of July, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
Prison Observatory Penang ...	29.869	19.6	82.7	90.4	71.1	19.3	78.6	.920	75.9	82.4	S.E.	2.98	1.12

Surgeon's Office,
11th August, 1910.

M. E. SCRIVEN,
Assistant Surgeon.

B. DANE.
Senior Medical Officer, Penang.

SELANGOR.

Abstract of Meteorological Readings in the various Districts of the State for the month of July, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
General Hospital, Kuala Lumpur ...	29.868	145.7	81.0	90.1	72.0	18.1	75.9	0.798	72.5	76	Calm.	5.54	2.24
Pudoh Gaol " "	...	...	...	...	...	...	...	...	...	...	...	5.36	2.41
District Hospital "	...	...	...	...	...	...	...	...	...	...	...	8.26	2.35
" Klang	...	...	...	91.1	69.8	21.5	...	...	...	...	...	4.82	1.41
" Kuala Langat ...	...	...	...	88.8	73.4	15.8	...	...	...	...	...	7.36	3.20
" Kajang	...	...	...	86.3	74.9	11.4	...	...	...	...	...	4.55	1.22
" Kuala Selangor ...	...	...	...	88.0	75.0	13.0	...	...	...	...	...	1.50	0.55
" Kuala Kubu	...	...	...	91.7	70.3	21.4	...	...	...	...	...	10.06	1.88
" Serendah	...	...	...	92.8	70.8	22.0	...	...	...	...	...	8.52	3.41
" Rawang	...	...	...	90.7	70.7	19 9	...	...	...	...	...	8.45	2.86
Sabak Bernam	...	...	...	...	...	...	...	...	...	...	...	1.64	0.48

Office of Senior Medical Officer,
Kuala Lumpur, 15th August, 1910.

G. D. FREER,
Senior Medical Officer, Selangor.

KELANTAN.

Abstract of Meteorological Readings in Kelantan for the month of July, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	%	...	Ins.	Ins.
Kota Bharu	...	148.4	83.2	87.9	75.0	12.9	79.7	.943	77.5	83	...	5.69	1.80
Kuala Lebir	...	...	78.6	90.2	72.6	17.6	75.6	.820	73.3	83.9	...	7.36	3.00
Kuala Kelantan	...	..	...	82.68	75.87	6.81	...	...	...	...	...	5.81	2.67
Kuala Pahi	...	...	...	86.06	72.16	13.90	...	...	...	...	...	3.82	1.33
Taku Plantation	...	...	...	...	...	...	...	...	...	...	...	3.24	1.92
Pasir Besar	...	...	...	...	...	...	...	...	...	...	...	5.33	2.70
Nenggiri	...	...	...	...	...	...	...	...	...	...	...	10.56	2.02
Pasir Tinggi	...	...	...	...	...	...	...	...	...	...	...	6.44	2.93
Chaning Estate	...	...	...	...	...	...	...	...	...	...	...	3.93	1.18

Residency Surgeon's Office,
Kota Bharu, 20. 8. *1910.*

John D. Gimlette,
Residency Surgeon, Kelantan.

NEGRI SEMBILAN.

Abstract of Meteorological Readings in Negri Sembilan Hospitals for the month of July, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Seremban		150.5	81.4	86.5	70.8	15 9	76.2	.808	72.8	75.2	W	5.21	.91
Mantin												4.12	1.75
Tampin												4.89	1 80
Kuala Pilah												3.48	.89
Jelebu												2.84	.83
Port Dickson Town												8.92	2.08
Do. B. B.												8.10	3.00

Medical Officer in Charge's Office,
Seremban *13th August 1910.*

A. J. M. MOSLEY,
Medical Officer in Charge.

PAHANG.

Abstract of Meteorological Readings in the various Districts of the State for the month of July, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Mean Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity. %			
Kuala Lipis	...	...	75.8	92	65	20.6	74.40	.897	73.41	91	...	6.65	2.75
Raub	...	...	78.7	93	64	20.77	75.20	.990	72.79	83	...	3.84	1.80
Bukit Fraser	...	...	...	...	59	...	...	...	...	...	...	7.83	2.69
Bentong	...	...	80.22	92	67	19.51	75.41	.023	72.14	78	...	4.00	1.00
Temerloh	...	...	...	97	70	11.22	...	...	...	...	...	2.40	.90
Pekan	...	...	83.	93	70	17.7	78.1	.128	74.65	78	...	5.30	1.34
Kuantan	..	...	84.8	93	69	19.19	74.91	.203	68.47	59	...	3.61	1.3
Sungei Lembing	...	...	...	87	66	...	...	...	...	...	...	7.37	2.24

Office of the Medical Officer in Charge,

K. Lipis, 23rd August, 1910.

CECIL F. NICHOLAS,

for Medical Officer in Charge, Pahang.

SEREMBAN.

Table showing the Daily Results of the Reading of Meteorological Observation taken at the General Hospital, Seremban, for the month of June, 1910.

Date.	Temperature of Radiation. 9 H.	15 H.	Mean.	Maximum.	Minimum.	Range.	Temp. of Radiation. Sun.	Difference Sun & Shade.	Wind Direction. 9 H.	15 H.	Temp. of Evaporation. 9 H.	15 H.	Mean.	Computed Vapour Tension 9 H.	15 H.	Mean.	Relative Humidity. 9 H.	15 H.	Mean.	Clouds 0 to 10. 9 H.	15 H.	21 H.	Cloud and Weather Initials. 9 H.	15 H.	21 H.	Rain. Inches.
1	81	89	85.	90	74	16	148	58	NW	SW	74.3	76.	75.1	.849	.895	.872	80	65	72.5	0	0	0	S	S	S	
2	80	80	80.	89	74	15	144	55	NW	NW	75.	76.6	75.8	.867	.916	.891	85	90	87.5	0	7	6	S	N	C	.43
3	80	81	80.5	84	72	12	132	48	NW	NW	75.	77.7	76.8	.867	.947	.907	85	90	87.5	0	10	0	S	N	S	.58
4	78	80	79.	89	73	16	140	51	NW	W	74.6	76.7	75.6	.857	.916	.886	89	90	89.5	0	8	5	S	N	C	.05
5	73	84	81.	86	74	12	139	53	NW	NW	74.6	75.7	75.1	.857	.888	.872	89	76	82.5	0	0	0	S	S	S	
6	74	86	80.	88	71	17	141	53	NW	W	72.3	76.1	74.2	.793	.904	.848	94	72	83.	0	0	0	S	S	S	
7	78	81	79.5	86	73	13	134	48	W	W	74.6	76.	75.3	.857	.897	.877	89	85	87.	0	6	4	S	C	C	.04
8	76	85	80.5	88	73	15	144	56	NW	NE	74.3	76.7	75.5	.848	.922	.885	94	76	85.	0	7	0	S	N	S	
9	76	87	81.5	88	74	14	145	57	NW	SW	74.3	73.9	74.1	.848	.837	.842	94	65	79.5	0	0	0	S	S	S	
10	80	90	85.	91	72	19	148	57	NW	W	75.	73.7	74.3	.867	.833	.850	85	59	72.	0	0	0	S	S	S	
11	78	86	82.	87	75	12	136	49	NW	NW	74.6	74.5	74.5	.857	.855	.856	89	68	78.5	4	0	9	C	S	N	2.45
12	76	86	81.	88	72	16	139	51	NW	NW	72.6	76.1	74.3	.801	.904	.852	89	72	80.5	0	0	10	S	S	N	1.11
13	79	79	79.	85	73	12	135	50	NW	NE	75.6	75.6	75.6	.887	.887	.887	90	90	90.	0	0	8	S	S	N	.70
14	76	84	80.	84	72	12	131	47	W	SW	74.3	74.	74.1	.848	.840	.844	94	72	83.	6	0	0	C	S	S	
15	79	84	81.5	86	73	13	136	50	W	W	73.9	75.7	74.8	.839	.888	.863	85	76	80.5	0	8	7	S	N	N	1.21
16	75	83	79.	85	73	12	135	50	NE	W	73.3	76.3	74.6	.820	.905	.862	94	80	87.	6	6	9	C	C	N	.10
17	77	76	76.5	87	72	15	143	56	NE	W	73.6	72.6	73.1	.829	.801	.815	89	89	89.	0	10	5	S	N	C	1.30
18	75	80	77.5	83	72	11	126	43	W	W	73.3	75.	74.1	.820	.869	.843	94	85	89.5	6	5	6	C	C	C	.04
19	79	84	81.5	86	73	13	137	51	NW	W	75.6	74.	74.8	.887	.840	.863	90	72	81.	0	0	4	S	S	C	.15
20	76	82	79.	86	73	13	140	54	W	W	74.3	75.3	74.6	.848	.877	.862	94	80	87.	0	0	0	S	S	S	
21	76	75	75.5	82	72	10	140	58	W	NW	74.3	73.3	73.6	.848	.820	.834	94	94	94.	0	10	0	S	N	S	1.00
22	78	83	80.5	86	72	14	146	60	W	SW	72.9	71.3	72.1	.810	.766	.788	84	68	76.	0	0	0	S	S	S	.11
23	78	86	82.	87	72	15	151	64	NW	SW	72.9	71.2	72.	.810	.763	.786	84	61	72.5	0	0	0	S	S	S	.19
24	76	84	80.	85	71	14	141	56	N	SW	72.6	75.7	74.1	.801	.888	.849	89	76	82.5	0	0	0	S	S	S	
25	76	86	81.	88	71	17	145	57	W	SW	72.6	76.1	74.3	.801	.904	.853	89	72	80.5	0	0	0	S	S	S	
26	78	88	83.	90	73	17	151	61	W	SW	74.6	74.9	74.7	.857	.865	.861	89	65	77.	0	0	0	S	S	S	.14
27	73	85	79.	88	70	18	144	56	N	SW	71.3	73.4	72.3	.766	.826	.796	94	68	81.	6	0	0	C	S	S	
28	78	87	82.5	89	72	17	149	60	W	W	72.9	72.2	72.5	.810	.792	.801	84	61	72.5	0	0	0	S	S	S	.27
29	79	86	82.5	88	70	18	144	56	W	SW	72.3	69.5	70.9	.793	.721	.757	80	58	69.	0	0	0	S	S	S	
30	76	83	79.	85	72	13	143	58	NW	NW	72.6	69.7	71.1	.801	.724	.762	89	64	76.5	3	2	0	S	S	S	
Mean.	77.3	83.6	80.4	86.8	72.4	14.3	140.9	54.1	W	W	73.4	75.2	74.1	.835	.856	.846	88.8	74.6	81.7							9.87

Seremban,
12th July, 1910.

Highest Temperature 91
Lowest Temperature 70

Greatest Rainfall in 24 hours 2.45

A. J. M. CLOVELY,
Senior Medical Officer.

SEREMBAN.

Table showing the Daily Results of the Reading of Météorological Observation taken at the General Hospital, Seremban, for the month of July 1910.

Date.	Temperature of Radiation.						Temp. of Radiation.		Wind Direction.		Temp. of Evaporation.			Computed Vapour Tension			Relative Humidity.			Clouds 0 to 10			Cloud and Weather Initials.			Rain.
	9 H.	15 H.	Mean.	Maximum.	Minimum.	Range.	Sun.	Difference Sun & Shade.	9 H.	15 H.	9 H.	15 H.	Mean.	9 H.	15 H.	Mean.	9 H.	15 H.	Mean.	9 H.	15 H.	21 H	9 H.	15 H.	21 H	Inches.
1	80	86	83.	88	70	18	150	62	N W	S W	73.3	69.5	71.4	28.0	.721	.770	80	58	69	0	0	0	S	S	S	
2	80	87	83.5	89	70	19	150	61	W	W	69.9	70.6	70.2	73.2	.749	.740	71	58	64.5	0	0	0	S	S	S	
3	81	85	83.	87	70	17	150	63	W	W	74.3	71.8	73.	84.9	.781	.815	80	64	72	0	0	0	S	S	S	
4	81	86	83.5	88	69	19	155	67	N W	S W	72.6	71.2	71.9	80.2	.763	.782	76	61	68.5	0	0	0	S	S	S	
5	80	87	83.5	88	70	18	153	65	N W	S W	73.3	70.6	71.9	82.0	.749	.784	80	58	69	0	0	0	S	S	S	
6	80	85	82.5	89	71	18	152	63	W	S W	71.6	75.1	73.3	77.5	.873	.824	75	72	73.5	0	0	0	S	S	S	
7	80	86	83.	89	74	15	155	66	N W	S W	75.	74.5	74 7	86.7	.855	.861	85	68	76.5	0	0	7	S	S	N	.03
8	79	77	78.	87	69	18	152	65	N W	W	72.3	71.9	72 1	79.3	.783	.788	80	84	82	0	0	0	S	S	S	.62
9	78	82	80.	85	70	15	151	66	N W	S	72 9	75.3	74.1	81.0	.877	.843	84	80	82	0	0	0	S	S	S	.10
10	80	84	82.	87	68	19	153	66	N W	W	75.	75.7	75.3	86.7	.888	.877	85	76	80.5	0	9	0	S	N	S	.28
11	79	85	82.	87	72	15	154	67	W	W	73.9	71 8	72.8	83.9	.781	.810	85	64	74.5	0	8	0	S	N	S	.91
12	79	83	81.	85	70	15	153	68	W	W	72.3	73.	72.6	79.3	.810	.801	80	72	76	0	0	0	S	S	S	.03
13	80	83	81.5	85	71	14	152	67	W	W	73.3	74.7	74.	82.0	.856	.838	80	76	78	0	0	0	S	S	S	.60
14	77	84	80.5	85	71	14	148	63	W	W	73.6	74.	73.8	82.9	.840	.834	89	72	80.5	4	3	0	C	S	S	
15	81	86	83.5	87	71	16	153	66	N W	S W	72.6	71.2	71.9	80 2	.763	.782	76	61	68.5	0	0	0	S	S	S	
16	78	84	81.	85	72	13	144	59	N W	W	72.9	74.	73.4	81.0	.840	.825	84	72	78	2	0	0	S	S	S	
17	80	85	82 5	87	71	16	151	64	W	W	75.	75.1	75.	86.7	.873	.870	85	72	78.5	0	0	0	S	S	S	.02
18	81	81	81	87	71	16	153	66	N W	W	72.6	74.3	73.4	80.2	.849	.825	76	80	78	0	4	0	S	C	S	.03
19	81	85	83.	88	71	17	157	69	N E	S W	72.6	73.4	73.	80.2	.826	.814	76	68	72	0	9	0	S	N	S	.12
20	77	74	75.5	84	72	12	141	57	N W	S E	73.6	72.3	72.9	82.9	.793	.811	89	94	91.5	0	10	4	S	N	C	.40
21	79	87	83.	88	71	17	150	62	N	N	72 3	72.2	72.2	79.3	.792	.792	80	61	70.5	0	5	10	S	C	N	.74
22	79	85	82.	87	71	16	149	62	W	S W	73.9	73.4	73.6	83.9	.826	.832	85	68	76.5	0	0	5	S	S	C	
23	77	80	78.5	82	74	8	141	59	N W	N W	73.6	73.3	73.4	82.9	.820	.824	89	80	84.5	0	7	6	S	N	C	.25
24	78	82	80.	85	71	14	146	61	N W	N W	72.9	73.6	73.2	81.0	.830	.820	84	76	80	0	7	10	S	N	N	.70
25	78	84	81.	85	70	15	141	56	N W	W	71.2	70.7	70.9	76.5	.751	.758	79	64	71.5	0	0	0	S	S	S	.24
26	77	84	80.5	86	71	15	154	68	W	S W	71.9	72.4	72 1	78.3	.794	.788	84	68	76	0	0	7	S	S	N	.10
27	75	85	80.	86	70	16	147	61	N W	S W	71.6	71.8	71.7	77.4	.781	.777	89	64	76.5	0	0	0	S	S	S	
28	80	86	83.	87	72	15	150	63	W	W	71.6	74.5	73.	77.5	.855	.815	75	68	71.5	0	0	0	S	S	S	.04
29	74	83	78.5	84	70	14	152	68	N W	S W	72 3	71.3	71 6	79.3	.766	.779	94	68	81	4	0	0	C	S	S	
30	80	85	82.5	87	72	15	150	63	W	W	73.3	71.8	72.5	82.0	.781	.800	80	64	72	0	0	0	S	S	S	
31	79	86	82.5	87	70	17	151	64	N W	S W	72.3	72.8	72.5	79.3	.808	.800	80	64	72	0	0	0	S	S	S	
Mean.	78 9	83.9	81.4	86.5	70.8	15.9	150.5	63.7	N W	S W	72.8	72.8	72.8	81.0	.809	.808	81.7	68 8	75.2							5.21

Seremban,
12th July, 1910.

Highest Temperature 89
Lowest Temperature 68

Greatest Rainfall in 24 hours .91

A. J. M. CLOVELY,
Senior Medical Officer.

PERAK.

Abstract of Meteorological Readings in Perak for the month of July, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Taiping	...	108	82.24	92	69	23	77.39	876	...	79	...	7.62	1.51
Kuala Kangsar	...	...	80.56	92	68	24	75.96	835	...	80	...	6.57	1.55
Batu Gajah	...	105	81.56	93	69	24	77.06	868	...	81	...	9.91	2.64
Gopeng	...	...	81.35	91	...	...	75.68	812	...	76	...	8.33	1.70
Ipoh	...	...	81.85	92	...	...	78.41	925	...	85	...	5.44	1.14
Kampar	...	...	81.47	91	70	21	76.47	843	...	78	...	12.28	2.15
Teluk Anson	...	...	82.59	91	70	21	77.65	880	...	79	...	8.28	2.10
Tapah	...	...	81.48	92	68	24	76.30	839	...	78	...	9.96	2.80
Parit Buntar	...	...	81.92	91	71	20	76.93	858	...	78	...	5.86	1.28
Bagan Serai	...	...	82.49	91	70	21	77.25	868	...	79	...	6.11	1.85
Selama	...	...	81.05	93	71	22	76.24	837	...	80	...	14.96	3.95

Office of Senior Medical Officer,

12th August, 1910.

S. Lucy,

Senior Medical Officer, Perak.

No. 10.] OCTOBER, 1910. Vol. IX.

Agricultural Bulletin

OF THE

STRAITS

AND

FEDERATED MALAY STATES.

EDITED BY

H. N. RIDLEY, M.A., F.R.S., F.L.S., F.R.H.S.

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AGRICULTURAL BULLETIN

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THE AGRICULTURAL SHOW.

The seventh joint Agri-Horticultural Show was held at Singapore on the seventeenth to the twentieth of August. Till he left the Botanic Gardens in June, Mr. T. Main acted as the Secretary and was succeeded by Mr. M. Rodesse, who carried the work to a successful conclusion, assisted by a large committee. The show was held on the Raffles Reclamation ground as on the previous occasion, and was very largely attended by Europeans and Natives. It was opened in the usual way at 11 a.m., on the first day, the admission to the opening ceremony being two dollars, and all subsequent times 25 cents. The weather was fine with a few intermittent showers till the last day which was very rainy.

At the present period of writing we have not the full accounts of the expenses or number of persons admitted, but there is little reason to doubt that the expenses will not prove in excess of the takings and the number of visitors was nearly or quite as large as on the previous occasion.

Among the more important visitors from other countries who were present were Captain de Coispellier and Madame Coispellier from French Indo-China, Dr. Romburg, Dr. Vriens, Dr. Tromp de Haas, Mr. Van Hazzelt, and Mr. Prautch from Manila.

A new feature in the exhibition was the admission of exhibition of rubber for competition from countries outside the Malay Peninsula. Two cups were offered by Dr. Lim Boon Keng and Mr. G. Pertile, respectively, for rubber exhibits and these were allotted to the best exhibits from countries outside the area of the colony and Malay States.

The circular announcing this was by force of circumstances sent out too late perhaps to bring all the exhibits which might have come, but rubber was shown by Capt. le Coispellier from Cochin-China and from Sengore Estate, Java, and from Sumatra.

Another new feature was the delivery of lectures on planting subjects, an idea frequently proposed, in fact, one of the original proposals made when the first of this series of shows was instituted but never carried out. The Planters' Association held a meeting on the 18th, Dr. Brooke delivered a lecture on Estate Sanitation on the 19th, and the Director of Gardens one on the fungus-pests, *Fomes* and *Diplodia*, on the 20th. These meetings, which were very well attended, were held in the billiard room of the Drill Hall which, though small, was capable of containing about 100 people.

An unusually large number of cups were presented chiefly for rubber exhibits this year, and some of these, notably the cup presented by the Sultan and planters of Johore, were very fine. The cups and medals for the Agricultural section were presented by Mrs. Evans on the afternoon of Friday.

Agricultural Produce was exhibited in a long shed, with sloping staging, which, though very suitable for most of the exhibits, was not at all adapted for the oils which being shown in bottles were in a very unstable equilibrium. The exhibits were very extensive, but in some cases not equal to those of previous years, while at the same time there was nothing very striking.

The Padi classes were well filled.

Coconuts were well shown, some exceptionally large ones being shown, and occupied a large portion of the staging. The copra was very varied, some samples fine, clean and bright, and all that could be desired, others poor, ill dried and somewhat mouldy. An additional class this year was for 25 catties to be shown in sacks ready for shipment. There was some obscurity as to what was actually intended to be shown in this class, as to whether a merchant could show a selected sample made up for shipment from any locality, or whether it was only allowable to show a sack of copra grown or prepared in a known locality in the peninsula. There is no definite advantage to be gained by awarding a prize for a sack of copra selected from some hundreds of tons of imported copra from Bali, or further distant islands. It should have been specified that the copra should be from a certificated locality within the prescribed area of the Malay peninsula. Some very large roots of Tapioca were shown, and the flour, pearl and flake gave some work to the judges to decide the merits of the samples. There were a number of exhibits of arrowroots, and some very good ones, but we have seen better. Those of Mr. Norris who has so constantly taken the first prize in previous shows with splendid samples, were this year not up to his usual standard.

Prepared arrowroot and sago were both good and abundantly shown.

The maize was as fine as ever, and there was much of it. The riverside sandbanks of Perak and other parts of the northern districts of the peninsula produce very fine samples.

Both ginger and turmeric were really quite exceptional this year, and the best of the specimens shown would be hard to beat anywhere. The amount exhibited, too, was quite unusual, showing a greater interest taken in these two useful minor crops.

The Tuba-root was good also, though some of the samples were too woody. Nearly all were roots of the true Tuba, *Derris-elliptica*, but on previous occasions we had interesting collections of different poisons of this class from other species of trees or shrubs staged.

Sugar cane was less extensively shown than it has been when the exhibitions was held nearer the cane-districts of Province Wellesley and Perak. It is certainly rather a cumbrous exhibit to bring from long distances. The cultivation of the cane has, however, in any case fallen off owing to its place being so largely taken up by rubber. There was little variety in the exhibits, the yellow eating cane, known as Telor, and a purple field-cane being the only varieties staged. There were, however, good samples of both of these, and the Telor cane carrried away the first prize.

The sugars, coco-nut, nipah and kabong gave some work to the judges, all were abundant and the best samples were exceptionally firm, well flavoured and neatly prepared.

There were a good many samples of coffee, considering how this product has lately dropped out of cultivation, and the cocoa-pods shown were better, more abundant and riper than at most of the previous shows. Some of the pods were of very good size, and there were but few marks of disease so prevalent here. The first prize was allotted to some excellent, though small, pods, of the green variety, the second to some fair Sangue Toro. No prizes were offered this year for tea or indigo, which have always been represented at previous shows.

Betel nuts, both fresh and dried, formed a very conspicuous feature, and were well up to average, and Sireh leaves were more abundantly represented than usual, and very large, fresh and good.

Cloves were scanty, only two good samples, and these not the very best. A nice little lot of mother-cloves, the fruit of the clove tree was shown also, nutmegs were not up to the average standard, especially the fresh ones. Perhaps the season had something to do with this. Mace was better, the red being represented by some very clean and bright spice. But, we have often seen a better show of these spices. Pepper was fair, but not as abundant or fine as we have seen, the fall off in cultivation of late years perhaps accounts for this.

The spice collections were better than usual, both in abundance and arrangement, the large numbers of samples of spices used in curries arranged in little bowls on staging being very attractive and interesting.

Patchouli was abundantly shown but many of the samples were quite odourless, probably too old.

A good prize was offered for camphor for the best sample of that of *Cinnamomum Camphora.* Of this, there were several examples of obviously purchased camphor, one of which bore still the label of the shop, there was also a good sample of Borneo camphor. It was perhaps too premature to offer a prize for this new cultivation. In the fruits and flowers shed Mr. Eaton staged a camphor still in work with samples of camphor, and camphor oil and photographs of trees at Kuala Lumpur.

In the oil and oilcake section,the Singapore Oil Mills easily carried off most of the prizes with grand samples of oils and cakes, but other exhibitors showed good and poor samples of coconut, castor, citronella and lemon grass, some of the aromatic oils shown by native distillers were very deflcient in aroma, and seemed to have mixed with other oils. The Para seed cake appeared to be very good with a pleasant taste and the characteristic slight bitterness of this oil, Kabu-kabu seed (*Eriodendrou anfractuosum*) was very largely shown, and the samples very even.

Of the Getahs, jelutong was fairly good and the guttapercha was represented by some excellent specimens There were a few collections of " local gutta " nearly all of which contained rambong probably cultivated, getah grip, jelutong, etc.

An exhibition of models made of guttapercha attracted much attention and the carriages, machinery, a swan, cat and dog, and very cleverly made figures of natives caused much amusement.

Damars were of the usual style, the collections being good but not exceptional. Dragon's blood contained a number of good samples. The Gambier block and cube was very inferior, only one poor specimen of block, wet and mouldy, and a few samples of lead cubes. Chewing gambier for which no prize was scheduled, was better, and there were some good samples.

In the Fibre section there were no first class collections of fibres, and the black fibre, (fibre of *Areng Saccharifera*) was scantily shown and not of its best.

Tree cotton (Kabu Kabu) was very largely represented and some samples were good, and there was some fair specimens of cotton, Rotans and bamboos were plentiful and walking sticks extensively shown and very variable in form. For medicinal plants, there were two classes, one " open," presumably for Europeans, for which medals were offered, and one for natives, the distinction of the two classes were not sufficiently clearly indicated in the schedule. However, all the exhibits were sent in by natives, one or two collections being very large and carefully named, with native names.

In this shed was also staged a most instructive and interesting exhibit from the Philppipines by Mr. Prautch. It included a very large series of Phillipine timbers, Manila hemp, very fine and long, Gutta-percha, locally made hats and a remarkably fine sample of Caraica cotton obtained at one gathering from a sample plant, a large series of very beautiful photographs, illustrating most of the cultivation and manufactures of Manila was well-worthy of study, and showed the progress that our American friends have already made in opening up their tropical colonies. The whole collection was most attractive and was constantly surrounded by visitors eager to learn what was doing in that part of the east. A special medal was awarded to Mr. Prautch for this exhibit.

The Brunei Malays had a stall of brass and silver work, sarongs, mats, etc. next to this, where their works found a ready sale, and on the other side of the same shed was the tin-workers of Seremban, who also appeared to do good business. Both of these stalls would however have been more in place in the shed for native industries, especially as more room was required for the large padi and coconut exhibits. Agricultural machinery, and tools, pottery, tiles, etc., were also staged in this shed.

RUBBER SECTION.

For this section the fine large drill hall of the Singapore Volunteers had been secured thus affording safe keeping for the rubber while the exhibits were displayed to the best possible advantage. Some idea of the interest taken in this section may be gathered from the following figures:—

State or Settlement	Quantity of Rubber Exhibited
Perak	1172 lbs.
Selangor	2438
Negri Sembilan	975
Johore	480
Kelantan	25
Province Wellesley	497
Dindings	25
Malacca	645
Singapore	250
Total	6982 lbs.

Countries outside the F. M. S. or Colony.

Borneo	50 lbs.
Sumatra	300
Java	50
Cochin China	75
Total	475 lbs.

Future donors of cups would, I am sure, be welcomed in two important classes not included at the Show under review, viz:—Blanket Crepe, and Prepared Scrap.

Scrap was rather poorly represented, probably because it was not allotted a class in the original Schedule. Rambong, too, was scanty, but the cultivation of this has nearly died out. Among the exhibits from other countries than Malaya, Capt. Coispellier, and Baron Issaverden staged a series of samples from Cochin-China with photographs showing manufacturing scenes, and some excellent crepe came from Sumatra. But perhaps the most striking was the sample of Ceara sheet from Wiling, in Java. It was clean, of good colour, and remarkably strong. This Ceara is grown at a considerable altitude in Java, 2000 feet and upwards, and seems to do remarkably well there. It was indeed the finest sample of Ceara rubber we have ever seen.

Despite the large representation of this section one looked in vain for a novelty or general advance in preparation over previous Shows. The Da Costa treatment of latex found a place in crepe and block but in neither instance appealed to the Judges as satisfactory. The smoked balls or spindles coagulated after the Brazilian method from the Botanic Gardens, Singapore, were the most unusual exhibit and this rubber may contain more latent possibilities than is yet realised. Undoubtedly, the best advance in treatment of well-known methods was the smoked sheet put up by Highlands and Lowlands who carried off 3 firsts and one second prize, as well as the championship cup of the Show, presented by the United Planters' Association. Another fine exhibit came from Linggi Plantations in the form of blanket crepe which secured Mr. H. M. Darby's cup. Both Vallambrosa and Bukit Rajah put up well prepared exhibits, and very clean, even, samples of sheets came from Glenealy who secured the Kelantan Planters' Association cup. Lanadron block secured the handsome cup presented by H. H. the Sultan of Johore for the best commercial sample, in which class Highlands and Lowlands obtained Mr. Tan Chey Yan's cup—being bracketed second—with Linggi Plantations.

Messrs. Barlow & Co.'s cup for the best sample of crepe was carried off by Seafield Estate, Caledonia obtaining Messrs. Hogg & Co.'s cup, the second prize.

In Para sheet, Malacca Plantations were the winners of the cup presented by the Malay Peninsula Agricultural Association, the second prize or cup offered by the proprietors of Raffles Hotel falling to Glenealy Estate.

For smoked sheet Mr. H. N. Ridley's cup went to Highlands and Lowlands, the second prize or Mr. E. M. Janion's cup to Bukit Rajah.

In Para block, dry, Lanadron Estates received the "Straits Times" cup, Vallambrosa being second, thus obtaining Messrs. Hogg & Co.'s second cup.

For the "best exhibit ready for shipment"—a cup presented by Messrs. Tan Jiak Hoe, Tan Jiak Kim, and Tan Jiak Choo was awarded to Highlands and Lowlands and this exhibit also obtained

the championship cup already referred to. The second prize—a cup offered by Messrs John Little & Co.—was secured by Bukit Rajah estates.

Much interest was taken in a small case labelled historical rubber shown by the Botanical Gardens. It contained the earliest samples of Para rubber made from cultivated trees, the first biscuit, the first block, the first cultivated rubber sold in the London Market, the first tyres made from cultivated rubber in Singapore, and samples of amazons rubber brought from Brazil by James Collins who was the first to bring living plants of Hevea Braziliensis to England. The Department also showed some very superior smoked sheet and biscuit, the spindles already alluded to, and some balls of Jelutong prepared with Purub.

Rubber machinery, tools, and all kinds of things suitable for a planter on an estate formed a large feature of the trade exhibits.

