Rubber Planting in Malaya

WITH

PRACTICAL HINTS ON PLANTING

By

C. MALCOLM CUMMING

ALSO

Statistics showing the Growth of the Industry in Malaya.

MALAY STATES INFORMATION AGENCY,
88, CANNON STREET, LONDON, E.C.

MR. H. N. RIDLEY IN BOTANIC GARDENS, SINGAPORE.
The Para Rubber Tree is one of the oldest in the Malay Peninsula.

RUBBER PLANTING IN MALAYA

RUBBER is the chief agricultural product of the Malay Peninsula. What sugar and coffee are to Java, tobacco to Sumatra, rice to Siam and Burma, and tea to Assam and Ceylon, rubber is to British Malaya, and although, doubtless, other forms of tropical cultivation will receive attention as time goes on, rubber is likely to retain its pre-eminence for many years to come. For experience has shown that there is practically no limit to the commercial uses for which rubber may be employed; and the steadily increasing demands of manufacturers for the cultivated product is the best indication that could be given that the better qualities supplied by the plantations are equal to the wild rubber which was formerly the main staple of the world's markets.

It is computed that no less a sum than £90,000,000 sterling is invested in rubber companies owning estates in various countries within the tropical zone, and of this amount fully half is invested in the Middle East. In British Malaya alone, the estimated amount raised by rubber companies, or financial concerns interested in the production of cultivated rubber, is placed at over £24,000,000, while the area actually planted in the Peninsula at the end of 1912—the last year for which reliable statistics are available—approximated to 622,000 acres. Last year (1913), British Malaya supplied about half of the world's consumption of cultivated rubber, and at all the Rubber Exhibitions held in Europe and America the principal awards have been won, in open competition, by Malayan companies, and from what we know of the conditions of the country, and the men engaged in the industry, it is a safe conjecture that Malaya is likely to retain the premier position she has taken in the industry.

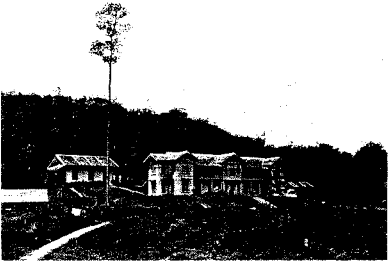
Malaya's Advantages. This position it owes to a variety of causes, natural and artificial. The great natural advantages of the Peninsula are its soil and climate; the rainfall is heavy and well distributed throughout the year, while the temperature is even more uniform. Here the planter has few dry spells and no cold ones, so that the growth of his trees and the flow of latex goes on uninterruptedly from January to December. This constant flow of latex is a matter of considerable importance in estate economy. It is helpful to the planter in the management of his labour force and the organisation of the work of the estate, apart altogether from the higher yields he is able to obtain from the trees.

The country is also fortunate in the manner in which it has been developed by successive British administrators. For years its financial resources have been carefully nursed, and the annual surpluses expended in opening up the country by means of a magnificent railway system and a system of roads unequalled in any tropical country. The result was that from the first enormous areas of suitable land for cultivation were available, already provided with easy communications; the Government came forward at once to provide adequate water supplies for populous districts, to assist the planters in obtaining an ample supply of Asiatic labour for the rapidly developing rubber territory, and the no less important work of medical supervision; while the Agricultural Department, of which the present director is Mr. L. Lewton-Brain, was strengthened and equipped in order to help the planters to combat possible natural enemies of the new industry and to carry out experiments with a view to its further development along scientific and commercial lines.

Historical. Before reverting in detail to the progress that has been made in rubber planting in Malaya, it will be interesting to learn something of the introduction of the Pará rubber tree (*Hevea brasiliensis*) into the Middle East and of the commercial history of rubber, as it has been set out by Mr. Henry N. Ridley, C.M.G., F.R.S., until recently Director of the Botanic Gardens, Singapore. A portrait of Mr. Ridley appears on the frontispiece of this pamphlet, the picture showing one of the oldest rubber trees in Malaya.

Rubber is one of the comparatively few natural products in universal use; that is to say, it is a substance which is used by almost everyone in civilisation to-day, as are wheat, cotton, tea and coffee.

Till the year 1898, practically the whole of the Caoutchouc of trade was derived from wild trees or vines of the tropical forests, chiefly of America and Africa, and was collected by natives for export to Europe. The idea of cultivating the plants for profit was ridiculed at first by almost everyone; yet in a dozen years it produced a sensational boom only equally by the boom caused by the invention of railways. As we have already stated,



OFFICES, DEPARTMENT OF AGRICULTURE, KUALA LUMPUR.

upwards of ninety million pounds are invested in its cultivation and marketing. Immense areas of dense forests have been converted into flourishing and profitable plantations, and a vast army of Europeans, Tamils, Malays, Chinese and Javanese is employed in clearing and planting the land, and in preparing the rubber for export. This sudden development has also brought about a remarkable progress in the science of tropical agriculture affecting the whole of the previous theories and practice of planting and estate management.

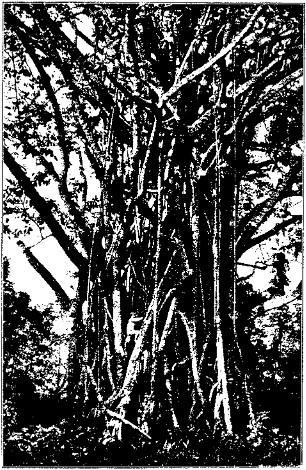
Rubber (or Caoutchouc) was well known to the South American Indians before the discovery of America by Columbus. The cities of the Gulf of Mexico used to pay large quantities of rubber to the Aztecs as tribute. This was, doubtless, the Panama Rubber *Castilloa*, but later these natives discovered the Pará Rubber. It was used chiefly for balls, and also for bottles, tubs and syringes.

In 1536, the Spanish invaders became acquainted with it, and the missionaries, following later, utilised it for the manufacture of shoes and waterproof cloth. La Condamine, the naturalist, gave the first account of the plant and its products in 1736, the former under the name of He'vé (whence Hevea), the latter as Cahuchu. The substance began to attract attention in Europe at the end of the eighteenth century, but little advance was made in the study till 1820. In 1770, Priestly pointed out its use in effacing pencil marks, and it was sold in stationers' shops for this purpose under the name of india-rubber, at the price of 7s. 6d. an inch cube.

Rubber in Manufacture.

Thomas Hancock, in 1820, took out his first patent for the use of Caoutchouc in articles of dress. The strips of rubber used were cut from the imported blocks, and this entailed a good deal of waste, so by dint of persevering experiments he invented a machine known later as the masticator, and also the washing machine, of which those in use to-day are modifications. In 1823, Charles Macintosh, of Glasgow, obtained a patent for rendering two fabrics waterproof by uniting them with a solution of rubber in coal-naphtha. These cloths were called "waterproof double textures," but soon afterwards came to be known as "Macintoshes," as they are till this day. However, it was found that extremes of heat and cold soon destroyed the articles made of rubber, but Charles Goodyear, after years of experiment, discovered, in 1839, that a combination of rubber with sulphur submitted to heat remained flexible and unaltered in high and low temperatures. In 1842, Hancock obtained from America, where Goodyear was working, some small scraps of this prepared rubber, and after many experiments discovered the art of combining the sulphur and rubber by means of masticators and rollers, and to this process he gave the name of "Vulcanization." This was the first really important discovery since the actual discovery by the Spaniards.

as it at last made rubber of practical value. From this time onward, the improvements in manufacture and the uses of the substance rapidly increased, and rubber took its place as one of the most important and valuable vegetable products of the world.



FICUS ELASTICA (GETAH RAMBONG): A NATIVE RUBBER TREE.

After Hancock's discovery of the art of vulcanization, rubber began to take an extremely important position in the market, and its use has increased to the present day to so large an extent that it would be impossible in these pages to give a list of the articles partly or wholly made of it. As the demand increased owing to the rapid development of the electrical and motoring industries, all tropical or warm regions were explored for fresh supplies, and upwards of 100 kinds of plants were found to give rubber of greater or less value. In South America were the *Heveas*, *Castilloa*, Ceara (*Manihot*), and Mangabeira (*Hancornia*); in Africa, *Landolphia* and *Funtumia*; in Asia, *Ficus elastica*, the *Willughbeia* and *Urceola* vines and many of less value.

For many years the whole rubber supply was derived from wild plants, the natives penetrating the forests and taking the rubber where they could find it. In most cases, the trees and vines were destroyed in collecting the rubber, and it was necessary for the rubber gatherers to push further and further into the forests in search of it. This, naturally, greatly increased the cost of the product, as the distance it had to be conveyed became longer, and in many cases the collection and transport to the ports was so expensive that no margin of profit was left in the trade. Some of the South American rubber has to be transported, by land or river, some 3,000 miles before reaching the port of shipment, and it takes as much as a year to reach the manufacturer in Europe. It became clear that a time was coming when all the accessible supplies would be exhausted, and the price of the commodity would eventually become almost prohibitive, at least for articles of ordinary use.

So far, the general history of rubber by Mr. Ridley. It is at this point that an element of romance enters into the history of rubber.

Beginnings of Cultivated Rubber.

The credit of initiating the cultivation of rubber in British territory belongs to the late Marquess of Salisbury, then Secretary of State for India. With the object of obtaining seeds or plants for the purpose of introducing the industry into India, Lord Salisbury communicated with Sir Joseph Hooker, the Director of Kew Gardens. Taking up the matter with enthusiasm, this sagacious official proceeded to make the arrangements to put the project into effect. The British Government authorised the despatch of an expedition to the Amazons to procure seeds and plants for cultivation in India, and in 1873 Mr. James Collins (afterwards Government Botanist at Singapore) went to Brazil and obtained some hundreds of seeds of Pará rubber. On his return, Mr. Collins published a description of the method of collecting and preparing the rubber as practised in the Amazons. From the seed sent by him about a dozen plants were raised at Kew. Six were sent to Calcutta, but they died, the climate, apparently, not suiting them.

Mr. Wickham's Commission.

At this stage, recourse was made to Mr. H. A. Wickham, a traveller and planter in Central America, who had already been in communication with Sir Joseph Hooker. He was planting near Santarem, on

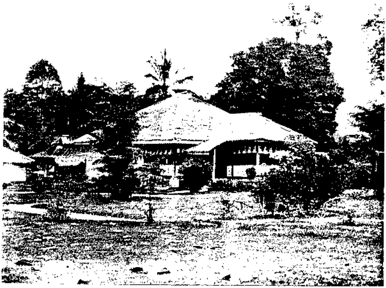
Burning Jungle for Rubber Estate.

the Tapajos plateau, when he received an open commission from the Kew authorities to obtain another consignment of seeds and bring them to England. The commission was a welcome one. But it was another thing to carry it out successfully. He was puzzling as to how the work was to be accomplished when he and the few European planters in the locality were surprised by news of the arrival on the great river of a fully-equipped ocean liner - the *Amazonas*, the first of the new Inman Line of steamships trading direct between Liverpool and the Alto-Amazon. By a lucky chance, just at the right season, this large steamer was left stranded by her supercargoes without freight for the return voyage. This was Mr. Wickham's opportunity. Boldly chartering the steamer on behalf of the Government of India, he arranged with her commander, Captain Murray, to meet him at the junction of the Tapajos and Amazon rivers. Starting for the forests in the highlands between the Tapajos and Madeira rivers, where the finest of the true Pará rubber trees were to be found, taking with him as many Tapüyo Indians as he could get together on short notice, he daily ranged the forest, and packed on their backs in Indian pannier baskets as heavy loads of seed as they could carry. With great care some 70,000 seeds were collected and packed in native baskets, brought to the steamer and slung fore and aft in the empty forehold. It was necessary to call at Pará, where, thanks to the good offices of the British Consul, Mr. Green, the steamer was allowed to proceed without delay. It had been feared that the Brazilian authorities would prohibit the export of the seeds. Favoured by fine weather, the captain was able to leave the hatchways open throughout the voyage, so that the seeds were preserved in the best condition. Wickham was landed at Havre, and from there hastened to Kew, saw Sir Joseph Hooker, and arranged for a night goods train to meet the *Amazonas* on arrival at the Liverpool docks, on June 14, 1876.

When it is mentioned that only 4 per cent. of the 70,000 seeds germinated when planted, it will be recognised how fortunate was the concatenation of circumstances which enabled Mr. Wickham to collect his seeds and transport them to the steamer, to find a vessel at his disposal, and to preserve the seeds in good condition between Brazil and Kew.

Introduction into Malaya.

From the Brazilian consignment of seeds about 2,800 plants were reared at Kew. It was now decided to utilise the Botanic Gardens at Peradeniya, in Ceylon, as a depot for the plants, spreading the cultivation of the tree over all the British Colonies where it was thought it would thrive. Of the plants reared at Kew a consignment consisting of 1,919 plants was sent to Ceylon in 38 Wardian cases, in charge of a gardener, and 90 per cent. reached Ceylon in excellent condition. Of these, 50 plants were despatched to the newly-founded Botanic Gardens at Singapore, but all perished on the voyage. At the same time, however, two cases of plants were sent to Sir Hugh Low, the British Resident in Perak, which had come under British protection a few years earlier. Seven plants arrived safely at Kuala Kangsar, and were planted by Sir Hugh in the garden of the Residency. These



A TYPICAL PLANTER'S BUNGALOW.

were the first Pará rubber trees planted in the Peninsula, and we find in his annual report for 1882 Sir Hugh Low's statement that "seeds and plants of *Hevea brasiliensis* have been distributed to Java and Singapore, to Ceylon and to India."