Messrs. Guthrie showed some fine rubber machinery for sheet making in action, Latex being supplied from the Singapore United estates, and up to date machinery was shown by the Federated Engineering Company, Riley Hargreaves and Howarth Erskine.

In Paterson Simons' exhibition was the Da Costa machine which was in work every day, and attracted a crowd of visitors. The machine was only a small one, but of course for estate purposes is made on a more extensive scale. Its system is to force smoke through the latex by steam pressure and thus coagulate it. The coagulum is then conveyed to other machinery and converted into block or crepe as may be required. The idea is good and the coagulation is quick, but it does not appear that sufficient smoke goes into the latex, so that when dry it is difficult to detect the scent of smoke. At the same time the temperature of the latex is rather higher than one would like it to be. Samples of block and crepe were made by the process shown in the exhibition.

Disc-ploughs, planter's bungalows, tools, etc., were exhibited on various parts of the ground, and the Singapore Rubber Works exhibited a series of articles manufactured from rubber, such as tyres, valves, plugs, etc.

DIVISION B.—FLOWERS, FRUITS & VEGETABLES.

This was the largest Show that has been held in Singapore for many years, and a very great improvement on that held under similar auspices in 1909. The entries were a record, totalling as they did upwards of 982. They were as follows:—

Singapore	...	...	234
Penang	...	...	423
Malacca	...	...	90
Perak	...	...	114
Selangor	...	...	60
Negri Sembilan	...	...	56
Muar	...	...	5

although somewhat a large number of these being from the F. M. S. and Penang did not reach here in show condition, and therefore were not staged.

The exhibits were placed in a large rectangular shed in front of which were erected wide double gables. This plan afforded ample space, including an enclosed dais from which the Governor made his speech, and from which the cups were presented. In this part of the shed were placed garden seats and they were much patronised during the whole of the show.

As regards plants, the Botanic Gardens staged three beautiful, groups including many choice specimens, largely composed of Aroids, Mr. J. d'A. Pereira also exhibited, not for competition, a tasteful group of foliage plants. These added much to the decoration of the gable entrance.

In Flowering plants the Show was perhaps somewhat disappointing. There was nothing in this section of any special merit, and yet at the time of the Show there were existing in gardens, mostly owned by Chinese, magnificent specimens of Chrysanthemums, Cockscombs, Gaillardias, Ageratums, Petunias, Balsams, Dahlias, Asters, and others, which would have made a very brilliant display, but although urged to exhibit by several members of the Committee, they, in most instances, declined to do so. Here was much felt the loss of Mr. Choa Kim Kiat, who was such a prominent exhibitor in former times.

As regards Foliage Plants, there were good collections. Of special mention were Dieffenbachias, Crotons and Palms, but we missed the grand specimens of Dracaenas, Marantas, and Calatheas, which were such a prominent feature of Shows in past years. Selaginellas have also dropped out, only small plants being shewn, but Ferns, and especially Adiantums were well shewn by one exhibitor, and a magnificent specimen of Gymnogramme (Golden Fern) was shewn by Mrs. Stewart. Palms also were a good class, and here there were many entries. Caladiums were well represented; Mr. Joo Tan Chin being far ahead of all other competitors. He also shewed some of the best foliage plants. In Begonias there was good competition, both in the Rex and flowering kinds. This being an unfortunate time of year, Orchids were very scarce; there was no exhibit of any special merit, but one uncommon plant, an Acampe, was shewn in good condition. The specimen prize went to a large plant of *Grammatophyllum Measuresianum*. with three sprays.

In table decorations there were no less than 15 entries. The judges awarded four cups, taking this fact into consideration. The first prize went to Mrs. Salzmann for a well thought out arrangement of Sunflowers with Acalypha foliage and fine grasses; the second prize was awarded to Miss Lloyd, for Arundina Speciosa, fine Adiantum and grasses. The third prize was given to Mrs. Saunders and Miss Gunn for a very pretty arrangement of Antigonum and Rex Begonia foliage, whilst the fourth prize was secured by Miss Mary Lloyd, for an artistic arrangement of white Chinese Clematis.

There were very few entries for Bouquets, or Buttonholes and Sprays, Miss Norris securing the first prize for a bouquet which it would have been difficult to excel; Miss Mary Lloyd being second with a beautiful arrangement, but considered too large. The class for Cut Flowers arranged for effect was not well supported, Mrs. Felkin carrying off the first prize; and there were only two competitors for the section of Cut Flowers, Mrs. Stuart being first and Mrs. Gilmore Ellis second; the latter was a very elaborate arrangement and completely covered a table 7 ft. by 3½ ft. In wild flowers arranged for effect, Miss Clare Lloyd secured the first award.

This not being the fruit season in Singapore, almost all the exhibits travelled from Penang, Perak, Selangor and Malacca, and therefore on arrival were mostly not in the pink of condition. There were very large entries for Bananas, Pines and Limes; Durians were very scarce, being out of season. Rambutans, also, were not well represented for the same reason. Of Mangosteens there were only a few from Penang.

In Vegetables mention must first of all be made of the handsome exhibit from the Perak Government Gardens in the Larut Hills, which was beautifully staged by Mr. Long. From Singapore there were not many exhibits, Mr. Broadrick's being the most prominent. Mrs. Gad also shewed a good collection of European vegetables. Jerusalem Artichokes included some good exhibits, Mr. Broadrick here getting first prize.

In Preserved Fruits Mr. Sin Whatt Hin obtained a Silver Medal for an excellent exhibit of preserved Pineapples. Although there were many samples of Pickles and Jellies, many of them were ill-prepared and fermenting. Mrs. Moorhouse, who has had considerable experience, obtained the first prize for Pickles, Mrs. Gad gaining the second, while Mrs. Angus took the first prize for Jellies. The Chutneys were not well prepared, and the Judges refused to award any prizes.

In the same shed were shown bees at work and honeycomb from them by Father Gex, who also showed grapes and figs which are rarities here, the figs were especially excellent. Mr. Eaton showed here too Camphor grown and manufactured in Selangor, with photographs of the trees, solid camphor, camphor oil and a still which showed the method of manufacture on a small scale. He also exhibited oils from the oil palm (*Elaeis Guineensis*).

The Poultry and live stock generally with the dairy produce, were shown at the end of the ground nearest to the Esplanade, and a fine lot of chickens were shown. The Singapore Poultry Farm had some fine birds and pigeons, and also some good rabbits. Mrs. Klimmet's Victoria crowned pigeons were very much admired as was a very talkative mynah shown among the cage birds.

There was a fair competition in diary produce, but it must be admitted that it is difficult to get milk and butter down fresh from long distances, such as Penang and Perak, and the judging in this class was rather late. Cattle were not numerous and there were no pigs shown, a few fine animals, however, were on view. One Indian bull, a champion for several shows, held his own easily.

SUMMARY.

On the whole the show was a very good one, and attracted a large number of visitors, but in some points, notably Native industries, there was a great falling off from the last exhibition held here, nor was the Agricultural produce section quite as large or good, in many classes. The rubber and the horticultural sections were, however, better.

The expenses and labour connected with these exhibitions as held annually are great and fall rather too heavily on many persons who assist at getting them up, and it might be expected that the interest would diminish when these exhibitions had been held for many years consecutively. It was never intended that they should be permanently annual institutions. In the original scheme five annual shows only were to be held, after which it was suggested that such general shows could be held at intervals of three or five years. Seven annual shows have now been held, and it is now proposed to hold them at intervals of not shorter than three years. This, of course, does not preclude in any way a district or state from holding little local exhibitions of rubber or produce of any kind as was too commonly done in previous years. These little local shows were held constantly in Singapore and Penang from 1884, and later in Malacca and the Native States, and were very pleasant little functions.

It has been stated that the big exhibitions have failed in their object, a statement with which we should entirely disagree. The objectors seem to have thought that they were entirely arranged for the benefit of native padi-cultivators or to improve native cultivations only. This we do not think it was ever expected by any of the original proposers of the exhibitions that the padi cultivation would be vastly improved by this or any other method of the type. The effect of these exhibitions has, we believe, been very much greater than is at first visible.

Their importance has been realised so much by other nations that they are being invited in numerous parts of the East. From India to the Philippines there have been from time to time little shows such as we formerly had till the commencement of this series, but it was the Malay peninsula which took the lead in really large and representative exhibitions of produce and trade products, after the style of the large exhibitions in Europe, and as in other progresses in agriculture in this country, our lead is being followed elsewhere.—ED

DIVISION A.—Agricultural Produce.

1.	Padi, best sample of any named variety	1st	Mat Daus b. Dayong	$15	Malacca	74
	"	2nd	Peng. Kulop b. Banshi	10	"	71
	"	3rd	Putsh b. Khamis	5	Penang	95
1a.	"	1st	H. Daus b. Hji Mat Saman	8	Penang	43
	"	2nd	Kulup Abdul Rahman b. Saleh	4	Perak	15
	"	3rd	Hadji Moh b. H. Abd Rasit	2	Penang	107
1b.	"	1st	Yeope Shamad Peng Trong	8	Perak	7
	"	2nd	Sleman Peng Sungie Trap	4	Perak	10
	"	3rd	Osman b. Hji Syiti	2	Penang	32
1c.	"	1st	Hadji poh Arshat	8	Penang	29
	"	2nd	Hadji Darub b. H. Mat	4	Penang	43
	"	3rd	Osman b. Hji Spihi	2	Penang	32
2.	Pulut, best sample of any named variety	1st	Zobit b. Hji Sallit	10	Penang	31
	"	2nd	Pamudh	5	Kelantan	64
	"	3rd	Mohd Hashim b. Said	3	Penang	101
3.	Rice, best sample prepared by machinery.	1st	Hadji poh b. H. Abdull	10	Penang	37
	"	2nd	Hadji poh b. H. Abd Rasit.	5	Penang	107
	"	3rd	H. Darus b. H. Mat Saman	3	Penang	43
4.	Rice, best sample prepared in a lesong	1st	Pch b. Awaludin	10	Malacca	21
	"	2nd	Osman b. H. Spihi	5	Penang	32
	"	3rd	Poh Rouse	3	Penang	206
5.	Best collection of different Padi in the ear, 10 heads in each sample	1st	Mohd. Hashim b. Said	20	Penang	101
	"	2nd	H. Draus b. H. Mat Saman	10	Penang	43
	"	3rd	Zobit b. Hadji Salit	5	Penang	31
6.	Best Padi and Pulut, grown in one mukim to be exhibited by the Penghulu of such mukin and so certified by him (6 Samples)	1st	Mohd. Hashim b. Said	50	Penang	101
	"	2nd	Ismail b. Mat Taip	25	Penang	13
	"	3rd	Jusah b. H. Latif	10	Penang	153
15.	Coconut, unhusked, best sample	1st	Hadji Amudin Peng S. Tenggi	5	Perak	5
	"	2nd	Abdul Wakat Peng S. Raya	3	Perak	60
	"	3rd	Bagan Datoh Estate	2		

16.	Coconut, husked best sample	1st	Tunku Besar	$5	Kelantan	30
	"	2nd	Mohd. Rouse	3	Penang	206
	"	3rd	Mohd. Tahir	2	Penang	197
17.	Coconuts, best bunch	1st	Hadji Amudin Peng S. Tenggi	5	Perak	5
	"	2nd	Mohd. Shahid	3	Penang	170
	"	Special.	Tunku Besar	2	Kelantan	31
18.	Coconuts, collection of varieties	1st		S. M.	Malacca	30
	"	2nd	Mamad b. Ab: Gham	B. M.	Malacca	32
19.	Copra, best sample kiln dried	1st	Malakoff Estate	Cup.	Penang	224
		No Second				
20.	Copra, best sample Sun-dried	1st	Malakoff Estate	Cup	Penang	224
	"	2nd	E. J. Unger.	S.M.	Singapore	7
21.	Copra, best sample Sun-dried	1st	Chi Tek Yew	Cup	Penang	18
	"	2nd	Malakoff Estate	S.M.	Penang	224
22.	Tapioca Roots, best sample	1st	Tanah Merah Estate Ltd	$5	Muar	3A
	"	2nd	Said K. L. Kiri	3	Perak	46
23.	Tapioca, Pearl Medium best sample	1st	Malakoff Estate	5	Penang	224
	"	2nd	Merlimau Estate	3	Malacca	35
24.	Tapioca, Pearl Seed best sample	1st	Malakoff Estate	5	Penang	224
	"	2nd	The Tepong Estate	3	Singapore	80
25.	Tapioca Flake, best sample	1st	Merlimau Estate	5	Malacca	35
	"	2nd	Malakoff Estate	3	Penang	224
26.	Tapioca Flour, best sample	1st	Cheae Ah Noh	5	Penang	77
	"	2nd	C. Tuah Choo	3	Penang	208
27.	Arrowroot, fresh	1st	Japar b. Hadji Abd. Raman	5	Selangor	68
	"	2nd	Suawi b. Md. Jenus	2	Penang	180
	"	3rd	Harry H. Norris	1	Singapore	10
28.	Arrowroot, prepared best sample	1st	Aisha b. H. Hussein	5	Penang	24
	"	2nd	Mat Hassan b. Awang	2	Penang	34
	"	3rd	Malakoff Estate	H.C.	Penang	224
29.	Sago Pearl, best sample	1st	Soh Keong Low	$5	Singapore	60
	"	2nd	Teo Hoo Lai	3	Singapore	53
30.	Sago Flour, best sample	1st	Chi Tek Yew	5	Penang	18
	"	2nd	Sin Guan Lee	3	Singapore	56
31.	Maize, best sample	1st	Hadji Abd. Kady	5	Penang	5
	"	2nd	Kuluf Kamad	3	Perak	32
	"	3rd	Indut	1	Perak	57
	"	H.C.	Milah	H.C.	N. S.	43
32.	Ginger, best sample	1st	Raja Ally	$5	Singapore	69
	"	2nd	Mat Sahat b. Omar	3	Penang	84
	"	3rd	Yeong Shew Soon	5	Penang	71

33.	Turmeric, best sample	1st	Yeong Chew Soon	$5	Penang	71
	,,	2nd	Hadji Moh. Arsat	3	Penang	29
	,,	3rd	Peng Hasan b. Eting	1	Penang	209
34.	Tuba (akar) best sample	1st	Abubaka b. H. Berhim	5	Penang	21
	,,	2nd	Peng Sam b. H. Saleh	3	Malacca	13
	,,	3rd	Sliman Peng Sungei Trap	1	Perak	10
35.	Sugar Cane, best sample	1st	Harry H. Norris	8	Singapore	12
	,,	2nd	Hadji Mate Saman	5	Penang	139
	,,	3rd	H. Siman b. H. Sakah	3	Malacca	81
36.	Sugar Coconut, best sample	1st		5	Malacca	65
	,,	2nd	Peng Sam b. Saleh	3	Malacca	13
	,,	3rd		1	Selangor	11
	,,	H.C.	Aman b. Mohd	H.C.	Selangor	4
37.	Sugar nipah, best sample	1st	Hashim b. Mhd. Salleh	$5	Penang	11
	,,	2nd		3	Penang	87
	,,	3rd	Chi Napbet H. Bakar	1	Penang	72
38.	Sugar kabong, best sample	1st	Chi Mat	5	Penang	96
	,,	2nd	Said H. Mamat b. H. Musah	3	Malacca	8
	,,	3rd	Itam b. Mat	1	Malacca	6
39.	Sugar (cane) brown best sample	1st	D. Podisesgho	S.M.	Perak	83
	,,	2nd	Hadji Moh. b. H. A. Sasat	B.M.	Penang	107
40.	Coffee, Liberian, best sample	1st	Peng Mat Sah	S.M.	Selangor	78
	,,	2nd	Hadji Mustafa	B.M.	Selangor	38
41.	Coffee any other variety	1st	Moh b. Hadj Ismail	S.M.	Penang	40
	,,	2nd	H. Mhd. b. H. Abdula	B.M.	Penang	37
42.	Cocoa, fresh pods, best sample	1st	Peng Abdula Ghain	$5	Malacca	18
	,,	2nd	Moh. Shat	3	N.S.	50
	,,	3rd		3	Penang	86
43.	Toddy, best sample	1st		5	Selangor	7
	,,	2nd	Malakoff Estate	3	Penang	Nil
	,,	3rd	A. T. Govindasamy	3	Singapore	44
44.	Rum, best sample		No Exhibits			
44a.	(Samsoo)	1st	Cheah kee Ee	B.M.	Teluk Anson	
45.	Rum shrub, best sample	1st	Fatimah b. H. Abd. Rasat	S.M.	Penang	103
			(One prize only)			

SECTION IV.—Spices, etc.

46.	Betel Nuts, fresh, best sample	1st	Moh. Marican	$3	Penang	179
	,,	2nd	Some b. Abdul Brahin	2	Penang	68
	,,	3rd	Hadji Dollah b. Brahin	1	Selangor	71

47.	Betel Nuts, dried and split, best sample	1st	Peng Hassan b. Eting	$4	Penang	209
	„	2nd	Bidi Seputoh Kinta	2	Perak	88
	„	3rd	Moh. Taha b. Abrahman	1	Malacca	16
48.	Sereh Leaves, best sample	1st		4	Malacca	67
	„	2nd	Itam b. Mat	2	Malacca	9
	„	3rd	Moh. Marican	1	Penang	179
49.	Cloves, best sample	1st	Osman b. Isahik	5	Penang	19
	„	2nd	Wan Chee	3	Penang	213
	„	3rd	No Exhibit	1		
	„	H.C.	Yeong Chew San	H.C.	Penang	71
50.	Nutmegs, fresh, best sample	1st	Hamat b. H. Sahat	$5	Penang	210
	„	2nd	C. Tuah Choo	3	Penang	208
	„	3rd	Kamuludin b. H. Bahadin	1	Penang	63
	„	H.C.	Mhd. Ali K. Lawakiri	H.C.	Perak	43
51.	Nutmegs, dried, best sample	1st	Yeong Chew Gan	$5	Penang	71
	„	2nd	Osman b. Isahit	3	Penang	19
	„	3rd	Mat Din b. Mat	1	Penang	114
52.	Mace, dried yellow	1st	Osman b. Isahik	4	Penang	19
53.	Mace, dried, red	1st	Law Chit Man	4	Penang	76
	„	2nd	Yoong Chit Man	3	Penang	71
	„	3rd	Kamabudin b. H. Baherdin	1	Penang	63
54.	Pepper, white.	1st	Moh. Abas	5	Perak	78
	„	2nd	Chee Wan Estate	4	Selangor	73
	„	3rd		3	Malacca	68
55.	Pepper, Black	1st	Chee Woh	5	Selangor	74
	„	2nd	Arsha b. Hadj Hussin	4	Penang	24
	„	3rd	Abdul Jubit	3	Selangor	39
56.	Spices, best collection (optional)	1st	Hadji Mat Saman	10	Penang	139
	„	2nd	Shaik Housan	5	Penang	150
	Special		Hadji Hassan Alwi	5	Penang	25
57.	Patchouli, best sample	1st	Shamad b. Lebai	5	Penang	83
	„	2nd	Arsit b. Alas.	3	Penang	81
	„	3rd	Minum (No prize given)	1	Penang	196
58.	Camphor, (Cinnamomum Camphora) best sample	Extra Prize	Haji Ahmed	5	Penang	6

SECTION V.—Oils, Oil Cake, etc.

59.	Oil, Citronella, best sample	1st	Jong London Estate	$8	Perak	59
	„	2nd	Tampinis Para & Coconut Plantations, Ltd.	4	Singapore	33
60.	Oil, Lemon Grass, best sample	1st	Syed Abdul Rahman	8	Penang	137
	„	2nd	Wan Chee	4	Perak	77

61.	Oil Coconut, best sample	1st	Kung Shean Sung	$10	Penang	125
	„	2nd	Singapore Oil Mills	5	Singapore	16
	„	3rd	Chi Tek In	3	Penang	18
62.	Oil, Gingelly, Teal Seed, best sample	1st	Singapore Oil Mills	5	Singapore	17
	„	2nd	M. Naina	3	Penang	52
	„	3rd	Shaik Housan	1	Penang	150
63.	Oil, Castor, best sample	1st	Singapore Oil Mills	5	Singapere	18
	„	2nd	Shaik Housan	3	Penang	150
	„	3rd	Hadj Mat Saman	1	Penang	139
64.	Oil, Clove, best sample	1st	Singapore Oil Mills (1st prize only)	5	Singapore	19
65.	Oil Para Rubber Seed best sample	1st	Singapore Oil Mills	S.M.	Singapore	20
	„	2nd	Linggi Plantations	B.M.	N.S.	X
66.	Oil, Kabu Kabu Seed best Sample	1st	Singapore Oil Mills (1st Prize only)	$5	Singapore	21
67.	Oil, any other kind best sample	1st	Singapore Oil Mills	5	Singapore	22
	„	2nd	Kung Theam Sung	3	Penang	125
68.	Oil Cake, Cocoanut, best sample	1st	Hawthrudon Estate	5	Selangor	A
	„	2nd	Singapore Oil Mills	3	Singapore	23
	„	3rd		1	Singapore	75
69.	Oil, Cake, Para Seed best sample	1st	Linggi Plantation	5	N.S.	X
	„	2nd	Singapore Oil Mills	3	Singapore	24
70.	Oil, Cake, Kabu Kabu Seed, best sample	1st	Singapore Oil Mills (1st prize only)	5	Singapore	25
70A.	Oildake Kabu Kabu Seed, Special Prize for Cakes		Singapore Oil Mills	S.M.		
71.	Seed, Kabu Kabu, best sample	1st	Moh. Abb. Matahil	$5	Penang	26
	„	2nd	Sahid b. Sahat	3	Penang	75
	„	3rd	Haji Ebrahim b. Hasad	1	Selangor	66
72.	Oils, best collection	1st	Singapore Oil Mills	S.M.	Singapore	26
	„	2nd	Moh Abas	B.M.	Perak	78

SECTION VI,—Getahs, Gums, ete,

73	Getah Jelutong, best sample	1st	E. J. Unger	$10	Singapore	6
	„	2nd	Gimbam	5	N.S.	51
74.	Getahs, best collection of local	1st	*Low Ah Jit & Sons	10	Singapore	38
	„	2nd	Peng W. Ijok	5	Perak	2
	„	3rd	Sliman Peng	2	Perak	10
75.	Getah Taban, best sample	1st	*Low Ah Jit & Sons	5	Singapore	40
	„	2nd	Rapin	2	Selangor	53

*(Special Prize of $10 or Diploma to Low Ah Jit & Sons for collection models in Gutta Percha)

Note.—Low Ah Jit & Sons wish Silver or Bronze medal not money.

No proper entries but given to Chewing Gambier.

76.	Gambier Cubes	1st	Peng H Rajah	$49	Malacca	
	„	2nd	Syed Ahmat Sel	19		
77.	Gambier Block					
78.	Dragon's Blood, best sample	1st	Abdullah Sirat	5	Perak	21
	„	2nd	Abdul Samat	2	Perak	6
	„	3rd	Sliman Lambar Kiri	1	Perak	62
79.	Gums and Damars, best collection of local	1st	Mohd b. Mat Selleh	7	Penang	14
	„	2nd	Abdul Jebil	3	Selangor	39
	„	3rd	Along Mot Ludin	1	Perak	19

SECTION VII.—Fibres.

80.	Cotton, (Kakabul) best sample	1st	Syed Rahamnfulla	$6	Penang	65
	„	2nd	Chemat b. Chiedin	3	Penang	144
	„	3rd	Tamby Kechil	2	Penang	195
81.	Cotton, any other variety, best sample	1st	Haji Moh b. H. Abb Rasat	6	Penang	107
	„	2nd	Moh Kassim	3	Penang	141
	„	3rd	Sriffen	2		149
82.	Fibres, best collection	1st	Khoo Soo Ee	S.M.	Penang	91
	„	2nd	Salih	B.M.	Malacca	52
		Extra Prize	Sedang Rusat b. Dris	$4	Malacca	36

SECTION VIII.—Miscellaneous.

83.	Rottans, best collection	1st	Syed Ahamad	10	Penang	86
	„	2nd	Che Towe	5	Perak	79
	„	3rd	Sin Taw Choo	3	Perak	25
		Special Prize.	Weng Hong Loong	5	Singapore	2
84.	Bamboos, best collection	1st	Moh Taib	5	Penang	138
	„	2nd	Ujang	2	Selangor	42
	„	3rd	Ahamad b. Bingkus	1	N.S.	9
85.	Walking Sticks, best collection (unprepared)	1st	Tuan Haji Abdul Raman	5	Perak	87
	„	2nd	Moh. b. M. Salleh	3	Penang	14
	„	3rd	Abd. Rahim b. Mohd. Sahid	2	Penang	105
	Special Prize.		Abubakar b. Ahmed	5	Singapore	1
86.	Medicinal Plants, best collection (open)	1st	Shaik Ismail	S.M.	Penang	87
	„	2nd	Said K. L. Kiri	B.M.	Perak	46
	Extra Prize		Peng Moh Rais	$4		

87. Medicinal Plants, best collection (Natives only)	1st	Mohd. Abas	$8	Perak	78
,,	2nd	Mat Mor b. Ahmat	4	Penang	28

DIVISION B.

JUDGES AWARDS.

88.	Aroids	Tan Joo Chin	1st	Prize
		Teo Kong Hin	2nd	,,
89.	Aroid Specimen	Tan Boon Teck	1st	,,
		Mrs. Bidwell	2nd	,,
90.	Caladiums	Tan Joo Chin	1st	,
		Teo Kong Hin	2nd	,,
91.	Caladium-Specimen	Tan Joo Chin	1st	,,
		Teo Kong Hin	2nd	,,
94.	Crotons	R.A.G. Bidwell	1st	,,
		F. E. Jago	2nd	,
95.	Croton-Specimen	Teo Kong Hin	1st	,,
		Tan Boon Teck	2nd	,,
96.	Dracaenas	Teo Kong Hin	1st	,,
		J. d' A. Pereira	2nd	,,
97.	Dracaena-Specimen	Teo Kong Hin	1st	,,
98.	Ferns-Any variety	St. V.B. Down	1st	,,
99.	Adiantums	St. V.B. Down	1st	,,
100.	Adiantums	R. A. G. Bidwell	1st	,,
		Mrs. Bidwell	2nd	,,
101.	Fern-Specimen	Mrs. Stuart	1st	,,
		St. V.B. Down	2nd	,,
102.	Marantas	J. d' A. Pereira	2nd	,,
104.	Palms	Tan Joo Chin	1st	;,
		Tan Boon Teck	2nd	,,
105.	Palm-Specimen	J. d' A. Pereira	1st	,,
106.	Panax and Aralia	Tan Joo Chin	1st	,,
107.	Selaginella	J. d' A. Pereira	2nd	,,
109.	Any Ornamental Plants	Teo Kong Hin	Special	
110.	,, Specimen	J. d' A. Pereira	1st	,,
111.	Foliage Plant Specimen	Tan Joo Chin	1st	,,
		J. d' A. Pereira	2nd	,,
113.	Amaranthus	St. V.B. Down	1st	,,
118.	Cannas	Rev. G. Gex	1st	,,
119.	Canna-Specimen	Rev. G. Gex	1st	,,
122.	Dahlias	Tan Joo Chin	1st	,,
		Mrs. Scott	2nd	,,
127.	Orchids	Mrs. Scott	1st	,,
		Mrs. Gad	2nd	,,
128.	Orchid-Specimen	St. V. B. Down	1st	,,
131.	Petunias	Tan Joo Chin	1st	,,
134.	Zinnias	Tan Joo Chin	1st	,,
136.	Best Plant in Flower	E. G. Broadrick	1st	,,
137.	Begonias	Tan Joo Chin	1st	,,
		St. V.B. Down	2nd	;,
138.	Begonia-Specimen	St. V.B. Down	1st	,,

139.	Group of Plants	Tan Joo Chin	1st	Prize
		Mrs. Thomas	2nd	„
143.	Dahlias	Mrs. Scott	2nd	„
144.	Roses	Miss Lloyd	1st	„
145.	Cannas	Rev. G. Gex	1st	„
		Mrs. Scott	2nd	„
146.	Orchids	W.C. Coveney	1st	„
		Mrs. Scott	2nd	„
147.	Bridal or Hand Bouquet	Miss Norris	1st	„
		Miss Lloyd	2nd	„
148.	Cut Flowers	Mrs. Felkin	1st	„
		E.G. Broadrick	2nd	„
149.	Collection of Cut Flowers	Mrs. Stuart	1st	„
		Mrs. Ellis	2nd	„
150.	Table Decoration	Mrs. Salzmann	1st	„
		Misss Ethe Lloyd	2nd	„
		Mrs. Saunders & Miss Gun	3rd	„
		Miss Lloyd	4th	„
151.	Wild Flowers	Miss Lloyd	1st	„
		Mrs. Faston	2nd	„
152.	Button-holes & Sprays	E. Dowland	1st	„
153.	Bananas	Mohd Taha B. Ahdulmanan	1st	„
		Mohamed Salleh	2nd	„
154.	Bananas Best Bunch	Kulup Ahmat	1st	„
		Ahdul Jabil	2nd	„
155.	Champedak	Hassan	1st	„
		H. Nasurdin	2nd	„
156.	Chiku	Yusuf Bin Arshat	1st	„
		Chia Joon Hock	2nd	„
158.	Custard Apple	Miss E.C. Brown	1st	„
		Sidang Mohd Sahat	2nd	„
159.	Cultivated Fruits	Mohd Abas	1st	„
161.	Durian Blanda	Mohd Yusuf	1st	„
162.	Duku	Janudin Bin Abu	1st	„
164.	Jack Fruit	H.H. Norris	1st	„
165.	Jambu	Haji Ismail	1st	„
166.	Langsat	Ramli	1st	„
167.	Limes	Indut Pen Shin	1st	„
		Chein	2nd	„
		Sidang Mamat B. Musah	Special	
168.	Mangoes	Sidang H. Ma' ali	1st	„
169.	Manchang	Sidang Mamat B. Musah	1st	„
170.	Mangosteen	Yusuf B. Arshat	1st	„
171.	Mata Kuching	Yusuf B. Arshat	1st	„
172.	Melon	Chein	1st	„
173.	Papaya	Selangor 9	1st	„
174.	Oranges	Abdul Wahat Peng S.	1st	„
		Raya	2nd	„
175.	Pineapple Kew Variety	Said Alwi	1st	„
		Sidang H. Ma' ali	2nd	„
176.	Pineapples	Penghulu Hasan B. Eting	1st	„
		C. Quah Choo	2nd	„
177.	Pomeloes	Husin B. Sleiman	1st	„
		S. Moorhouse	2nd	„

179.	Rambai	Mun B. Jayah	1st	Prize
		Chemat B. Chedui	2nd	„
180.	Rambutan	Mun B. Jayah	1st	„
		Sahchee	2nd	„
181.	Wild Edible Fruits	Bahari	1st	„
		Peng Japah	2nd	„
182.	Any Kind of Fruit	T.C.B. Miller	1st	„
		Rev. N. J. Couvreur	2nd	„
183.	Artichokes	E. G. Broadrick	1st	„
185.	Benny Fruits	M.Nasurdin	1st	„
186.	Brinjals	Sidang Arshat	1st	„
187.	Beans	Mohd. Yusuf B. Hashim	1st	„
189.	Chillies	Kulup Mohamed	1st	„
190.	Cucumbers	Ahdul Samat	1st	„
191.	Herbs used in Curries	Tan Pong Guan	1st	„
192.	Ladies' Fingers	Chu Cheng Tek	1st	„
193.	Lettuces	E. G. Broadrick	1st	„
195.	Onions etc	Kung Thean Sung	1st	„
196.	Pumpkins	Itam B. Kassim	1st	„
197.	Radishes	Tan Pong Guan	1st	„
199.	Tomatoes	Syed Ahamed	1st	„
200.	European Vegetables	Mrs. Gad	1st	„
201.	Vegetables & Herbs	E. G. Broadrick	1st	„
202.	Water-Melons, etc.	Omar B. Musah	1st	„
		Mohd. Hussian	2nd	„
203.	Yams & Kladis	Mohd. Jusoh B. Hashin	1st	„
		Syed Ahamed	2nd	„
204.	Any Vegetable	Rev. G. Gex	1st	„
		W. Dunman	2nd	„
205.	Preserved Fruits	Sin whatt Hin	1st	„
		Mohd. B. Mohd. Din	2nd	„
		No. 25	3rd	„
207.	Pickles	Mrs. Moorhouse	1st	„
		Mrs. Gad	2nd	„
208.	Jellies	Mrs. Angus	1st	„
		Haji Ismail	2nd	„

DIVISION C.—Stock and Dairy Produce.