These trees and their descendants continued to thrive, and, together with trees which were subsequently reared successfully at Singapore, became the nucleus of the rubber industry, as we know it to-day, in the Malay Peninsula and the Middle East.

Growth at Kuala Kangsar.

In 1898, in an article on "Rubber Cultivation in Perak," published in the Perak Museum Notes, Vol. II., Part 2, we find Mr. Leonard Wray writing as follows:—

"In 1887 some seeds were obtained from Kuala Kangsar trees and planted in the Museum grounds, Taiping. The soil is very bad, the land having all been mined over, but still the trees have grown well and have attained, in the ten years which have elapsed since they were planted, a considerable size.

"Finding that they grew so well I ventured, in 1891, to write to Sir F. A. Swettenham, the then British Resident of Perak, suggesting that they should be planted on waste lands and, as a result, Mr. O. Marks, then Superintendent of Government Plantations (now Acting Resident of Perak), put out a number of trees at Kuala Kangsar, which are now about six years old, and are doing very well. It is much to be regretted that more were not planted at that time, as by now they would be valuable, not only as rubber, but as seed producers.

"The tree has also been planted at Parit Buntar, where it grows well. It is in the garden of the District Magistrate, and close to the river. The land is occasionally flooded by the river, and in the ordinary way at high tide the river is only a foot or two below the level of the surface of the ground. The river is quite salt enough for the nipah palm to grow well on its banks.

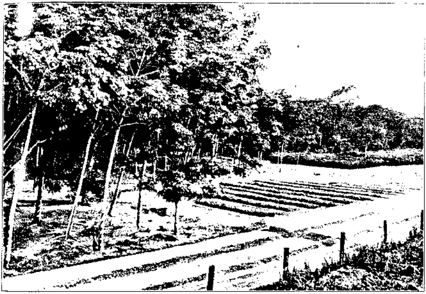
"It has been planted at Setiawan, also on low land near the sea; at Tapah, Batu Gajah, in Kinta, and other places in the State, and in all it has grown well.

"It may, therefore, be stated that it will thrive in any locality, from the bakau swamps to the foot-hills, and on any soil from rich alluvium to old mine heaps.

"Hitherto the trees have been planted singly, and, as might be expected, they have grown with short trunks and bushy tops. To be a success, that is to yield large quantities of rubber, the tree must be planted so that it will run up and form a tall, straight, branchless trunk.

"There is little to guide one on the subject, but from 15 to 20 feet apart would appear to be about the correct spacing. At 20 feet it might be necessary to plant something in between to keep them from early branching, but this would not be necessary at 15 feet. In Larut, at an estate at Kampong Dew, they are being planted at 10 by 10 feet, that is 434 per acre. It is very close, but it is the intention, I am informed by Mr. Waddell Boyd, the Manager, to thin them out later on to 20 by 20 feet, or 108 per acre, tapping the intermediate trees, that is those which are ultimately to be thinned out, as early as possible and as severely as they will stand, while the others are allowed to grow to a large size before tapping.

"The greatest difficulty in planting Pará is the very short time which the seed remains good after it falls from the trees.



RUBBER NURSERY AND 8 YEAR OLD PARA RUBBER TREES.

The time which elapses before they are planted should not under any circumstances be longer than a week, and if they can be planted before this so much the better. Sown at once nearly all germinate, but each day which intervenes increases the number of failures, till at the expiration of ten days or so none grow.

"The trees are very prolific seed bearers. Those in the Museum grounds have this year yielded nearly 14,000 seeds, or, to speak more correctly, that number have been collected. Most of the trees are planted by the side of a large ditch, and all the seed which fall into it are at once carried away as they are very light and float on the water. The seeds have been distributed 3,000 given to the Jebong Estate and 11,000 to the Sam Sing Estate."

In the same issue of the Museum Notes, Mr. R. Derry mentions that applications for 70,000 seeds had been received in 1898 (of which 25,000 had been supplied), and an application filed for 100,000 seeds for 1899.

Trees at Singapore.

In June, 1877, a second consignment of 22 plants was forwarded from Ceylon to Singapore, and were successfully planted by the Curator, Mr. Murton. Some of the original trees are still standing in the Singapore Gardens. One of these trees, planted in a wood, shot up to a height of 100 feet and had a girth of 72 inches at three feet from the ground in fifteen years; but the celebrated tree shown in the frontispiece had a height, two years ago, of 84 feet, and measured 124 inches in girth at three feet from the ground, and was adding an inch-and-a-half a year to its girth. It is believed to be the biggest tree in girth yet recorded. The trees in Singapore first fruited in 1881, and seed was sent to Borneo and elsewhere; and a large number, over a thousand, were planted in the form of a forest in the Singapore Economic Gardens. When Mr. H. N. Ridley became Director of the Singapore Botanic Gardens in 1888, he found that the rubber trees had been allowed, from lack of funds, to revert to secondary jungle.

From the first, Mr. Ridley seems to have appreciated the possibilities of the plantation rubber industry. He commenced to tap the Singapore trees almost immediately, and rubber made from the latex was exhibited at the Singapore Agri-Horticultural Show in 1890 and subsequent years. (It should be mentioned in parenthesis that Dr. Trimen, the Director of the Botanic Garden at Peradeniya, was the first to commence tapping the Ceylon trees in 1884 and to record results.)

Early Treatment.

At first, the method of collecting and treating the latex was most primitive. The rubber was allowed to coagulate naturally in the cigarette tins used for collecting the latex, and small blocks of rubber were made. Later, common enamelled plates were used for coagulation, which naturally gave the rubber a "biscuit" form. The first sheet was made in a photographer's large developing

General View, Young Rubber Estate.

tray. In [illegible] samples were sent to Mr. Silver, of the Silverton Works, in England, who pronounced it to be of very good quality; and in 1899 some sheet rubber prepared by Mr. Derry from the trees planted in Perak and their descendants was sold in London at 3s. 10d. per lb. This was the first cultivated Pará rubber sold in the markets of Europe. As far back as 1900, records show that of the total of 53,890 tons of world's supply, plantation rubber accounted for four tons only. In 1913, the world's total supply amounted to 108,440 tons, and of this 47,200 tons was plantation rubber. The world's output for 1914 is estimated at 107,000 tons, and of this it is computed that the plantations will supply 65,000 tons of cultivated rubber against 42,000 tons of wild rubber from Brazil and elsewhere. These statistics convey some idea of the rapid growth of this new industry, but it is not generally known that of the total of 1,225,000 acres of plantations under rubber at the end of 1913, British Malaya had more than all the other countries put together and sent out more than half of the 47,200 tons of rubber marketed, the actual amount from the Federated Malay States alone being 23,463 tons.

The First Planters.

It was very difficult, Mr. Ridley wrote, a few years ago, to induce planters to look with favour on what was evidently the coming cultivation. The discovery of extensive areas producing *Landolphias* and *Funtumias* in Africa kept the price of rubber rather low, but it was at the same time clear that this supply, derived mainly from *Landolphias* which were destroyed in taking the rubber, could not last more than a few years, and that then, the supply from the Amazons also showing signs of decrease, wild rubber would be insufficient to meet the trade requirements, while, owing to the immense increase in rubber-tyred vehicles, the demand was becoming greater and greater. The planters of the Malay Peninsula were then engaged in planting coffee, and it seemed impossible to interest any of them in rubber. It was not till 1895 that any rubber was planted as an estate culture on any large scale. The fall in the price of coffee and the rise in the price of rubber, mainly due in the latter case to the development of the motor car industry, forced the cultivation on the attention of planters. In that year, Mr. R. C. M. Kindersley and Mr. D. C. P. Kindersley were the first planters in the Federated Malay States to take up the industry in a practical way, and Mr. Tan Chay Yan, a Chinese planter in Malacca, was the first to plant rubber systematically in the Colony of the Straits Settlements. Another pioneer planter was Mr. T. Heslop Hill, the first owner of Kamuning Estate, near Kuala Kangsar, in Perak, and in 1898, Mr. W. W. Bailey also entered upon the cultivation of the rubber tree. Their example was followed by almost every planter in the Peninsula, and very soon there followed a boom in cultivation such as has probably never previously occurred.

The demand for seed, indeed, was at first greatly in excess of the supply, and nearly all the seed from the rubber forest

TAMIL COOLIES WEEDING YOUNG RUBBER

in the Economic Gardens at Singapore went to the formation of the estates in the Colony and the Federated Malay States. The old trees in Perak, planted by Sir Hugh Low, also supplied the rapidly developing estates throughout the Peninsula. But the most extensive areas were first opened in the neighbourhood of Port Swettenham, in the State of Selangor. Between this port and the Capital (Kuala Lumpur) there were considerable number of coffee estates. The coffee speedily disappeared, and was replaced by Pará rubber. The forests were swept away and many districts all over the Peninsula, which had hardly ever been visited by the white man, now became flourishing rubber plantations. Roads and railways increased, new villages sprung up, labourers (Tamil, Javanese, and Chinese) poured into the country, Europeans hastened out to act as managers and assistants, trade and wealth increased.

Federated Malay States. In 1905, when the Federal Department of Agriculture was started in the Federated Malay States, it was estimated that the area under rubber at the end of the year was 40,000 acres, of which 16,000 acres had been planted during the year. From that time on the increase in acreage was much more rapid, as is shown by the following table, which refers to the Federated Malay States only (Perak, Selangor, Negri Sembilan and Pahang):—

	Acres.
1905	40,000
1906	85,579
1907	126,235
1908	168,048
1909	196,953
1910	246,774
1911	352,974
1912	399,197

It is not expected that 1913 will show the same large increase as those for the two preceding years.

Statistics for the Straits Settlements and the non-Federated Malay States (Johore, Kelantan, Kedah and Trengganu) show a similar growth, and at the end of 1912 the total area planted in Malaya on over 1,000 estates was recorded as 621,621 acres.

Following the planted areas, the following table showing the growth of the exports of rubber from the Federated Malay States, taken from statistics supplied by the Commissioner of Trade and Customs, will be of interest:—

	Tons.	Value.
1907	885.84	£452,900
1908	1,413.21	531,765
1909	2,717.77	1,686,531
1910	5,452.02	4,487,716
1911	8,792.55	4,656,711
1912	15,505.54	7,364,506
1913	23,465.84	6,610,795

Other tables of statistics dealing with the industry throughout the whole of British Malaya will be found at the end of this pamphlet.

Planting Methods.

At this point, it may not be out of place to quote from an article written by Mr. L. Lewton-Brain (to whom we are indebted for much of the material upon which this pamphlet is based and for most of the excellent photographs with which it is illustrated) some comments on the methods employed on rubber estates at the present time and, so far as can be judged, modern tendencies :—

"Chiefly for the reason that the pre-existing coffee estates were situated there, most of the early planting of rubber was done on the flat, alluvial coast plain of Malaya and particularly in Selangor. Later it was found that the undulating land lying between the coast plain and the central mountain range of the Peninsula was equally, if not better, suited to the growth of *Hevea*. At present, there are probably about equal areas of the two classes of land planted. Each has its advantages : the flat land requires heavier expenditure on drainage, etc., to start with, but when planted is probably more easily managed than the hilly. On the other hand, the root development on undulating land is better and healthier, as a rule, than on the flat, and for this reason, if no other, my own preference for a rubber plantation would be for gently undulating country.

"The greatest change that has taken place is in the views held by planters with regard to planting distances. In the report of the Director of Agriculture for 1905, the late Mr. J. B. Carruthers states that most of the older plantings gave 200 trees or more to the acre, while the average was probably about 175. At the end of 1910, when I first came to the country, 100 trees to the acre was thought quite wide planting, and, though a good many planters preferred this spacing theoretically, most of the planting was done at 15 by 15 feet, 24 by 12 feet, 25 by 12½ feet and so on, the theory being that this would allow for thinning out later to about 100 trees to the acre. At the present time, it is difficult to find any planter recommending any original planting of more than 100 trees to the acre ; the debated point now is whether about 100 should be planted originally, to be thinned out about the eighth year, or whether only 50 or 60 trees should be planted to start with. A good many of our best planters favour the latter system, and their views will probably gain ground with a continued low price of rubber. Estates that have thinned out have found their yields per acre to increase within a very short time.

"Clearing is done in much the same manner as formerly, no attempt being made to remove the heavy timber left after the burn, except where this can be sold as timber or firewood. The large stumps are left to decay in the ground, while the logs are piled in heaps between the rows of rubber trees.

"After the rubber stumps are planted, on nearly every estate in Malaya the land is kept absolutely clean-weeded, a procedure which has been justified in practice. I am convinced that proper cover crops, properly looked after, would be preferable, both in saving loss of good surface soil by wash on hilly estates and by improving soil texture. The danger of their use is, that unless they are most carefully looked after, covers are apt to hide the growth of weeds, particularly "lalang" (*Imperata arundinacea*) until these have firmly established themselves, and many estates have suffered heavy financial losses in this way. The growth of weeds is just as luxuriant and rapid as the growth of rubber in this country, and it is astonishing what the result of a few weeks' neglect may be.