SECTION I.—Cattle

209.	Bull	1st	Bruseh H. T. M. Co., (F. Hilton)	Cup & $10	Singapore	46
	„	2nd	Abdul Odood	5	„	110
	Cup presented by Seah Eng Kun, Esq.					
	$10 presented by J. R. Belilios & Co.					
210.	Cow and Calf, (Australian excluded)	1st	Syed Gulab Shah	S.M.	Singapore	18
	„	2nd	Mrs. Morgan	$5	„	37
	1st Prize $10 presented by J. R. Belilios & Co.					
211.	Milch Cow	1st	Mrs. Plumpton	S.M.	„	22
212.	Pair of Draught Bullocks (Siamese)		No Entries			
213.	Pair of Draught Bullocks (Indian)	1st	Not awarded	$10		
	„	2nd	A. T. Govindasamy	5	„	24
	$10 presented by E. G. Broadrick, Esq.,					

214.	Champion Cow in Classes 210-11	Cup	Mrs. Plumpton	Cup	Singapore	22A

Cup presented by W. Patchett, Esq.,

SECTION II.—Buffaloes.

215.	Buffalo Bull	1st	Dasrat	S.M.	„	17
	„	2nd	Tongkoo Tomenggong	$5	Kelantan	87
216.	Buffalo Cow	1st	Abdul Odood	S.M.	Singapore	101
	„	2nd	Tongkoo Tomenggong	$5	Kelantan	88
217.	H. Goat	1st	Mrs. Perreau	S.M.	Singapore	2
	„	2nd	Tongkoo Tomenggong	$5	Kelantan	89
218.	She Goat with Kids	1st	Sidang Marrat B. Musah	15	Malacca	3
	„	2nd	F. H. Smith	5	Singapore	5
219.	Ram Sheep	1st	Abdul Odood	S.M	„	102
	„	2nd	„		„	105
	This prize cannot be presented. See Rule 6.					
220.	Ewe Sheep	1st	Abdul Odood	S.M.	„	108
	„	2nd	„		„	106
	This prize cannot be presented. See Rule 6.					
221.	Pen of four Malay Sheep		No Entries			
222.	Pen of Sheep any other breed		No Entries			
223.	Champion Goat in Classes 217/8		Sidang Marrat B. Musah	S.M.	Malacca	3
224.	Champion Sheep in Classes 219/22		Abdul Odood	S.M.	Singapore	102

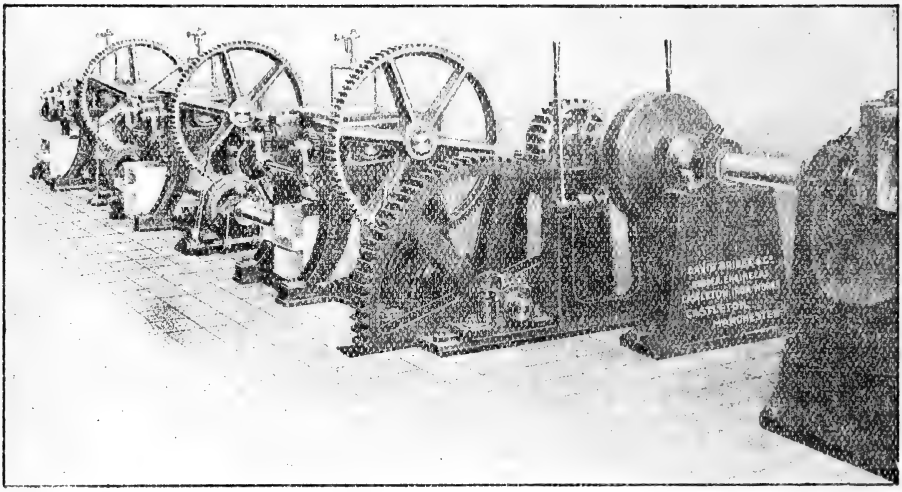
SECTION IV.—Pigs.

225, 226, 227, 228 — No prizes awarded

SECTION V.—Poultry.

229.	Bantam Cock & Hen	1st	G. McBreau	B.M. & $5	„	25
	„	2nd	Tan Kwee Liang	3	„	70
	1st Prize presented by Dr. Croucher.					
230.	Malay Cock & Hen	1st	Haji Mohamed Noh	5	Selangor	61
	„	2nd	Tongkoo Tomenggong	3	Kelantan	92
231.	Malay Game Cock and Hen	1st	Mat Yusop	5	Perak	6
	„	2nd	Lim Peng Chin	3	Singapore	85
	1st Prize presented by Dr. Croucher.					
232.	Chinese Cock & Hen	1st	Mrs. Coveney	5	Singapore	6
	„	2nd	Not awarded			
233.	Cock & Hen any other breed	1st	Lee Pek Hoon	5	Singapore	47
	„	2nd	Haji Osman	3	Penang	22
233A.	Best Cock and 2 Hens Houdans	1st	John Lee	10	Singapore	42
	Prize presented by the Singapore Poultry Farm					
233B.	Plymouth Rocks	1st	W. Madden	$10	Singapore	14
	Prize Presented by the Singapore Poultry Farm					
233C.	Polish		No Entries			
233D.	Brahmas	1st	Tan Kwee Liang	$10	Singapore	72
	Prize presented by the Singapore Poultry Farm.					

Bridge's Rubber Machines.



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Telephone **No. 5.**

233E.	Orpingtons	1st	Lee Pek Hoon	$10	Singapore	49
	Prize presented by the Singapore Poultry Farm.					
233F.	Leghorns	1st	Lee Pek Hoon	$10	Singapore	50
	Prize presented by the Singapore Poultry Farm.					
233G.	Wyandotts	1st	Lec Pek Hoon	$10	Singapore	58
	Prize presented by the Singapore Poultry Farm.					
233H.	Minorca	1st	Lee Chin Twan	$10	Singapore	78
	Prize presented by the Singapore Poultry Farm.					
234.	Pen of six fowls for table use	1st	Mata Sudin bin Amah	$10	Malacca	7
	„	2nd	Mat Yusop	5	Perak	6
	Prize presented by T. R. Nicholson, Esq.,					
235.	Champion Fowl in Classes 229/34		Lee Pek Hoon for Orpington Cock	Cup	Singapore	
	Cup presented by A. T. Bryant, Esq.,					
236.	Muscovy Duck and Drake	1st	Not awarded	$5		
	„	2nd	Lim Peng Chin	3	Singapore	85
237.	Duck & Drake any other breed	1st	John Lee	5	Singaporc	43
	„	2nd	Singapore Poultry Farm	3	Singapore	62
238.	Gander & Goose	1st	Not awarded	5		
	„	2nd	Jandin Bisi Abu	3	Malacca	8
	Special prize for Gander to F. H. Smith			5	Singapore	11
239.	Turkey Cock and Hen	1st	Not awarded	5		
	„	2nd	Lim Peng Chin	3	Singapore	87
240.	Pair of Pigeons	1st	Singapore Poultry Farm	5	Singapore	63
	„	2nd	John Lee	3	Singapore	44
241.	Best Cage bird	1st & 2nd Divided				
			Miss Agnes Hodge	4	Singapore	
			Abdul Shukor B. Gagah	4	Perak	9
242.	Best collections of cage birds		No Entries			
243.	Rabbits buck and doe	1st	Singapore Poultry Farm	5	Singapore	64
	„	2nd	Tan Boo Liat	3	Singapore	57

SECTION VI.—Dairy Produce.

244.	Best sample of butter locally produced	1st	Kung Than Seng	M. & $10	Penang	24
			Presented by Dr. Fowlie.			
245.	Best sample of milk in bottle	1st	Mrs. Morgan	M. & 10	Singapore	41
246.	Best collection of 12 eggs	1st	Singapore Poultry Farm	5	Singapore	65
	„	2nd	Sandak	3	Perak	7
246A.	Honey in Comb	1st	Rev. G. Gex	10	Singapore	32
	„	2nd	Not awarded	5		
246B.	Honey, Clear	1st	Haji Mat Saman	10	Selangor	62
	„	2nd	Rev. G. Gex	5	Singapore	33

Special Prizes,

Deer	1st	Mrs. Klimmet	$10	Singapore	92
Crown Pigeons	1st	Mrs. Klimmet	5	Singapore	4

Singapore Poultry Farm's Incubators were highly commended by judges.

A. G. HARRINGTON,
Hon. Sec., Division C.

DIVISION E.

Section No. 1.

Class No.		Amount of Prizes.	Winner's No.	Names.	
273	1st	$10	1	Penang	67
	2nd	5	2	„	69
274	1st	5	12	Malacca	22
	2nd	3	17	N. Sembilan	18
275	1st	10	4	Singapore	28
	2nd	5	8	Penang	7
276	1st	5	2	Singapore	16
	2nd	2	11	Perak	17
277	1st	7	3	Penang	82
	2nd	3	6	Penang	107
278	1st	10	6	Kedah	37
	2nd	5	9	Penang	55
279	1st	5	No award.		
	2nd	3			
280	1st	5	10	Kelantan	106 & 107
	2nd	3	7	Penang	82
281	1st	5	47	Perak	33
	2nd	3	59	Perak	18
282	1st	5	28	Perak	19
	2nd	3	29	N. Sembilan	28
283	1st	5	16	Selangor	43
	2nd	3	35	Kelantan	IIIB
284	1st	5	20	Kedah	40
	2nd	3	47	Kelantan	105
285	1st	10	1	Singapore	21
	2nd	5	4	N. Sembilan	64
286	1st	5	2	Selangor	19
	2nd	2	No Prize		
287	1st	5	1	Malacca	5
	2nd	3	5	Kelantan	104
288	1st	10	2	Singapore	11
288	2nd	5	1	Singapore	10
289	1st	10	1	Singapore	13
	2nd	5	3	Penang	7
290	1st	10	1	Singapore	22
	2nd	5	4	Singapore no number	
291	1st	5	1	Singapore	14
	2nd	3			

Section No. 2.

292	1st	10	30	Malacca	51
	2nd	5	32	Singapore no number	
293	1st	10	2	Penang	105
	2nd	5	1	Penang	87

Class No.		Amount of Prizes.	Winner's No.	Names.	
294	1st	$7	14	Perak	6
	2nd	3	15	Perak	33
295	1st	7	4	Malacca	17
	2nd	3	3	Penang	68
296	1st	7	17	Penghulu Bida Perak	41
	2nd	3	2	Penang	38
297	1st	1	10	Perak	43
	2nd	5	11	Perak	47
298	1st	5	1	Perak	3
	2nd	3			
302	1st	10	3	Penang	7
	2nd	5		No Prize	
303	1st	10	17	Perak	20
	2nd	5	15	Kelantan	176/180
304	1st	10	18	Penang	71
	2nd	5	16	Penang	68
305	1st	5	7	Penang	69
	2nd	3	4	Penang	55
306	1st	15	8	Penang	55
	2nd	10	26	Kelantan	119/130

Section No. 3.

299 (*a*)	1st	15	27	Malacca S. Prize	34
	2nd	10	3	Penang S. Prize	2
299 (*b*)	1st	10	38	Perak	9
	2nd	5	39	Perak	10
300 (*a*)	1st	10	51	Punggit G. School	
	2nd	5			
300 (*b*)	1st	5	36	Negri Sembilan	29
	2nd	3	1	Penang	1
300		42	Special Prize	Perak	10
301	1st	10	5	Penang	117
	2nd	5			

Section No. 4.

307	1st	5	7	Perak	42
	2nd	3	2	Penang	86
308	Special	5	5	Malacca Native Schools awarded to Lewai bin Jampang, Klang	10
	1st	5	6	Malacca	11
	2nd	3	18	Negri Sembilan	87
309	1st	10	14	Selangor	58
	2nd	5	5	Penang	127
310	1st	7	13	Negri Sembilan	27
	2nd	5	4	Penang	104
311	1st	5	16	Malacca	37
	2nd	3	24	Perak	1
312	1st	5	4	Penang	91
	2nd	3	14	Perak	31
313	1st	5	5	Negri Sembilan	67
	2nd	3			

Class No.	Amount of Prizes.		Winner's No.	Names.	
314	1st	45	6	Perak	1
	2nd	3	8	Perak	18
315	1st	15		Not worth a first	
	2nd	10	5	Selangor	18/18

Section No. 5.

316	1st	5	16	Penang	110
	2nd	3	17	Penang	112
317	1st	5	2	Penang	2
	2nd	3	7	Penang	110
318	1st	10	1	Singapore	1
	2nd	5	5	Penang	110
319	1st	5	3	Penang	101
	2nd	3	7	Perak	21
320	1st	5	28	Malacca	20
	2nd	3	16	Penang	72
321	1st	5	4	Penang	129
	2nd	3	7	Perak	19
322	1st	10	11	Perak	48
	2nd	5	12	Perak	49
323	1st	10	No award.		
	2nd	5			

322 NOTE.—A special prize of $5 was awarded under this class to a Malay chauffer of father somebodys (Singapore) for a model of a steam launch. I cannot remember his name which was put into the official prize list but not noted here.

Section No. 6.

324	1st	5	Schools 858		
	2nd	3	818		
326	1st	7	98 & 255	Perak.	The ticket had both these numbers on it.
	2nd	4	No. IV.		
329	1st	10	550	Perak	
	2nd	5	837		

Section VI.—Malay Schools.

325	1st	10	Schools 20	
	2nd	5	No award	
327	1st	5	Schools 1397	
	2nd	3	Schools 291	
328	1st	10	Schools 530	
	2nd	5	Schools 1252	
330	1st	10	Schools 557	
	2nd	5	Schools 1320	
331	1st	5	Schools 599	
	2nd	3	Schools 28 G	
	Special	5	Schools 1673	decided by ladies for embroidery and fancy work.

Remaining Classes in this Section will be judged by ladies.

Weaving	Special	10	Batang Tiga School (Girls)

DIVISION F.

332.	1st	Penghulu Esop	$10	Malacca
	2nd	Syed Ahamad	5	Selangor
333.	1st	Syed Ahmad	Cup	Penang
	2nd	Kung Thean Sung	S.M.	Penang
		Presented by Guthrie & Co., Ltd.		
334.	1st	John Little & Co., Ltd.,	Cup	Singapore
	2nd	McAlister & Co., Ltd.,	S.M.	Singapore
		Presented by Riley Hargreaves & Co., Ltd.		
335.	1st	John Little & Co., Ltd.,	S.M.	
		No Second	B.M.	
337.	1st	McAlister & Co., Ltd.	$10	
		No Second	5	
338.	1st	Borneo Co., Ltd.,	10	
		No Second	5	
339.	1st	Riley Hargreaves & Co., Ltd.,	G.M.	
	2nd	Howarth Erskine, Ltd.,	Cup	
		Presented by Tan Khean Hock.		
340.	1st	McAlister & Co., Ltd.,	S.M.	
	2nd	John Little & Co., Ltd.,	B.M.	
341.	1st	R. Morton	$10	Singapore
	2nd	A. T. Govindasamy	5	Singapore
342.	1st	Haji Osman	Cup	Penang
	2nd	Tan Oon Peng Saiong	B.M.	Perak
343.	1st	Syed Ahmad	$10	Penang
	2nd	Guthrie & Co., Ltd.,	5	Singapore
344.	1st	Ang Guan	10	Penang
	2nd	Syed Ahmad	5	Penang
345.	1st	Guthrie & Co., Ltd.,	10	
		No Second	5	
346.	1st	Syed Ahmad	10	Penang
	2nd	Abdul Jalil	5	Selangor
		Ibrahim C. Abdul Hamid	S.P.	Penang
347.	1st	Ah Seng	$10	Penang
	2nd	No Second	5	
348.	1st	Ah Seng	10	Penang
	2nd	Syed Ahmad	5	Penang
350.	1st	Wee Kay Siang	S.M.	Singapore
		No other exhibit	S.M.	
352.	1st	R. Morton		Singapore
		No other exhibit	S.M.	
354.	1st	John Little & Co., Ltd.,	Cup	
		No Second	B.M.	
355.	1st	F. Clark & Co.,	$10	
		No other exhibit	5	
357	1st	Sidang Dris b. Hasan	10	Malacca
	2nd	Tuan Haji Abdul Rahman	5	Perak
		Nunuameah	S.P.	Perak

SMOKED RUBBER.

We have the pleasure of presenting the following report on some Para rubber smoked on spindles in the Botanic Gardens and sent to Messrs. Gow-Wilson and Stanton for examination and report. It will be noticed that the report is not made by a broker, but by a manufacturer who has treated it from a manufacturer's point of view, the only view that is really valuable.

For some time we have been working and experimenting with various methods of smoking latex with a view of making Plantation rubber if possible as closely resembling Fine Hard Cure Para of the Amazons as could be.

Fine Hard is considered the best class of rubber in the world, and very superior to ordinary Plantation rubber in tensile strength and power of recovery, but at the same time as ordinarily sent to market is less clear than Plantation rubber, which was why it often fetched a lower price.

To make them a rubber which possessed all the best qualities of Fine Hard cure and the purity of Plantation was the object of this series of experiments. From time to time the reports of the examination of these samples prepared in this way have been published in the Bulletin and in the last annual report, but some of these reports did not satisfy the experimenters. However, it appeared clear we were on the right track and the work was carried on, and the present report now submitted to our readers is a most encouraging one, and shows that we are within a measurable distance of making a very superior class of Rubber equal to Hard fine Para, but cleaner.

Further experiments are in progress and we hope soon to be able to show that Plantation rubber by proper treatment of the latex can be made equal if not superior in every respect to the finest rubber produced in the Amazons.

Further, we do not think that the method employed will prove to be any more expensive than the ordinary making of sheet or crepe but on the contrary may possibly be made even cheaper.

H. N. Ridley, Esq.,
Director, Botanic Gardens,
Singapore, S. S.

Dear Sir,

We are in receipt of your favour of the 30th June, and have just heard from Messrs. Beck and Pollitzer that the 10 cases Rubber referred to by you have duly arrived. We hope to forward you full report on the condition and quality of these samples shortly.

Meanwhile, we have received from the manufacturer who had undertaken the experiment with the previous sample of Smoked Para cured on the lines of Hard Fine Para which you had sent us, his report on the subject, and enclose herewith extract from same.

We think you will agree that this is in most respects extremely satisfactory, far more so in fact than the physical properties of the samples before manufacture appeared to warrant.

It is of course more and more clear that the important matter in handling plantation rubber is the vulcanising, and we trust that the opinions our friends have formed after these experiments will be confirmed after more prolonged tests.

We are, Dear Sir,
Yours faithfully,
for Gow, Wilson & Stanton Ltd.,
SPENCER BRETT,
Managing Director.

EXTRACT.

Para Rubber from Singapore Botanical Gardens.—With reference to your letter of October 20th sending a small sample of Smoke Cured Para Rubber from the Singapore Botanical Gardens prepared exactly on the same lines as Hard Fine Para, we have tested this rubber and compared it with Hard Fine with the following results:—

	Hard Fine Para	*Singapore Botanical Gardens Smoke Cured Para.*
	%	%
Loss in washing	18	13.
Resin	3.5	5.11
Organic Matter	1.5	2.03
Ash	0.25	0.38

In quality and general behaviour, this rubber is extremely like Hard Fine Para in tensile strength and in power of recovery, but is slightly softer and requires a different vulcanising heat.

The elasticity and tensile strength for the period covered by the experiments show that at the proper vulcanising heat, it is as durable as Para. We will, however, make periodical tests in order to confirm this fact over a longer period

PEAT SOILS.

Mr. Schirmer sends some correspondence and analysis of soils in Johore which may interest some. It is on the peat soil especially that his Sisal hemp and other fibres have grown in so striking a manner.

The interesting point of the analysis of the peat soil lies in its close resemblance in chemical constituents to that of an analysis from another source given previously in the Bulletin.

One could hardly agree however with Mr. Baur as to the peat soil being well suited for rubber from a chemical standpoint: and it is still less so from a physiological standpoint as pointed out in a previous Bulletin dealing with this subject. The contrasts between the constituents of the soils in the Botanic Gardens where the rubber grows superbly and that of the soil mentioned by Mr. Baur as well suited for rubber is very striking. For comparison I select two soils on which the biggest trees in the Gardens are growing and where the development and rapid growth is the greatest, No. 1, a more peaty soil on which grew the celebrated tree, No. 2, and No. 6 on which grew the tree which attained a height of 100 feet in 14 years.

	Botanic Gardens 1	6	Peat Soil
Organic matter	34,000	11,800	88,060
Oxide iron	2,000	6,200	500
Oxide alumina	23,602	51,280	559
Silicates	32,000	74,000	2,860

In the Garden soils the amount of organic matter is a little more than the silicates in the most peaty; and less than one sixth of the proportion of silicates in the more clayey soil. In the Johore peat soil there is more than forty times as much organic matter than mineral 88 per cent. against 34 and 11.8 in the good rubber gound. Could there be any greater difference between the soils?

It is always satisfactory to have analysis of soils on which cultivation is going on and which can be watched, as by this we can learn gradually the effect of abnormal and normal soils on the plants growing therein.—Ed.

Copy.

The Manager,
Sungei Peradin Estate,
Kukub, Johore.

Colombo, 19th August, 1910.

Dear Sir,

With reference to your letter of the 28th June, advising me of two samples of soil from the above estate, I have much pleasure in informing you that the same have been carefully analysed by my agricultural expert, and I am now enclosing a report on the soil, which I have no doubt you will find very interesting.

As regards the mixtures recommended to you the same can be supplied at the following rates, viz:—

Mixture for Peaty Soil.—At £10. 0. 0. per ton. gross weight cif Singapore.

Mixture for Clayey Soil.—At £9.15.0 per ton. gross weight cif Singapore. Documents against payment.

I should be glad to hear from you whether you have an intention of going in for manuring, as recommended by me, and in the meantime.

I beg to remain,
Dear Sir,
Yours faithfully,
(Sd.) A. BAUR.

Colombo, 16th August, 1910.

Sungei Peradin,
Kukub Estate, Johore.

Peat: Surface Soil.—This is a dark brown soil and composed entirely of decaying vegetable matter including decomposing wood. It is very acid, and when dry is in a fine state of division. Chemically it is exceedingly rich in Nitrogen and plant food generally with the exception of Potash which, however, is in fair amount.

Clay: Sub-Soil.—This is a compact grey clayey mud, which dries very slowly and forms a hard mass, but this becomes friable on moistening. It is in a fine state of division, rich in Nitrogen and Potash, but a little deficient in Lime and Phosphoric Acid.

The soil is well suited for Rubber from a chemical standpoint, but a great depth of peat means some risk of loss from disease and more from the trees falling over as the peat contracts. I would advise close drainage gradually increasing the depth and spreading the material dug from the drains over the roots of the trees, so as to keep them covered.

Owing to the marked acidity the application of ground or burnt Lime at least 5 cwts. per acre is advisable, and the following manure could be applied to supply any deficiency until the drying of the soil and cultivation renders the reserve plant food more available.

PEATY SOIL.

100	lbs.	Sulphate of Potash, 50% potash
100	,,	Precipitated: Phosphate 40% Phos. Acid
150	,,	Nitrate of soda, 15% nitrogen
200	,,	Ground Lime, 98% carbonate of lime
550	lbs.	

CLAYEY SOIL.

100	lbs.	Sulphate of Ammonia, 20% Nitrogen.
100	,,	Sulphate of Potash, 50% Potash.
200	,,	Precipitated Phosphate, 40% Phos. Acid.
150	,,	Ground Lime, 98% Carbonate of Lime.
550	lbs.	

The careful burning of stumps on the clayey soil is advisable, as the Ash will do good, and it will minimise the risk of fomes, etc. On the peat it is too dangerous; but if an acre of waste peat could be isolated where the peat could be burned, the resulting ash could be an excellent manure both on the peat and clay soils, though it must not be applied at more than 5 cwts. per acre at one time.

Coconuts would probably do excellently in these soils if planted deep enough and well drained.

(Sd.) A. BAUR,

Colombo, 15th August, 1910.

Estate	Kukub-Sungei Peradin Estate
District	Johore
Product	Rubber
Soil Samples	Two

MECHANICAL COMPOSITION.

	PEATY SOIL.	CLAYEY SOIL.
Fine soil passing 90 mesh ...	44.00%	52.00%
Fine soil passing 60 mesh ...	56.00%	48.00%
Medium soil passing 30 mesh ...	...	...
Coarse sand and small stones ...	...	...
	100.00	100.00

CHEMICAL COMPOSITION.

Moisture	7.000 %	3.000 %
Organic matter & combined water	88.060 „	25.200 „
Oxide of iron and manganese ...	0.500 „	1.600 „
Oxide of alumina	0.559 „	6.390 „
Lime	0.600 „	0.120 „
Magnesia	0.216 „	0.288 „
Potash	0.076 „	0.138 „
Phosphoric acid	0.128 „	0.064 „
Sand and Silicates	2.860 „	63.200 „
	100.000	100.000
Containing Nitrogen	1.800 „	0.450 „
Equal to Ammonia	2.180 „	0.550 „
Lower Oxide of iron	Fair	Fair
Acidity	Marked	Marked

PERSONAL.

Mr. C. K. Bancroft has joined the Department of Agriculture as Assistant Mycologist. He obtained a Barbados Scholarship in the West Indies in 1905 and proceeded to Cambridge where he took the Natural Science Course obtaining his B. A. with 1st Class Honours, and 2nd Class Honours in Botany in the Tripos Part II. In 1908 he also won the Major Scholarship at Trinity College. After leaving Cambridge he worked for nearly 18 months at Kew under Mr. G. Massee, the great British authority on fungus diseases, being engaged principally in the study of tropical fungi.

EXPORTS TELEGRAM TO EUROPE AND AMERICA.

15th to 31st July.

	Steamers.		Tons.	Tons.
Tin	Str Singapore & Penang to	U. Kingdom &/or	1691	1821
Do.	do.	U.S.A.	525	495
Do.	do.	Continent	305	210
Gambier	Singapore	Glasgow	—	—
Do.	do.	London	—	35
Do.	do.	Liverpool	160	35
Do.	do.	U.K. &/or Continent	—	70
Cube Gambier	do.	United Kingdom	25	20
Black Pepper	do.	do.	—	95
Do.	Penang	do.	55	—
White Pepper	Singapore	do.	70	100
Do.	Penang	do.	5	—
Pearl Sago	Singapore	do.	10	260
Sago Flour	do.	London	75	100
Do.	do.	Liverpool	1,200	575
Do.	do.	Glasgow	50	—
Tapioca Flake	Singapore	United Kingdom	360	175
T. Pearl & Bullet	do.	do.	45	100
Tapioca Flour	Penang	do.	50	350.
Gutta Percha	Singapore	do.	150	150
Buffalo hides	do.	do.	110	90
Pineapples	do.	do.	30,000	15,500
Gambier	do.	U.S.A.	225	375
Cube Gambier	do.	do.	55	30
Black Pepper	do.	do.	150	210
Do.	Penang	do.	—	160
White Pepper	Singapore	do.	55	210
Do.	Penang	do.	—	55
Tapioca Pearl	Singapore	do.	120	150
Nutmegs	Singapore & Penang	do.	11	48
Sago Flour	Singapore	do.	75	250
Pineapples	do.	do.	1,750	1,000
Do.	do.	Continent	3,250	4,000
Gambier	do.	S. Continent	—	55
Do.	do.	N. Continent	700	200
Cube Gambier	do.	Continent	5	50
Black Pepper	do.	S. Continent	200	125
Do.	do.	N. Continent	210	45
Do.	Penang	S. Continent	10	30
Do.	do.	N. Continent	—	—
White Pepper	Singapore	S. Continent	15	10
Do.	do.	N. Continent	75	60
Do.	Penang	S. Continent	5	—
Do.	do.	N. Continent	5	40
Copra	Singapore & Penang	Marseilles	660	240
Do.	do.	Odessa	—	1,950
Do.	do.	Other S. Continent	540	100
Do.	do.	N. Continent	3,660	1,350
Sago Flour	Singapore	Continent	1,300	750
Tapioca Flake	do.	do.	10	75
Do. Pearl	do.	do.	—	10
Do. Flake	do.	U S.A.	50	—
Do. do.	Penang	U.K.	—	—
Do. Pearl & Bullet	do.	do.	110	125
Do. Flake	do.	U.S.A.	—	—

	Steamer.		Tons.	Tons.
Do. Pearl	do.	do.	55	325
Do. Flake	do.	Continent	35	—
Do. Pearl	do.	do.	160	25
Copra	Singapore & Penang	England	360	—
Gutta Percha	Singapore	Continent	20	35
Cube Gambier	do.	do.	—	—
T. Flake & Pearl	do.	do.	—	—
Sago Flour	do.	do.	—	—
Gambier	do	S. Continent	—	—
Copra	do.	Marseilles	—	—
Black Pepper	do.	S. Continent	—	—
White Pepper	do.	do.	—	—
Do.	do.	U.S.A.	—	—
Pineapples	do.	do.	—	—
Nutmegs	do.	do.	—	—
Black Pepper	do.	do.	—	—
Do.	Penang	do.	—	—
White Pepper	do.	do.	—	—
T. Flake & Pearl	do.	do.	—	—
Nutmegs	do.	do.	—	—
Tons Gambier			1,100	650
Do. Black Pepper			70	150

PENANG.

Abstract of Meteorological Readings in the Prison Hospital Penang for the month of August, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
Prison Hospital Penang	29.860	154.3	82.3	89.8	73.4	16.4	77.7	.894	74.7	80.8	S.E.	13.10	2.80

Prison Hospital, Penang,
14th September, 1910.

B. DANE.
Senior Medical Officer, Penang.

NEGRI SEMBILAN.

Abstract of Meteorological Readings in Negri Sembilan Hospitals for the month of August, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Seremban		149.4	81	86	71	15	75.9	.806	72.7	76.8	W	6.33	1.54
Mantin												6.99	2.13
Tampin												10.50	1.80
Kuala Pilah												3.24	.43
Jelebu												3.76	1.43
Port Dickson Town												20.79	3.73
Do. B. B.												15.21	3.35

Medical Officer in Charge's Office,
Seremban *15th September, 1910.*

A. J. M. MOSLEY,
Medical Officer in Charge.

SELANGOR.

Abstract of Meteorological Readings in the various Districts of the State for the month of August, 1910.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
General Hospital, Kuala Lumpur ...	29.855	147.5	81.5	88.8	72.5	16.3	76.2	0.814	72.9	76	Calm.	4.36	1.20
Pudoh Gaol ,, ,, ...	...	...	...	...	...	...	...	...	...	...	...	6.58	2.07
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	4.03	1.20
,, Klang	...	...	...	91.0	69.8	21.2	...	...	...	...	...	2.07	0.48
,, Kuala Langat ...	...	...	...	87.7	73.5	14.2	...	...	...	...	...	8.49	1.85
,, Kajang	...	...	...	84.9	75.1	9.8	...	...	...	...	...	7.55	1.53
,, Kuala Selangor ...	...	...	...	87.3	74.9	12.4	...	...	...	...	...	6.52	1.35
,, Kuala Kubu	...	...	...	92.5	70.2	22.3	...	...	...	...	...	11.41	1.27
,, Serendah	...	...	...	92.6	70.5	22.1	...	...	...	...	...	5.64	1.64
,, Rawang	...	...	...	90.4	70.8	19.6	...	...	...	...	...	2.70	0.58
Sabak Bernam	...	...	...	...	...	...	...	...	...	...	...	1.36	0.30

OFFICE OF SENIOR MEDICAL OFFICER,
Kuala Lumpur, 20th September, 1910.

G. D. FREER,
Senior Medical Officer, Selangor.

PERAK.

Abstract of Meteorological Readings in Perak for the month of August, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Taiping	...	109	82.61	94	70	24	77.63	880	...	79	...	7.36	2.00
Kuala Kangsar	...	...	80.50	93	69	24	75.61	820	...	78	...	2.95	.72
Batu Gajah	...	104	80.83	92	72	20	76.79	866	...	82	...	4.60	2.88
Gopeng	...	...	81.14	91	71	20	75.46	806	...	76	...	4.44	.87
Ipoh	...	...	80.93	92	70	22	76.65	861	...	82	...	4.82	1.67
Kampar	...	...	81.14	93	70	23	76.02	830	...	78	...	5.31	2.43
Teluk Anson	...	...	81.70	91	70	21	76.80	855	...	78	...	3.61	.97
Tapah	...	...	81.14	91	68	23	76.24	837	...	78	...	6.17	1.51
Parit Buntar	...	...	82.41	91	71	20	76.92	852	...	77	...	6.06	1.02
Bagan Serai	...	...	82.30	91	71	20	76.91	854	...	78	...	5.45	2.50
Selama	...	...	80.56	91	72	19	75.92	835	...	80	...	9.08	2.21

OFFICE OF SENIOR MEDICAL OFFICER,
Ipoh, 14th September, 1910.

S. LUCY,
Senior Medical Officer, Perak.

KELANTAN.

Abstract of Meteorological Readings in Kelantan for the month of August, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° F.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	° *F.*	%		Ins.	Ins.
Kota Bharu ...	...	151.5	82.5	87.8	74.3	13.5	76.7	.820	73.3	72.0	...	6,79	1.33
* Kuala Lebir ...	...	...	79.2	89.7	72.2	17.5	75.7	.823	73.4	78.6	...	11.42	3.28
Kuala Kelantan ...	...	...	...	78.84	74.23	4.61	...	...	...	...	...	3.40	1·15
Kuala Pahi ...	...	...	...	85.61	72.0	13.61	...	...	...	...	...	8.61	2.52
Taku Plantation ...	...	...	...	...	...	...	...	...	...	...	...	9.63	1.75
Nenggiri ...	...	...	...	...	...	...	...	...	...	...	...	6.65	1.51
Pasir Tinggi ...	...	...	...	...	...	...	...	...	...	...	...	11.25	2.72
Chaning Estate ...	...	...	...	...	...	...	...	...	...	...	...	5.78	.98

* Supplied by the courtesy of the Kelantan Planters' Association.

John D. Gimlette,
Residency Surgeon,
Kelantan.

Residency Surgeon's Office.
Kota Bharu, *26th September, 1910.*

SEREMBAN.

Table showing the Daily Results of the Reading of Mëteorological Observation taken at the General Hospital, Seremban, for the month of August 1910.

Date.	Temperature of Radiation. 9 H.	15 H.	Mean.	Maximum.	Minimum.	Range.	Temp. of Radiation. Sun.	Difference Sun & Shade.	Wind Direction. 9 H.	15 H.	Temp. of Evaporation. 9 H.	15 H.	Mean.	Computed Vapour Tension 9 H.	15 H.	Mean.	Relative Humidity. 9 H.	15 H.	Mean.	Clouds 0 to 10 9 H.	15 H.	21 H	Cloud and Weather Initials. 9 H.	15 H.	21 H.	Rain. Inches.
1	79	85	82.	88	72	16	145	57	W	W	72.3	71.8	72.	.793	.781	.787	80	64	72	9	0	0	N	S	S	
2	81	85	83.	87	69	18	151	64	N W	S W	72.6	73.4	73.	.802	.826	.814	76	68	72	0	0	0	S	S	S	.24
3	75	85	80.	86	72	14	147	61	N W	S W	73.3	70.1	71.7	.820	.738	.779	94	61	77.5	0	0	0	S	S	S	1.54
4	75	80	77.5	81	71	10	148	67	W	S W	73.3	73.3	73.3	.820	.820	.820	94	80	87	0	5	0	S	C	S	
5	78	82	80.	84	70	14	137	53	W	S W	74.6	72.	73.3	.857	.785	.821	89	72	80.5	4	0	0	C	S	S	
6	79	85	82.	88	72	16	154	66	W	W	75.6	73.4	74.5	.887	.826	.856	90	68	79	0	0	0	S	S	S	
7	81	88	84.5	90	71	19	150	60	S W	W	74.3	73.3	73.8	.849	.819	.834	80	61	70.5	0	0	0	S	S	S	
8	82	86	84.	88	70	18	151	63	S W	S W	75.3	69.5	72 4	.877	.721	.799	80	58	69	0	0	0	S	S	S	
9	82	83	82.5	86	71	15	151	65	W	S	75.3	71.3	73.3	.877	.766	.821	80	68	74	0	0	0	S	S	S	
10	80	83	81.5	87	70	17	154	67	W	W	71.6	74.7	75.1	.775	.856	.815	75	76	75.5	0	0	0	S	S	S	.61
11	76	82	79.	84	72	12	146	62	W	W	72.6	70.3	71.4	.801	.742	.771	89	68	78.5	3	4	0	S	C	S	
12	77	85	81.	86	70	16	155	69	N W	W	73.6	71.8	72.7	.829	.781	.805	89	64	76.5	0	0	0	S	S	S	
13	80	87	83.5	89	71	18	150	61	N W	W	73.3	73.9	73.6	.820	.837	.828	80	65	72.5	0	0	0	S	S	S	
14	75	83	79.	85	72	13	155	70	W	W	73.3	71.3	72.3	.820	.766	.793	94	68	81	7	0	0	N	S	S	.44
15	77	79	78.	82	73	9	134	52	W	S W	73.6	73.9	73.7	.829	.839	.834	89	85	87	4	3	0	C	S	S	
16	79	85	82.	86	71	15	144	58	W	S W	73.9	71.8	72.8	.839	.781	.810	85	64	74.5	0	0	0	S	S	S	
17	75	84	79.5	85	70	15	156	71	W	S W	73.3	70.7	72.	.820	.751	.785	94	64	79	5	0	0	C	S	S	
18	76	84	80.	86	72	14	153	67	N W	S W	74.3	74.	74.1	.848	.840	.844	94	72	83	4	5	0	C	C	S	.08
19	78	81	79.5	86	73	13	150	64	N W	S W	72.9	76.	74.4	.810	.897	.853	84	85	84.5	0	7	0	S	N	S	.04
20	78	83	80 5	85	72	13	138	53	W	S W	72.9	71.3	72.1	.810	.766	.788	84	68	76	6	10	5	C	N	C	.55
21	80	84	82.	86	70	16	156	70	N W	S W	73.3	74.	73.6	.820	.840	.830	80	72	76	0	3	2	S	S	S	
22	74	76	75.	84	72	12	151	67	W	N W	74.	74.3	74.1	.840	.848	.844	100	94	97	8	9	0	N	N	S	1.33
23	80	86	83.	87	71	16	150	63	N	S W	73.3	72.8	73.	.820	.808	.814	80	64	72	0	0	0	S	S	S	
24	81	84	82.5	87	71	16	151	64	N W	S W	70.9	72.4	71.6	.757	.794	.775	72	68	70	0	0	5	S	S	C	.95
25	79	86	82.5	87	72	15	156	69	N E	W	72.3	74.5	73.4	.793	.855	.824	80	68	74	4	0	0	C	S	S	.25
26	77	87	82.	87	70	17	155	68	N W	S W	71.9	67.3	69.6	.783	.669	.726	84	52	68	5	2	4	C	S	C	
27	75	85	80.	86	70	16	145	59	S W	S W	73.3	66.8	70.	.820	.660	.740	94	55	74.5	5	6	5	C	C	C	
28	76	86	81.	87	70	17	150	63	N W	S W	74.3	67.9	71.1	.848	.681	.764	94	55	74.5	2	4	0	S	C	S	
29	76	85	80.5	86	70	16	152	66	S W	S W	72.6	70.1	71.3	.801	.738	.769	89	61	75	8	6	3	N	C	S	.30
30	76	84	80.	86	70	16	148	62	S W	S W	72.6	70.7	71.6	.801	.751	.776	89	64	76.5	7	4	2	N	C	S	
31	82	85	83.5	86	71	15	149	63	S W	S W	75.3	75.1	75.2	.877	.873	.875	80	72	76	2	1	0	S	S	S	
Mean.	78	84	81.	86	71	15	149.4	63.3	W	S W	73.3	72.	72.7	.824	.788	.806	85.8	67.9	76.8							6.33

Seremban,
15th September, 1910.

Highest Temperature 90
Lowest Temperature 69

Greatest Rainfall in 24 hours 1.45

A. J. M. CLOVELY,
Senior Medical Officer in charge.

No. 11.] NOVEMBER, 1910. VOL. IX.

Agricultural Bulletin

OF THE

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AND

FEDERATED MALAY STATES.

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Director of Botanic Gardens, S.S.

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To be purchased at the Botanic Gardens, Singapore, from MESSRS. KELLY AND WALSH, LTD., No. 32 Raffles Place, and 194 Orchard Road, and THE STRAITS TIMES OFFICE, CECIL STREET, SINGAPORE.

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AGRICULTURAL BULLETIN

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CHILIS AS A CATCH-CROP.

The demand for Chilis or capsicums by natives for local consumption is very large. They are used both fresh and dry, and the chief source of supply of dried Chilis in the Malay Peninsula is India, whence very large quantities are exported to Singapore and Penang. It seems absurd that in a country like this we cannot grow all the Chilis we require for local consumption, but not only have we, it seems, ever been able to supply a sufficiency of dried Chilis, for the demand, but during the past two or three years fresh chilis have been so scanty that the price had gone up from 6 to 10 cents a catty to 40 to 50 cents a catty.

The reasons for their scarcity in Singapore are several. During the past few years, it is said by the Chinese, that the weather has been bad, too much rain at the wrong time, so that the Chilis rot. This rot is due to a fungus attacking the fruit of which I will give an account later, and no doubt excessive wet would increase the development of this pest. Another reason for the scarcity is the fact that large areas of ground which were formerly vegetable gardens have been converted into rubber estates. Chilis and other vegetables could, of course, be grown as catch-crops at least in the early years between the rubber trees with benefit both to the trees and to the planter, but somehow this is not done. The Chinese also affirm that vegetables cannot be grown without manure, of which they hold night-soil the best. Objections have been raised to growing vegetables with night-soil anywhere near town for sanitary reasons, and the result has been a notable scarcity of vegetables, all of which are now very expensive. Indeed, we are informed such vegetables as pumpkins, brinjals, cabbage, etc., are at prices which are prohibitive to the poorer classes. With these cultivations Chilis, which, also require in our poor soil a good deal of manure, have also risen very high in price. Vegetables, including Chilis, are an absolute necessity for the health of rice-eating peoples, who require large quantities of them, and it is a question worthy of study by those who are interested in the health of the population as to whether the failure of the vegetable supply does not produce an insanitary condition which is of considerable importance and possibly even greater than the risk from using night-soil on such vegelables, at least as brinjals, pumpkins, beans and Chilis. The Chilis cultivated are chiefly the *Capsicum frutescens*, or *Capsicum annuum*, the long cylindrical red fruit commonly known as capsicums of the long Cayenne variety.

There are a considerable number of varieties of this plant, many of which are rather fancy kinds, which are cultivated more as curiosities, or from fancy, such as the black or yellow fruited varieties, but for trade purposes the important one is the long Cayenne.

The bird's eye Chili, *Capsicum Minimum*, is much used by natives also, but sufficient is cultivated usually in their gardens or in waste ground and it does not seem to form a vegetable garden crop as the long capsicum does, though it would be easy enough to cultivate it so. It is not popular among the Indian races, and is chiefly used by Javanese and Malays. It is, as is well known, much more pungent than the long Cayenne and is commonly used as a pickle or for making a very hot sauce.

For market-purposes the long pepper is the one in demand, both fresh and dry, and for making Cayenne pepper.

The Capsicum is usually grown as an annual and replanted each year, but it can be continuously cultivated for two or three years, the stems and branches being cut back each year. They, however, are useless after the second or at least the third year and require replanting from seed. They cannot be grown continuously on the same soil, as they deteriorate, and consequently require rotating with other crops, such as brinjals, beans, or some other annual crop. This is the way the Chinese usually grow them.

In Singapore the soil in which they are cultivated is usually stiff clay, well worked up. If procurable, manure, such as cow-dung, should be worked into it, and burnt earth is added.

The seeds taken from fresh-pods are soaked in salt fish water, that is water in which salt fish has been soaked. In this liquid they remain for a week. They are then taken out and dried well and mixed with soft earth. The object of these proceedings is to separate the seeds and free them of pulp, so as to be able to sow them at a distance from each other in the seed bed, otherwise they would cling together and be planted in a lump.

They are sown in a nursery bed and after fifty days pricked off into the permanent plot. The beds in the plot are fifty feet in length and three feet in width, and a foot apart, so that the planter can walk between the plants and weed them. A five foot-way runs between each block of beds.

The soil of the beds is worked up fine and banked up, and two holes are made on either side of the bed about $1\frac{1}{2}$ to 2 feet apart, giving from 50 to 60 plants to a bed. Cow-dung is put in each hole and the plants are planted therein and soil raked over the cow-dung to the bases of the plants. Liquid manure is given once a week, or oftener. Urine is often used in the proportions of three parts of urine to two of water when the plants are young and two parts of urine to three of water later. Pig-dung is also used when procurable; over manuring is to be avoided, but the plants can take a good deal of liquid manure. The weeds have to be removed from the beds from time to time. Plants commence fruiting in three months and go on bearing for seven more. The fruit are picked when fully red, unless green capsicums are wanted for pickling.

Excessive rain in injurious, and often spoils the crop to a considerable extent. The actual cause of this is a fungus which attacks the pod and which is most prevalent in continued rainy weather. The fungus is a species of *Gloeosporium (G. piperatum)*, a plant allied to, if not the same, as the ripe sort of apples. It causes brown spots of decay, firm to the feel, eventually developing pinkish pustules, becoming black.

The common Capsicum fungus in Singapore is either this species described by Tubeuf or an allied one. It appears as an oval or circular blotch gradually spreading, at first black, but as the tissue destroyed dries, brown with a black edge. The epidermis is cracked dry and elevated, finally the whole fruit dries up and is worthless.

The diseased pods should be removed, and the plants and ground disinfected with Bordeaux mixture.

It is not easy to discover what amount of pods can be obtained per acre in the Straits Settlements, as the Chinese are very vague upon this point. In Montserrat, in the West Indies, a return of 4850 lbs. of fresh capsicums, 2921 lbs. when dry, is given as a good return, but this seems much too high for an average return. As a catch-crop they ought to pay well in the neighbourhood of a town or a largely populated native district, where they could be sold fresh.

In Singapore dried Chilis are seldom prepared, unless when the crop is large or there is an overstock. They are dried in the sun, exposed on mats or in trays. Locally-dried Chilis, however, are not popular with the natives here, probably from carelessness in drying and the absence often of enough sunheat. It is possible also to dry them with fire heat or in a desiccator and I have seen good samples prepared by careful heating over a fire.

The native, however, does not seem to care about kiln dried Chilis preferring sun-dried, still, there should be a fair sale for well prepared samples; near market there would probably be a better sale for the fresh fruit, and in such a locality it might pay very well to grow Chilis as a catch-crop.—Ed.

DISINFECTION OF RUBBER SEEDS.

The question of the possibility of introduction of the spores or mycelium of the various fungi attacking Para rubber on the seeds of the rubber tree has been the subject of much discussion at the Chambre d'Agriculture de La Cochin Chine at Saigon, and the subject of disinfection by chemicals discussed.

The smooth seed of the Para rubber, I do not think, could retain spores, but should there be any fragment of soil attached to them spores could be carried, the subsequent washing or soaking in water that seeds should receive on arrival from some distance to facilitate their germination should however remove any possible risk.

M. Morange thinks that there is always a risk in seeds picked up and not disinfected, and as to mycelium he urges that if seeds of Para rubber are piled in a heap and left they go mouldy and this mould is a mycelium growing on the seeds.

Para rubber seends, if left in a pile, become heated very quickly, in fact commence a chemical decomposition, the polished surface of the seed is rapidly destroyed and the thin outer layers broken up so that the mould can then attack the seed. But it is not assumed that rotten seed is imported and carefully planted by a rational planter. Would a planter sow a Hevea seed covered with the very conspicuous mycelium of *Fomes*? and should a fragment of mycelium of *Fomes* be buried with the seed what are the chances of its being planted in actual contact with dying shrub or tree on which it could continue to develop? Besides, even supposing the seed had not been exposed to the light and heat of the sun which in a few minutes would certainly kill the mycelium, the chances of survival of the mycelium threads are very small indeed.

A fungus to establish itself requires a good deal more than importation of one or two spores, or a scrap of mycelium. It requires to be brought and put in such a position that it can actually then and there continue its growth luxuriantly, the actual chance of this in most cases is extremely small, otherwise we should utterly fail to keep out any fungus that happened to be suited for growth on any particular crop.

Fungus spores can be borne by the wind to any distance and doubtless are, but wide as the distribution of these air-borne cellular plants is, many quite fail to effect a settlement in many places. Nothing that man can do can prevent this method of invasion. What we can do is to prevent infected, that is diseased plants, from being brought in and planted among healthy ones of the same kind.

Fomes semitostus is not yet recorded for Cochin China, but the mycology of that country is quite unknown at present, and it may be there all the while. However the agriculturists of Cochin China are taking care not to let it or any other fungus-pest be imported which is prudent. For this object the importation of Hevea-plants is strictly forbidden and the seeds must be disinfected with Bordeaux mixture or some such disinfectant. One planter having alleged that such disinfection would kill the seed, M. Morange made a series of experiments with bichloride of mercury, and copper sulphate with the following result :

1. Bichloride of Mercury 1 per 1,000

   A. Seeds washed after treatment Proportion of seeds which germinated after 30 days ... 70%

   B. Seeds not washed 68%

2. Bichloride 2 per 1,000
   washed 84
   not washed 90

3. Sulphate of copper 1 per cent,
   washed after ... 62%
   not washed 52%

4. Sulphate of copper 5 per cent.
   washed 68%
   not washed 62%

Check experiment, Seeds washed in pure water gave 78, and 70% germinated after 30 days

The seeds were put in the disinfectant for half an hour.

Except in one case there is a slight proportion of larger germination in the washed over the unwashed seeds, and there is a fall off in germination in the seeds treated with copper sulphate but not a very large one compared with the check experiments.

Another experiment was made by M. Belland—400 seeds were plunged in water and left for half an hour; all germinated

500 were put in a solution of 1 per cent. of copper sulphate for half an hour and continuously stirred round (brassées) energetically for half an hour. Of these only 38 germinated.

500 were similarly treated with a solution of bichloride of mercury 1 per 1,000, only fifty four germinated.

M. Morange made also an experiment of the same nature.

Five hundred seeds were sown dry without washing and 285, i. e. 56.8 per cent. germinated in a month.

Another lot were stirred in plain water more carefully, of these 213. or 42. 6 per cent. germinated.

Another lot was stirred in copper sulphate solution 2 per cent and 291 or 58. 2 per cent. germinated.

A fourth lot were stirred in Bichloride of Mercury at 2 per 1,000, of these 285 or 59 per cent. grew.

It is clear from these experiments that stirring the seeds round in the liquid, whether water or copper sulphate solution, is extremely injurious.

The best disinfectant results as far as germination is concerned appear to be from the use of bichloride of mercury in weak solution, and washing afterwards without stirring the seeds round.

This solution might, however, not be strong enough to thoroughly disinfect the seeds, assuming they were covered by spores.

Personally I think the risk of importing seeds with spores of rubber-killing fungi is infinitesimal. Supposing, for instance, one rubbed a seed with spores of Fomes and planted it in the nursery. The spores would not last indefinitely and it would be probably two years before the plants in the nursery would be old enough to be attacked. It is in the highest degree improbable that any of the spores would germinate at all under the circumstances. In the case of *Diplodia* the risk would be still smaller, as *Diplodia* requires to be put on the cut end of a shoot to make a successful growth. As I have pointed out till decomposition of the exterior of the shell of the seed sets in the spores could hardly rest on the smooth surface, and would even, if attached by mud etc., or included in the packing, be washed away by ordinary plunging in water and probably by the first rain also.

The case is quite different with stumps or plantlets infected being brought into the estate. Here the fungus is established in a thriving state on the young plant, and can go on developing there. It is put in contact with healthy plants in the same conditions of life perhaps even thumb-nail pruned or with buds wounded in some away. By planting infected spore producing plants in such a healthy lot, a planter would be putting the fungus in the best possible position for its development.

The fungi belonging to the group *Polyporei* are extremely abundant all over the tropics and it is very unlikely that *Fomes semitostus* is the only one that can adapt itself to attack Para rubber. Indeed we know that *Irpex flavus* which used to give trouble with coffee can attack Para rubber. Tubenf records thirty species of Polyporei as fatally attacking trees in Europe and North America in the same way as *Fomes* has taken to attacking Hevea, and as far as one can see any at least of the larger *Polyporei* in the Tropics could adapt themselves to attack Hevea. In Christmas Island I and others collected eleven species of Polyporei, and there are probably a great many more to be found in wetter seasons. How did these get to this isolated island? Some at least by spores blown for 250 miles from the nearest land, but a number of the wood-destroying fungi were undoubtedly brought in planks, poles, firewood, old boxes, etc. It is absolutely impossible to prevent this. A bit of firewood on arrival at the port is found to be rotten, i. e., it contains mycelium. It is naturally thrown away, the mycelium continues to grow, and produces its sporophores. Other rotting timber is lying round its spores attack that and

Charduar Rubber Plantation.

Tenders are invited for the purchase of the Charduar Government Rubber plantation (including buildings) situated in the Darrang District, Eastern Bengal and Assam. The plantation, which would be leased on periodic lease, covers about 3,000 acres of which 1,700 acres are fully and 1,047 acres partially stocked with Ficus Elastica trees (between 25,000 and 30,000 in number.)

A contiguous area of 2,000 acres would if desirable be leased on favourable terms for extensions. A memorandum giving full particulars of the estate and conditions of tender and sale can be obtained from the Conservator of Forests, Western Circle, Eastern Bengal and Assam, or from Messrs. GRINDLAY & CO., 51 Parliament Street, London, S. W. Tenders, which will be treated as confidential, should be accompanied by a deposit of Rs. 1,000 and should reach the undersigned not later than the 1st December, 1910. The Local Government does not bind itself to accept the highest or any tender.

A. V. MONRO,
Conservator of Forests, W. Circle,
Eastern Bengal and Assam.

SHILLONG,
23rd July, 1910.

the fungus is established. We cannot stop this but we can prevent the introduction of plants infected by a fungus which has adapted itself so as to be parasitic on any plant we are cultivating, and its being put in contact with other healthy plants of the same kind, and this is or should be the object aimed at by all legislation against the introduction of fungus pests.

One of the difficulties in carrying out the disinfection laws of the various countries seems to be due to the smallness or incompetence of the staff. A case of plants sent from Singapore to an island where the laws were stringent was entirely destroyed by the disinfecting process, entailing a great loss on the importer. Another planter complains that the delay in disinfecting and inspecting is so great that the plants are half dead when they arrive at his estate. In some countries formerly, at least, no plants of any kind were allowed to be imported, preventing thereby any progress in agriculture at all. It should not be difficult to prevent the importation of sick plants without discouraging the importer of new strains or new species of useful plants which may be of the greatest value in the future to his country. At the same time, in the case of any disease of a cultivated plant appearing it should be possible and compulsory for the planter to report to a scientific staff who could take steps to prevent the disease increasing or being spread by sending infected plants from one estate to another. As so many of our plant diseases are of local origin I hold this system to be actually of more importance than preventing accidental introduction of the pest from outside, which is none the less a point not to be lost sight of.—Ed.

A NOTE ON SOME RECENT FUNGUS LITERATURE.

Bulletin No. 65, Vol. IX, of the Department of Agriculture of Trinidad contains, among other interesting articles, an admirable account of some recent investigation on pod-rot, chupon-wilt and canker of cacao by Mr. J. B. Rorer, the Mycologist to the Department.

In the first part of the work the author deals with the history of pod-rot and canker, mentioning Harrison's report (1895) on a disease which occurred in Grenada, Surinam and British Guiana and which was undoubtedly pod-rot, and describing Willis' and Green's report (1897) on "canker" of cacao in Ceylon, thus showing that the first accurate descriptions of pod-rot and canker came respectively from the West and from the East. He next describes Carruthers' work in Ceylon (1898) in which the pod disease was attributed to one of the *Peronosporaceae* and the canker to a species of *Nectria* which was afterwards identified as *N. ditissima*, Tul.; he mentions Howard's work in Grenada (1901) o na pad disease of cacao caused by *Diplodia cacaoicola*, P. Henn., and on a canker disease of the stem which was attributed to two fungi named by Massee *Nectria Theobromae* and *Calonectria flavida*; he points out that Hart was the first to make pure cultures of *Phytophthora omnivora,* De Bary, and with them to reproduce the pod disease by inoculation ; and finally, he refers to the work of Mrs. Van Hall in Surinam (1909) on the canker disease which was said to be caused by *Spicaria colorans,* n. sp. Having thus described the work of previous investigators on pod disease and canker of cacao, the author is careful to point out that whereas pod disease has been shown by inoculation experiments with pure cultures to be caused by *Phytophthora omnivora,* the canker has never been reproduced by infection with spores derived from pure cultures.

A description of the life-history of *Phytophthora omnivora,* is given, being based on the results of infection experiments. The fungus is shown to be capable of penetrating the unbroken surface of a pod either through the epidermis or through a stoma. When the tissues of the pod have become invaded by the fungus the mycelium is said to pass backwards to the cushion and to produce a cankered appearance of the cushions and of the surrounding area of the bark. Other infection experiments showed that the fungus could spread from the stem to the pods.

A careful description is given of the inoculation experiments carried out with the following species :— *Phytophthora omnivora, Diplodia cacaoicola, Nectria Theobromae, Nectria Bainii, Calonectria flavida, Spicaria colorans,* and two species of *Sphaerostilbe.* Positive results were obtained only with *Phytophthora omnivora and Diplodia cacaoicola,* and only in the case of the former was the cankered appearance oi the stem produced. The author, therefore, concludes that the canker is caused by *Phytophthora omnivora,* and that the other species of fungi mentioned above, with the exception of *Diplodia cacaoicola,* are incapable of affecting the healthy tissues of the plant. The infection experiments were numerous and in each case a pure culture of the fungus was employed.

The remedial measures which are recommended for treatment of the canker and pod disease are :—

(1). Spraying the pods with a fungicide, in which experiments are said to be in progress for the purpose of determining the best fungicide and the most suitable time of application.

(2). Cutting out the cankered area on the stem.

(3). Avoiding needless wounding of trees and unnecessary shading.

(4). Better drainage.

Phytophthora omnivora occurs as parasite wherever the cacao plant is cultivated ; but it has hitherto been supposed to be confined to the pods, causing a disease known in the West Indies as "black pod-rot." The author's conclusion that the canker and pod-rot are caused by the same fungus is, therefore, contradictory to the results obtained by previous investigators. His work is, however, accurately described and the conclusions are based on the results of numerous experiments; it is, therefore, of the greatest importance not only because it throws so much light on the cacao diseases of the West Indies, but because it concerns all cacao-producing countries of the world.

KEITH BANCROFT,
Assistant Mycologist,
to the
Federated Malay States.

PROGRESS IN UGANDA.

The report of the Botanical Forestry and Scientific Department of Uganda for the year ending March 31, 1909, is published as an annual report, and shows a good deal of energy has been expended and good work done. The staff of Europeans is a large one, contrasting very favourably with that of many of the colonies of the Empire. Besides Mr. Dawe, the Director, there is one assistant, one Inspector and five assistants to deal with cotton, and one entomologist, besides several overseers of outlying experimental stations. A big exhibition of many thousand exhibits was held at Kampala which seems to have been a success.

All kinds of useful plants are belng cultivated by the department, though cotton is the most important from all points of view. Para rubber is being grown with success and though most of the trees are young tapping experiments were made. The yields, however, seem small, and tapping can apparently be carried on for 8 months only, commencing in the wet season. The growth of the trees, however, is not below the average, the oldest tree, 7½ years old, measures 42½ feet in height and 30 inches in girth. It increased in height 5 feet 9¾ inches, and in girth 5½ inches in the year.

Castilloa is attacked by a borer, and does not promise so well.

Cocoa is being taken up by settlers, Coffee crops well and heavily, but a new leaf disease, *Colletotrickum Coffeoe*, destroyed one plantation. Its attacks, however, were defeated by Bordeaux mixture. Wheat and rice and lemon-grass are successfully worked. Much attention is paid to the cotton industry and the outturn of ginned cotton has risen from 858 cwts. in 1905-6 to 14,087 in 1908-9. There is much too little cotton ground in the Empire for the need of the country so that it is of the greatest importance that areas in which cotton can be successfully grown should be developed to their utmost. It is well suited too to the native population, and is quite the thing for a country with a large native population, and considering the large and increasing area under rubber at the present time is of more importance to the Empire than that popular plant.—ED.

RUBBER IN JAMAICA.

The Director of Agriculture of Jamaica publishes in his annual report an account of the failure to cultivate Para rubber in that island. His remarks on the subject in the previous report occasioned a good deal of comment and criticism, and it was stated that his pessimistic views had a material effect in preventing the rubber boom from extending in Jamaica. His evidence that he now produces seems certainly to justify his condemnation of the cultivation.

The first plants of Hevea braziliensis he says were planted as Castilla in 1872. This is interesting because the first plants imported, by Collins, arrived at Kew in 1873, Where did these plants come from? Did Collins leave some at Jamaica on his return from the Amazon? One of these trees, still standing, and consequently 38 years old, only measures 43½ inches in girth at three feet from the ground and produces with difficulty only a little scrap. Six tappings on a thorough going scale only yielded 4 ounces of rubber per year. In the Straits a tree of this age should be at least 120 inches round, and give 30 to 40 pounds of rubber, and produce over a thousand seeds.

This tree is not the only failure, for reports have been sent in from twelve other localities in Jamaica, all giving the same verdict, "Trees weak and spindly", and in some yield of latex very poor. One correspondent states: "From what I saw of Para rubber in Singapore and Ceylon last summer (1909) I am quite convinced that it is no good here as the girth of my largest tree (four years old) is not as big as one of eighteen months growth in Singapore."