Tapping. Tapping methods by means of pricking have never found favour among Malayan planters, and excision of bark is the universal practice. Patent tapping knives also have never been greatly in favour, and such simple tools as the farrier's knife (or the 'jebong') and the straight or bent gouge are almost the only ones used. The manner in which the trees are tapped has immensely improved even in the last few years. It was not uncommon in 1910-1911 to see five or six cuts a foot apart, on one quarter of the tree tapped continuously, the idea being that the more cuts one made the greater amount of rubber one obtained, at any rate for the time being. Both experience and experiments have shown, however, that this is a mistake, and that not only was the coolies' labour being wasted, and the tree being exhausted, but that actually a smaller yield of rubber was being obtained almost from the tapping than would have been given by a more reasonable removal of bark. The correct number of cuts and their best distance apart must vary according to the age of the trees and their condition, soil, etc. The maximum, probably, is three cuts over one-fourth the circumference or some equivalent system. The favourite system to start with at present is two cuts on adjacent quarters, forming a "V," at about 18 inches from the ground; after the first year, some planters prefer to go on to two cuts on one quarter of the tree, while others continue with the "V" system. The experiments of the Department of

CLEARING FOR RUBBER ESTATE

Agriculture, so far as they go, favour the latter system, but the full results of any system cannot be seen until it has been carried out for at least eight years.

"The quality of the tapping has also shown great improvement in recent years, and it is rare now to find trees badly wounded, while at the same time it is realised that the cuts must be sufficiently deep to extract the greater part of the latex.

"The usual method of employing a tapper is to give him a day's pay for tapping a fixed number of trees, collecting the bark shavings and scrap rubber and cleaning his cups, spouts and latex buckets; the 'task' varies usually from 300 to 400 trees per day, depending upon the age of the trees, the number of cuts, and the nature of the land. A few estates, especially those employing Chinese, are trying to contract work paying a fixed rate per lb. for rubber collected by each coolie, or some modification of this idea. The difficulty of this method is to ensure the reduction in the cost of production which comes automatically with the increasing age and yield of the trees on the other system.

"The most debated question in Malaya with regard to tapping at the present moment is as to whether tapping every day or on alternate days is the more economical system. It is a question that each estate must settle for itself, so many varying factors have to be taken into consideration. Two points seem settled; every-day tapping gives the greater total yield of rubber for the same amount of bark removed; alternate-day tapping gives the greater yield per tapping. Which system pays best will therefore depend upon the quantity of labour available and its cost, the yielding capacity of the trees, and, finally, upon the price of the rubber. One point requires attention from all those in control of estates; by adopting the alternate day system it is perfectly easy for any manager to reduce his *cost of production per lb.* of rubber. In doing this, however, he may be losing money for his estate by reducing the *profit per acre of rubber* producing at the current market value. It is the latter figure, and it should be arrived at by careful experiment, not by theorising, that ought to be worked out before any change to alternate-day tapping is authorised.

"The most unsatisfactory part of the plantation rubber industry to-day is the manufacture. For this planters are not to blame; when they found that their produce sold entirely according to its appearance, and when one day a premium was paid for thick 'gristly' crepe, a week or so later for smoked sheet, later again for fine pale crepe, it is not to be wondered at that they concentrated all their energies on appearances and could have little regard for real values.

"The result is that on many estates, now, varying amounts of water are added to the latex in the field by way of the cuts or latex cups; when this fluid of varying consistency is brought to the coagulating room, an amount of acid which is guessed at is added, with perhaps some Sodium bisulphite to preserve a uniform light colour, and the coagulum is subjected to a varying amount of machining, again till a uniform appearance is secured.

"On several of the better organised estates, and their number is increasing monthly, efforts are being made to do away with this state of affairs and to secure real uniformity in their product. No water is added to the latex in the field, a point which can be tested by specific gravity methods or by coagulating small

RUBBER ESTATE: COOLIES COLLECTING LATEX.

samples of latex as brought in. If it is wished to add water, a definite dilution is made in the factory, and therefore a definite and regular amount of acid can be added and a uniform coagulum obtained. Whenever possible coagulation in bulk is advised. When sheet is made, a uniform amount of machining is also secured by passing the coagulum a definite (and minimum) number of times through first smooth rollers and finally once through corrugated rollers to give a diamond (or other) marking,

Preparation for Shipment.

"The two favourite modes of preparing 'first latex' plantation rubber at present are as fine pale crepe and smoked ribbed sheet. Smoked sheet is undoubtedly the stronger and better rubber for most purposes, and it can be more easily made in a uniform manner than crepe; for some time past, also, it has commanded a higher price in the markets, and its manufacture has been steadily increasing proportionately to crepe. The lower grades of cup washings scrap, earth scrap, and bark scrap are usually creped.

"A number of inventions are continually being brought forward which claim to be improvements over the present methods of manufacture. Most of them endeavour to imitate to a greater or less extent the methods of the Brazilian collector. So far, none of them has been widely adopted on estates, possibly because most of them are not really adapted to be used on a large estate scale.

"As I understand it, what the manufacturer complains of in plantation rubber is not so much that it is of inferior quality, but that its quality varies, even if he buys the product of the same estate. As I have explained above, the best estates are now endeavouring to make their own product uniform, but even so the products from different estates will vary, and until this is done away with plantation rubber cannot compete on even terms with 'fine hard pará.'

"The factors which may (or may not) influence the quality of plantation rubber are very numerous: the quality of the soil, age of the trees, time of tapping, dilution of latex, quantity of acid, nature of acid (acetic is almost universal but formic is used on a few estates), length of time between coagulation and machining, amount of machining, subsequent drying or smoking or curing, temperature of smoke room, are only some of the more obvious. To test which of these are most influential and how to overcome their influence, the Federated Malay States Government has recently installed an Experimental Vulcanising and Testing Station in Kuala Lumpur, which will have an adequate staff of chemists. The work of the station will, at first at any rate, be purely experimental, and will be directed at the problem of how to produce a uniform plantation rubber of high standard. It is hoped that a few years' steady work will enable us to approach the problem with knowledge instead of guess-work, and it will then remain to persuade planters generally to adopt rational methods.

"It is on these lines, in my opinion, that the most important progress will be made in the rubber industry of Malaya during the next few years."

A Rubber Estate Factory.

Use of Machinery.

As the cultivation and output of rubber increased machinery came into use, and the first one here was the Rubber Washing Machine made by the Federated Engineering Company of Kuala Lumpur in [illegible]. Block rubber was made by machinery at Lanadron Estate, and was much approved of. Another advance was the invention of the creping machine made by the above-mentioned company. This produced a beautiful lace-like sheet, which is easily made and has always been an attractive form.

Besides these forms of rubber, there are others of what may be called waste bits. The latex which hardens in the cuts after tapping, when the flow has ceased, is extracted, usually by children and women on the estate, rolled into balls or passed through a creping machine, and is known as scrap. It is an excellent rubber and fetches a good price.

Even the bits of bark cut off in tapping, which carry small pieces of rubber on them, are put through a machine and crushed, the bits of bark washed away, and the bark scrap, as it is called, made into a crepe, which has a considerable value. On a good estate, not a drop of rubber latex need be wasted: all can be converted into a useful and saleable product.

Smoking the rubber when in biscuit or sheet was very early practised, but as this darkened the colour of the rubber it was dropped for a time, for the most highly admired rubber then was the clear amber sheet. It was found, however, that for most practical purposes smoked rubber was superior, and the demand for this fine dark-coloured rubber caused a return to the smoking process, and many estates erected a smoking house where the sheets hung in a dense atmosphere of smoke during the drying process. The rubber collectors of the Amazons smoke the latex itself, pouring it on a bat of wood and turning it round and round in smoke till it sets, and then pouring more on forming a large spindle or ball of thoroughly smoked rubber in layers. For some years, attempts have been made to imitate this process in an improved way, as well as a more economical way, than by hand, and several methods of smoking the latex by machinery are now under trial. Anyone looking at the samples of jungle rubbers and the beautiful specimens of sheet and crepe from the plantations of the Malay Peninsula cannot but be struck by the immense improvement that has been effected by the careful preparation of Malayan rubber.

Its regular and equal shape, its complete purity, and its homogeneous character give it an advantage over the roughly collected and often dirty jungle rubber which was formerly so extensively imported for the factory.

By-Products of Rubber. So far, nothing has been said of the development of the manufacture of by-products from the Pará rubber tree. The following excellent abstract of an interesting article on the utilisation of Pará rubber seed in the "Bulletin of the Imperial Institute," was published recently by Mr. B. J. Eaton in "The Agricultural Bulletin of the Federated Malay States":—

Samples of the seed were distributed to various firms for technical trial, and samples of the cake, after expressing the oil,

RUBBER AND COFFEE ROBUSTA, KUALA SELANGOR.

were sent to the South Eastern Agricultural College, Wye, for feeding trials. The results of these trials may be summarised as follows:—

Para Rubber Seed Oil. *Paint and Varnish Manufacture.*—One of the principal uses to which the oil may be put is the manufacture of paints and varnishes, since it belongs to the class of oils known as drying oils and closely resembles linseed oil, for which it forms a good substitute for the above purposes.

The opinions expressed by manufacturers to whom the samples were sent for trial indicate that, unless the oil could be obtained at a fairly reasonable price compared with linseed oil, it would not be able to compete with the latter.

Linoleum Manufacture.—Several trials were made with the oil for this purpose, and the general opinion was that it was not very suitable for linoleum manufacture and could not be used as a substitute for linseed oil, unless the price was very low.

Soap Manufacture.—One firm of oil crushers were of opinion that it would be equal in value to linseed or cotton seed oil for the manufacture of soft soap.

Conclusions.—The opinion is expressed that there would be no difficulty in finding a suitable market for the oil, not only as a substitute for linseed oil, when the latter was high in price, but also for purposes for which linseed oil was unsuitable.

The problem of utilising the oil is concerned principally with the cost and manufacture of the oil and the quantities available.

In view of the new process recently patented for the "hardening" of liquid oils by hydrogenation, a new market may be found for oils of this type, *e.g.*, in candle making or even for edible purposes.

Para Rubber Seed Cake.

Feeding Trials.—The first consignment of cake from Rangoon, which was used in the feeding trials, was abnormal, since it contained about 18 per cent. of fat, whereas not more than 6 to 9 per cent. would be normally present in the cake from well-expressed seeds.

In the second series of experiments a cake of more normal composition was used.

In the first trials, which were on a small scale only, the cake was fed to cows; most of them ate the cake readily after it was moistened with water. (N.B.—It is dry and powdery in the natural state.) No abnormal results were obtained.

Similar results were obtained in the case of sheep, which did not like the cake when fed alone, but ate it when mixed with other foods.

In the second series, one-and-a-half tons of cake, made from kernels obtained from Ceylon, were used. The cake used is stated to resemble a normal market product, and to be comparable with linseed cake used in England.

The following results were obtained from these feeding trials :

Sheep.—A group of animals accustomed to trough feeding were used, and the smallest admixture of Pará seed cake in other concentrated food was detected by them and left uneaten, even when the total food supplied over a fortnight was reduced below the ration necessary for maintenance.

All attempts at feeding sheep with the cake failed.

Young Cattle.—These ate the cake readily, but when the quantity was increased to 8 lbs. per head daily, scouring occurred, and even 5 lbs. per day with 56 lbs. of mangold produced slight laxative effects. Further experiments confirmed these results, and the cake should not, therefore, be fed in larger quantities than this latter amount.

The beef from two of these cattle, subsequently slaughtered, after having been fed with Pará seed cake at the rate of 6 lbs. per day for ten weeks, was very favourably reported upon.

Dairy Cows.—Six barren cows were taken for this trial and were fed with increasing quantities of Pará rubber seed cake up to 14 lbs. at the end of a week, this being the only concentrated food given. No change was observed in the excreta after continuing the trial for six days. The yield of milk rose, as the food was richer than that normally fed, but the percentage of milk fat was unchanged. Butter made from the milk was normal. The conclusion is drawn that dairy cows may be safely fed with Pará seed cake.

Full-Grown Fattening Cattle.—The dairy cows used in the previous trial were fattened while in milk, the amount of Pará seed cake fed being reduced from 14 lbs. to 8 lbs., with the addition of 4 lbs. of other cake.

The cows remained healthy and gave a high milk yield, till they were intentionally dried off a month before sale for slaughter. The increase per day in live weight over a period of nine weeks was 1.7 lbs. per cow.

From these experiments, the cake appears to be an excellent fattening food for cows, and its value as a cattle food has been proved.

The following is the chemical composition of the cake used in the two trials in comparison with linseed cake :—

	Para seed cake (abnormal sample).	Para seed cake (normal sample)	Linseed cake.
Moisture	6.91	8.75	11.6
Crude proteins	29.93	30.19	29.5
Consisting of—			
True proteins..	27.03	24.85	—
Other nitrogenous substances	2.90	5.34	—
Fat	17.68	8.71	9.50
Carbohydrates (Starch, etc.)	35.97	41.71	35.54
Fibre	4.82	5.01	9.10
Ash	4.69	5.60	5.20
Nutrient ratio..	—	1.20	1.20
Food units	—	139.	133.

The close agreement between the normal cake and linseed cake is very marked. A small quantity of cyanogenetic glucoside was present, yielding approximately 0.02 per cent. prussic acid —a negligible quantity.

Para Rubber Seed Kernels

A sample of kernels from Ceylon yielded 45 per cent. of oil, on extraction with solvents. A sample of the extracted oil was found to give a high "acid value," and this was seen to be the cause of the poor non-spreading qualities of paint prepared from it. A high "acid value" is given by oil from damaged or old kernels, which indicates the necessity of using only sound seeds. If seeds are decorticated in this country, as they should be for export, they should be well sun dried, to prevent moulds, which are likely to break up the fat into free acids.

Practical Hints on Planting

By C. Malcolm Cumming, Director of Linggi Plantations, Ltd.

THE object of these notes is to give parents, and young men with moderate capital, some idea of the commercial possibilities of rubber planting in Malaya. Practical experience on an estate is the only step to learning the actual business of a planter, and one might just as well try and write a book on farming in the belief that the reader, having thoroughly mastered its contents, would then be a practical farmer, as write notes on rubber planting in the belief that the reader would become a practical planter. As a guide to the advisability of taking up planting, and the investment of capital in the enterprise, these notes may be of service, but in no way is this pamphlet intended to be a comprehensive treatise on the planting of rubber. Excellent bulletins are issued by the Agricultural Department of the Federated Malay States dealing scientifically with the growth of the Para Rubber Tree (*Hevea braziliensis*), and the intending planter could, with advantage, study them in conjunction with these notes.

Acquisition of Land.

Land can be acquired readily from the Government of the Federated Malay States by persons who have the means and the intention of planting it with Para Rubber. In the three Western States of Perak, Selangor and Negri Sembilan, there are still large tracts of land, both accessible and suitable, for the cultivation of rubber. The procedure to be followed for obtaining land, after a selection has been made, is to apply on the prescribed form at the Land Office of the particular district in which the land is situated, depositing at the same time the necessary survey fees, which on an area of 640 acres amount to \$560 or £66. If the application is approved the applicant can enter into occupation before survey and on payment of the premium, which is \$3 (7s.) per acre for first-class land having a road frontage, or \$2 (4s. 8d.) for second-class land having no road frontage, and the current year's rent, which is $1 or 2s. 4d. per acre. After six years' occupation of the land, the rent is increased to $4 (9s. 4d.) per acre per annum.

Local Conditions. Before dealing in detail with the planting of land after acquisition, it is advisable to insert a few words of warning to those for whom this pamphlet is intended. To the healthy young man with capital, the life of a planter is an ideal one, the work entailing no great amount of physical hardship or mental strain. The faculty of organisation and supervision is more likely to command success in the business of a planter than brilliant brain power. The young man contemplating planting, after a perusal of these notes will probably remark on the simplicity of everything in connection with the work, from acquisition of the land to the preparation of the rubber, but therein he will be greatly mistaken. Sound experience gained on an estate before the investment of capital, and that experience put into practice afterwards, when investing the capital, will make all the difference between a profitable and an unprofitable investment. There is scarcely an operation in connection with this industry in which experience will not direct the way by which economies may be effected, time saved, and better results obtained. Malay is the language of the country, but the labourers are mostly from Southern India, so therefore it is essential to have a fair colloquial knowledge of Tamil in addition to Malay. A year spent on an estate, where the planting of new areas and the upkeep and harvesting of planted fields are both being carried on, would probably be sufficient training for the young man of ordinary intelligence to enable him to start opening an estate—provided he had obtained the services of a more experienced planter to advise and visit him, and had learnt colloquial Malay and Tamil.

The question will be asked as to what amount should be provided for a young unmarried man for his expenses on his own estate, and the reply to this important question is that on $200 per mensem, or £280 per annum, a young planter should be able to live comfortably, but quietly, and he should be able to take occasional recreation in the township nearest his estate. In the estimates this expenditure is provided for under the heading of Manager's Salary.

Tapping Rubber Trees, Government Plantation, Kuala Lumpur.

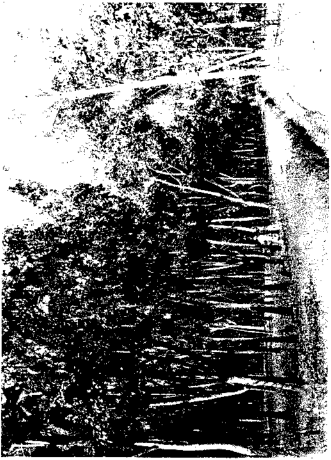
Felling and Burning. The first operation, after obtaining possession of the land, is to fell the jungle, and this is generally done on contract, the price varying much in different districts. Jungle badly felled, and the branches not properly lopped and piled, will probably result in a bad burn, and much expense will be incurred in clearing up.

As soon as the jungle is burnt it is essential to take the weeding in hand at once, as, if the weeds are kept under from the very start, an immense saving will be effected. There have been many controversies between believers in clean weeding and those who believe in allowing a certain amount of grass to grow, but it may be accepted that the most flourishing estates are those that have been clean weeded from their inception, and that grass should not be allowed unless some reason can be adduced for its presence, and that reason will be difficult to find, except it be the lack of funds. Once allow grass to get the upper hand, then lalang, the worst enemy of the planter, will make its appearance; and its eradication is most costly.

Lining and Holing. Authorities still have different ideas as to the number of trees that should be planted to the acre, but the general policy followed is that of planting 20 ft. by 20 ft., which gives 108 trees to the acre. The alignment of the holes for planting the trees must be laid out carefully, and the holes should be dug two feet square and eighteen inches deep. When filling in the holes, it is as well not to replace the earth that has been dug out, but to scrape in all the surrounding surface soil, which will be rich in humus, thus giving the young plant a good start.

Planting. The operation of planting should only be undertaken in wet weather, and the months of November and December and March and April are generally considered the most suitable, but in the Malay States, which have no really fixed seasons, it is very often the case that the months mentioned are particularly dry. Great care must be taken to see that the young plants are properly planted, and that the soil is well pressed down round them. It is also advisable to shade the plants with palm leaves.

Buildings. It is probably quite possible to acquire by purchase a small and suitable area of adjacent land, from which the jungle has been cleared, for the erection of temporary coolie lines, office, store, etc., and these should be ready just before the jungle is burnt. The bungalow for the manager is a matter that can wait until the estate is opened up, as a selection of a suitable site will be far easier after the jungle is felled and burnt off. And the same course should be followed in the case of permanent coolie lines and other buildings.



General View, Rubber Estate

There is nothing more important than the supply of pure drinking water, and money spent on good wells is money well spent, as it is on uncontaminated drinking water that the labour force will largely depend for good health.

The selection of the site for the permanent buildings is one of importance, and a large enough space should be allowed for the expansion of buildings in later years.

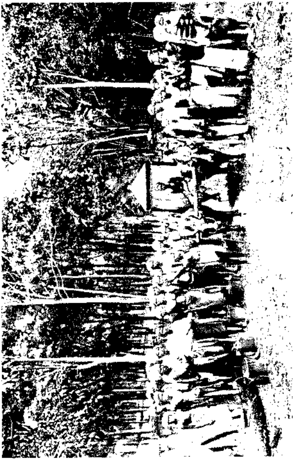
Nursery. One of the first things to be done after the jungle is felled and burnt is the preparation of a nursery. Selected seeds from good producers should be purchased from a well-known estate, and from trees not less than ten years old. The young plants from the nursery will be used for the second clearing of 250 acres, and for supplies for the first 250 acres. To avoid the delay in waiting for mature plants from the nursery for the first 250 acres, plants should be obtained from some other estate in the vicinity. The plant from the nursery is generally a long weedy stalk, and it is usual to cut it down to one foot or eighteen inches from the root before being planted out.

Labour. In the early days of the estate, the labour employed will be largely obtained through a contractor. Gradually a labour force will have to be built up, and as the estate progresses the planter will see for himself the class of labour which is most suitable to its requirements. Tamil labour is the cheapest, the most amenable to European supervision, and can, if the necessary arrangements have been made, be obtained through the Immigration Department.

Chinese and Javanese labour may also be employed, but the rate of pay is much higher, and it is doubtful whether it is proportionately of extra value. Local Indian labour can be obtained, but—and it is a big "but," too—the estate that depends on locally recruited Tamil labour is looked upon with disfavour by adjacent estates. The recruiting of immigrant labour is made very simple and inexpensive, as each estate pays an assessment in proportion to the labour employed, and the amount so collected is placed to a fund to aid Tamil immigration, coolies being landed on the estates free of all debts. The control of the fund is in the hands of a committee, on which the planters have a strong representation, so that they obtain full consideration and attention to their requirements. The few cents extra that may be paid to attract local labour may seem, in the first instance, money well spent, but the planter who establishes a labour force on these lines will be probably the first to grumble when a neighbour offers a higher rate of pay with a similar purpose.

Roads and Drains.

If a happy selection of up-country land is made, not too steep, and not too flat, but gently undulating, the amount of money to be spent on drains will be found to be small. Where land is swampy it is essential to drain the land, as rubber will not grow in water-logged country.



TAMIL LATEX COLLECTORS AND LATEX CART.

Where the land is steep, contour paths at regular distances may be cut to prevent the wash that would occur during heavy rains, and on these paths the trees should be planted. It would be difficult to set out any system of drainage until the area to be planted had been felled and burnt, and though in the course of carrying out a scheme some plants may have to be rooted up, it will be more economical to plant up the land before making drains and thus save loss of time.

The same remarks hold good for roads, and it will be wise not to lay these out until the future site of the factory is fixed, to which all roads should lead. The spacing of the trees twenty feet apart gives ample room for constructing roads without the necessity of uprooting any of the trees, except at curves and angles.

Weeding. In a previous paragraph, reference was made to the necessity of weeding the estate directly after the burn. If this is taken in hand at the start, the cost, to begin with, should not be more than $1 per acre per mensem, gradually coming down to 40 or 50 cents per acre per mensem. Weeds should be buried or burnt, and not left lying on the surface, where they may take root and seed. If the weeds on an estate appear to be getting out of hand, to abandon all other work and concentrate labour on weeding is a sound doctrine in the economy of planting, and one that has been proved over and over again.

Estimates. The object of these notes is to give a young man or his parent some idea of the circumstances of acquiring a block of 640 acres and the cost of bringing an estate into bearing. The area to be brought under cultivation is 500 acres, of which 250 acres is to be planted in the first year, and the balance in the second year. As rubber plantations go, this is a small area for a company, but for an individual who is looking after the place himself it is a suitable and, at present prices, apparently a remunerative commercial investment.

In high-class planting, where money is not of much object, the jungle stumps are rooted up and burnt, to prevent the chance of fungus and white ants attacking the rubber trees, but as rubber estates have thriven without this being done, so in these estimates no provision is made for stumping. However, an allowance is made for clearing away all but the heaviest timber.

It is not intended to give very full details of the expenditure, and the amounts mentioned under each heading are approximate as various items of expenditure may be different in each district. The figures are given as a rough guide, and the careful, intelligent man may be able to effect considerable economies on them.

ESTIMATE—FIRST YEAR.

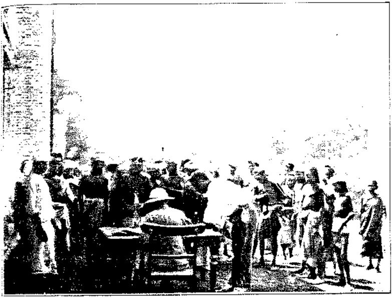
	$	$
Survey Fees	560	
Premium at $3 per acre	1,920	
Rent	640	
		3,120
Salary of Manager at $200 per month.. ..	2,400	
Salary of Visiting Agent..	1,000	
Salary of Conductor at $80 per month ..	960	
Two House Coolies at $12 per month	288	
Doctor and Medicines	1,000	
Travelling Expenses	240	
		5,888
Buildings—Bungalow and Well	3,000	
,, Furniture and Safe..	800	
,, Coolie Lines and Well	1,500	
,, Store and Office	500	
		5,800
Felling, Burning and Clearing 250 acres at $22	5,500	
Lining, Holing, Filling and Planting at $7 ..	1,750	
Purchase of Plants, 35,000	1,050	
Weeding, eight months, at $1	2,000	
Roads and Drains	1,500	
		11,800
Nursery and Purchase of Seeds..	750	
		750
Tools	500	
Stationery, Postages, Transport, etc.	500	
Contingencies	2,000	
		3,000
Total Expenditure, 1st Year.. ..		$30,358

From the above it will be seen that a liberal estimate will entail an expenditure of $30,358, say £3,541, or about £14 per acre in the first year.

ESTIMATE—SECOND YEAR.

		$	$
Rent	..	640	
			640
Salary of Manager, $250 per month	..	3,000	
Salary of Visiting Agent	..	1,000	
Salary of Conductor	..	960	
Two House Coolies	..	288	
Doctor and Medicines	..	1,500	
Travelling Expenses	..	240	
			6,988
Buildings—Upkeep	..	500	
" Permanent Lines	..	2,000	
			2,500
Upkeep 250 acres—Weeding	..	3,000	
" " " Roads and Drains	..	1,000	
" " " Pests and Diseases	..	1,250	
			5,250
Recruiting Labour and Assessment	..	1,000	
Stationery, Postages and Transport	..	500	
Tools	..	500	
Contingencies	..	3,000	
			5,000
Preparing and Planting 250 acres at $29	..	7,250	
Roads and Drains	..	1,500	
Weeding, eight months, at $1	..	2,000	
			10,750
Total Expenditure, 2nd Year	..		$31,128
Add Expenditure, 1st Year	..		30,358
Total to end of 2nd Year	..		$61,486

From the above figures it will be seen that the total expenditure to the end of the second year is $61,486, or £7,173, for which there are 250 acres rising two and 250 acres rising one year old. Provision has now been made for recruiting a labour force and the building of permanent coolie lines.