The seeds seem to have germinated fairly well as in 1906. Mr. Fawcett writes that of 7,500 "we shall hardly lose 500," one unlucky lot from an estate sent there however came to grief. In 1905, 5,642 plants were distributed to planters from a lot of 10,000 seeds sent from the gardens in Singapore, but if this was all that germinated this was under the usual germination for seed to Guiana, etc., 86 to 90 per cent. an equally long voyage.

The evidence now brought forward by the Director seems to be conclnsive. The plant has been tried everywhere in Jamaica, and the Department has given it a good trial. The result has been uniformly the same, for some reason the tree will not grow and if it does, produces little or no latex.

More hope is entertained about Castilloa, but there it is reported that under favourable conditions trees of ten years old produce but one pound of rubber, and trees of 14 to 20 years of age 2 lbs. and over. This seems a very poor return. Should rubber fall, as it certainly will do in a few years, to a low figure, it can hardly pay on this return especially as the labour in Jamaica costs four times as much as in the Straits Settlements.

Fruit, Coconuts, and Cocoa seem to be the most successful products in Jamaica.—Ed.

EUTYPA CAULIVORA.

Two excellent photographs of this fungus (of which some account was given in the Bulletin IX. p. 216-218) are published in the Kew Bulletin No. 7, 1910, by M. Massee, who writes as follows:

"Other species of Eutypa as *E. erumpens Mass,* and *E. gigaspora* Mass, are distinctive parasites to timber trees and undoubtedly *caulivora* is a tree parasite, though the fruit of the fungus only appears on the trunk when the tree is dead. A section of the trunk shows the dark lines formed by the mycelium of the fungus extending quite to the centre and proves that in the example under consideration the fungus has been present in the tissues for some considerable time previous to the death of the tree. Death ensued from starvation owing to the water supply from the root being checked by the copious development of the mycelium in the water conducting tissue. It is highly probable that the fungus occurs on indigenous trees and has passed from thence to the cultivated rubber trees which, judging from the materials received, prove to be admirabiy adapted to meet the requirements of the parasite. A careful search for this fungus in indigenous trees should be made and its extermination attempted if discovered in localities where the establishment of a rubber plantation is contemplated."

I have found the Eutypa also on cut logs of *Macaranga Griffithii,* a common tree of the class called Mahang by Malays, and an ally at least of Para rubber being one of the *Euphorbiaceae* and which is probably the original host of the *Eutypa.*—Ed.

LOCAL FLOWER POTS MAKING.

It is perhaps well-known to everyone, that the Chinese were really one of the pioneers in the art of pottery, and so a short resumé as to their method of making flower-pots may not be amiss.

Very few implements are used by them in the process, and it is really surprising at the rapidity by which they cast out of a shapeless mass of clay, a 5, 10, or 12 inch pot, as the case may be.

Clay, i.e., ordinary local clay, is the substance used, to which is added some fine silver sand also got locally. These two substances are thoroughly mixed together by chankol (native spade) and by hand.

A good "potter's wheel" is the essential part of the equipment. This consists of a large flat disc of stone which revolves on a wooden pivot (made of Tembusu) sunk in the ground. This disc is revolved at a good speed by the foot of a Chinaman, who whisks it round and round according to the needs of another coolie, the later performing the actual operation of moulding the clay into the shape of pots.

When the clay and sand has been prepared to the necessary consistency, a piece of about 5 lbs. is cut off which is sufficient for a 10 pot. The base of this roundshaped lump is dabbed in burnt paddy husk, thereby preventing the base from cracking during subsequent operations and also causing the lump to adhere to the surface of the "wheel."

The wheel is now set agoing by a few vigorous whisks. A little water is then sprinkled over the lump and the Chinaman (No. 2), who by the way squats himself on the ground, also wets his hands to prevent the clay from sticking to them.

His left hand is gently thrust into the centre of the clay while his right hand is slightly pressing on the outside to keep the whole together, but it is from the inside that most of the shaping is done, meanwhile the "wheel" is made to turn more quickly. Then by keeping both hands opposite each other, i.e., one inside and one outside, together moving slowly up from the wheel, pressure by both hands is exerted, and the shapeless mass of clay assumes the shape of a pot with astonishing rapidity. A thin piece of wood is used to flaten the rim and usually the same piece is used to measure the pot to see if it is to the correct size. If not, then a little more pressure is given from the base upwards, but they seldom require to alter it, for it is usually exact, so used are they to the process. So quick are those two coolies at it, that they will mould 2 10 inch pots in 3 minutes.

The holes in the base of the pot are punched out with a piece of tin as are also the holes necessary for orchid pots. These newly made pots are then set in the sun for one day, and are then placed in an oven arrangement where they are "fired." The operation of firing takes 4 days to complete.

Throughout the whole operation, the coolies display an ingenuity which surprises all who have the pleasure of seeing them at work.

J. W. ANDERSON.

TWO PARA RUBBER FUNGI.

In the Ceylon circulars, Vol. 5, No. 6 and 8, Mr. Petch describes two fungi attacking the roots of Para rubber, viz., *Hymenochoete noxia* Berk and *Sphoerostilbe repens* B. and B. The first mentioned is called by him Brown root disease and has been already mentioned in the Bulletin (July 1909). It attacks all kinds of tress, rubber, cocoa, tea, dadap, cotton, cinnamons, cocoa and other plants. It is the commonest root disease in Ceylon, but is by no means as common as Fomes is, here. It is not as injurious as the latter fungus as it spreads very slowly and only along the roots of the trees, and does not affect neighbouring trees, unless the roots are in actual contact. Usually, therefore, one tree is killed at each centre of infection unless the dead tree is left standing for two or three years.

The trees die in the ordinary way that they do from other root diseases, the leaves wither and fall off and the whole tree dies. The characteristic feature of the fungus is seen on digging up the roots, which, and especially the top root, are encrusted with a mass of stones, earth, and sand. This is cemented to the root by the mycelium which consists of tawny brown threads collected here and there into nodules. The mycelium in a young stage brown becomes black later forming a continuous black layer over the brown masses of, hyphae (The brown mycelium coating has a shining appearance and suggests a thin layer of brown plush, whence here we call it the brown plush fungus). On scraping away the fungus, the bark is found to be decayed and usually coloured brown ; the wood, if affected, is yellow, but this depends to some extent on the tree attacked. In Hevea it is usually discoloured and rotten, and wedges of decayed tissue brown and powdery, are seen penetrating to the centre from the outside (In a specimen of Hevea root sent to the editor some years ago the wood was not altered but remarkably dry and hard, as if it had lost all its water by drying).

The fructification is rarely met with. It consists of a patch of a finely velvety appearance covered with minute projecting bristles. It ppears not to be produced till the tree has been long dead.

In Ceylon it appears that nearly all the Heveas attacked have been planted in old Cacao land which had been cleared for planting Hevea, as Cacao is the tree most affected by *Hymenochaete.* That the growth of the fungus is slow is evidenced by the fact that in a row of Heveas fourteen feet apart, and eight years old, one tree having been affected and died, it was two years before the next in the row succumbed, and another two years before the third in the row died.

A root fungus with so slow a progress as this should easily be cleared out if it appears. To dig out the diseased tree completely and fork in lime would probably prevent any further danger.

Mr. Petch gives figures of a shrub and a Hevea root attacked by Hymenochoete, showing the characteristic clinging of the sand. He also mentions and figures a curious destruction of timber by another species, *Hymenochete rigidula,* in which the wood in decay has remarkable honeycombed appearance. This I have found in our forests rarely, chiefly in Seraya timber (Shorea) which has lain rotting in wet spots.

Sphoerostilbe repens B. and Br. This parasite on Hevea roots has been found in about a dozen cases killing Para Rubber in Ceylon. In most cases it seems to have attacked trees in swampy soil, but has killed trees in average plantation soil. In the first noticed case three trees in a patch of undrained sour soil between a set of coolie lines and a factory where the surface roots were constantly being damaged were killed. The ground was used for storing firewood and probably the fungus was brought in on jungle billets. It occurs up to 2,000 feet in Ceylon. The mycelium is easily recognised. When the root is

dug up the bark is decayed but there is no mycelium on the outside. Beneath the bark, however, black or red flattened strands are to be seen running over the surface of the wood, at first red outside and white inside, but as the root decays they decay, too, and turn black.

The mycelium enters the smaller roots and creeping up to the big roots spreads out in this manner.

The fructification is very smaller and of two kinds, the Conidial form is consisting of short red stalks with white globose heads ½ to ⅓ of an inch tall, and an ascigerous form of small cone shaped bodies on the mycelium strands.

This fungus was first found on Jack-trees obviously as a saprophyte, but it has also been found as a parasite on rhizomes of arrowroot. As it develops freely on Jackwood, even on chips, it is necessary to destroy all stumps of such trees and remove the bits left during cutting up. Gocd figures are given of this fungus. We have not yet heard of the pest yet in the Malay peninsula but a lookout should be kept for it.—ED.

SUGAR PLANTING IN NEGROS.

The Sugar industry of the island of Negros in the Philippine islands forms the subject of an extensive monograph by Herbert S. Walker, of the Government Sugar Laboratory of Iloilo. There have been, it appears, at least two large volumes on the Sugar industry here published, but these official reports, it is said are, full of exaggerated conjectures and estimates so as to be valueless. The present monograph has been written from carefully compiled statistics with analyses, and accurate information obtained from planters and others throughout the islands. The author spent 6 months on the island of Negros taking with him a portable laboratory for the analyses of the canes, sugar and products of the mill and analyses of soil were also made and add to our information on the subject. Negros produces a very large proportion of the Sugar made in the Philippines from forty to fifty per cent. of the whole output. In 1893 the island produced 115,000 metric tons out of 300,000 produced by the whole Archipelago. It has the advantage too of being remarkably free from sugar pests, the only fungus met with was *Ustilago Sacchari* of which there was an outbreak in 1908, but which was easily dealt with. A beetle attacking the roots, a moth whose caterpillar bored the stem and a coccid are practically the only insect-pests, and seem not to be very troublous.

At present the planter grows and manufactures his sugar and puts it on the market himself, but it is pointed out that much advantage is to be derived from having central mills which would take the cane from the planter and manufacture the sugar, so that the planter would be able to devote his whole time to the cultivation and thus the cultivation could be improved, while the output of sugar would be increased (to ascertain extent at least). More, it is suggested, might be done in the matter of soil fertilisation which it would seem has been somewhat neglected. The crops could be improved by the utilisation or the mill refuse, animal manure and green soiling with crops and commercial fertilisers could be used. Cane is an exhausting crop and what is taken from the soil should be, if possible, replaced, if the ground is to last for a long period.

Ploughing is done by single buffaloes, and this ploughing does not go deep enough. Steam ploughs are suggested but are too expensive for the ordinary planter. A combination of planters might perhaps get round this difficulty.

The adoption of modern methods as noted above would probably put the industry on a very sound footing and allow of further developments.

The monograph is illustrated with a number of photographs, and two of the old systems of ploughing by buffaloes, and of a steam plough with disc ploughs attached illustrate the difference between old-fashioned systems and modern methods. Negros does not appear to possess the advantage of canals through the fields which we possess in Province Wellesley, but has to transport its cane by tramways worked by men and the buffalo-cart, and the photographs of factories show a simplicity of apparatus which is in great contrast with the fine machinery of Caledonia and other estates. Some of the mills only are run by steam, others by water-power or by buffaloes, these latter are disappearing and steam mills are coming into general use, and to an Englishman it is satisfactory to learn that "the steam mills are practically all of English or Scotch origin."

The literature of Sugar cultivation and manufacture is probably the most extensive of any of the literatures of tropical economics, and the supply of statistics of returns, analyses of produce and soils is the largest of any of these products, but the last word on sugar cultivation has not yet been spoken, and in this monograph we have an important and interesting contribution to the study of the Sugar industry.—Ed.

A LARGE SOURSOP.

(*To the Editor, The Agricultural Bulletin*).

Sir,

Yesterday I picked a durian blanda fruit which weighed 9¾lbs. Is this a record weight? The tree is a very fine one growing on flat land behind my bathroom. As a rule, it fruits very little, the fruits being small.

Kota Tinggi, October, 9. Yours, etc.,

Too late for the Show.

(Can anyone beat this record?—Ed).

COCONUT TREES ATTACKED BY A COCCID.

A portion of a leaf of a coconut palm attacked by a Coccid in immense abundance was sent from Kelantan to the Botanic Gardens. The whole of the leaflets were covered on the underside with a vast number of the insects which were in the form of circular brown hats; the biggest about $\frac{1}{16}$ of an inch across. There were about 800 of them of various sizes to a square inch of the leaf. The sender writes that some of the trees first showed signs of the sickness some ten or twelve days previously and it seems to have spread fairly quickly over a small part, the leaves turning red and dying.

A blight like this is apt to be very troublesome on coconut of the immense abundance of the insect and its very rapid reproduction.

As it seems to dry up and become easily detached when adult, it is quite possible that it could be carried from one tree to another by puffs of wind, conveying eggs with it and so might spread rapidly.

In such cases as these the first and obviously the first thing to do is to cut off the infected leaves and burn them at once. A palm will usually stand the removal of nearly all its leaves, so that a large proportion may be removed safely. The rest should be sprayed or washed down with kerosine emulsion, made with kerosine and soft soap.

After an attack of blight like this it is very advisable to manure the affected trees to assist them in recovering their strength.—ED.

EXPORTS TELEGRAM TO EUROPE AND AMERICA.

15th to 31st July.

	Steamers.		Tons.	Tons.
Tin	Str Singapore & Penang to	U. Kingdom &/or	1691	1821
Do.	do.	U.S.A.	525	495
Do.	do.	Continent	305	210
Gambier	Singapore	Glasgow	—	—
Do.	do.	London	—	35
Do.	do.	Liverpool	160	35
Do.	do.	U.K. &/or Continent	—	70
Cube Gambier	do.	United Kingdom	25	20
Black Pepper	do.	do.	—	95
Do.	Penang	do.	55	—
White Pepper	Singapore	do.	70	100
Do.	Penang	do.	5	—
Pearl Sago	Singapore	do.	10	260
Sago Flour	do.	London	75	100
Do.	do.	Liverpool	1,200	575
Do.	do.	Glasgow	50	—
Tapioca Flake	Singapore	United Kingdom	360	175
T. Pearl & Bullet	do.	do.	45	100
Tapioca Flour	Penang	do.	50	350
Gutta Percha	Singapore	do.	150	150
Buffalo hides	do.	do.	110	90
Pineapples	do.	do.	30,000	15,500
Gambier	do.	U.S.A.	225	375
Cube Gambier	do.	do.	55	30
Black Pepper	do.	do.	150	210
Do.	Penang	do.	—	160
White Pepper	Singapore	do.	55	210
Do.	Penang	do.	—	55
Tapioca Pearl	Singapore	do.	120	150
Nutmegs	Singapore & Penang	do.	11	48
Sago Flour	Singapore	do.	75	250
Pineapples	do.	do.	1,750	1,000
Do.	do.	Continent	3,250	4,000
Gambier	do.	S. Continent	—	55
Do.	do.	N. Continent	700	200
Cube Gambier	do.	Continent	5	50
Black Pepper	do.	S. Continent	200	125
Do.	do.	N. Continent	210	45
Do.	Penang	S. Continent	10	30
Do.	do.	N. Continent	—	—
White Pepper	Singapore	S. Continent	15	10
Do.	do.	N. Continent	75	60
Do.	Penang	S. Continent	5	—
Do.	do.	N. Continent	5	40
Copra	Singapore & Penang	Marseilles	660	240
Do.	do.	Odessa	—	1,950
Do.	do.	Other S. Continent	540	100
Do.	do.	N. Continent	3,660	1,350
Sago Flour	Singapore	Continent	1,300	750
Tapioca Flake	do.	do.	10	75
Do. Pearl	do.	do.	—	10
Do. Flake	do.	U.S.A.	50	—
Do. do.	Penang	U.K.	—	—
Do. Pearl & Bullet	do.	do.	110	125
Do. Flake	do.	U.S.A.	—	—

	Steamer.		Tons.	Tons.
Do. Pearl	do.	do.	55	325
Do. Flake	do.	Continent	35	—
Do. Pearl	do.	do.	160	25
Copra	Singapore & Penang	England	360	—
Gutta Percha	Singapore	Continent	20	35
Cube Gambier	do.	do.	—	—
T. Flake & Pearl	do.	do.	—	—
Sago Flour	do.	do.	—	—
Gambier	do.	S. Continent	—	—
Copra	do.	Marseilles	—	—
Black Pepper	do.	S. Continent	—	—
White Pepper	do.	do.	—	—
Do.	do.	U.S.A.	—	—
Pineapples	do.	do.	—	—
Nutmegs	do.	do.	—	—
Black Pepper	do.	do.	—	—
Do.	Penang	do.	—	—
White Pepper	do.	do.	—	—
T. Flake & Pearl	do.	do.	—	—
Nutmegs	do.	do.	—	—
Tons Gambier			1,100	650
Do. Black Pepper			70	150

SINGAPORE MARKET REPORT,

July, 1910.

Articles.	Quantity sold.	Highest price.		Lowest price.	
	Tons.	$	c.	$	c.
Copra	6,820	10	10	9	25
Gambier Bale	1,775	11	72½	11	40
,, Cube No. 1 and 2 ...	240	14	45	14	62½
Gutta Percha 1st quality	...	350	00	300	00
,, Medium	...	240	00	120	00
,, Lower	...	100	00	26	00
Gutta Jelotong	...	14	00	11	00
Nutmegs, 110 s.	...	17	50	17	00
,, 80 s.	...	24	50	23	25
Mace, Banda	...	100	00	90	00
,, Amboina	...	82	00	78	00
Black Pepper	143	13	75	13	50
White Pepper	430	26	25	24	87½
Sago Pearl Small	270	5	25	4	50
,, Medium	40	...		...	
Sago Flour, No. 1	4,485	3	60	3	00
,, 2	25		80		77
Tapioca Flake, Small	824	6	45	6	00
,, Medium	85	...		...	
,, Pearl, Small	392	7	37½	6	00
,, Medium	507	6	45	6	25
Tin	2,632	75	55	74	32½

PENANG.

Abstract of Meteorological Readings in the Prison Observatory, Penang, for the month of September, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°	°	°	°	°	°	°	°	%		Ins.	Ins.
Prison Observatory Penang ...	29·883	149	84·7	87·6	75·8	11·8	77·6	·907	73	827	S.E.	5·39	2.11

Prison Hospital.
Penang, 15th October, 1910.

E. Arthur Gimlette,
Medical Officer.

NEGRI SEMBILAN.

Abstract of Meteorological Readings in Negri Sembilan Hospitals for the month of September, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Seremban		148.9	82.3	87.2	72	15.1	76.5	812	72.9	73.6	W	7.84	2.20
Mantin												5.67	1.39
Tampin												4.11	1.15
Kuala Pilah												4.14	.97
Jelebu												4.31	1.11
Port Dickson Town												8.11	1.72
Do. Blri Beri												9.56	1.51

Office, of the Medical Officer in Charge.
Seremban *22nd October, 1910.*

A. J. M. CLOVELY.
Medical Officer in Charge.

SELANGOR.

Abstract of Meteorological Readings in the various Districts of the State for the month of September, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
General Hospital, Kuala Lumpur ...	28.856	146.6	81.5	88.7	73.2	15.5	76.2	.802	72.6	75	CALM	4.97	1.43
Pudoh Gaol ,, ...	...	...	...	...	...	...	...	...	...	...	...	4.94	1.36
District Hospital ,, ...	...	...	...	...	...	...	...	...	...	...	...	5.40	2.32
,, Klang...	...	...	...	91.0	69.8	21.2	...	...	...	...	...	5.38	2.88
,, Kuala Langat	...	...	...	88.8	73.0	15.0	...	...	...	...	...	6.18	1.98
,, Kajang	...	...	...	85.6	75.3	10.3	...	...	...	...	...	8.56	2.41
,, Kuala Selangor ...	...	...	...	88.1	75.6	12.5	...	...	...	...	...	5.95	1.70
,, Kuala Kubu	...	...	...	91.1	70.4	20.7	...	...	...	...	...	11.82	4.74
,, Serendah	...	...	...	92.2	70.5	21.7	...	...	...	...	...	5.13	2.19
,, Rawang	...	...	...	90.9	71.3	19.6	...	...	...	...	...	6.85	3.03
,, Sabak Bernam ...	...	...	...	...	...	...	...	...	...	...	...	3.53	1.01

Office of Senior Medical Officer,
Kuala Lumpur, 20th October, 1910.

Senior Medical Officer, Selangor.

PERAK.

Abstract of Meteorological Readings in Perak for the month of September, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Taiping	...	109	82.57	93	70	23	77.41	872	...	79	...	3.96	1.26
Kuala Kangsar	...	...	81.61	92	67	25	75.95	820	...	76	...	4.08	1.71
Batu Gajah	...	110	80.78	91	72	19	76.42	853	...	82	...	3.03	1.32
Gopeng	...	...	80.65	91	69	22	75.09	797	...	76	...	5.94	1.87
Ipoh	...	...	80.90	91	70	21	75.98	833	...	78	...	8.68	3.35
Kampar	...	...	80.61	92	69	23	75.98	838	...	80	...	6.22	1.86
Teluk Anson	...	...	81.95	91	69	22	77.07	866	...	81	...	3.43	1.32
Tapah	...	...	81.17	92	69	23	76.36	847	...	80	...	10.00	2.10
Parit Buntar	...	...	81.66	90	72	18	76.61	849	...	78	...	5.14	.95
Bagan Serai	...	...	81.71	91	70	21	76.73	858	...	78	...	5.15	2.05
Selama	...	...	80.60	92	71	21	76.14	841	...	80	...	8.06	2.00

OFFICE OF SENIOR MEDICAL OFFICER,

Ipoh, October 14th, 1910.

S. LUCY,

Senior Medical Officer, Perak.

PAHANG.

Abstract of Meteorological Readings in the various Districts of the State for the month of August, 1910.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Mean Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
										%			
Kuala Lipis	...	...	75.7	91	65	20.9	74.0	.897	72.80	91	...	12.62	2.05
Raub	...	...	80.6	93	66	23.2	77.81	.057	75.90	86	...	6.49	1.50
Bukit Fraser	...	...	...	...	58	...	...	...	...	...	...	6.06	1.23
Bentong	...	...	80.2	92	67	19.4	75.91	.023	72.98	80	...	5.58	1.72
Temerloh	...	...	...	94	69	19.9	...	...	...	...	...	4.11	1.28
Pekan	..	...	82	91	70	16.7	77.1	.092	73.65	78	...	4.15	1.20
Kuantan	...	...	85	94	69	19	78.11	.203	73.62	71	...	4.06	1.11
Sungei Lembing	...	...	...	87	68	...	...	...	...	...	...	7.37	1.42

Office of the Medical Officer in Charge, Pahang

K. Lipis, 21st September, 1910.

S. C. G, FOX,

Medical Officer in Charge, Pahang.

SEREMBAN.

Table showing the Daily Results of the Reading of Meteorological Observation taken at the General Hospital, Seremban, for the month of September, 1910.

Date.	Temperature of Radiation. 9 H.	15 H.	Mean.	Maximum.	Minimum.	Range.	Temp. of Radiation. Sun.	Difference Sun & Shade.	Wind Direction. 9 H.	15 H.	Temp. of Evaporation. 9 H.	15 H.	Mean.	Computed Vapour Tension 9 H.	15 H.	Mean.	Relative Humidity. 9 H.	15 H.	Mean.	Clouds 0 to 10 9 H.	15 H.	21 H	Cloud and Weather Initials. 9 H.	15 H.	21 H	Rain. Inches.
1	84	86	85.	88	72	16	155	67	S W	S W	69.1	72.8	70.9	.710	.808	.759	60	64	62	0	0	0	S	S	S	.26
2	78	85	81.5	87	71	16	147	60	S E	W	71.2	73.4	72.3	.765	.826	.795	79	68	73.5	1	0	0	S	S	S	1.25
3	80	87	83.6	88	71	17	156	68	W	W	73.3	73.9	73.6	.820	.837	.828	80	65	72.5	0	0	0	S	S	S	
4	79	82	80.5	88	72	16	160	72	W	W	72.3	75.3	73.8	.793	.877	.835	80	80	80	0	10	4	S	N	C	1.10
5	78	83	80.5	86	73	13	149	63	W	S W	76.3	76.3	76.3	.906	.905	.905	94	80	87	5	0	0	C	S	S	.10
6	80	84	82.	85	72	13	138	53	W	N W	75.	75.7	75.3	.867	.888	.877	85	76	80.5	0	0	0	S	S	S	.34
7	81	84	82.5	87	73	14	152	65	W	S W	72.6	72.4	72.5	.802	.794	.798	76	68	72	0	5	7	S	C	N	.91
8	77	85	81.	86	72	14	153	67	W	W	73.6	71.8	72.7	.829	.781	.805	89	64	76.5	4	0	0	C	S	S	.04
9	82	88	85.	89	72	17	148	59	W	S W	73.6	71.6	72.6	.830	.775	.802	76	58	67	0	0	0	S	S	S	.10
10	77	87	82.	88	73	15	150	62	W	S W	73.6	73.9	73.7	.829	.837	.833	89	65	77	5	0	0	C	S	S	
11	82	85	83.5	87	73	14	145	58	W	W	73.6	73.4	73.5	.830	.826	.828	76	68	72	0	0	0	S	S	S	
12	79	86	82.5	87	73	14	156	69	W	S W	73.9	71.2	72.5	.839	.763	.801	85	61	73	5	0	0	C	S	S	
13	81	89	85.	90	72	18	154	64	W	S W	74.3	72.7	73.5	.849	.801	.825	80	58	69	0	0	0	S	S	S	
14	81	82	81.5	89	70	19	153	64	N	S W	70.9	75.3	73.1	.757	.877	.817	72	80	76	0	4	6	S	C	C	
15	78	83	80.5	84	73	11	143	57	N	N W	71.2	71.3	71.2	.765	.766	.765	79	68	73.5	5	4	0	C	C	S	
16	80	85	82.5	86	73	13	135	49	N	N	69.9	71.8	70.8	.732	.781	.756	71	64	67.5	0	0	0	S	S	S	
17	78	84	81.	85	74	11	136	51	W	N W	71.2	74.	72.6	.765	.840	.802	79	72	75.5	6	0	0	C	S	S	
18	79	83	81.	87	72	15	142	55	N W	N W	72.3	73.	72.6	.793	.810	.801	80	72	76	0	7	0	S	N	S	.42
19	82	90	86.	91	73	18	150	59	W	S W	75.3	73.7	74.5	.877	.833	.855	80	59	69.5	0	0	10	S	S	N	2.20
20	76	85	80.5	87	71	16	152	65	N	S W	72.6	73.4	73.	.801	.826	.813	89	68	78.5	0	8	0	S	N	S	
21	81	80	80.5	86	71	15	155	69	N W	S W	72.6	73.3	72.9	.802	.820	.811	76	80	78	0	0	0	S	S	S	
22	79	84	81.5	86	71	15	145	59	N	W	72.3	74.	73.1	.793	.840	.816	80	72	76	0	0	0	S	S	S	.84
23	78	85	81.5	86	72	14	150	64	N W	S W	72.9	73.4	73.1	.810	.826	.818	84	68	76	0	0	0	S	S	S	
24	80	86	83.	88	71	17	158	70	W	S W	73.3	74.5	73.9	.820	.855	.837	80	68	74	0	0	0	S	S	S	.28
25	76	85	81.5	86	71	15	153	67	W	W	72.6	73.4	73.	.801	.826	.813	89	68	78.5	5	0	0	S	S	S	
26	80	86	83.	88	73	15	151	63	W	S W	73.3	74.5	73.9	.820	.855	.837	80	68	74	0	0	0	S	S	S	
27	79	86	82.5	87	73	14	148	61	W	S W	73.9	72.8	73.3	.839	.808	.823	85	64	74.5	0	0	0	S	S	S	
28	79	86	82.5	88	71	16	144	56	N W	S W	70.6	69.5	70.	.749	.721	.735	75	58	66.5	0	0	0	S	S	S	
29	82	85	83.5	87	70	17	132	45	N W	S W	72.	70.1	71.	.785	.738	.766	72	61	66.5	0	0	0	S	S	S	
30	80	87	83.5	89	72	17	156	67	W	S W	71.6	72.2	71.9	.775	.792	.783	75	61	68	0	0	0	S	S	S	
31																										
Mean.	79.5	85.1	82.3	87.2	72	15.1	148.9	61.2	W	S W	72.6	73.1	72.9	.811	.817	.812	79.8	67.5	73.6							7.84

Seremban,
22nd October, 1910.

Highest Temperature 91
Lowest Temperature 70

Greatest Rainfall in 24 hours 2.20

A. J. M. CLOVELY,
Senior Medical Officer in Charge.

No. 12.] DECEMBER, 1910. VOL. IX.

Agricultural Bulletin

OF THE

STRAITS

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FEDERATED MALAY STATES.

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H. N. RIDLEY, M.A., F.R.S., F.L.S., F.R.H.S.

Director of Botanic Gardens, S.S.

From the first of January, 1910

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Printed at the Straits Times Press, Ltd., Singapore.

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No. 12.] DECEMBER, 1910. [Vol. IX

A PRELIMINARY NOTE ON THE FUNGUS CAUSING THE "DIE-BACK" DISEASE OF CACAO AND OF PARA RUBBER.

By Keith Bancroft, B. A.
Assistant Mycologist, F.M.S.

In some recent publications* the author has had occasion to refer to the necessity for making a complete investigation of the life-history of *Diplodia cacaoicola*, P. Henn., the fungus which has long been known to cause the "die-back" disease of the stem of the cacao plant and the "brown rot" of the cacao pods. Since these publications were issued, further work has revealed two facts which are considered to be of some importance; the first of these is the establishment of the identity between the fungi causing the "die back" of cacao and of Para rubber, and the second is the discovery of the mature form or ascigerous condition of the fungus. Before describing the work which has led to these conclusions it will, perhaps, be better to briefly summarise the work of several authors on the fungus more especially from a historical point of view.

Diplodia cacaoicola was described by Hennings on wood of cacao from the Cameroons in 1896. Howard, in 1901, investigated a die-back disease of cacao in Grenada, West Indies, and showed that the fungus which caused the disease was identical with this species. Since then the fungus has been shown to occur on cacao throughout the West Indian Islands and has also been reported from St. Thomè, West Africa, Java, Samoa, the Philippines and Surinam.

* Kew Bulletin of Miscellaneous Information, 1910, No. 3. A Handbook of the Fungus Diseases of West Indian Plants, p. 11.

Griffon and Maublanc, in 1909, working in the French Congo, have shown by comparison of various specimens that three other species are identical with *Diplodia cacaoicola*: these are *Botryodiplodia Theobromae*, Patouillard, 1892, the oldest synonym, described on fruits of cacao in San Domingo, *Lasiodiplodia nigra*,, Appel and Lambert on cacao in Samoa, and *Macrophoma vestita*,, Prilleux and Delacroix, 1894, on roots of cacao in equatorial America ; these authors have also shown that according to the present system of classification the fungus is a *Lasiodiplodia* which they have named *Lasiodiplodia Theobromae*. More recently Petch has described from Ceylon a "die-back" disease of *Hevea brasiliensis*, the later stage of which he has attributed to *Botryodiplodia elasticae*, Petch ; he has pointed out that this species is probably identical with *Diplodia cacaoicola* (*Lasiodiplodia Theobromae*, Griffon and Maublanc). There has, therefore, been from time to time a multiplication of names for one and the same fungus.