Pay Day, Government Plantation, Kuala Lumpur.

Loading Rubber for Shipment, Kuala Lumpur

ESTIMATE—THIRD YEAR.

	$	$
Rent	640	
		640
Salary of Manager, $300 per month	3,600	
Salary of Visiting Agent	1,000	
Salary of Assistant Manager	1,800	
Two House Coolies	288	
Doctor and Medicines	1,800	
Travelling Expenses	500	
		8,988
Buildings—Bungalow (Assistant's)	2,000	
.. Furniture	500	
.. Permanent Lines	2,000	
.. Hospital	2,000	
.. Upkeep	1,000	
		7,500
Upkeep 500 acres—Weeding, at $.90 per month	5,400	
,, ,, ,, Roads and Drains.. ..	1,000	
,, ,, ,, Pests and Diseases ..	2,000	
		8,400
Recruiting Labour and Assessment	1,500	
Stationery, Postage and Transport	500	
Tools	500	
Contingencies	3,000	
		5,500
Total Expenditure, 3rd Year.. ..		$31,028
Add Expenditure, 1st and 2nd Years		61,486
Total to end of 3rd Year		$92,514

At the end of the third year a sum of $92,514, or £10,793, will have been expended, and in the fourth and fifth years the expenditure will probably amount to $25,000 annually, making a total of roughly $142,000. In the fifth year provision should be made of $20,000 for a factory and drying sheds, which will bring up the total to $162,000, or roughly £19,000—say, £38 per acre.

Possible Economies. A few explanatory notes may be useful at this stage, and some idea of the savings that could be effected can be gauged from the following remarks. A sum of $900 has been provided for a Native or Eurasian Conductor. A saving under this heading could easily be effected by an energetic planter. The amount also for doctor and medicine might be considerably reduced. The amounts under felling, burning and clearing are liberal, and are sufficient for

RUBBER NURSERY, NEWBURY ESTATE.

the extra expense that might have to be borne in the case of a bad burn.

A considerable sum has been provided for recruiting labour and assessment, but this recurrent expenditure may not be necessary, and will depend largely on how the planter treats his labour, and the general health of the estate.

The man with an eye to economy and the ability to organise would probably be able to effect a reduction of initial expenses in all directions without the estate suffering in any way; but the amount saved will depend upon the planter's individual efforts.

Produce and Revenue.

The basis for calculating probable revenue and profits has been taken at 2s. 6d. per lb. of rubber, and the matter of when trees can first be economically tapped is of great importance. Trees rising four and five years old can be tapped, but the low yield per tree makes it an expensive business. Moreover, rubber from very young trees is not considered of good quality. In these estimates no production has been taken into account until the sixth year, i.e., a full five years after the first trees were planted, when, if the trees are well and evenly grown, about 40,000 lbs. of dry rubber may be expected, which, allowing 2s. per lb. as the cost of production, should give a profit of £1,000.

In the seventh year the production should be 75,000 lbs., which, at 1s. profit, should return £3,750. In the eighth year the return should be 100,000 lbs., and, at a cost of 1s. 3d., the profit should be £6,250. The ninth year should give a return of 150,000 lbs., which, at a cost of 1s. a lb., should give a profit of £11,250; and in the tenth and following years a regular return should be about 175,000 lbs., giving an annual profit of £13,125.

Collection and Preparation for Export.

The actual method of collecting the rubber is somewhat as follows:—The fields are divided into groups of trees, varying from 200 to 400, each individual tree being marked and numbered according to its group. The coolie, called the tapper, being also numbered, proceeds direct to his group of trees, and extracts the latex by means of incised cuts into the bark, great care being taken to get the right depth of cut, for, should it be too deep, incalculable damage will be done to the tree, while, if not deep enough, a sufficient supply of latex will not be obtained. The length of time which should elapse before cuts should be reopened has not yet exactly been decided on, but many planters are marking their trees so as to allow of a six years' renewal of bark. Some are in favour of the cuts being opened each day, others every other day, while various experiments are being tried at varying intervals of time.

The tapper, having made his incisions and placed a small cup of either tin or porcelain to catch the latex, then proceeds to the next tree, and so on until his task is finished. He then collects the produce in pails, which he carries either to a receiving house or the factory, where his name is recorded and his work is finished.

The latex is then carefully strained and bulked, and, to assist coagulation, a small amount of diluted acetic acid is added. After coagulation, there are various methods of treatment, the two most common forms of manufacture being that of crêpe and smoked sheet.

Crêpe is made by coagulating the latex in bulk, and passing the rubber (now resembling dough) through heavy rollers revolving at different speeds, by which means long thin strips are formed, which are then hung up to dry in well-ventilated stores.

Smoked sheet is made by coagulating the latex in shallow pans and lightly rolling the thin sheets which form in them. They are then subjected to the action of smoke.

Packing Rubber for Shipment.

There are other processes in course of trial, such as the Byrne, the Wickham and the Jackson processes, and no doubt there will be many others. The tendency at present is to subject the crude rubber to as little treatment as possible on the estate, but, however prepared, care should be taken to see that it is carefully dried before packing for export.

At first not much attention was paid to the appearance of the rubber when it was placed on the market at Mincing Lane, but nowadays it is recognised that to obtain the best price on the market the rubber must be not only of good quality but attractive in appearance.

STATISTICS

SHOWING THE

Growth of the Rubber Industry in Malaya.

TABLE I.

RUBBER AREAS, MALAYA, FROM 1906 TO 1912.

Years.	No. of Estates.	Acreage under Rubber.	Acreage Planted each year.
1905	—	40.000*	—
1906	254	99.230	47.607
1907	365	179.227	55.581†
1908	417	241,138	60.636
1909	534	292.035	50.897
1910	632	362.853	70.818
1911	964	542.877	180.025
1912	1.055	621.621	78.744

* Approximate. F.M.S. only. † Incomplete.

TABLE II.

RUBBER CROPS EXPORTED AND VALUE, MALAYA, FROM 1905 TO 1912.

Years.	Quantity Exported.	Value.
1905	*1.977 lbs.	$1.057.231 = £124.000
1906	1.035.001 lbs.	3.393.474 = 399.000
1907	1.998.889 lbs.	6.677.031 = 785.000
1908	3.186.099 lbs.	7.498.258 = 882.000
1909	6.112.023 lbs.	19.894.287 = 2.340.000
1910	12.245.864 lbs.	48.405.471 = 5.695.000
1911	23.914.263 lbs.	50.788.282 = 5.925.000
1912	42.462.401 lbs.	73.056.515 = 8.523.260

* Straits Settlements only.

TABLE III.

Estate Labour, Malaya, from 1906 to 1912.

Years.	Tamils.	Javanese.	Malays.	Chinese.	Others.	Total
1906	29,358*	4,070*	1,400*	3,433*	914*	39,274*
1907	49,647	7,538	4,838	12,848	..	74,871
1908	51,409	7,473	4,416	15,008		78,306
1909	69,780	9,574	7,153	22,684	1,022	110,213
1910	98,988	17,760	14,258	45,963	2,361	179,030
1911	126,665	20,869	19,097	58,043	2,411	227,085
1912	145,848	23,580	19,426	63,210	3,848	255,912

* Federated Malay States only.

Table III. gives an idea of the labour force employed to produce the results shown in the previous tables. From the beginning, the Tamil has been the most important class of labourer, and at the end of 1912 more than half the total of estate labour was Tamil. Not only are they the most numerous, but they are usually considered the most satisfactory labourers for agricultural work on rubber plantations.

It is interesting to note the difference between the Federated Malay States and the Straits Settlements and other States in this respect. In 1912, two-thirds of the labour force on Federated Malay States estates was Tamil. In the Straits Settlements also, Tamils considerably outnumber the Chinese, who follow them in point of numbers.

TABLE IV.

Returns of Indian and Chinese Immigrants in Federated Malay States and Straits Settlements, from 1905 to 1912.

Years.	Indian Immigrants.	Chinese Immigrants	Total.
1905	39,539	252,154	291,693
1906	52,051	253,235	305,286
1907	60,542	327,299	387,841
1908	54,522	219,152	273,674
1909	49,817	208,489	258,306
1910	83,723	282,059	365,782
1911	108,471	269,854	378,325
1912	106,928	251,644	358,572

Table IV. shows the efforts that have to be made by the Government and plantations to maintain and increase the labour force. Out of the 106,028 immigrants in 1912, 73,671 were immigrants provided with free passages by the Tamil Immigration Fund; the remainder were ordinary deck passengers paying their own passages. The total number of Tamil immigrants during the last eight years is over 555,000, less than a third of whom now remain. A more settled state of affairs is beginning to be noticeable, at least on a few estates, which the labourers begin to look upon as their homes. No conclusion can be drawn from the number of Chinese immigrants, as to rubber labour, as the great majority of these labourers are absorbed by the great tin-mining industry.

TABLE V.

GROWTH IN GIRTH OF RUBBER TREES AT 3 FEET FROM BASE.

1st year	..	— inches.	11th year	..	60 inches.
2nd ..	..	9 ..	12th ..	..	66 ..
3rd ..	..	14 ..	13th ..	..	72 ..
4th ..	..	20 ..	14th ..	..	78 ..
5th ..	..	24 ..	15th ..	..	80 ..
6th ..	..	30 ..	16th ..	..	82 ..
7th ..	..	36 ..	17th ..	..	84 ..
8th ..	..	42 ..	18th ..	..	86 ..
9th ..	..	48 ..	19th ..	..	88 ..
10th ..	..	54 ..	20th ..	..	90 ..

Table V. is from figures supplied by Mr. Ridley, late Director of the Botanic Gardens, Singapore. It shows the growth in girth that may be expected from a fairly well treated rubber tree. The first two years' growth is very variable. During the next three years, the girth should increase 6 inches every year. From the fifth to the fifteenth year, the increase should be 3-4 inches annually, and from then on to the twentieth year 2-3 inches.

Close planting will reduce this increase materially after the tenth year, and probably before that. Too closely planted trees sooner or later cease to show any material increase.

The figures are for trees grown in good soil without manuring and with wide planting, *e.g.*, 20 by 20 feet. An individual tree Mr. Ridley has measured shows at fifteen years a girth of 72 inches (this in the forest among other trees); another tree thirty-two years old is now 124 inches in girth.

Two of the old trees at Parit Buntar, Perak, were measured by Mr. Lewton-Brain in January of 1910, and were $64\frac{1}{2}$ and $72\frac{1}{2}$ inches in girth at three feet from the ground.

A rubber tree should be ready for tapping in its fourth or fifth year, according to the conditions under which it is growing.

ROBINSON & CO.

SINGAPORE

Ladies' and Gentlemen's Outfitters

COMPLETE HOUSE FURNISHERS
JEWELLERS & SILVERSMITHS, Etc.

DEPARTMENTS

GENTS' OUTFITTING
GENTS' TAILORING
JEWELLERY
BICYCLES
MOTOR CYCLES
PHOTOGRAPHIC
TOBACCO AND PIPES
CIGARS
SEWING MACHINES
HARNESS & SADDLERY
GRAMOPHONES AND RECORDS
DRAPERY AND MILLINERY
SILKS AND COSTUMES
CARPETS AND MATS
CHINA AND GLASS
BEDSTEADS
IRONMONGERY
LAMPWARE
CUTLERY
SPORTING & ATHLETIC
GUNS, RIFLES AND AMMUNITION

ROBINSON'S PATENT LEVER WATCHES
Etc., etc., etc.

SOLE AGENTS FOR

RALEIGH BICYCLES
FULLER'S SWEETS. HENRY HEATH'S HATS
BARTLETT & BICKLEY'S CIGARETTES AND TOBACCO.
ELKINGTON'S CUTLERY AND SILVER.
"SUVUS" FIRE EXTINGUISHERS.
"RAMSBOTTOM" RACKETS.
KYNOCH'S SPORTING CARTRIDGES.
"FORCE" CRICKET BATS.
PROSSER'S CORONA RACKETS.

Paterson, Simons & Co.

LTD.

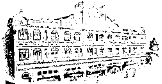
LONDON, SINGAPORE,
PENANG, KLANG,
KUALA LUMPUR.

Secretaries and Agents for:

Benar (Selangor) Rubber Estate, Limited.
Bujong Rubber Estate, Limited.
Cheran Jeloh Coconut Estate, Limited.
Doolos Estates, Limited.
Henrietta Rubber Estate, Limited.
Kuala Pergau Rubber Plantations, Limited.
Laras (Sumatra) Rubber Estates, Limited.
Lenggeng Rubber Company, Limited.
Malayan Rubber Loan & Agency Corporation, Limited.
Rampah Coconut Estates, Limited.