A careful comparison of the fungus causing the "die-back" disease, or what is better known as the "stem and branch" disease of *Hevea brasiliensis* in the Straits Settlements and Malay States with the fungus occurring on cacao in West Africa has quite recently been made at the Department of Agriculture at Kuala Lumpur. After an examination of several specimens it has been concluded that the two fungi are identical. The characters which were considered were the nature of the stroma and perithecia, the measurement of the perithecia, of size and shape of the spores and he the paraphyses ; in these the two fungi were indistinguishable from each other

The cause of the occurrence of these synonyms is the absence of a constancy or fixation of characters on which the divisions between the genera are based. In *Diplodia* the perithecia are scattered, in *Botryodiplodia* they are aggregated on a stroma which is smooth and in *Lasiodiplodia* they are included in a stroma which is covered with a soft felt of hairs. In the fungus under consideration there is a tendency for the perithecia to be scattered on the younger parts of the stem, while on the older parts they are usually aggregated on a stroma : the stroma is in some cases almost smooth, while in others, and especially when the fungus is producing perithecia in large numbers, the stromata are covered by a soft felt of hairs. The perithecia always contain paraphyses mixed with the spore-bearing hyphae.

This variability in characters has led to the multiplication of names for the fungus and has tended to prevent the recognition of its wide geographical distribution and of its variety of hosts.

In a previous work* the author was careful to point out that judging from analogy the *Diplodia* on cacao might well be expected to belong to an ascigerous fungus which was probably a member of the *Sphaeriaceae*. To investigate this point a number of cultures were made in artificial media ; several of these are now more

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* A Handbook of Fungus Diseases of West Indian Plants, p 11.

than a year old and these have failed to show the production of any form other than the *Diplodia.* Eight months ago some material was received from West Africa at the Jodrell Laboratory, Kew Gardens; this material consisted of a stem of the cacao plant which had been badly attacked by *Diplodia* and on which the fungus was producing abundant perithecia grouped in stromata. Some of this material was selectd and placed in a sealed jar. An examination at the end of six months showed that the fungus was passing into an ascigerous condition. The formation of the asci in the same stromata as had previously borne spores of *Diplodia*, coupled with the fact that asci could be observed in process of formation in some of the perithecia on a stroma while other perithecia on the same stroma had not yet got rid of all of their *Diplodia* spores, left no room for doubt that it was the ascigerous condition of the fungus.

From the mode of arrangement of the perithecia and from the nature of the stroma, asci and spores, the fungus has been classified in the genus *Thyridaria*, Saccardo (Sphaeriaceae, Phaeophragmiae) and has been named *Thyridaria tarda*, n. sp. The following diagnosis of the fungus is here given:—Peritheciis monostichis, stromate atro erumpente villosulo semi-immersis (3-7), ostiolo minuto; asci cylindraceo-clavatis sessilibus, 90-100x 12 microns, paraphysibus (100-130 microns longis) copiosis filiformibus obvallatis; sporidiis oblique monostichis, oblongatis, fuligineis, triseptatis, leniter constrictis, 19-20 x 6-7 microns.

Diplodia (*Lasiodiplodia*) pycnidicus status est:—Sporis ellipticis, utrinque obtusis, uniseptatis, haud constrictis, fuligineis 24-27 x 13-15 microns.

(*Translated*). Perithecia monostichous, semi immersed (3-7) in a black erumpent stroma bearing a covering of weak hairs, having a minute ostiole, asci cylindrical-clavate, sessile, 90-100 x 12 microns surrounded by abundant filiform paraphyses (100-130 microns long); spores obliquely monostichous, oblong, fuliginous, 3-septate, slightly constricted at the septa, 19-20 x 6-7 microns,

Diplodia (*Lasiodiplodia*), is the pycnidial form:—Spores elliptical obtuse at both ends, uniseptate not constricted, fuliginous, 24-27 x 13-15 microns.

The *Diplodia* form is esentially the form which is destined for rapid reproduction of the fungus. It does not appear to pass readily into the ascigerous condition, as is evidenced by the failure hitherto to reproduced the ascigerous condition in artificial media. This is, however, not infrequently met with in the conidial and pycnidial forms of ascigerous fungi in the tropics.

The life-history is, however, not yet complete; it is still necessary to trace the development of the ascospore. This work is being continued and will be published when it is completed along with an account of the disease more especially as affecting the Para rubber plant.

At present the following facts may be considered to be established :--

(1). *Thyridaria tarda* is the cause of the "die-back" disease of the cacao plant and of the "brown rot" of cacao pods. Its *Diplodia* form is identical with the *Diplodia* which is known to cause a "die-back" disease of Para rubber in the Straits Settlements and Federated Malay States. The fungus also attacks mango, papaw, *Castilloa*, rubber, sugarcane and *Albizzia moluccana*, and is considered to cause a root disease of coconut in Trinidad.

(2). It occurs in the West Indies, tropical America, tropical Africa, the Philippines, Ceylon (?), Java. Samoa, St. Thomè and the Malay Peninsula.

(3). It is a wound parasite, and the disease is caused by the fungus when it is in its *Diplodia* stage. The *Diplodia* condition is capable of reproducing itself and passes on the dead parts into the ascigerous (*Thyridaria*) condition some time after they are dead.

The following references are appended :—

1892. PATOUILLARD.—Bulletin de la Societé mycologique de France, p. 136.

1894. PRILLEUX & DELACROIX.—Bulletin de la Societé mycologique de France, p. 165, t.vi, fig c.

1896. HENNINGS.—Fungi Camerunenses; Engler Bot. Jahrb., xxii, p. 172.

1901. HOWARD.—West India Bulletin, Vol. II, p. 203.

1906. APPEL & LAUBERT.—Arb. aus der Kaiserl. Biol. Anst, fur Land and Fortswirts, p. 147. 1906.

1909. GRIFFON & MAUBLANC.—Bulletin de la Societè Mycologique de France, xxv, p. 51.

1910. PETCH.—Circulars and Agricultural Journal, Royal Botanic Gardens, Ceylon, iv, No. 23.

A BACTERIAL DISEASE OF POTATO AND TOMATO.

BY KEITH BANCROFT, B.A.

Assistant Mycologist, F. M. S.

Specimens of potato plants have been recently received from Taiping (Perak) exhibiting the well-known "bacteriosis" caused by *Bacillus Solanacearum*, E. Smith. The same disease has been known for two or three years to occur in Kuala Lumpur on tomato plants cultivated in vegetable gardens. These two crops are but little cultivated in the

Malay States, so that the disease has little more than a passing interest. It is, however, interesting to record its occurrence in this country, and a brief note will be given of the symptoms of the disease and of some methods of treatment which are likely to prove effective.

The disease is well-known in the United States of America where it has been carefully studied by Dr. E. Smith on potato, tomato and egg-plant (*Solanum melongena*). It has also been recorded on potato in Scotland, in the north of England and in Mysore, and it has recently been reported from Ceylon.

The symptoms of the disease appear to be constant in the different countries in which it is known to occur, and they may be briefly reviewed thus:—

Attacked plants show a wilting and shrivelling of the leaves; soon afterwards brown streaks appear on the stem and spread downwards to the parts underground. Finally, the whole stem rots. A browning of the affected parts is very characteristic of the presence of the bacterium; the browning will be found to be first evident in the vascular ring on examining the cut surface of an affected stem. The vascular bundles are first affected, the supply of water to the leaves is checked and the consequent wilting and shrivelling makes its appearance.

The disease in the potato tubers is very well-marked by the presence of a circular, usually incomplete, brown ring which is situated at some litttle distance from the surface and which corresponds in position with the vascular ring of the tuber. This ring darkens and expands until the whole of the starch-producing area of the tuber is affected. The tuber decays and the bacteria are liberated in the soil where they can infect other healthy tubers.

Dr. E. Smith considers that the rapid spread of an epidemic is due to insects of different kinds feeding alternately on healthy and infected plants. Under these circumstances it is advisable to spray the plants with an insecticide. A vegetal wash, e.g tobacco wash, should yield good results. This may be made by infusing half a pound of tobacco leaf in water for about six hours, straining off and pressing the tobacco and again infusing; the extract is added to a solution of half a pound of soft soap in water, the whole being made up to ten gallons. The wash is applied by means of a spray. Any coarse tobacco leaf may be used.

Infected plants should be taken up along with their roots and burnt. They must on no account be thrown on to a manure heap. In the case of the potato plant it is advantageous to lift the crop early when the disease has made its appearance; in this way many of the tubers may be saved.

Plants belonging to the potato family should not be planted on soil which has yielded infected plants for at least two years, since the bacterium probably attacks a large number of members of that family (*Solanaceae*).

E. F. SMITH.—United States Department of Agriculture, Bull. No. 12, 1896.

G. MASSEE.—Diseases of Cultivated Plants and Trees, p. 513, 1910.

T. PETCH.—Tropical Agriculturist, Vol. xxxiii, No. 6, Dec. 1909.

A HANDBOOK OF FUNGUS DISEASE OF WEST INDIAN PLANTS.

We have received an excellent little handbook dealing with the parasitic fungi of the West Indies by Mr. Bancroft which is most compact and handy. Many of the fungi described and figured are well-known pests here, such as *Fomes semitostus, Irpex flavus, and Diplodia* and there are accounts of the best methods of dealing with these pests. It is interesting to find *Schizophyllum commune* recorded as a parasite on sugar cane and mulberry trees. This little grey fan-shaped fungus is familiar to us here as being one of the commonest destroyers timber in buildings and wood-yard. I have never yet, common as it is, seen it attacking any live plant. It is much to be hoped that similar works will be published on our pestilential fungi here. The only large work on parasitic fungi is that of Tubeuf, an invaluable work but unfortunately for us almost confined to the fungi of temperate climates. A good work on the parasitic fungi of the tropics is badly wanted. Much has been written about them but it is scattered over various periodicals and practically inaccessible to the ordinary searcher after knowledge.—ED.

PLANTING OF TREES.

A tree planted anyhow does not grow as satisfactorily as one properly planted, and the usual coolie method of just making a hole and putting the plant in, giving it a little water and leaving it to live or die as it chooses, generally has poor results. One of the commonest blunders here is caused by not filling up the hole properly. A hole is dug, the soil more or less mixed with leaf mould and cow-dung, filled to the top or nearly so and the plant put in. The result is that the loose soil sinks to several inches below the surface of the surrounding ground, and the plant appears in a small pit. Into this rain water pours and the plant's roots are sodden and the unhappy thing dies or at least has a hard struggle for life. The soil should be raised to at least six inches above the surrounding ground so that the plant is at first on a mound which sinks as the earth settles, so as to bring the plant in a few days into its proper position. I have often seen rubber trees planted in pits in the regular coolie method much to their detriment. Another thing is of importance and that is to press the earth tight round the tree after planting it. Some time ago, in Bulletin 8., 1909, p. 239, we published an account of tree planting from experiments made by Mr. Pickering, of the Woburn Experimental Fruit Farm. Similar experiments have been carried out in the West Indies with oranges, mangoes, limes, and rubber, castilloa, and an account has been published in the West Indian Bulletin vol. xi p. 50, with photographs of trees planted (a) in the ordinary way carefully; (b) carefully planted and rammed with a heavy rammer till the whole was thoroughly puddled and the ground shook like a jelly; (c) carelessly planted, roots heavily pruned and rammed; (d) carelessly planted, roots heavily pruned and not rammed; (e) carelessly planted and rammed. The results seemed to show that the trees carefully planted and not rammed were the best, and next came those under treatment, (b). Carelessly-planted trees in no case seem to do well.

Probably the amount of ramming desirable depends on the kind of soil in which the plant is growing. It is a fact that a number of our fruit trees, such as Rambutans, are killed by putting a few feet of soil over the roots. Thus, in cases where low-lying ground bearing an orchard is filled in for say two feet with the ordinary clay soil, a large percentage of the trees will quickly die. This may be due to the heavier weights on the roots, or their being more compressed, and it is possible that this heavy ramming may have the same effect. The experiments would be well worth trying with rubber trees here. They show at least that careful-planting pays.—Ed.

THE STERILIZATION OF SOIL AS A MEANS TO INCREASE ITS FERTILITY.

The ultimate cause or causes of soil fertility have from the earliest ages remained obscure and when one realizes that the practice or art of Agriculture is the oldest in the world, this obscurity is perhaps somewhat remarkable to the lay mind, although not to the scientific investigator who has tried and is still trying to evolve theories and explain facts from the vast amount of experience in the past from which he is able to draw.

As soon, however, as one begins seriously to consider the subject, its immensity is apparent and it is realized how many are the factors which influence what we describe as soil fertility.

The facts are, however, sufficiently realized by the practical man whether planter or farmer who is ready to pay two or three times the amount for a certain piece of land compared with another.

The science of Agriculture dates back to the seventeenth century but the work done by numerous investigators in the early years bore little fruit, due principally to the fact that the science of chemistry had scarcely been born, and it was not till the nineteenth century when the nature of the elements and their combinations began to be known that agricultural chemistry as a science was really founded.

It was not till nearly the middle of the nineteenth century that it was understood that the plant derived its nutrition partly from the air and partly from the soil, and the first theory which was in any way supported by facts that soil fertility was based on the amount of the material required by the crop and capable of being removed from the soil.

It was soon realized, however, that there was a vast difference between the amount of material taken out by a crop and the total material present in the soil, and that this theory did not by any means explain the facts, since any normal soil contains sufficient material, e. g., potash, phosphoric acid, calcium, etc., for say a hundred crops,—and yet a very small quantity of a suitable manure gave remarkable increases of crop.

This naturally led up to another theory—that of "unavailable" and "available" plant food,—the latter being in some way only slowly formed in soils—the addition of a manure would thus really mean the addition of available food.

This theory was forgotten and renewed again within quite recent years and in fact one of the recognised methods of soil analysis of the present day is to determine what is known as "available" potash, and phosphoric acid.

Even this theory is, however, now abandoned by various well-known investigators who believe that the actual amount of plant food in the soil has little if any influence on soil fertility,—but, on the other hand, there are many equally brilliant investigators who think that the abandonment of this theory is not logical. One has particularly to bear in mind in studying such a complex material as the soil and its fertility—the question of limiting factors, i. e., if one particular ingredient is entirely absent, the plant starves, however liberally it may be supplied with the others.

A more recent theory expounded by several investigators, particularly in America, and receiving support from others in various parts of the world, is that fertility is determined by plant excretions, that is, that plants excrete a poison which is injurious to themselves—hence the necessity of crop rotation.

One investigator in fact claims to have actually isolated compounds from such soils, injurious to the same crops which produce them, but the results are far from conclusive.

Having failed to account for soil fertility by the amounts of plant food actually found in various soils by analysis, we are compelled to search for other causes, and although we have again to return to older theories—as has frequently happened in the advance of science in general, it was not till comparatively recently that such theories—then only advanced as theories—have been found to explain certain facts.

Recent investigations have shown the presence in soils of bacteria now known as "nitrifying bacteria" which convert nitrogenous matter into nitrites and subsequently nitrates by oxidation—and thus supply plants with nitrogen in an assimilable form—since with the exception of a few plants, viz., those of the leguminous order—plants can only assimilate nitrogen after conversion to an oxidized form. Such bacteria are consequently regarded as a great factor in soil fertility.

The proof of the existence of such oxidizing bacteria explained to a great extent the value of tilth in surface soil, the lack of value of the subsoil in which such bacteria do not exist, and the value of shallow ploughing contrasted with deep subsoil ploughing.

These discoveries led to others, in which two brilliant investigators, Hellreigel and Wilgarth and subsequently others made the interesting discovery that certain plants of the leguminous order possessed bacteria growing in symbiosis on the roots, which possessed the power of assimilating nitrogen directly from the atmosphere and converting it into a form suitable for the use of the plant.

Long before this discovery, however, the value of leguminous plants had been realized by the farmer and a system of rotation of crops based on it. Since the discovery, other bacteria possessing similar properties, but not associated with any plant, have been found in the soil.

The farmer long before this, also, had realized the value of what is known as "fallowing," in which sufficient food is allowed to accumulate for a period, to supply the bacterium with its food.

From the fact, however, that these discoveries do not absolutely explain or account for all the problems of soil fertility or lack of fertility, we realize that these bacteria are merely another determining factor in connection with the problem.

These results have remained without intrinsic alteration till quite recently, when we are brought in contact with another phase of the question, the elucidation of which has been solved by Russell and Hutchinson within the last year, viz., the partial sterilization of soil as a means to increase its fertility.

Here again we have the accumulated experience of ages of agricultural practice explained by the results of scientific investigation.

The effect of heat on soils has been known not only in European agricultural practice but in other countries—notably India and I find too that it is known to Javanese gardeners in this country, whose common practice is to burn together a mixture of earth and dry manure before using it in pots for horticultural purposes. When asked why they practice this method—they reply that it is valuable' although they offer no reason why this is so.

It is now known that partial sterilization of soils, not only by heat, but by certain antiseptics such as chloroform and carbon bisulphide, has a very beneficial action, and the reason for this action has been most ably explained by the above mentioned investigators.

Crops grown on soils sterilized by heat become doubled in some cases, and almost equally good results are obtained by treating with antiseptics. The plants on analysis are also found to contain much more nitrogen than those from undertreated soils, showing that the result of the treatment has effected an increase of nutriment.

Russell and Hutchinson found that (1) the nitrogen combined as ammonia in the soil increased remarkably under the treatment (2) the treatment did not effect complete sterilization (3) the bacteria in the soil were greatly reduced in number at first (4) subsequently the bacteria increased to an enormous extent, and far beyond the original number. (5) the nitrifying bacteria were destroyed.

From these results they naturally concluded that the increased ammonia content of soil treated in this manner was due to the increase in bacteria, and the absence of nitrifying bacteria which enabled the ammonia to accumulate; but the real value and brilliancy of their discoveries was the realization that the subsequent enormous increase of the bacteria was due to the absence of some factor in the soil which had been destroyed in the process of partial sterilization.

Subsequent investigation proved that this factor was a class of larger organisms—amoeba or protozoa which under ordinary conditions fed on the bacteria and maintained them at a normal number, and that these organisms were completely destroyed by the sterilization process, thus allowing the bacteria to multiply at an extraordinary rate.

These results have since been confirmed by others and by evidence of a different nature, and also by the practice of the agriculturist in ancient days and in other lands than in Europe.

Science has once more explained facts known long years ago, and will doubtless be able to demonstrate in what way such facts may be utilized again to the best advantage in advancing the ancient art and practice of agriculture.

Already in fact on a small scale, a method has been adopted, based on these principles, for the sterilization of soils for nursery beds and for intensive cultivation of vegetables and market produce, and it might be of interest and value to give details of this method for the benefit of those who may be interested in the subject.

The method is described in Vol. VIII, Part 6, of the Journal of Agriculture of Victoria, for June, 1910.

In this article the writer incidentally mentions the discovery of the action of heat on soils some 25 years ago and the action of carbon bisulphide, the effect of which was first observed when applied in certain vineyards for the purpose of eradicating phylloxera.

The various theories to account for these effects are those numerated as follows :—

(1). Chemical reaction formed by heat or between antiseptic and soils—recently revived by Pickering in England.

(2). Physiological theory of Koch—the antiseptics being supposed to stimulate root activity—since disproved by Russell's and Darbishire's experiments—in which all the antiseptic was evaporated from the soil after treatment.

(3). Change of bacterial flora as suggested by Hiltner and Storme

(4). Stoklasa's theory—that the production of too much carbon dioxide by bacteria interferes with the plant's respiration does not hold good in the light of Russell's and Hutchinson's recent investigations.

(5). Russell's and Hutchinson's theory—increase of bacteria after primary decrease, due to destruction of large organisms of protozoal nature.

Soils sterilizer :

A very effective sterilizer is described as follows:—

A brick chamber 18 inches deep consisting of brick floor with brick walls 9 inches thick, the chamber is open at the top and divided into two compartments by a brick partition, each compartment having a capacity of two tons. Only one compartment is used at a time, so that the other can be filled while the first is being sterilized.

Steam is supplied from a portable boiler worked at a pressure of 25=30 lbs., the steam being led to the floor of the chamber through ¾ in. piping. The tube is here joined to a T piece and from the T piece in each of the pits, six pipes are let into a space between the bricks work on the floor. The pipes between the brick work and the floor are covered over with a layer of sand; they are 8 inches apart, plugged at the ends and perforated along one side with 3/16 inch holes—about 3 inches apart, and have a fall of 1 inch. A side drain is provided at one side of the chamber to carry off condensed steam this drain is buried in cinders 1 inch below the surface and has a fall of 2=3 inches.

Steam can be turned into either compartment by means of valve traps as desired. The soil is placed in the chambers and covered, with sacking and steam allowed to pass through the mass till the temperature of the top layer is 212°F (i. e., boiling point of water). It is then allowed to steam for 30 minutes—making a total period of about 2½ hours.

As soon as the soil is sufficiently cool, it can be used for seed beds. It can be readily seen, that apart from initial expense which is not high, the apparatus is simple, effective and economical and should be of immense value in preparing good soil for seed beds of all kinds.

The cost of sterilizing 1,000 cubic feet of soil by this method is stated to be only about 8 shillings. The treatment not only improves the soil but kills all larger forms of life present in the soil likely to be injurious to plant life.

B. J. Eaton,
Agricultural Chemist, F. M. S.
and
Acting Director of Agriculture, F. M. S.

THE CONTROL OF SCALE INSECTS BY FUNGOID PARASITES.

For some years experiments have been carried out chiefly in the West Indies and Florida, on the destruction of scale insects by infecting them with certain fungi parasitic on them.

That these fungi gave a very severe check to the scale insects in a natural state was shown by an observation on orange scales

infesting orange trees in Florida. The trees bore very few scale insects, till they were thoroughly sprayed with Bordeaux mixture when they immediately began to increase owing to the parasitic fungi being destroyed by the Bordeaux mixture and the trees were finally badly attacked. Similar trees near by which were not sprayed were as free from scale as before. The principle of infecting the trees infested by scale with the suitable fungi has been found successful in combating the pests, and three methods of so doing have been adopted. The first is to spray the infected trees with spores and portions of mycelium of the fungus. This is done by stirring up leaves well infected by the fungus for ten to fifteen minutes in water, so that about forty fructifications are mixed with a pint of water. The liquid is then strained through a fine wire mesh or coarse muslin, and sprayed on the trees, as finely as possible. This has been found the most effective way.

The second method is to tie infected material in the trees so that the spores of the fungus may come in contact with the scales. This has proved very successful also. The third method consists of planting among the trees to be infected small trees bearing the parasitic fungi so that the spores may spread from one to the other.

The Coccidac are not as a rule so destructive in the Malay Peninsula as they are elsewhere, but occasionally are very abundant and injurious. No attempt has been made yet in this region to study their parasitic fungi, but we may hope that our mycologists will devote some time to this subject, in order that in case of attacks we may be able to deal with them. The greatest attention seems to have been paid to the scale attacking limes and oranges in the West Indies and Florida, and these plants are worse attacked her ethan any other.

The whole paper from which these notes are taken (published in the West Indian Bulletin Vol by i. p. by Mr. F. W. South) is one of considerable interest and well worth study.—ED.

COTTON IN GERMAN EAST AFRICA.

We have received from the Kolonial Wortschaftliches Komitee of Berlin an excellent account of the cultivation of cotton in the German Colonies (Anleitung fur die Baumwolkultur in den Deutschen Kolonien) by Prof, Dr. A. Zimmermann. The work, though not a very large one, is very rich in important information and is very well illustrated and treats in a compact way of the varieties, cultiva tion, preparation, returns, markets, value and use of the seed, and the diseases. Of animal pests the author records 258 kinds ranging from the hippopotamus to coccids and eelworms. The number of Hemiptera as pests is very large. Upwards of eighty fungi are recorded as attacking the cotton plants. The pests recorded are however records of enemies all over the world and a very large proportion are naturally not met with in the German colonies. The literature of cotton is very large but this little work of 145 pages is a useful addition.

In their African Colonies the Germans have a fine field for the extension of one of the most important products of the world, and they seem to be making great progress in the cultivation of cotton.—Ed.

PURIFICATION OF BRACKISH WATER ON ESTATES.

M. Kelway Bamber sends us the following letter on the treatment of brackish water from the saline muds and peaty soils, which not rarely occur on our lowland country near the sea. This article will, we think, be read with interest by those who have estates on the plain country along the coasts where the water is often foul.

"Re brackish water from Selangor muds, I had some sent over of the worst kind to make some experiments regarding its purification for drinking and manufacturing purposes. I enclose the analysis. The water was sour, brackish, muddy, and with a strong smell of decomposing organic and sulphur compounds.

Lime water produced an immediate curdy precipitate which settled clear in a few minutes, but the water still had some smell.

Alum solution caused a similar precipitate even more rapidly and the water cleared at once, but the smell was intensified and the water was still very acid.

Permanganate of Potash also caused a bulky precipitate and if sufficient was added the smell in 24 hours practically disappeared, but this alone would be too expensive.

I then found that a mixture of lime water, Alum and Permanganate of Potash, gave a clear water with little or no smell and quite capable of being used for rubber manufacture or for drinking, the cost being only about 23 cents per 1000 gallons.

The method to adopt should be to dig settling tanks in one of the main drains passing near the factory site. These should be about 50′ long and 14′ wide by 6′ deep and can be dug along the drain at intervals of 50′ or so. Two thirds full they would each hold 17,500 gallons and they would require

12 lbs. Quicklime stirred up in cold water
34 lbs. Alum.
½ lb. Permanganate of Potash.

The cost of these would be about 4s. 2d. or say $4 on the estate.

There should be wooden doors across the drain above and below the first and last settling tank, which could be closed if necessary after rain to keep the tanks full.

The lime water should then be sprayed over the tank, followed by the alum solution, the water being stirred to cause even admixture.

Finally the permanganate solution can be sprayed on as uniformly as possible after the bulk of the precipitate has settled.

If the pink colour produced by the last salt disappears rapidly, more permanganate should be added until the water remains pink for at least half an hour.

The water will then settle clear and practically free from odour and can be pumped to the factory from the nearest tank.

The drain between the settling tanks can be the same depth as the tanks so that all the water can be uniformly treated.

Similar tanks can be dug in other drains about the estate to provide clear water for tapping and washing purposes.

For drinking purposes the water can be boiled in addition, but if the right amount of permanganate is added it is not absolutely necessary.

The quantity of Lime added should be sufficient to neutralise the acidity and can be increased with impunity as a hard water will probably be found to give better results in the factory.

I thought perhaps you would like to publish this regarding brackish water for the benefit of estates on the ordinary Selangor alluvial soils.

Water from Lapan Utan Rubber Co., Ltd.

PARTS PER 100,000,

Total Solids	42.000
Chlorine	15.000
Free Ammonia	0.040
Albuminoid Ammonia	0.150
Nitrates and Nitrites	2.000
Nitrites	Present

I certify that this water is so polluted as to be unfit for human cncsumption.

DAMARS.

The following article on local Damars will be read with interest. These resins are produced by a number of the large Dipterocarpous trees, natives of the Malay peninsula. They are usually collected by natives searching in the forests for spots where old trees have decayed or where masses of the resin are to be found lying in the soil, having dropped from the trees. Locally the substance is chiefly used for damar torches, caulking boats, etc. In the home trade they find their way into varnishes.

The most valuable are the transparent resins such as those from the *Balanocarpi*, known as Penak or Chengei and the Mata Kuching Damar from Hopeas. The resins from Shoreas are usually opaque, yellowish or brownish, and rather chalky. The black resins often in long pipes often met with in the forests are usually the produce of some species of *Canarium (Burseraceae)*. They are apparently not much valued on account of their dark colour. Some years ago an attempt was made to start a Damar industry near Raub by tapping *Balanocarpus maximus* but we have not heard more of this movement. Bulletin VI. 138), and Mr. Moorhouse published an account of Damar tapping in Bulletin IV., p. 124 (See also Damars and wood oils by H. N. Ridley, Journ. Roy. As. Soc No. 34, p. 89).

Manila Copal or Almaciga is obtained from the coniferous tree *Agathis alba* or *Damara alba*. Some account of this is given by Mr. Foxworthy in the Philippine Journal of Science, May 1910 p. 173. The resin found in hard lumps in the forks of trees or in masses in the ground at the base, is collected by the Tagbuanas of Palawan. The tree also occurs it appears, in Borneo, on Mt. Poe, Sarawak, where Beccari found the resin at the foot of the tree. It is collected by the Dyaks, and Beccari gives the name of Dammar Daghin (Damar Daging) to it. This name, however, is usually applied to the resin of one of the Shoreas. Mr. Foxworthy found the Land Dyaks collecting it there under the name of Damar Bindang. They ascended the tree by a ladder of pegs driven into it and tying saplings thereto and by this means collected the resin on the branches. Warburg (Monsunia i 182-185) gives the Damara of the Malay Peninsula as a different species under the name of *Dhomboiaalis.* It is abundant and of large size on the Taiping hills and on Penang hill and produces much turpentine, but this does not seem to set into the clear hard blocks which are obtained from Manila. I have seen a stream of the turpentine flowing across the path up the Taiping hills where a root had been cut. The Malays call it Damar minyak, oil damar which rather impies, that it does not set hard. Manila Copal is much valued and it would be worth while investigating our Damara trees to see if a similar product not be obtained.

Dammar.

The dammars form a group of resins characterised by being largely soluble in spirits of wine or oil of turpentine and therefore suitable for the preparation of so-called "spirit varnishes" used mainly for indoor woodwork, paper, cloth, etc. They are obtained from species of *Hopea*, *Shorea*, and *Balanocarpus*, mainly in the Federated Malay States as well as in Sumatra and other Dutch East Indian Islands. Small quantities of dammarlike resins are obtained in India, but so far as European commerce is concerned these are of no importance. The dammars are all collected from living trees. The Dutch East Indian resin is shipped chiefly from Batavia, whilst the product of the Federated Malay States reaches Europe via Singapore.

The value of Singapore dammar in London at present is 25s. to 67s. per cwt., whilst that from Batavia is worth 65s. to 70s. per cwt.

Dammar Resins from the Federated Malay States.

These dammar resins, produced in the Federated Malay States, were forwarded to the Imperial Institute by the Conservator of Forests in 1905, with the request that information might be supplied as regards their suitability for varnish-making and their probable commercial values in this country.

Description of Samples.

No. 1. (Dammar Penak, No. 1 quality, derived from *Balanocarpus maximus* or *Wrayi*):—The sample weighed nearly one pound, and consisted of tears agglomerated into masses of light yellow transparent resin. It was brittle, readily reduced to powder, and appeared to be quite free from any foreign matter. It was partly soluble in alcohol, completely so in ether, and almost entirely soluble in turpentine, forming a slightly opalescent solution, which when applied to sized wood, dried to a brilliant, transparent, hard, and almost colourless "coat."

No. 2. (Dammar Kumus, from a Shorea sp., rather like *Shorea glauca*, probably *S. ciliata* Ed).—The sample weighed about four ounces, and consisted of two small masses of reddish-brown resin, which was translucent in thin pieces. It was partially soluble in alcohol, and almost completely soluble in ether. The solution in oil of turpentine was dark coloured, and when applied to sized wood left a fairly hard, brownish "coat" which was not very glossy.

No. 3. (Dammar Mata Kuching, Port Dickson).—This sample weighed about 1.5 ounces, and consisted of small, roughly ovoid, slightly yellow transparent tears of resin. It was hard, and free from foreign matter, and dissolved partially in alcohol and completely in ether. The solution in oil of turpentine was clear, and when applied to sized wood left a hard, brilliant, nearly colourless "coat."

No. 4. (Dammar Soongyi) (Sungei).—This weighed nearly fourteen ounces, and consisted of irregularly shaped lumps of dark-brown resin, which was translucent in thin pieces. The resin was hard; it dissolved partially in alcohol or ether and completely in oil of turpentine, forming a brown opaque solution which dried on wood, leaving a light brown, soft, dull "coat."

No. 5. (Dammar Meranti, derived from various *Shoreas,* of inferior quality).—This sample weighed about twenty ounces, and consisted of a single lump of opaque, yellowish-white resin, which was friable and softened readily when rolled between the fingers. It was partially soluble in alcohol or ether, and formed with oil of turpentine an opaque varnish which when applied to wood left a dull and sticky "coat."

No. 6. (Dammar Mata Kuching from Jempol).—The sample consisted of a lump of hard, transparent, pale amber-coloured resin, weighing about seven ounces. It was free from foreign matter and was partially soluble in alcohol and completely soluble in ether. It dissolved in oil of turpentine to form a pale yellow transparent solution, which dried on sized wood, forming a hard, brilliant, and almost colourless varnish similar to that produced by Sample No. 1.

No. 7. (Dammar Rengkong ?).—This weighed about two ounces, and consited of small pale yellow, hard and transparent tears. It was partially soluble in alcohol or ether and dissolved completely in oil of turpentine, forming an opalescent solution, which dried on sized wood leaving a "coat" which was hard, but lacked gloss.

No. 8. (Dammar Merawan from a Shorea).—The sample weighed nearly two ounces, and consisted of large translucent, yellowish-white tears of resin. It was partially soluble in alcohol, completely so in ether, and formed an almost colourless solution in turpentine oil, and this on drying left a fairly hard, clear, glossy "coat" inferior to those produced by Nos. 1, 3, and 6.

No. 9. (Dammar strayah) (Seraya).—This weighed about five ounces, and consisted of lumps of pale yellowish-brown resin showing a laminated structure. It was partially soluble in alcohol or ether. The solution in oil of turpentine dried to a fairly hard "coat" which was devoid of gloss.

Chemical Examination.

The nine samples of resin, when chemically examined, gave the results recorded in the following table:—

	No. 1,	2,	3,	4,	5,	6,	7,	8,	9
Melting point	90°c	94°c	87°c	180°c	185°c	92°c	200°c	97°c	190°c
Ash per cent	0.26.	0.08.	0.05.	0.52.	0.03.	0.06.	0.04.	0.25.	0.09
Saponification number *	46.7.	72.0.	38.5.	34.3.	72.0.	33.0.	46.7.	38.5.	55.0
Acid number *	45.3.	72.0.	38.5.	33.0.	72.0.	33.0.	46.5.	38.5.	55.0
Ester number *	1.4.	—	—	1.3.	—	—	0.2.	—	—

* *Milligrams of potash required for one gram of resin.*

The results of this examination show that these resins exhibit considerable differences in chemical composition and properties. They are all, however, partially soluble in alcohol and completely soluble in turpentine oil forming fairly light-coloured varnishes, and would therefore be classed commercially as dammars.

Commercial Valuation.

Samples of the nine dammars were submitted for valuation to commerical experts, who were also informed of the results of their examination. They reported on the samples as follows :—

Number of Sample	Description.	Commercial experts. comment.	Commercial values estimated by experts.
1.	Dammar penak	"Clean pale yellow"	55s. to 60s. per cwt.
2.	" Kumus	"Black"	20s. per cwt.
3.	" Mata Kuchtng	"Pale drop"	70s "
4.	" Soongyi	"Black"	15s "
5.	" Meranti	"Chalky"	10s "
6.	" Mata Kuching	"Bold pale"	60s "
7.	" Rengkong	"Green like Ceylon"	35s "
8.	" Merawan	"White"	35s "
9.	" Strayah (Serayah)	"Chalky inferior"	5s to 6s per cwt.

The prices quoted for the better qualities of the dammars included in this series of samples compare very favourably with those obtained in the open market in London, thus on the November 1905, the better qualities of Batavia dammar were quoted at from 70 s. to 80 s. per cwt. and Singapore kinds at from 30 s. to 75 s. per cwt. (November 1905).

(Colonial Reports Miscellaneous No. 63 Imperial Institute Gums and Resins 182)

OIL FROM RUBBER TREE SEEDS.

The United States Consul-General at Singapore suggests that the oil of seeds of *Hevea Braziliensis* will ultimately be of great commercial value. He recalls that it was a long time before the oil of cotton seeds became a valuable commercial factor. The Consul-General (Mr. Dubois) reports that at present there is such a demand for the seeds of *Hevea* for planting that the supply is not sufficient. It is now suggested by experts, however, that in erecting machinery on new rubber plantations the plans should be made with a view to rubber seed crushing machines being included later. This would leave a residue on the estates which it is believed will prove good for cattle food, as well as a fertilizer for rubber trees. (United States Daily Consular and Trade Reports, September 13, 1910).

At a recent meeting of the United Planters' Association of South India, Mr. R. D. Anstead mentioned that a large number of Para rubber trees planted in that country are already beginning to bear seed, and each year more will do so. It has been estimated that trees after the fifth year will yield 500 seeds each, and the product of 400 trees will weigh a ton. It is stated that the seeds contain about 20 per cent of an oil which has been valued at $100 (gold) per ton. Mr. Anstead was of opinion that the planters should gather the seed, crush it for the oil, and use the residue for fertilizing the rubber plantations:—(The India Rubber World, Vol. XLIII., p. 16).

"The comparisons of rubber seed with linseed and cotton-seed have led to inquiries as to the possible commercial utilisation of rubber-seeds in the future. At present there is such a demand for seeds for planting that there is no surplus supply. The Botanic Gardens at Singapore—which is really the birth-place of the Malay rubber-industry have already furnished great quantities of seed for the plantations, but the authorities now refuse to undertake any more orders for seed before next spring owing to the engagements already booked. But the time will not be long in arriving when there will be a large surplus of seeds from the ninety millions of trees already planted. Scientific investigation of the rubber-seeds has proved that they yield a fine clear oil of good drying quality. It has recently been suggested that, having in view the future commercial value of the seeds, it would be wise in erecting new machinery on plantations to make provision for power and space for seed-crushing machines. By doing so the residue from the crushers, which is valuable both as cattle-food and for fertilising, would be left on the estates."

(The Chemist and Druggist Vol. LXXVII p. 63).

We understand that there is just now rising a strong demand for oil of Para rubber seed in the United States of America. The failure of the linseed crops, and the substitution of the cultivation of the soy bean for the linseed by many planters has left the consumer of this oil short, and this is probably the cause of the interest now taken in Rubber seed oil.

Reports and notes on this oil have been already published in the Bulletin, but in the days when the attention of planters was called to this product all seeds were required for further planting, and since then the production of the rubber has been naturally the sole objective of the planter who has not bothered about the minor product.

Now, seed is abundant. and it would doubtless be possible to bring this product into the market and so to add to the profits of the estates. In clean weeded estate it should not be difficult for women and children to collect large quantities of seed at a cheap rate, they being paid by results. The seed could be shipped to the oil-mills, and there sold.

Only to-day a merchant was enquiring where a few tons of the oil were to be had for shipment to America, and it is certain that the oil would fetch a ready sale were it procurable in large quantities especially at the present time:—Ed.

Para Rubber-Seed Oil.

(*Extracts from Chemist and Druggist.*)

Attention is again called to this article of future commerce in several papers owing to the shortage of linseed oil this year. The amount of rubber seed in the Peninsula now practically wasted is very large and some addition to the profit of the industry might certainly be made from the seeds. On clean weeded estates, in the season it should be possible to gather or sweep up the seed at a comparatively small cost and supply it to the oil-mills, where it could be crushed and the oil extracted, the residue being made into oil-cake.

The great scarcity of linseed oil is causing much anxiety among consumers. The paint trade has been making a large use of substitutes but for wagon sheet making, oilcloths, etc., nothing can take the place of linseed. The present quotation for linseed is higher than it has been for twenty years, and 100 per cent higher than this time last year. The failure of the linseed crop and the occupation of many of the mills in soy bean crushing seems to be the causes of this rise in price (extract from chemist and Druggist, October 1, 1910). Now it seems would be the time to put Para seed oil on the market as a substitute for linseed. The following quotations from the same journal for will be of interest.

OBITUARY.

DR. MELCHIOR TREUB.

By the death of Dr. Treub the world loses its greatest tropical agriculturist and administrator of cultural establishments, and we could not pass over the death of one who has done so much for agriculture in the East without expressing our sense of the sad loss of so great a man. Dr. Treub was born at Voorschoten, near Leyden, on December, the 26th 1851, and after completing his undergraduate career was appointed assistant in the Botanical Institute of the University of Leyden, in 1874, and in 1880 was appointed to the Directorship of the Botanic Gardens at Buitenzorg, (being then only 29 years of age), succeeding Dr. Scheffer.

Through his energy and perseverance he raised the position of the Buitenzorg Gardens to the highest rank of any gardens in the world. Aided by a sympathetic government and his own great powers of administration he developed the economic functions of the establishment to the utmost, increasing the area under cultivation, and the staff, and adding the finest Botanical Laboratories in the world. He persuaded his Government to provide special laboratory accommodation for foreign workers, a very large number of whom came to take advantage of the facilities offered for original research. The results of these extremely important works were published in the Annales du Jardin Botanique de Buitenzorg, Teysmannia, and other Journals. The "Annales" were founded by Scheffer, who published the first volume, and thence forward carried on by Dr. Treub.

Besides his vast administration work he found time, too, to publish many important papers on his own special studies.

In organizing the Scientific Department of Agriculture he visited many of the other botanical establishments of the East, and on several occasions visited the Singapore Botanic Gardens. In the course of one of these investigations in Manila he contracted a severe illness from which it appears he never really recovered, and a little more than a year ago it was found necessary for him to retire from his post, first to Egypt and then to the South of France, where he died on October 3rd, at the age of fifty-eight, after a service of nearly 30 years in Java.

He will be deeply missed by many who knew him, not only as a most able administrator and agriculturist, but also as a kind and helpful friend, full of encouragement and sympathy for humbler workers:—Ed.

Dr. W. Burck.

We have also to record with regret the death of Dr. Burck who was formerly attached to the Botanic Gardens at Buitenzorg. He was born in 1848 and was well-known from his studies in the *Dipterocarpeæ* and *Sapotaceæ*. He was particularly interested in the cultivation of Guttapercha and for the study of their product visited the Highlands of Sumatra in search of plants. He collected a large number and started the Tjepetir and Guttapercha plantations, where Dichopsis gutta and other species are cultivated in a large scale. Later he was put in charge of the Government coffee plantations, and retired about eight years ago to Leyden where he devoted himself to Botanical science.—Ed.

PERSONAL.

Mr. F. G. Spring, of the Aberdeen and North of Scotland College of Agriculture, Aberdeen University, has arrived and assumed duties as Assistant to the Director of Agriculture, and Superintendent Government Plantations, F.M.S., vice Mr. J. W. Campbell, resigned. Mr. Spring holds the National Diploma in Agriculture and the University Diploma.

Mr. W. L. Wood, late of the Kew staff, has arrived and assumed duties as Superintendent of Government Plantations, Perak. Mr. Wood, after leaving Kew was for some months assisting Dr. Henry in his work on British Forestry.

MINUTES OF MEETING.

Held at the Masonic Hall, Kuala Lumpur, at 11-30 a. m. on October 23rd, 1910.

PRESENT.

Chairman :—Mr. C. M. Cumming.

For Kuala Langat District Planters' Association :—Mr. F. J. Dupuis.

Johore Planters' Association :—H. M. Morschell.

Kuala Lumpur District Planters' Association :—Messrs. F. G. Harvey, E. B. Skinner, H. C. E. Zacharias.

Klang District Planters' Association :—Mr. E. B. Prior.

Negri Sembilan Planters' Association :—Messrs. W. Buyers, A. Dupuis Brown, J. B. Douglas, A. B. Davidson.

Legal Adviser :—Mr. G. H. Day.

Visitors :—Messrs. K. J. Thorpe, M. Sharpe Smith, F. G. Hubback, B. J. Eaton, A. M. Pountney, Hon. C. W. Darbishire.

1. The Notice convening the Meeting having been read, Mr. Cumming says, that before proceeding with the business of Meeting he must say a few words with regard to the untimely death of Mr. W. W. Bailey. As they were all aware, he was for some years chairman of this Association and he was a splendid planter, a good sportsman and a good friend, and he did not hesitate to say that partly owing to his unswerving faith in the prospects of plantation rubber many of them by the force of his example were encouraged to go on planting up. He felt sure they would all join with him to-day in recording the great sympathy they felt for Mrs. Bailey, in her bereavement. The Secretary had already telegraphed to her the condolences of the Planters' Association of Malaya.

Mr. E. B. Prior says that there had been a suggestion to hold a memorial service for Mr. Bailey, and he had discussed the matter with the Rev. P. G. Graham, but in view of the fact that the majority of Mr. Bailey's old friends had left the country it had seemed that it would be somewhat out of place. It was felt that as Mr. Bailey was the pioneer planter at Klang, it would be appropriate that there should be a memorial in Klang, and the Chaplain had suggested placing a pulpit in Klang Church.

Mr. Cumming seconds this proposal.

Mr. Zacharias, reminding the Meeting that Mr. Bailey, after the federation of the Planters' Associations and the formation of the U. P. A., was the first chairman of that body, thinks it appropriate that, as the Planters' Association of Malaya was the continuation of the U. P. A., something should be done to mark the appreciation of the Association as such. The personal esteem of the planters might be marked separately, *e.g.* by the forming of a "W. W. Bailey Memorial Fund" for endowing Scholarships at the Straits and F. M. S. Medical School.

Resolved that a sum not exceeding $500/—from the funds of the Planters' Association of Malaya be devoted to the erection of a pulpit in Klang Church as a Memorial to the late Mr. W. W. Bailey.

2. The Minutes of the previous Meeting are taken as read and confirmed.

3. PLANTATION PRODUCE PROTECTION ENACTMENT.

The Legal Adviser reports that this Draft Enactment meets all the suggestions previously brought up by this Association for the amendment of the "Praedial Produce Enactments."

4. ABSCONDING COOLIES.

The Secretary reads the following letter:

Federal Secretary,
F. M. S.
Kuala Lumpur. 2nd August, 1910.

SIR,—At the last Meeting of my Association held on 18th instant, I was instructed to submit that the Labour Enactment be amended so as to make it an offence punishable with imprisonment for a laborer to abscond, without having given due notice.

I have etc.,
(Sgd.) H. C. E. ZACHARIAS,
Secretary.

Mr. G. H. Day reports that this suggestion has been adopted in the Labor (General) Draft Enactment, which was shortly to come before the Federal Council.

5. LONDON EXHIBITION.

The Secretary reads the following correspondence:

H. C. E. ZACHARIAS, Esq., LONDON, W.C.,
Kuala Lumpur. 4th August, 1910.

DEAR SIR,—I thank you for yours of the 6th July, re 2,806 sq. ft. of space, block 3/4. This has been reserved; we received official notification from the Colonial Secretary, Singapore, by letter: dated 25th April, and I thank you for confirming same.

Re space 1/2 this has been reserved by Ceylon but I think 2/4 equally good if not better. If I find that it is possible to alter the positions I shall have great pleasure in meeting your wishes.

Malay Cottage. I still have this stored in case you require to use it at the next Exhibition. I am afraid you would require some fresh roofing, though not a very great deal. There are no kitchen utensils but to the best of my belief the whole of the woodwork is complete; it has been lying in the store where it was placed at the close of the last Exhibition.

It is advisable to send over a good supply of stumps showing the various tappings if you can, and they are bound to draw attention like they did at the 1908 Exhibition, also live rubber plants and special decorations. Some of the photos you sent before were too small. It would be better not to have so many and have them much larger; you can get them enlarged cheap enough in London.

I am only making these suggestions for the benefit of the Exhibit.

What few photos Ceylon had were very large and could easily be seen.

If your Committee wish, I can get out a design for your stand though I presume you will send over a portion of it to give it the look of Federated Malay States and Straits Governments; it would look more natural, than if it were made wholly of English design. It will be necessary to have a platform down.

There is one thing I would like to impress upon you, viz., next year being Coronation which will take place shortly before the opening of the Rubber Exhibition on the 24th June, every one, especially standfitters, will be extremely busy and all arrangements therefore in connection with the buildings of the Stands should be made well in advance.

Yours truly,

(Sgd.) A. Staines Manders,
Manager.

H. C. F. Zacharias, Esq.,
Kuala Lumpur.

London,
31st August, 1910.

Dear Sir,—In reference to the F.M.S. and Straits Settlements it is to be hoped that the Committee arranging the representation of the two Colonies at this Exhibition, will see that no private firms have articles or goods placed on the Government space as if they did, it would take away from special nature of the exhibit and turn it into an ordinary general commercial stand instead of a representative Rubber Exhibit.

Why I mention this is, that at the last Exhibition several Exhibitors of rubber utensils, knives, seeds, also engineering firms had their goods shown free on the Government space when their proper place was in the commercial section where they would pay for space in the ordinary way. I am sure you will as all other Government Representatives have done, agree though I do not expect any one over there will try but just mention the matter in case. This of course does not apply to raw rubber, or other products, but ordinary commercial exhibits.

Yours truly,
(Sgd.) A. STAINES MANDERS,
Manager.

The Secretary,
Rubber Growers' Association,
1 Oxford Court,
Cannon Street,
London, E. C.

6th October, 1910.

DEAR SIR,—As you are aware, the second International Rubber and Allied Trades Exhibition will be held in London, during June next.

As it is essential that this Peninsula should make an imposing Show, a commanding position has already been booked and the co-operation of the S. S. and F. M. S. Governments has likewise been secured.

We feel sure you will agree with us, that it will be most desirable to concentrate the energies of everybody connected with the Rubber Industry in this Peninsula, on getting up one really representative stand rather than have a multitude of disjointed exhibits serving merely private ends.

It is, therefore, proposed to ask all our producing estates to send samples of not less than 25 lbs. each to this office at a date not later than April 2nd, 1911, when a select Committee will judge at a preliminary local Show all these exhibits and choose from amongst them such as they will consider best suited to advertise the quality of the various grades of rubber produced in this country.

In addition a large model is being got up, showing part of an estate, model coolie lines, machinery and drying sheds, assistant's bungalow, etc.

We merely give you a sketch of what we are doing, for your information, and will supplement this from time to time.

In the meantime we should be very glad if we could count on your co-operation in this matter, by recommending to your members, to give us their support, both by sending us samples of their rubber, as aforesaid, and by contributing to the expenses of the whole undertaking.

The latter we estimate at quite $10,000/-, and we therefore shall have to depend on donations, limited to say £50/-, from all those who are interested in the Staple Industry of this Peninsula.

Thanking you in anticipation, we are, dear sir,

Yours faithfully,

(Sgd.) H. C E. ZACHARIAS,
Secretary.

Mr. Cumming urges all planters to co-operate to make a first-class show, and refers to the local show which is to be held here in April, when a Committee will select the best samples to be sent Home. It was the wish of the Committee to have a really representative exhibit, and no expense should be spared.

Mr. Skinner proposes that all companies be circularised and asked to contribute a sum not exceeding $200/—each ; the surplus, if any, to be refunded.

Mr. Harvey seconds, and the resolution is carried unanimously

6. COMPULSORY GRADING OF AGRICULTURAL PRODUCE.

Mr. Prior thinks such a thing as compulsory grading of rubber impracticable.

Mr. Skinner presumes the idea was to prevent tapping immature trees, but it was surely a dangerous thing to leave it to Government to decide, which tree was immature, and which was not.

Mr. Cumming deprecates further interference by Government and restriction of the liberty of the subject.

Mr. A. Dupuis Brown says that a similar question arose in Egypt over cotton, and the Association there definitely fixed certain grades. In view of the methods adopted by the Malays the question was a very important one.

Mr. Prior says that the Malay was not the direct exporter, as he sold to the European.

Mr. Dupuis Brown proposes, Mr. Skinner seconds, and it is carried unanimously, that a sub-committee be appointed to consider the question, with power to correspond with Government, and report to the P. A. M., at the next meeting. Messrs. Skinner, Dupuis Brown and F. G. Harvey are appointed members of the sub-committee.

7. BRUSSELS EXHIBITION.

The Secretary reads the following correspondence:

The Secretary, 8th September, 1910.
Planters' Association of Malaya,
Kuala Lumpur.

DEAR SIR,—We beg to enclose a copy of a letter received from Messrs. Lewis and Peat together with an account of the rubber purchased for the Brussels Exhibition.

You will notice that there remains to be received the account for the sale of the exhibits which will be rendered together with account for the purchase, on arrival from London.

We shall forward to you the photographs of the exhibits on receipt.

We are, Dear Sir,
Yours faithfully,
(Sgd.) THE PLANTERS' STORES & AGENCY CO., LTD.
6, Mincing Lane,

Lewis and Peat 12th August, 1910.
Messrs. The Planters' Stores & Agency Co., Ltd.,
Kuala Lumpur.

DEAR SIR,—We very much regret having omitted to write exactly what we had done, as to exhibits on account of the Malay Planters' Association in the Brussels Exhibition. On the 1st April we informed you that the quantity you named was far too much; we had been in communication with the man who had charge of the rubber section at the Exhibition, and learnt from him that this was to be shown in a somewhat small pavilion, about 7 miles from the main Exhibition, which would be entirely devoted to rubber. The writer was on the Committee for the Rubber Growers' Association of London, and discussed the matter with them before deciding the quantity to be sent; he also got together their exhibit and he visited the exhibition himself with other Members of the Association, and found that the samples sent along were fully sufficient, and with the photographs supplied and the big name board of the Malay Planters' Association made an excellent exhibit. We enclose the invoice now, leaving out a small item of insurance, for which we have been waiting for some time.

The section, being so far away from the main exhibition, is only being visited by comparatively few of the general public, but by a great many people actually interested in the article.

When the Exhibition closes, we hope to be able to get a fair price for the samples from buyers in Brussels.

We are, dear sirs,
Yours faithfully,
(Sgd.) LEWIS & PEAT.

P. S.—We hope to send you a photograph of the exhibition next mail.

6, Mincing Lane London, *12th August, 1910.*

THE PLANTERS' STORES AND AGENCY Co., Ltd.

Dr. to Lewis and Peat.

For Amount of the following goods.

LOT SAMPLES RUBBER FOR BRUSSELS EXHIBITION.

				£	s.	d.
1.	5 lbs.	Ceara Biscuit	@ 10/ 7½	2	13	3
2.	10 ,,	Pale Para Blanket Crepe...	,, 7/ 6	3	15	0
3.	10 ,,	,, ,, Biscuit	,, 11/10¾	5	19	0
4.	10 ,,	Dark ,, Crepe	,, 11/ 7	5	15	10
6.	20 ,,	Fine Pale ,, ...	,, 11/ 9½	11	15	10
5.	50 ,,	Black	,, 12/ 2	30	8	4
7.	20 ,,	Brown Crepe	,, 11/ 7½	11	12	6
8.	15 ,,	Fine Para Sheets	,, 12/ 5¼	9	6	7
				81	6	4
			Discount 2½ %	2	0	8
				79	5	8

Charges.

			£	s.	d.
1.	Sampling, supplying bag and porterage	2. 8			
2.	,, ,, ,, ,, ,,	4. 2			
3.	,, ,, ,, ,, ,,	4. 2			
4.	,, ,, ,, ,, ,,	8. 1			
6.	,, ,, ,, ,, ,,	4. 2			
5.	Delivery and forwarding case	1. 6			
7.	Sampling, supplying bag and porterage	8. 0			
8.	,, ,, ,, ,, ,,	4.11			
	Case for samples	4. 6			
	Forwarding to Brussels P. G. E. Ry. ...	1. 0			
	Freight	5. 0			
	Insurance to Brussels	3. 9	2	11	11
			£ 81	17	7

Mr. Skinner reports having, while at Home, visited the Brussels Exhibition, and gives the meeting a short account of the Malayan rubber exhibit there. It was situated in a big marble palace, some seven miles out, which was lent by the King of Belgium. Exhibits of Congo industries were in the same building, and thousands of people visited it. The Malayan rubber exhibit was a good one, comprising crepe, block sheet, tapping photos, etc.

8. STRAITS MEDICAL SCHOOL.

The Secretary places on the Table an Appeal for a Scholarship Fund by the Dean of the Straits and F.M.S. Medical School.

Mr. Harvey says that what was wanted was the class of medical practitioner known as " Assistant Surgeon " and it was exactly this class, which was being trained at the Straits School.

Mr. Prior reckons that the demand was more than double the supply. This was the crying need of the country, as without them they were unable to carry out the Hospital, &c. regulations.

Mr. Cumming emphasizes that more and more would be wanted as time went on, and they should do everything in their power to encourage the Government's scheme to raise up a class of qualified dressers for its own use and that of the planters.

It is proposed by Mr. Prior, seconded by Mr. Douglas, and carried unanimously, to send out a circular, accompanied by the appeal, to all members, asking for the largest contribution they could give, in order to form a W. W. Bailey memorial fund for the endowment of scholarships at the Straits and F. M. S. Medical School.

9. CENSUS.

The Secretary reads out the following letter:

No. 5224/1910. 29th September, 1910.

SIR,—I am directed to invite your attention to the selection of the night of Friday, March 10th, 1911, as the time for the taking of a census throughout the Federated Malay States and to say that the Resident-General feels assured that all officers engaged on the census will have the cordial co-operation and assistance of your Association and of the Planting Community generally in securing that all information required for the purposes of the Census in the Federated Malay States is fully and accurately given.

2. I am also to inform you that all correspondence on census matters addressed to Census Officers will be transmitted free by post.

I have etc.,
(Sgd.) E. C. H. WOLFF,
for Federal Secretary.

At the invitation of the Chairman, Mr. A. M. Pountney then explains the co-operation required of estate managers in the matter of the forthcoming census, by a sketch of the census operation.

An estate for census purposes was an area under cultivation, on which there is a resident labour force of ten or more coolies, and in respect of the residents on which area the manager is requisitioned by the District Census Officer to act as Enumerator.

Census returns would be published of the population of all agricultural estates so selected.

The numbering of the houses about to be undertaken in country districts was necessary in order to estimate the number of householders' schedules required and also in order to afford the best possible itinerary to the official enumerators.

In the case of estates in which the manager was ex-officio enumerator the actual numbering of the houses was left to the Manager's discretion, all that was required was that he should ensure the enumeration of every person sleeping in any building on his estate on the night of March 10th, 1911.

Managers were requested to notify the District Officers of any instances of houses within the boundaries of their estates having numbers affixed to them by the official numberers. In such cases the houses in question would be excised from the District House List.

The total number of houses on an estate was, however, required for Census purposes and the number of persons resident thereon was also required to render it possible to estimate the nunber of the householders' schedules to be issued to the estate.

For these reasons Managers would be requested to furnish information on Census Form 9, Estates Statistical Return.

As regards the item "Planted Area" of estates, the total planted area of all estates in a district was the only derived figure which would be published, and no figures in respect of individual estates would be divulged. On receipt of Form 9 from estates an estimate of the schedules required for each estate would be made and this estimated number of schedules would be forwarded to the manager by the middle of February, 1911. There would, thus, be time for managers to report any shortage of schedules to the District Officer before enumeration commenced. In the case of estates, the managers would probably have to appoint persons to carry out the preliminary enumeration and make the entries for the coolies on the schedules. Any person so appointed should be thoroughly capable of filling in schedules correctly and neatly in English.

The various houses on the estate should be divided up amongst the persons appointed to carry out enumeration in such a manner that all houses on the estate are allotted to some enumerator or other. During the three or four days prior to the Census day, the 10th March, 1911, the enumerators should fill in the particulars required in respect of all persons living in the houses allotted to them and the Manager should be in possession of all schedules by noon on the 10th March, 1911, to afford an opportunity of seeing that they are properly filled in.

Coolies should, as far as is reasonable, be prevented from leaving the estate on the night of 10th March, 1911, and early on the morning of the 11th March the manager should hold a muster or musters of all persons on the estate at convenient places. He should check the schedules by a roll call and add particulars in respect of all persons who were not on the estate during the preliminary enumeration, but slept there on the night of the 10th March, and should excise all entries in respect of persons resident on the estate during preliminary enumeration, but who did not sleep on the estate on the night of the 10th March.

During the final enumeration by the manager (or Assistant Managers) all houses on the estate should be searched to see that no one escaped enumeration.

The manager would then be required to sign the schedules and forward them, without delay, to the Assistant Superintendent of Census, that is the District Officer, for the District within which the estate was situated. Rules for the enumeration of estate population and specimen schedules properly filled in would be issued to estate managers with the householders' Schedules about the middle of February, 1911.

The Meeting then adjourns (at 1-15 p.m.) for a tiffin interval, and resumes the sitting at 2-30 p.m.

10. CHINESE LABOUR.

The Secretary reads out the following letters:

Chinese Protectorate,
P. of C. 619/10. Singapore, 23rd September, 1910.

GENTLEMEN,—I have the honor to enclose a copy of the form of contract to labour approved by His Excellency the Governor in Council for use under the Chinese Immigrants Ordinance, 1902, as it is about to be amended.

2. The Bill to amend this Ordinance has been published in the Government Gazette, and will probably become law about the 6th October. Similar legislation is also in contemplation in the Federated Malay States.

3. The enclosed form of Contract, with the addition of certain clauses (providing for the return of the laborers on determination of the contract to the Colony or China as the case may be, and for the cancellation of the Chinese Immigrants' contract on the terms laid down by section 32 of the Chinese Immigrants' Ordinance) will probably be approved for use under the Emigration Ordinance, 1910, which will soon be brought into force.

4. In the case of emigrants who do not also come under the "Chinese Immigrants Ordinance" there will be standard varieties of this form of contract, similar to those in use at present.

5. This letter is written to give employers and their agents early intimation of the change in the form of contracts and to draw attention to the impending alteration of the law. It is possible, but not probable, that further changes will be made in the contract, before it is gazetted.

I have, etc.,

(Sgd.) C. J. SAUNDERS,
Secretary for Chinese Affairs.

ENCLOSURE.

This Contract made the.........day of............191 between each of the persons named and described in the schedule hereto (hereinafter called the Labourer) of the one part and ....of................. ....his executors and administrators (hereinafter called the Employer) of the other part.

Witnesseth that, whereas the Labourer has received from the Employer advances to the amount hereinafter written against his name, the receipt of which advances the Labourer hereby acknowledges,

NOW it is hereby agreed between the parties as follows :—

1. The Labourer will proceed to........................at the expense of the Employer and will there labour for the Employer as.. ....

2. The Employer may require the Labourer to perform this contract under any headman, mandore, contractor or other person, provided that the Employer shall remain responsible to the Labourer for the due performance of the following conditions and for the good treatment of the Labourer.

3. The Employer will make no deduction from the Labourer's pay for any advances made to the Labourer, or for the cost of the following articles now supplied to the Labourer: one mosquito curtain, one sun hat, one coat, 2 pairs of trousers, 2 bathing cloths, one pair of clogs, one blanket and one mat or for any expenses incurred by him on account of the Labourer prior to the arrival of the Labourer at the place where the contract is to be performed.