Agents for:

"Red Cross" Brand Portland Cement.
"Malthoid" Roofing.
Orr's Zinc White, Limited.
Underwood Typewriters.
Cotton Powder Co.'s Explosives.
Baxter & Co.'s Canvas.
Chivas Brothers' Whisky.
Kuala Lumpur Engineering Works, Ltd.
(Fully equipped machine shops at Kuala Lumpur and Klang).
Bridges' Rubber & Copra Machinery.
Mirrlees' Diesel Oil Engines.
Keighley Imperial Oil and Gas Engines.
Hornsby's Mowers.
Herbert Morris, Ltd., Lifting Tackle.
Mather & Platt, Ltd.
J. Tylor & Son's Sanitary Fittings, etc.
J. Dawson & Sons, Ltd., Belting.
Thwaites Bros., Ltd., Blowers, etc.



THE FINEST STORE EAST OF SUEZ

Little's

SINGAPORE.—The Singapore premises of Messrs. JOHN LITTLE & Co., Ltd., designated "The Finest Store East of Suez," are situated in the central part of the town, and tourists will find after a long, hot round of sight-seeing, that a short stay of inspection in Little's cool and airy show-rooms, with perhaps a cold tiffin, a refreshing cup of tea, or a delicious ice cream, will be not the least pleasant part of the day's outing. Some idea of the size of Little's General Store can be imagined when it is stated that the premises have a floor space of over three-and-a-half acres. The Store is fitted up in the most modern manner, and every possible want is catered for in goods from the best markets in the World.

KUALA LUMPUR.—Some little time ago, Little's acquired a site of 12,400 square feet, with a frontage of 120 feet towards the New Embankment Road, and of over 110 feet towards Ampang Street. On this site has been erected an imposing three-storey building, on the lines so successfully carried out in Singapore. Electric Lifts and Fans are provided, also a Refreshment Room for the convenience and comfort of visitors and customers. John Little's bring their resources, through the medium of their catalogues, to your doors, enabling you to draw on the most complete, modern, and fairly priced collection of merchandise in the F.M.S. This places "Out-station" customers on an equal footing with those who shop personally at Little's.

CATALOGUES POSTED FREE.

Little's

KUALA LUMPUR PREMISES.

THE FINEST STORE IN THE F.M.S.

GUTHRIE & CO., Ltd.

SINGAPORE

General Merchants

Secretaries and Agents to Rubber Plantation Companies, Bank, Shipping and Insurance Agents.

ESTABLISHED 1821.

GOVERNMENT, &c.

Government of British North Borneo.
Singapore Electric Tramways.
The Island Trading Co., Ltd.
The British Borneo Petroleum Synd., Ltd.

BANKING.

Coutts & Co.
London County & Westminster Bank, Ltd.
Drummond's.
Ulster Bank, Ltd.
Herries, Farquhar & Co.

INSURANCE.

London Assurance Corporation.
Western Assurance Co.
Triton Assurance Co., Ltd.
Manufacturers' Life Insurance Co.
Phoenix Assurance Co., Ltd.
Hong Kong Fire Insurance Co., Ltd.
Imperial Marine Transport & Fire Insurance Co., Ltd.

COALING & SHIPPING.

Cory Bros. & Co., Ltd.
Eastern & Australian S.S. Co., Ltd.
Osaka Shosen Kaisha.

RUBBER COMPANIES.

Bangawan Rubber, Ltd.
Bantreng (Selangor) Rubber Estates, Ltd.
Bukit Kajang Rubber Estates, Ltd.
Brunei (Borneo) Rubber & Land Co., Ltd.
Changkat Salak Rubber & Tin, Ltd.
Cheviot Rubber Estates.
Galang Besar Rubber Plantations, Ltd.
Kamuning (Perak) Rubber & Tin Co., Ltd.
Kawie (Java) Rubber Estates, Ltd.
Kinnans Rubber, Ltd.
K.M.S. (Malay States) Rubber & Coconut Plantations, Ltd.
Labu (F.M.S.) Rubber Co., Ltd.
Linggi Plantations, Ltd.
Membakut Rubber, Ltd.
North Borneo State Rubber, Ltd.
Port Dickson-Lukut (F.M.S.) Rubber Estates, Ltd.
Rangoon Para Rubber Estates, Ltd.
Sendayan (F.M.S.) Rubber Co., Ltd.
St. Andrew (Malay) Rubber Estates, Ltd.
Sungei Buaya (Sumatra) Rubber Co., Ltd.
London & Colonial Rubber & Produce Investment Corporation, Ltd.
The Selangor United Rubber Estates, Ltd.
Tobacco Co. of British North Borneo.
United Sua Betong Rubber Estates, Ltd.
United Temiang (F.M.S.) Rubber Estates, Ltd.

Telegraphic Address: "GUTHRIE."

Branches at **PENANG, KUALA LUMPUR, KLANG, FORT SWETTENHAM** and **LONDON.**

Also **MEDAN, SUMATRA.**

GUTHRIE & CO., Ltd.

Eastern and General Merchants

SINGAPORE

Branches at Penang, Kuala Lumpur, Klang, Port Swettenham and Medan, Sumatra

Commercial Agencies include the following:

GENERAL COMMERCIAL

"Red Hand" Brand Cements.

"Tiger" and "Devil" Brands of Explosives.

"Elephant" Brand Undershirts.

"Izal" Disinfectants.

Milner's Safes.

GILLINGHAM PORTLAND CEMENT COMPANY LIMITED
LONDON
PORTLAND CEMENT
REGISTERED TRADE MARK
WORKS: GILLINGHAM, KENT

Webster's Canvas and Twines.

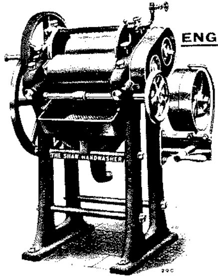
Hall's Distemper.

Gosnell's Cherry Blossom Soaps and Perfumes.

Mackie's White Horse Whisky.

Tennent's Beers.

"Solignum" Wood Preservative.



ENGINEERING

Marshall's Engines and Boilers.

National Gas Engine Co.'s Gas Engines.

Petter's Semi-Diesel Oil Engines.

Hayward-Tyler & Co.'s Steam Pumps.

Caillet's Monorails.

Daimler Motor Cars.

Lacre Motor Lorries.

A.C. Light Cars.

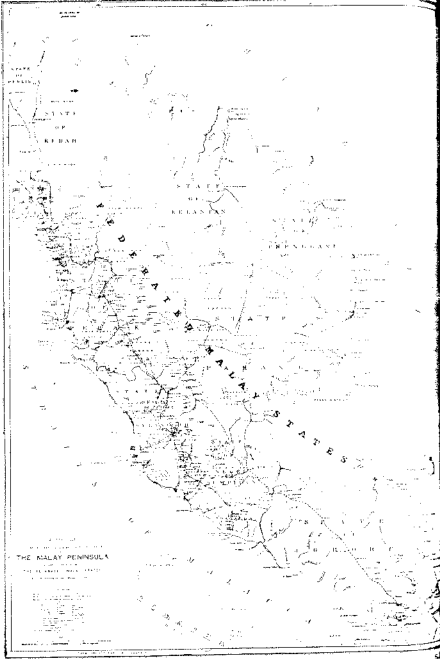
Rudge Motor Bicycles.

Seamless Steel Boats and Launches.

Marine Motors.

Kevle's Water Filters.

SHAW'S RUBBER-WASHING MACHINERY.



Hudson & Kearns Ltd.

Malay States Information Agency
88. Cannon St. London E.C.

Coconut Industry in Malaya

by

H. L. COGHLAN

Joint Author of "Coconut Cultivation and Plantation Machinery."

MALAY STATES INFORMATION AGENCY,
88, CANNON STREET, LONDON, E.C.

Coconut Estate, Selangor.

INTRODUCTION

COCONUT cultivation is one of the oldest of the agricultural industries in Malaya, and of the country's suitability for it no better evidence can be offered than the groves of vigorous old palms in some of the senior Settlements, where trees of 60 years and upward continue, with unfailing regularity, to bear heavy clusters of large nuts, and, moreover, show good promise of fulfilling their allotted span of five-score years and more.

Copra was first shipped from the Straits to Europe about the year 1850, but it is said not to have become an important article of export till 1870.

In the light of modern requirements, however, the coconut industry may be said to be in its infancy. It is by no means in the experimental stage; indeed, as an industry it is certain and lasting, and with the enlightened methods now being adopted for the preparation of copra, the extraction of oil, and the manufacture of fibre, it is bound to expand far beyond its present limits. In the past, it has assured comfort and prosperity to millions of the human race; in the future, it is safe to predict, it will bring benefit to millions more. Nothing that grows on earth has so many uses for humanity as this wonderful Coconut Palm. To the native it provides food and drink, and most of the necessaries of life.

Gibbon, the historian, writing of the palm tree, adds that the Asiatic celebrated, either in verse or prose, the three hundred and sixty uses to which the trunk, the branches, the leaves, the juice and the fruit were skilfully applied. Of course, he refers to its use in the domestic economy of the native; but the value of the coconut has long been recognised by Europeans and Americans, and as time goes on we find it being put to an increasing number of purposes in the manufacturing world.

Some of Its Uses.

Coconut Oil is utilised in the manufacture of nut butter or margarine, lard, soap, candles, and other articles. It is used both as a lubricant and as an illuminant, for embrocation and for perfumery. The coir or fibre is used in the manufacture of rope, cordage, matting, brushes, felt and mattresses, and, by an inexpensive dyeing process, the selected "bristles" from the fibre make a splendid substitute for horsehair for stuffing purposes. The kernel is used in confectionery, and the copra (or dried kernel), after the oil has been expressed from it, is made use of in the preparation of feeding stuffs for cattle, sheep, and poultry, and is also an extremely valuable fertiliser. The oil is particularly suitable for making marine soap, which will lather in salt water. Coconut Oil is saponified in heat with strong lye, but there is no "salting out"; a hard soap is formed, although the percentage of water is high.

As far as one can judge, the fear of over-production need not enter into present calculations. The markets of Europe and America, now short of animal fats for human consumption, all turn for their requirements to the coconut palm, and of late years increasingly large quantities of copra have been taken by China and Japan.

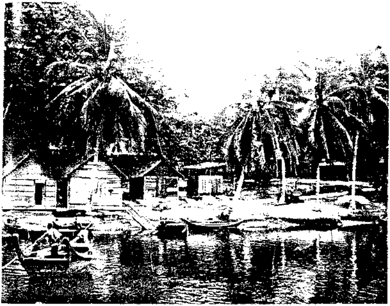
Growers' Home Consumption.

Apart from all these uses, in countries where the coconut palm is grown, the fruit of the tree is indispensable to the millions of natives, who for generations have relied upon it for food, drink, cooking oil, and the other numerous household purposes. This native demand, of course, has to be satisfied before a single nut is sold to the foreign manufacturer, or other outsider, and, with such populations ever on the increase, particularly so in the Malay Peninsula, an excellent argument against the probability of over-production is offered.

High Price of Seed Nuts.

In addition to this large home consumption, there is another factor which makes, for a time, for the further restriction of copra supplies to foreign markets. It is this. Present high prices and a clearer insight into the future possibilities of the industry have led to more areas being brought under coconuts. The demand for Seed Nuts, therefore, is great, and sold as such they pay the cover far better than copra. As much as [illegible] cents or 8 pence [illegible] is now being paid, or about [illegible] per thousand, or equivalent to [illegible] copra [illegible] [illegible] per [illegible] in copra.

The terms of this holding, in most cases, prevent the Malay from disposing of his plant [illegible] [illegible] [illegible] of coconut oil is not [illegible] with [illegible] Malayan [illegible], with possible [illegible], [illegible] with [illegible], the only possible [illegible] of his [illegible] planting.



Malay Kampong with Coconut Palms

One of the important [illegible] in the Malay Peninsula, coconut cultivation is one of the safest forms of tropical agriculture, and the history of the palm makes this [illegible] clear.

Maritime Climate. There is a popular belief that the coconut palm will grow only in regions near the sea, but experience has shown that the [illegible] flourishes [illegible] [illegible] its fruits [illegible] [illegible] [illegible].

shore as several hundred miles. A great point in favour of the Malay Peninsula is that it has a more extended seaboard than most tropical lands, having regard to its total area, so that if the salt sea air is essential to healthy palms, then the suitability of each of the Malay States for coconut growing is demonstrated in the following table of distances :—

Name of State.	Sea Coast line in Miles.	Remotest boundary from sea shore in Miles.
Perak	100	90
Selangor	120	50
Negri Sembilan	40	70
Pahang	120	150
Kelantan	60	95
Trengganu	150	50
Kedah	60	45
Johore	300	50

Approximately, the total area of British Malaya is 51,725 square miles, the Federated Malay States comprising more than half of the total. Johore contains about 9,000 square miles, Trengganu 6,000, Kelantan 5,500, and Kedah 3,000 square miles.

Areas under Coconuts. The total area under coconuts in the Federated Malay States only in 1912 was 157,600 acres, made up as follows :—

Perak	81,320 acres.
Selangor	38,323 ..
Negri Sembilan	20,595 ..
Pahang	17,362 ..