4.—(i) The Labourer will complete an aggregate number of (not exceeding 300) day's work and will work overtime when reasonably required by the Employer so to do.

(ii) Not exceeding nine hours shall constitute a day's work, but the Employer may reckon as a day's work the completion of an equivalent task previously determined by him, provided always that the local authority of the place where the contract is to be performed may at any time alter or revise such reckoning, if the task so fixed appears to him in the case of the Labourer to be unreasonable.

5. Except in case of emergency such as fire or flood, the Labourer need not work more than 26 days in any month nor upon the usual Chinese feast days which shall include the following:—

Chinese New Year (2 days)	5th of the 5th moon
15th of the 1st moon	15th of the 7th moon
Ching Ming	Tung Tsit.

6. The Employer will during the continuance of the contract provide the Labourer free of charge and to the satisfaction of the local authority of the place where the contract is to be performed with suitable house accommodation, with sufficient food of good quality, with medical attendance and treatment, with tobacco and with the services of a barber.

Provided that the Employer may charge the Labourer 15 cents for the food supplied to him on any day, over and above 4 days in any month, on which he is absent from work, if his absence is not due to sickness or to other cause beyond his control.

7. If the Labourer shall abscond and be arrested, he shall be liable to pay to the Employer such expenses of his arrest as the local authority of the place where the contract is to be performed may deem reasonable.

8.—(i) The Employer will at regular intervals of not over one month during the term of the contract pay to the Labourer wages at the rate of minimum eight cents for each day's work, completed by him and minimum seven cents an hour for all work done overtime.

(ii) The Employer may deduct from these payments the monies which the Labourer is liable under clauses 6 and 7 to pay to him.

9. If on the completion of this contract by the Labourer the monies which he is liable under clauses 6 and 7 hereof to pay to the Employer shall exceed the amount remaining due to him by the Employer under clause 8 hereof, the contract shall be deemed to be extended until such excess shall have been repaid. Provided that wages duirng such period of extension shall be payable at the rate of minimum twenty-five cents for each day's work.

Provided further that this contract shall be null and void on the expiration of eighteen months from the date hereof.

The Secretary,
Planter's Association of Malaya,
Kuala Lumpur.

Penang,
10th October, 1910.

DEAR SIR,—Enclosed we beg to hand you copy of a letter we have to-day forwarded to the Superintendent of Indian Immigration relating to the control which this Association advocates in reference to the importation of Chinese labour.

We are, dear Sir,
Yours faithfully,
(Sd.) KENNEDY & Co.,
Secretaries.

W. Peel, Esq.,
Ag. Superintendent of Ind. Immigrants, Penang.

Penang,
10th October, 1910.

SIR,—We have the honor to acknowledge receipt of your letter dated the 7th instant conveying the information that His Excellency the Governor has been pleased to allow the importation of Statute Immigrants to continue to the end of the present year.

We are instructed by the Committee of the Malay Peninsula Agricultural Association to request you to convey to His Excellency their thanks for his action in so readily acceding to the representations of the Association.

We are further instructed to request you to lay before His Excellency the views of the Association regarding the immigration of Chinese labourers for agriculture.

Following the gradual extinction of Tamil Contract labour, which seems to be settled policy of the Government, the Association has to recognize that estates will, as time goes on, become more and more dependent on Chinese. The Committee therefore desires to bring to the notice of His Excellency the Governor the unsatisfactory conditions at present existing in regard to the recruiting of Chinese Sinkehs in their own country, and the harm which results through the absence of any official control by the local authorities of the recruiters. It is generally recognised and admitted that so long as the traffic remains in the hands of brokers and agents it will be impossible to ensure that only men likely to make useful agricultural labourers are exported to the Straits. At present, while very high recruiting fees are being paid, a certain number of undesirables are being brought into Malaya, and the Association feels that it is justified in regarding the future with some apprehension unless steps are taken officially to remedy the existing state of affairs. Estates are perfectly willing to pay reasonable prices for Chinese labour of a suitable class and the cost of the establishment by the Government of the Straits Settlements and the Federated Malay States of an official recruiting agency in China would easily be defrayed by recruiting fees and such an agency would benefit both the coolie and his employer by the elimination of the middleman. A certain proportion of the exorbitant recruiting fees at present paid to the brokers might then be paid to the coolie and this fact, together with the placing of the traffic under official British control, would have the further effect of cutting away the ground beneath certain misinformed persons in England who are already beginning to agitate against the employment of Chinese contract labour in Malaya.

Should the Government not see its way to establish an official recruiting agency in China, the Committee trust it may yet be possible to eliminate some of the more pressing disadvantages of the present system by the institution of a labour bureau, financed and conducted by private individuals, but controlled and supervised by the Straits authorities. They would, however, much prefer an official agency as outlined above.

The Association ventures to hope that its views of this matter affecting so closely the interests of its members, a view arrived at after mature thought and with a due regard for the welfare both of the agricultural industry and the agricultural labourers, will receive His Excellency's sympathetic consideration.

We have, etc.,
(Sd.) KENNEDY & Co.,
Secretaries.

Mr. C. M. Cumming says that the new labour contract limited the term of contract to one year, or 300 days. Many planters in Perak, he understood, objected to this provision, and advocated a three years' term. Free labourers were preferable, but it was necessary to begin with some form of indenture. A one year indenture was now law in the Colony and they could not have another one in the F.M.S. It certainly was desirable that in the future one central labour department be instituted.

11. LABOUR ENACTMENTS.

Mr. Skinner proposes that estate doctors should have power to send Tamil and Javanese coolies to hospital.

Mr. Prior seconds, mentioning that Government prosecutes managers for not sending coolies early enough to hospital.

This resolution is passed.

Mr. Dupuis Brown proposes that the Government be approached with a view to include the undermentioned clause in the estate Laborers' (Protection of Health) Enactment, 1910:

"That Kanganies in charge of or owing coolies shall be made directly responsible under penalty for not reporting cases of sickness in the lines to their Manager, more especially cases of dysentery and advanced fever."

Mr. Day points out that this is covered by para. 27 of the Draft Enactment.

Mr. Dupuis Brown wishes the power to fine not to lie with the manager, but with the court.

Resolved that "or any magistrate upon report made to him by such resident manager" be inserted.

Mr. Day speaks on the provisions of the Chinese Immigrants Draft Enactment.

Resolved that in section 10 all the words from "and no person except" shall be omitted.

12. RAILWAY FREIGHT ON RUBBER.

The following resolution passed by the Negri Sembilan P. A. is read by the Secretary.

"That Government be informed of the great dissatisfaction caused by the raising of the railway rate on rubber from class 4 to class 2, whilst products such as cocoa, coffee and damar remain classed 3, 5 and 4 respectively, and that in comparison with Ceylon the rate in the F.M.S. works out at 25.2 cents per ton per mile, whilst in Ceylon the rates are approximately the equivalent of 7.55 dollar cents per ton per mile on the coast lines and 9.72 dollar cents per ton per mile on the main line, and that this resolution be forwarded to the Secretary of the P. A. M. to be placed before that Association for discussion at the next meeting."

The Chairman says that the raising of the rate was unjustifiable, more especially in view of the impending legislation against the Shipping Ring. It was a very drastic measure, and he thinks the Association should have been approached.

Mr. Dupuis Brown in seconding the resolution points out that rubber is now in the same category as wine, works of art, silk and walking sticks, drugs, boots and bonnets, ammunition and sealskin jackets, pianos, rickshas and perambulators, glassware, firearms and feathers, sewing machines, stationery, pickles and Chinese hair wash, statues of eminent persons and Chinese lanterns, umbrellas, tomtoms and tomb stones. The only consolation was that the rate was ½ cent less than the rate for empty coffins.

Resolved that the matter be left to the Members of Council present, who, it is understood, will raise this question at the forthcoming Meeting of the Federal Council.

13. INFECTED CLOTHING.

The Secretary reads the following letters:

Pendamaran,
Port Swettenham,
October 4th, 1910.

The Secretary,
Planters' Association of Malaya.

DEAR SIR,—The following resolution was carried at the last meeting of the Klang District Planters' Association:—

"That in view of the fact that some Planters had objected to the burning of coolies clothing at Penang the matter be laid before the Planters' Association of Malaya for discussion."

May I request you to list this subject on your Agenda for the next meeting.

Yours truly,
(Sgd.) W. H. TROTTER,
Hon. Secretary, Klang Dist., P.A.

No. (2) in 3352/10. Kuala Lumpur, 23rd August, 1910.

SIR,—With reference to your letter of July, 1910, in which you ask that the clothing and baggage of coolies arriving from India, where there is infection with cholera, should be destroyed, I am directed to inform you that the Superintendent of Indian Immigrants has been requested to give effect to this recommendation when he considers it necessary.

2. It will probably save time and prevent the reduplication of correspondence if the Secretary United Planters' Association will communicate with the Superintendent on the subject of terms, etc., if any further correspondence is necessary.

I have, &c.,
(Sgd.) R. C. GREY,
Secretary to Resident, Selangor.

Honorary Secretary,
District Planters' Association,
Klang.

Mr. Prior considers it perfectly frivolous for anybody to raise any objection to so commonsense a measure.

Mr. Cumming quite agrees and the Secretary is instructed to write to the Federal Secretary that this Association strongly approves of the clothes and baggage of all suspect Indian Immigrants being destroyed on coolies' arrival at Penang.

14. FUNDS.

The Secretary reads the following letter from the Taiping Planters' Association:—

5th October, 1910.

DEAR SIR,—At a General Meeting of the Taiping Planters' Association it was decided that as it was impossible to raise the subscription this year to meet the extra $400 required by your Association, I am requested to ask that you will allow us to have one delegate only this year, and next year we can arrange for funds to meet the extra expenses required.

The General Meeting also noted with approval that you are remonstrating with the Straits Government in bringing forward legislation dealing with planting matters without first consulting the different Planters' Associations, and I hope you will add that this Association are in very strong agreement with you.

Yours faithfully,
W. H. TATE.
Hon. Secretary
Taiping Planters' Association.

The Secretary,
The Planters' Association of Malaya,
Kuala Lumpur.

The Chairman says that the Association must have funds. It was doing good work. It was recognised by Government, and could get anything it asked for in reason. Funds were absolutely necessary. It was decided that the Secretary should write accordingly to the T. P. A. and inform them that no reduction in this year's subscription could be made.

15. AGRI-HORTICULTURAL SHOWS.

The secretary reads the following letters:—

Misc. 4908/1910. Singapore, 21st September, 1910.

SIR,—I am directed by the Governor to forward the enclosed copy of the minutes of a meeting of the Standing Committee for Agri-Horticultural Shows held at Singapore on the 20th ultimo. and to request that you will kindly favour me for His Excellency's information, with any observations which the Planters' Association of Malaya may have to make upon the proposals of the Committee.

EVANS,
Ag. Colonial Secretary,
Straits Settlements.

The Honorary Secretary,
Planters' Association of Malaya,
Kuala Lumpur.

Minutes of a Meeting of the Standing Committee of Agri-Horticultural Show held in the General Secretary's office on the show ground at Singapore, on 20th August, 1910, at 8 a.m.

Present:—Messrs. H. N. Ridley (in the chair) Long, Burnside, Hall, Farrer, and Derry. After considerable discussion it was unanimously resolved to report to Government that the Standing Committee is of opinion that these Annual Joint Shows are held too frequently and they should not be held oftener then triennially.

Mr. Farrer proposed and Mr. Hall seconded that an addition be made to the Rules and regulations already drawn up, to this effect "Local Secretaries are instructed that as a general rule entry tickets should be issued to the persons actually growing or making the exhibit." Carried unanimously.

This meeting also resolved unanimously:

(1) To recommend to Government the appointment on the Standing Committee of representatives for the New States of Kelantan, Trengganu and Kedah and to invite Johore to nominate a representative or representatives.

(2) That all the members of the Standing Committee for each place in which a show is held be ex-Officio Members of the Committee of Management of such show.

(3) That the Singapore Members of the Standing Committee be requested to make recommendations for a revision of the prize list issued after consultations with the Secretaries of the Standing Committee in the other places.

(*Sd.*) *H. N. RIDLEY.*

Mr. Cumming proposes, Mr. Prior seconds and it is resolved unanimously to recommend that these shows be held bi-annually in future.

16. LABOUR CLAUSE IN LAND GRANTS.

Mr. Cumming proposes "that it is desirable that a labour clause be inserted in new agricultural grants." He thinks that steps should be taken to stop the present methods of new companies depending on labour already in the country. A clause should be inserted in the grant whereby the holder should be bound to import his labour or pay a certain sum to Government who would provide the labour required.

Mr. Prior in supporting Mr. Cumming, mentions that 80 to 100 coolies had recently left one estate within a short time without any reason.

Mr. Skinner, while in favour of the motion, suggests that its consideration should be postponed until the next meeting. This is agreed to.

Mr. Dupuis Brown suggest that the motion be discussed meanwhile by the D.P.A.'s.

Resolved to hold the next meeting at Kuala Lumpur, on December 11th.

The meeting terminates at 3-30 p.m.

(Sd.) H. C. E. ZACHARIAS.
Secretary.

Misc. 4980/10

Colonial Secretary's Office,
Singapore,
30th September, 1910.

Sir,

With reference to your letter of the 15th September, forwarding a copy of the minutes of a meeting of the Standing Committee of the Agri-Horticultural Shows, I am directed to inform you that after consultation with the Planters' Association of Malaya, His Excellency the Governor has been pleased to direct that in future Agri-Horticultural Shows are to be held biennially instead of annually.

I have the honour to be
Sir,
Your obedient servant,
(Sgd.) W. EVANS,
Acting Colonial Secretary,
Straits Settlements.

H. N. RIDLEY, ESQ.,
Hon. Secretary,
Standing Committee,
Agri-Horticultural Shows, Singapore.

EXPORTS TELEGRAM TO EUROPE AND AMERICA.

15th to 31st August.

	Steamers.		Tons.	Tons.
Tin	Str Singapore & Penang to	U. Kingdom &/or	1971	2601
Do.	do.	U.S.A.	383	250
Do.	do.	Continent	370	130
Gambier	Singapore	Glasgow	—	—
Do.	do.	London	—	50
Do.	do.	Liverpool	50	—
Do.	do.	U.K. &/or Continent	—	25
Cube Gambier	do.	United Kingdom	15	40
Black Pepper	do.	do.	160	230
Do.	Penang	do.	5	10
White Pepper	Singapore	do.	70	35
Do.	Penang	do.	—	—
Pearl Sago	Singapore	do.	100	180
Sago Flour	do.	London	125	125
Do.	do.	Liverpool	1,500	270
Do.	do.	Glasgow	25	—
Tapioca Flake	Singapore	United Kingdom	375	200
T. Pearl & Bullet	do.	do.	330	175
Tapioca Flour	Penang	do.	—	250
Gutta Percha	Singapore	do.	110	125
Buffalo hides	do.	do.	80	5
Pineapples	do.	do.	13,750	4,500
Gambier	do.	U.S.A.	925	430
Cube Gambier	do.	do.	90	60
Black Pepper	do.	do.	225	45
Do.	Penang	do.	—	290
White Pepper	Singapore	do.	90	10
Do.	Penang	do.	—	65
Tapioca Pearl	Singapore	do.	180	200
Nutmegs	Singapore & Penang	do.	8	7
Sago Flour	Singapore	do.	150	200
Pineapples	do.	do.	1,500	7,000
Do.	do.	Continent	4,250	3,750
Gambier	do.	S. Continent	60	150
Do.	do.	N. Continent	190	150
Cube Gambier	do.	Continent	25	15
Black Pepper	do.	S. Continent	310	70
Do.	do.	N. Continent	375	15
Do.	Penang	S. Continent	25	20
Do.	do.	N. Continent	—	—
White Pepper	Singapore	S. Continent	20	—
Do.	do.	N. Continent	75	60
Do.	Penang	S. Continent	10	15
Do.	do.	N. Continent	5	20
Copra	Singapore & Penang	Marseilles	460	900
Do.	do.	Odessa	1,950	440
Do.	do.	Other S. Continent	150	150
Do.	do.	N. Continent	3,100	2,350
Sago Flour	Singapore	Continent	850	1,050
Tapioca Flake	do.	do.	5	110
Do. Pearl	do.	do.	35	—
Do. Flake	do.	U S.A.	—	—
Do. do.	Penang	U.K.	25	50
Do. Pearl & Bullet	do.	do.	150	70
Do. Flake	do.	U.S.A.	—	—

	Steamer.		Tons.	Tons.
Do. Pearl	do.	do.	10	250
Do. Flake	do.	Continent	30	—
Do. Pearl	do.	do.	110	90
Copra	Singapore & Penang	England	240	100
Gutta Percha	Singapore	Continent	55	50
Cube Gambier	do.	do.	—	—
T. Flake & Pearl	do.	do.	—	—
Sago Flour	do.	do.	—	—
Gambier	do	S. Continent	—	—
Copra	do.	Marseilles	—	—
Black Pepper	do.	S. Continent	—	—
White Pepper	do.	do.	—	—
Do.	do.	U.S.A.	—	—
Pineapples	do.	do.	—	—
Nutmegs	do.	do.	—	—
Black Pepper	do.	do.	—	—
Do.	Penang	do.	—	—
White Pepper	do.	do.	—	—
T. Flake & Pearl	do.	do.	—	—
Nutmegs	do.	do.	—	—
Tons Gambier			350	400
Do. Black Pepper			110	420

SELANGOR.

Abstract of Meteorological Readings in the various Districts of the State for the month of October, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
General Hospital, Kuala Lumpur ...	29.872	146.8	80.5	88.3	72.0	17.3	76.0	.813	73.0	78	CALM	6.68	1.33
Pudoh Gaol "	...	...	...	...	...	...	...	...	...	...	...	8.02	1.64
District Hospital "	...	...	...	...	...	...	...	...	...	...	...	10.15	1.98
" Klang...	...	...	...	89.1	69.3	19.8	...	...	...	...	...	6.22	1.58
" Kuala Langat	...	...	...	87.4	72.9	14.5	...	...	...	...	...	10.11	2.57
" Kajang	...	...	...	85.1	75.4	9.7	...	...	...	...	...	10.88	2.73
" Kuala Selangor ...	...	...	...	87.2	74.8	12.4	...	...	...	...	...	15.50	3.40
" Kuala Kubu	...	...	...	89.7	70.7	19.0	...	...	...	...	...	15.84	2.55
" Serendah	...	...	...	91.5	70.6	20.9	...	...	...	...	...	10.68	1.90
" Rawang	...	...	...	89.4	71.2	18.2	...	...	...	...	...	12.50	3.03
" Sabak Bernam ...	...	...	...	...	...	...	...	...	...	...	...	8.14	3.16

Office of Senior Medical Officer,
Kuala Lumpur, 24th November, 1910.

Senior Medical Officer, Selangor.

NEGRI SEMBILAN.

Abstract of Meteorological Readings in Negri Sembilan Hospitals for the month of October, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Seremban Hospital		151.2	81.4	86.8	71.8	15.	76.	.800	72.5	74.6	WNW	14.82	3.36
Mantin												7.99	2.35
Tampin												8.72	2.70
Kuala Pilah												7.08	1.09
Jelebu												8.20	1.94
Port Dickson Town												8.73	1.56
Do. Beri-Beri												6.75	1.41

Medical Officer in Charge's office,
Seremban, 11th November 1910.

A. J. M. MOSLEY,
S. M. O.

KELANTAN.

Abstract of Meteorological Readings in Kelantan for the Month of September, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Mean Maximum.	Temperature. Mean Minimum.	Temperature. Mean Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
		° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	%		Ins.	Ins.
Kota Bharu	..	150.5	82.08	86.98	74.30	12.68	78.52	1.254	76.52	82.	...	7.50	1.28
* Kuala Lebir	...	...	78.5	88.0	72.4	15.6	75.3	.815	73.1	83.5	...	6.63	2.03
Kuala Pahi	...	...	85.06	72.16	12.90	...	...	...	...	...	...	7.98	1.81
Taku Plantation	...	...	...	...	...	...	...	...	...	...	...	7.16	1.19
Pasir Besar	...	...	...	...	...	...	...	...	...	...	...	9.48	1.63
Nenggiri	...	...	...	...	...	...	...	...	...	...	...	5.58	1.60
Pasir Tinggi	...	...	...	...	...	...	...	...	...	...	...	7.44	2.09
Chaning Estate	...	...	...	...	...	...	...	...	...	...	...	6.87	1.16

* Supplied by the courtesy of the Kelantan Planters' Association.

Residency Surgeon's Office,
Kota Bharu, *20th October, 1910.*

John D. Gimlette,
Residency Surgeon, Kelantan.

KELANTAN.

Abstract of Meteorological Readings in Kelantan for the month of October, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° F.	Mean Maximum in Sun.	Temperature. Mean Dry Bulb.	Temperature. Mean Maximum.	Temperature. Mean Minimum.	Temperature. Mean Range.	Hygrometer. Mean Wet Bulb.	Hygrometer. Vapour Tension.	Hygrometer. Dew Point.	Hygrometer. Humidity.	Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	%		Ins.	Ins.
Kota Bharu ...	...	150.8	81.53	86.00	74.00	12.00	78.26	.897	76.0	84.8	...	15.65	2.42
Kuala Lebir ...	...	...	*77.4	87.9	72.1	15.1	74.8	.854	74.5	86.3	...	11.1	1.7
Kuala Pehi ...	...	...	...	84.67	72.13	12.54	...	...	...	...	...	10.57	3.38
Pasir Gajah Estate ...	...	...	...	86.0	74.0	12.0	...	...	...	...	...	8.51	1·50
Taku Plantation ...	...	...	...	...	...	...	...	...	...	...	...	13.2	1.8
Pasir Besar ...	...	...	...	...	...	...	...	...	...	...	...	16.7	2.5
Nenggiri ...	...	...	...	...	...	...	...	...	...	...	...	22.6	3.8
Channing Estate ...	...	...	...	...	...	...	...	...	...	...	...	10.50	3.17
Pasir Tinggi ...	...	...	...	...	...	...	...	...	...	...	...	9.23	1.92

*** Supplied by the courtesy of the Kelantan Planters' Association.**

John D. Gimlette,
Residency Surgeon,
Kelantan.

Residency Surgeon's Office.
Kota Bharu. *22th November, **1910**.*

PENANG.

Abstract of Meteorological Readings in the Prison Observatory, Penang, for the month of October, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Mean Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Mean Maximum.	Mean Minimum.	Mean Range.	Mean Wet Bulb.	Mean Vapour Tension.	Mean Dew Point.	Mean Humidity.			
	Ins.	°	°	°	°	°	°	°	°	%		Ins.	Ins.
Prison Observatory Penang ...	29·912	148.0	82·0	89·2	71·8	17·4	76·2	·773	72.4	70.6	S.E.	17·28	1.77

Prison Hospital.
Penang, 26th November, 1910.

E. Arthur Gimlette,
Medical Officer.

PERAK.

Abstract of Meteorological Readings in Perak for the month of October, 1910.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	Temperature.				Hygrometer.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Taiping	...	110	81.91	92	70	25	77 02	864	...	81	...	16.52	8.18
Kuala Kangsar	...	...	79 59	92	67	25	75.46	827	...	82	...	14.54	2.22
Batu Gajah	...	108	79 51	91	72	19	76.08	852	...	85	...	10 81	1.52
Gopeng	...	...	79.76	91	69	22	74.97	804	...	80	...	18.12	1.88
Ipoh	...	...	80 20	91	71	20	75.62	826	...	80	...	12.29	2 00
Kampar	...	...	80.18	93	68	25	75.92	841	...	82	...	14.10	2.60
Teluk Anson	...	...	80.67	91	69	22	76.80	872	...	85	...	9.12	1.50
Tapah	...	...	80.04	91	69	22	75.88	837	...	82	...	18.46	2 40
Parit Buntar	...	...	80.50	89	71	18	76 42	856	...	82	...	14.00	3 96
Bagan Serai	...	...	80.88	90	72	18	77.04	879	...	85	...	18.08	3.12
Selama	...	...	79.91	91	71	20	75.72	885	...	82	...	25.85	6.20

Office of Senior Medical Officer,

Ipoh, 17th, November 1910.

S. Lucy,

Senior Medical Officer, Perak.

SEREMBAN.

Table showing the Daily Results of the Reading of Meteorological Observation taken at the General Hospital, Seremban, for the month of October, 1910.

Date.	Temperature of Radiation. 9 H.	15 H.	Mean.	Maximum.	Minimum.	Range.	Temp. of Radiation. Sun.	Difference Sun & Shade.	Wind Direction. 9 H.	15 H.	Temp. of Evaporation. 9 H.	15 H.	Mean.	Computed Vapour Tension. 9 H.	15 H.	Mean.	Relative Humidity. 9 H.	15 H.	Mean.	Clouds 0 to 10. 9 H.	15 H.	21 H	Cloud and Weather Initials. 9 H.	15 H.	21 H.	Rain. Inches.
1	82	86	84,	88	72	16	153	65	N	S W	72.	72.8	72.4	,785	,808	,796	72	64	68	0	0	0	S	S	S	
2	80	87	83,5	88	71	17	148	60	W	S W	71.6	73.9	72.7	,775	,837	,806	75	65	70	0	0	0	S	S	S	
3	76	83	79,5	85	72	13	155	70	S W	S W	72.6	73.	72.8	,801	,810	,805	80	72	80,5	0	5	0	S	C	S	
4	82	87	84,5	88	70	18	155	67	W	S W	70.3	72.2	71.2	,742	,792	,767	68	61	64,5	0	0	0	S	S	S	
5	80	86	83.	87	73	14	145	52	W	S W	71.6	72.8	72.2	,775	,808	,791	75	64	69,5	0	0	0	S	S	S	
6	79	87	83.	89	73	16	157	68	W	S W	72.3	73.9	73.1	,793	,837	,815	80	65	72,5	0	0	6	S	S	C	
7	78	88	83.	90	72	18	152	62	W	S W	71.2	68.4	69.8	,765	,693	,729	79	52	65,5	0	0	0	S	S	S	
8	82	88	85,	90	72	18	156	66	W	S W	70.3	71.6	70.9	,742	,775	,758	68	58	63	0	0	0	S	S	S	
9	79	84	81,5	86	71	15	142	56	N W	N W	73.9	70.7	72.3	,839	,751	,795	85	64	74,5	0	0	0	S	S	S	
10	77	81	79,	83	72	11	149	66	W	N W	73.6	76.	74.8	,829	,807	,863	89	85	87	7	5	0	N	C	S	,15
11	81	77	79.	89	70	19	150	61	N	N W	70.9	73.6	72.2	,757	,829	,793	72	89	80,5	0	10	6	S	N	C	,22
12	79	78	78,5	87	71	16	150	63	N W	N W	72.3	74.6	73.4	,793	,857	,825	80	89	84,5	0	7	10	S	N	N	1,35
13	79	87	83.	88	71	17	154	66	N W	N W	72.3	67.3	69.8	,793	,669	,731	80	52	66	0	0	0	S	S	S	
14	82	84	83.	88	73	15	151	63	N	N W	70.3	70.7	70.5	,742	,751	,746	68	64	66	0	0	0	S	S	S	
15	77	84	80,5	85	72	13	145	60	N W	N W	70.2	70.7	70.4	,739	,751	,745	79	64	71,5	0	0	0	S	S	S	
16	82	85	83,5	86	72	14	148	62	N W	N W	72.	71.8	71.9	,785	,781	,783	72	64	68	0	0	0	S	S	S	1,74
17	77	85	81.	86	71	15	138	52	W	N W	73.6	73.4	73.5	,820	,826	,827	80	68	78,5	0	0	0	S	S	S	
18	76	84	80.	86	72	14	149	63	W	N W	74.3	74.	74.1	,848	,840	,844	94	72	83	10	5	0	N	C	S	3,06
19	80	77	78,5	85	74	11	144	59	N W	N W	73.3	71.9	72.6	,820	,783	,801	80	84	82	0	10	7	S	N	N	3,36
20	78	83	80,5	86	71	15	157	71	N W	N W	72.9	76.3	74.6	,810	,905	,857	84	80	82	6	0	4	C	S	C	,04
21	80	84	82.	85	72	13	153	68	N W	N W	73.3	74.	73.6	,820	,840	,830	80	72	76	5	0	9	C	S	N	,06
22	78	85	81,5	87	71	16	157	70	N W	N W	72.9	73.4	73.1	,810	,826	,818	84	68	76	0	0	8	S	S	N	,02
23	77	84	80,5	86	72	14	153	67	W	N W	71.9	70.7	71.3	,783	,751	,767	84	64	74	0	0	0	S	S	S	
24	77	82	79,5	85	72	13	155	70	N W	N W	70.2	73.6	71.9	,739	,830	,784	79	76	77,5	2	0	8	S	S	N	1,80
25	80	84	82.	86	72	14	158	72	N W	N W	69.9	75.7	72.8	,732	,888	,810	71	76	73,5	0	0	0	S	S	S	,30
26	78	83	80,5	88	73	15	152	64	N W	N W	71.2	73.	72.1	,765	,810	,787	70	72	75,5	7	0	0	N	S	S	,40
27	79	84	81,5	87	71	16	154	67	W	W	73.9	74.	73.9	,830	,840	,830	85	72	78,5	0	0	8	S	S	N	,15
28	77	87	82,	88	70	18	153	65	W	S W	71.9	72.2	72.	,783	,792	,787	84	61	72,5	0	0	0	S	S	S	
29	79	85	82,	86	73	13	154	68	W	N W	73.9	75.1	74.5	,839	,873	,856	85	72	78,5	0	0	0	S	S	S	,06
30	80	84	81,	87	73	14	150	63	N	N W	71.6	74.	72.8	,775	,840	,807	75	72	73,5	0	0	0	S	S	S	
31	81	78	79,5	86	72	14	153	67	W	N	74.3	74.6	74.4	,849	,857	,853	80	89	84,5	0	6	0	S	C	S	1,21
Mean.	79	83,8	81,4	86,8	71,8	15	151,2	64,2	W	N W	72,1	72,9	72,5	,790	,811	,800	79,4	70	74,6							14,82

Seremban,
11th November, 1910.

Highest Temperature 90
Lowest Temperature 70

Greatest Rainfall in 24 hours 3.36

A. J. M. CLOVELY,
Senior Medical Officer in Charge.

NUMBER OF TREES IN AN ACRE OF GROUND SET AT REGULAR DISTANCE APART IN SQUARE.

Distance Apart.						Number of Plants per acre.
1 foot	by	1 foot	...	...		43,560
2 feet	by	2 feet	...	...		10,890
3 "	"	3 "	...	...		4,840
4 "	"	4 "	...	...		2,722
5 "	"	5 "	...	...		1,742
6 "	"	6 "	...	...		1,210
7 "	"	7 "	...	...		888
8 "	"	8 "	...	...		680
9 "	"	9 "	...	...		537
10 "	"	10 "	...	...		435
11 "	"	11 "	...	...		360
12 "	"	12 "	...	...		302
13 "	"	13 "	...	...		257
14 "	"	14 "	...	...		222
15 "	"	15 "	...	...		193
16 "	"	16 "	...	...		170
17 "	"	17 "	...	...		150
18 "	"	18 "	...	...		134
19 "	"	19 "	...	...		120
20 "	"	20 "	...	...		108
25 "	"	25 "	...	...		69
30 "	"	30 "	...	...		48