But the total area under cultivation on estates of 100 acres and over was only 30,308 acres, so that it will be seen native holdings comprise four-fifths of the total estimated area under coconuts. The value of the planting is estimated roughly at over £3,200,000. The export of copra from the F.M.S. was approximately 7,700 tons. This amount was less than in 1911. This is explained by the satisfactory prices paid locally for the nuts, though the prices for copra were also very favourable to the grower, averaging over £1 3s. 3d. per pikul. At the close of the year, the price was over £1 7s. 11d. per pikul, and forward sales had been negotiated for 1913 at £1 8s. 6d. per pikul (16.8 pikuls = 1 ton).

Prices. At this point it may be appropriate to give the prices for copra and coconut oil, published in the London Chamber of Commerce Prices Current on May 7, 1914:—

		1914			1913			1912		
COPRA.		£	s.	d.	£	s.	d.	£	s.	d.
South Sea	April-May	25	12	6	27	15	0	25	12	6
Singapore (or F.M.S.)	..	26	2	6	27	17	6	26	2	6
Ceylon	..	27	2	6	29	10	0	27	10	0
Malabar	..	27	12	6	29	17	6	28	0	0
Java	April-June	26	5	0	27	2	6			
Macassar	..	26	2	6	27	10	0			
COCONUT OIL.		£	s.	d.	£	s.	d.	£	s.	d.
Cochin ..	per ton	52	0	0	51	0	0	46	0	0
Ceylon ..	..	43	0	0	40	0	0	41	10	0
Pressed ..	..	38	10	0		—		36	15	0

The exports of Copra from the Straits Settlements ports for three years were as follows:—

	TONS.	VALUE.
1912	80,520	.. £1,715,490
1911	97,113	.. 1,984,112
1910	104,839	.. 2,150,161

Available Land. Large tracts of suitable land may be obtained by the enterprising capitalist, either in the Federated Malay States or in the Native States that have recently come under British control.

In order to encourage the cultivation of coconuts in favourably situated districts on the East Coast of the Peninsula, the Government of Pahang grants land in blocks of 2,000 acres, on specially low terms to approved applicants. Titles in perpetuity are granted, and the initial quit rent is 10 cents (2.8 pence) per acre per annum, rising in ten years to the maximum rent per acre of $1 (2s. 4d.). Formerly the rent started at 50 cents (1s. 2d.) and rose in six years to $2 (4s. 8d.). The new advantageous terms will be further appreciated when it is noted that no premium is charged on the land granted, but merely the cost of survey and setting up boundary stones. A further concession has been made by the Government of Pahang by a reduction of the export duty on products of the coconut from $2\frac{1}{2}$ to $1\frac{1}{2}$ per cent. *ad valorem*.

Planting in Malaya.

Probably the reason why planting proves attractive is because of the open-air life of the planter, its constant and varied occupation, its opportunities for excellent shooting in leisure moments, and, in due course, the splendid returns on initial outlay. A large proportion of Malayan planters are old public school boys who, owing to the overcrowding of the old professions, recognised the fact that for young fellows of stability and ambition new fields of occupation and enterprise were necessary. To take up planting in Malaya, however, one must do so on somewhat prepared lines, and with capital, not necessarily large, but sufficient to deal with (say) 500 acres.

Cost per Acre to Bearing Stage.

The cost of bringing a coconut estate to the bearing stage may range from £21 to £35 per acre, according to the district, labour, and administration. The authors of "Coconut Cultivation and Plantation Machinery" (Coghlan & Hinchley) give an estimate to bring an estate of 500 acres to the bearing stage, including 6 per cent. per annum on capital invested, at £10,600, or £21 4s. per acre. In this figure, no allowance is made for London administration—an expensive item with so many rubber companies.

Against this estimate, the Selangor Coconut Co., Ltd., are quoted as giving £35 to £36 per acre, Mr. Kelway Bamber £35 to £40, or £25 to £30 where there is an ample labour supply.

Everything depends upon soil, sound planting, economy, and close personal supervision. Given these the sixth year should be the flowering year, and the cost to the bearing stage, with reasonable London administration fees included, ought not to be more than £25 per acre.

A reason for the higher figures given above may be found in the charge for absolute clean weeding. For rubber, this is necessary, but it is not so essential with coconuts, and is a waste of money.

The principal maxims to apply to coconut cultivation, especially in the early years, are: (1) Keep out lalang; (2) Look to your drainage; and (3) Generously fork your trees.

Profit per Acre.

It is not so very long ago that the Straits market price for coconuts was 1½ cents each, or the equivalent of £7 per ton of copra. Prices have since risen over 200 per cent. Can they be maintained, or are likely to revert to previous low levels? These questions naturally arise, but one has confidence in stating that prices are more likely to advance than otherwise. One important reason for saying so is the fact that in the days of low prices, nut butter was practically unknown. The English butter firm that now consumes over 100,000 tons of Copra per annum, in those days did not use an ounce of it, and these

Split Coconuts Drying for Copra.

conditions, in different degrees, apply to contemporary firms. Indeed, food purveyors throughout the world, wholesale and retail, are now alert to the possibilities of the new butter from coconuts.

On present prices, a well-kept estate in bearing should show a net profit of £10 per acre, but, for safety, calculations should be based on Copra at £22 per ton, at which price a good estate will return a profit of about £8 per acre.

Labour. The Agricultural Report of the Federated Malay States for 1912 gives the total number of plantation labourers as 255,012, comprising Tamils, Chinese, Malays and Javanese. The average daily wage is about 50 cents (1s. 2d.).

Coconut planting is popular with the real native of the country—the Malay—and he thoroughly understands it. Thus local labour is often available, where for other agricultural pursuits Tamil or Chinese labour would have to be imported.

Species of Coconut Palms. Generally, throughout Malaya the palm is the well-known *Cocos nucifera*, but of late years an interesting feature of coconut planting has been the introduction on a large scale of the dwarf or "King" Coconut (*Nyor gading*). These palms come into bearing in the fourth year, and consequently give earlier returns on capital invested. The nut, however, is much smaller, and the kernel less in weight, but as 60 trees against 40 trees can be planted to the acre, it remains to be seen whether an increased yield of copra will not compensate for the cost of dealing with a greater number of nuts.

ESTABLISHING THE PLANTATION.

Selecting the Land. In selecting land there are, apart from the requisite natural qualifications of the site, a number of commercial considerations, all of which are important factors in the cost of the plantation and its produce. Briefly, they are as follows:—Transport, waterways, communications, proximity to the sea or navigable rivers or railways, adjacency to towns or villages, the populations of which are likely to augment or supply the necessary labour force.

The Malay Peninsula is admirably served by roads and railways, and ocean liners, coasting steamers and local sailing cargo craft, so that excellent facilities are afforded for the transport of produce; therefore, given ordinary forethought in his initial investigations, the intending planter cannot materially err in choosing his land.

Coconut Palm (Cocos Nucifera).

Habital and General Requirements.

The conditions for successfully growing coconuts are perfectly met in the Malay Peninsula. Its geographical position is north of the Equator, extending from about the first to the seventh parallel. Its rainfall is about 90 to 120 inches evenly distributed throughout the year, and its mean temperature is about 80° F.

It is out of the hurricane zone, and the "Sumatra" wind storms that occur occasionally have never been known to devastate a plantation. As evidence in support of this, it may be mentioned that insurance against this form of loss is practically unknown.

The seaboard of the Peninsula is approximately 1,000 miles in length. On its East side it is favoured for six months of the year by the N.E. Monsoon, and during the remainder of the year, on its West Coast, by the S.W. Monsoon. The ozone-laden breezes, therefore, are carried well inland, indeed, from shore to shore, which, no doubt, accounts for the coconut thriving equally well in almost every part of the Peninsula.

Soil and Locality.

The best site for the cultivation of coconuts is found in the low alluvial flats in the neighbourhood of rivers that overflow from time to time, the loam being usually rich and deep. The coast districts of the Malay States offer these advantages, and it would be difficult to find the palm growing under more favourable conditions than prevail in these localities. Owing to the fertility of the soil, little or no manuring is required for many years.

On very low-lying land, peaty soil often exists, and before it can be turned to successful account it needs considerable care and attention. Drainage is the work of first importance, and this must be followed by complete turning of the top soil. The land must then be thoroughly limed so as to destroy the deleterious acids formed from stagnant water lying on or close to the surface for a long period.

Land to be avoided in particular is such having inert and heavy retentive soil; areas under lalang grass, more especially such large abandoned tracts as have been previously planted with tapioca or gambier. Old pineapple lands, too, are not recommended as a home for the coconut, unless the intention be first to restore to the soil by way of manure what the pines have taken from it. Such lands are often procurable on exceptionally cheap terms from private owners, but, in the long run, they are likely to prove disastrously dear, due to retarded growth and deferred fructivity of the palm, caused by soil deficiencies and inhibitions.

The Coconut Palm can be grown successfully up to an altitude of 2,000 feet, provided the temperature requirements are fulfilled, i.e., a mean of about 75° to 85°, but it will not develop into a fruit-bearing tree on steep slopes with an inclination greater than one in fifteen. Its position, too, should not be too shaded or sheltered; freely moving currents of air, especially sea-breezes, seem to impart much vigour to the palm.

To the planter of coconuts the locality must be his first consideration and the soil his next. Fortunately the soil in general throughout the Malay Peninsula is so fertile that, given the ordinary precautions outlined above, a mistake is scarcely possible.

For additional safety, however, and also to make sure of success, the newcomer is advised to consult the Department of Agriculture, where much excellent and free advice is available. Another excellent source of information, through its Secretary at Kuala Lumpur, is the Planters' Association of Malaya.

Soils in order of merit are placed thus:—(1) Alluvial flats near streams; (2) Deep brown gravelly loam; and (3) Deep loamy sand.

The proportion of vegetable matter, or humus, in the soil is readily ascertained, and on the result of the analysis soils are classed as under:

1. Rich—If they contain 1½ to 5 per cent. of humus.
2. Medium—If they contain ½ to 1½ per cent. of humus.
3. Poor—If they contain less than ½ per cent. of humus.

The palm is well known to residents of the Tropics, but as this treatise is intended to interest others also who have not yet visited the warmer climes, a short description of the tree may be appropriate. The palm, *Cocos nucifera*, most generally known, has a simple, unbranched trunk which attains a height of about 80 feet, and its diameter is from 12 to 18 inches. It is marked along its entire length by the scars of fallen leaves. These marks are said to be an indication of the age of the tree, the total number divided by two representing the years. Though expert opinions differ in this respect, the lay investigator will find it a fairly reliable method of ascertaining approximate ages.

The stem is surmounted with a crown of from 20 to 30 leaves, with the youngest nearest the centre. When full-grown, these leaves measure about 18 feet in length. From the central stalk of each, on both sides, narrow leaflets about 3 feet in length are thrown out at right angles.

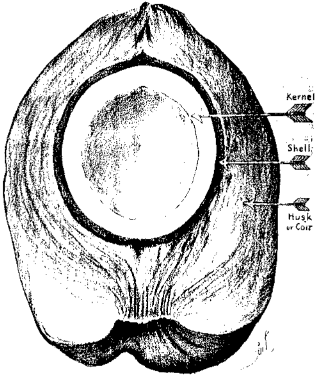
The Roots. The roots, red in colour, and near their origin as thick as a man's finger, form an almost compact mass some feet thick around the trunk of the tree at its base. While some of them penetrate the soil for a considerable depth—there is no tap-root—the majority spread out laterally in all directions, a foot or so below the surface. The active ends of these lateral or primary roots, and the young secondary roots arising from them, are found to a distance of about 50 feet from the tree. This is a point to be borne in mind when applying fertilisers to the soil. Further, the plant being a surface feeder, the utility of disturbing the top soil by mechanical appliances is manifest.

The Flowers. These are of two kinds, male and female. They are borne on the same stalk, and when young are enclosed in the spathe, or leaf wrapper, which unfolds as the flowers open. The male flower is yellowish in colour, and the female flower of a greenish hue.

The Fruit or Coconut. This is ovoid in shape, and, in the husk, is somewhat bigger than a football. Malay nuts, which are recognised as about the best grown, weigh in all from 5 to 6 lbs. Of this weight, about 30 per cent. represents husk. This is from 2 to 3 inches thick, and is a fibrous mass, lying between the smooth outer skin and the shell.

Within the shell is the hollow white kernel or nut flesh, which, when dried, is known commercially as copra. Its great value lies not only in the oil it contains but in the important residue after the oil has been expressed. The latter is known in the East as "poonac," and commands high prices, either as cattle feed or as a fertilizer of the first grade.

When young, the flesh is very thin and soft, and the kernel completely filled with liquid—that sweet, refreshing beverage,



Section of Coconut, showing Husk, Shell and Kernel.

Inflorescence of the Coconut Palm.

which the visitor to a Malay kampong knows so well. As nuts grow older, this moisture, known as the milk, is partly absorbed, and the cavity remains about half filled.

PREPARING THE LAND.

Felling. The first operations are to clear the selected land of jungle growth, which, when dry and withered, should be entirely burnt off. This should be done during the dry months, and about a month before the rains set in. The débris must not be fired until it is in a state of tinder, which should be in a month or so after felling, but firing must not be delayed until all the leaves have fallen, or the undergrowth, and possibly lalang, will have made some progress. A good burn is of paramount importance. It saves much after-labour and expense. In the waiting weeks, special precautions must be taken against a premature burn. The careless coolie and the discarded match have in the past been the direct cause of much increased expense to the plantation owner. The work is usually done on contract, and before letting out the job it is advisable to inquire strictly into the past work of the contractor—references are easily obtainable—and whether he is on good terms with his labour. One may thus avoid a premature burn at the hands of a spiteful coolie paying off old scores against the contractor.

The terms of a clearing contract should include, apart from general felling, provision for collecting and stacking trees up to five inches in diameter, prior to burning, and also for the cutting, shaping and transport of uprights for fencing.

Stumping. There ought not to be any doubt in the planter's mind as to the advisability of rooting up all the stumps, for such work has for its object the prevention of the development of fungi, termites, and other pests, and the decaying timber may become the future home of the dreaded black beetle.

The ideal plantation is, of course, freed from stumps and fallen wood before planting is begun. Some planters take the risk of disease, and allow the timber to rot away. The real danger is said to be during the first year. After that, the stumps appear to be immune from the attacks of pests, except beetles and may be left to rot away.

The cleared land must at all cost be kept free from lalang, an obnoxious grass, which not only retards the growth of the young cultivation, but, even with mature trees, is the cause of meagre and disappointing fruit yields. The writer attributes the smallness of West Indian nuts to the Para or Guinea grass that is allowed to thrive unheeded in the plantations.

Lining. The popular space for planting the coconut palm, *Cocos nucifera*, is a space of 30 feet by 30 feet, which gives 48 trees to the acre. The "King" or Dwarf Coconut, *Nyor gading*, is planted 20 feet by 24 feet, which gives 90 trees to the acre.

The stakes must be put in with accuracy and with due regard to an alignment.

Holing. When the land is cleared and lined, pits or holes are dug for the planting out of the seedlings, which, for the previous six months or so, have been growing in the nursery. The pits cannot be too large, but a cube of two feet is generally considered sufficient. The soil removed from the holes is replaced by good surface soil to within six inches of the top. When this is done, the plants are put in with the nut of the seedling slightly exposed, and about six inches to a foot below the level of the ground. Later, when the plant has come well away and has about a dozen well-grown leaves on it, the pits may be filled up to the top with more surface soil.

The advantages of these partly-filled pits or hollows are, that, apart from catching surface rain water, and the plant food it carries with it, the young plant, being sunk, is protected from wind, and thus takes firmer root in the soil.

Planting Seasons. The most favourable seasons in Malaya for planting are during April and May, and again from September to the end of October.

Drainage. On gently undulating land, little or no artificial drainage is necessary, but on low-lying flat country drainage is of considerable importance. In many cases the planter would be well advised to start his drainage schemes before felling the jungle growth. This is especially necessary with ground of a peaty nature. The trenches should be wide and deep, and afford every facility for the carrying off of stagnant water. When once this is done the fresh rain water, carrying with it matter in solution from the top soil, passes freely through the land, and as the water passes off, the air takes its place, thus energising the mechanical and chemical properties of the ground generally.

By generous trenching a heavy, compact and sodden soil can be converted to a porous one. An intelligent person acquainted with the elementary principles of agriculture will soon discover for himself what amount of drainage is necessary for his land.

Seed Selection.

The planter cannot exercise too much care in the selection of seed nuts, remembering that weak parents produce offspring with a tendency to weakness, whereas in planting good seed from strong mature trees a palm is produced which should prove a robust column of wealth production for quite a century. The nuts give thick-fleshed copra and the husk full quantities of coir.

Seed nuts should be taken from healthy heavily-bearing trees of mature age, *i.e.*, about 30 years; large-sized, roundish nuts, ripe but not dry, of a red, brown or green colour, with a thin husk, and the three longitudinal ridges not prominent.

When gathering for seed, nuts should be lowered from the tree, and on no account allowed to drop. The planter should, as far as practicable, personally supervise the collecting of his seed nuts, and thus become acquainted with their family history. Good bearing trees, destined for seed, can be given a distinctive mark in the form of a band of paint of striking colour.

In selecting seed nuts it is a sound principle to take those growing in a district where general conditions are similar to the district to be planted.

It is an advantage not to plant the seed nuts until the outer skin is thoroughly dry and the husk hardened. This occurs in a month or so after picking.

The Nursery.

This must be a carefully prepared piece of land of rich soil, light and free, not far from the permanent field, and in a locality where the planter can give it constant observation. The soil should be thoroughly changkolied" to a depth of 18 inches, and all large stones or roots removed. Trenches should then be made to a depth of about six inches, with pathway intervals. The nuts are then set in the soils at an angle of 45°, stalk ends slightly raised, the nuts one foot apart. The reason for this slanting position is that at the stalk end there is a depression around the "eyes" or germ seats in which water is likely to settle and rot the germ

YOUNG COCONUT PALMS.

if the nut is planted vertically. In the oblique position it drains off.

The nuts are then covered with good top soil and, if possible, with an additional thin layer of sand, until about only a quarter of each projects. They should be well watered so as to settle the soil round them, and the beds then shaded with grass or straw.

In dry weather it is very important that the nuts be watered from time to time. This also applies to the young seedlings.

It is advisable to plant in the nursery 50 per cent. more nuts than are actually required, in order to allow for those that do not germinate, and further to give a wide range for the selection of plants that show vigour. Those that are tardy in germinating should be rejected, as they are weakly plants. Germination occurs in three or four months. At the sixth or seventh month, when the leaves are a foot or so high, the young seedlings may be transplanted to the permanent field.

The Cultivation.

When the young plants have been put in the permanent field and are firmly rooted, very little cultivation is required beyond keeping them free from weeds and the lalang pest. They should be forked round every three months and ploughed or disc-harrowed down the avenues. As the trees advance in age, the circle forked round the tree should be extended, commencing with a radius of 3 feet from the stem for a one-year-old tree, 4 feet for a two-year-old, and so on till the tree is in bearing, when the radius from the stem is about 8 feet.

Clean weeding is of great importance during the first four years, for the simple reason that during that period the roots will have undisputed possession of the soil and the available plant food during their tender years. When the trees are older, their huge leaves create shade, which to a certain extent keeps weeds in check.

Many planters do not favour absolute clean weeding for coconuts. Except for the 8-foot circle around the tree, and provided lalang has been kept out, it is not necessary, and is very expensive.

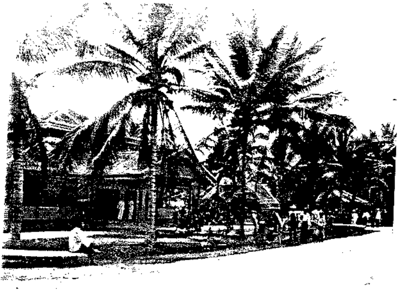
In the West Indies, the writer saw young seedlings put out in cleared lines through the bush or blukar, the latter forming a shade to the young plants. The same system is adopted with coconuts planted in sugar canes. The young palms seem to thrive well, and the cost of planting is very considerably reduced.

Manuring.

Given good soil, the young palm requires little or no manuring, except in cases of a backward plant, and a field should be allowed to demonstrate what the soil can do for the plants before attempting to force them.

At the end of the first year, plants that are of weakly appearance should be taken out and replaced by more vigorous ones from the original nursery. These being of the same age, a uniform growth in the permanent field is obtained.

Green Manure. In the [illegible] second to the [illegible] the planter [illegible] both [illegible] planting of leguminous Catch Crops. One [illegible] seems likely to [illegible] This is better known in Java than the Malay Peninsula, and [illegible]



[illegible] and [illegible] Grove, Kuala Kangsar, Perak.

[illegible] only as a green manure [illegible] allowed to [illegible] They [illegible] of course, [illegible] away from the trees down the lines of coconuts.

[illegible]

of returning humus to the soil, and the necessary tillage of the land for the second crop is most beneficial. This may be repeated for three years.

Artificial Manure.

After the fourth year, the treatment of the coconut palm must depend on circumstances, but it must be remembered that as the trees come into bearing, they require potash and phosphates, as these elements largely represent what the fruit is removing from the soil.

They may be supplied as Sulphate of Potash and Kainit for Potash, and as Superphosphate, Basic Phosphate or Bone Meal for Phosphorus. When husk is used as fuel, the residue ash is a useful manurial constituent, as is also the residue from the husk after the extraction of the fibre. Of course, cattle manure is, when obtainable, the most efficient fertilizer.

Each plantation, according to the state of its soil, is a law unto itself, and to meet its requirements the individual planter must study such local conditions. He should have the soil analysed periodically, and as he takes from it so in due proportions must he return to it.

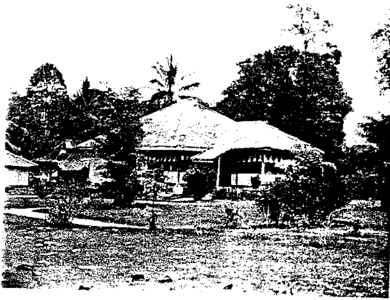
Much can be written on the important subject of fertilizers, and to treat of it as it deserves is beyond the scope of this brochure. Suffice it to say that any manuring scheme adopted must be thorough and systematic, must be in accordance with the ascertained requirements of the soil, and bear a close relationship to the elements absorbed by the crops.

The cost of manuring an estate is very considerable, and, unless the conditions are studied, the outlay may be a waste of money, to say nothing of loss of time and labour, and the disappointment of the investors.

A common way is to dig semi-circular trenches round the tree into which the manure is placed. The trench forms a crescent to the tree—half its root area being dealt with one year, the remaining half in the following year, and so on alternately. These trenches are dug approximately at the extremities of the roots. Here the lateral feeders are most vigorous, diminishing gradually in strength towards the stem. The trenches should be dug a foot in depth and 9 inches wide. They may be left open for some time as the aerating of the soil is very beneficial. The manure is then put in and the excavated soil replaced.

The "avenue" system is another way of applying manure, the latter being placed in ploughed furrows between two lines of trees, equidistant from the stems.

No tropical plant responds more generously than the coconut palm to high cultivation at the proper period, and for every dollar spent in feeding it, the tree returns treble the output even in its first producing year. As the planter would care for his



PLANTER'S BUNGALOW.

human family, so he must care for his palms, and they reciprocate far more than could be expected from any human alliance.

Fencing. The demarcation of property in the Federated Malay States is done by Government surveyors, and details of the survey are kept in the records of the Land Office, the plan of the property being inscribed on the Title Deeds.

To keep out buffaloes, cattle, wild deer, and hogs, it is necessary to erect a strong five-strand wire fence all round the plantation, and as this is intended as a permanency, the work should be well done. On page 22 reference is made to the hardwood uprights, which the fencing contractor should supply. These uprights should be of good hard timber, firmly fixed from 2 to 3 feet in the ground. Particular attention should be given to corner posts, end and straining posts, all of which should be sunk a foot deeper than the ordinary ones. A wood preservative, applied to the base of the posts adds considerably to their life time.

An excellent fencing is a galvanised welded wire mesh. Though this is more costly at the outset than the ordinary five strand wire fence, it lasts five times as long as the cheaper one and the cost of maintenance is very small.

HARVESTING THE CROPS.

Gathering. Nuts fall when ripe, and usually during the night, which is said to account for so few accidents to people on the plantations.

Climbing the tree for the collection of the fruit is one of the best methods of gathering. Past records in the Malay Peninsula show that the average coolie picks about 400 to 500 nuts a day, whereas in the West Indies 1,000 nuts a day is an ordinary task.

This remarkable difference in quantities is attributed to the different styles of climbing the tree adopted by the coolies and the manner they maintain their hold. The Malayan method is by means of cut notches in the stem. Holding on by one hand, the picker has only one hand free for his work in the crown of the palm. The West Indian method, as herein illustrated, is by means of a rope loop which encircles the stem and the picker, a gunny bag taking the strain where the rope rests in the small of the back. By this means, a much more rapid ascent is made, both hands are free, not only for picking the nuts, but for the removal of dead leaves, moss, and lichen; the picker, too, is enabled to make a more thorough search for beetles and pests.

Fortunately, a disease, known as bleeding stem, is almost unknown in Malaya, but this immunity may not last for ever, and for this reason the writer would enter an emphatic protest against notching trees in any shape or form. Wounds of this nature leave a tree open to attack, not only from disease, but from borers.

Climbing the Palm, Malayan Method

Climbing the Palm, West Indian Method

The practice of using a knife attached to a long pole for cutting down nuts is to be deprecated also, for by this means insufficiently ripe nuts are brought away in the cut bunches.

Old habits die hard, but the Malay, with his stem notching and the Chinaman with his pole-knife, must be taught to appreciate the many advantages the rope-loop system of climbing has over present Malayan methods.

Yields. These, of course, vary according to the cultivation. In the Malay Peninsula, the coconut palm is known to fruit in the fourth year; this is especially so with the "King" tree. On the other hand, many of the palms may not flower till the seventh year, so that, to arrive at a fair average, the sixth year should be reckoned as the one on which returns can be based. It should be noted that the term maturity, as generally applied to fruit-bearing trees, has a wider interpretation when associated with the coconut tree. For instance, though the latter does not arrive at maturity till about its thirtieth year, it has for the previous twenty years or so borne fruit. This is mentioned to correct a common idea that "bearing" and "maturity" are synonymous terms. Instances are common in the Malay Peninsula of full-grown trees bearing as many as 300 nuts, of which about half may mature. It would not be advisable, however, to take such figures as a basis upon which to calculate revenue.

The following is the generally adopted estimate :—

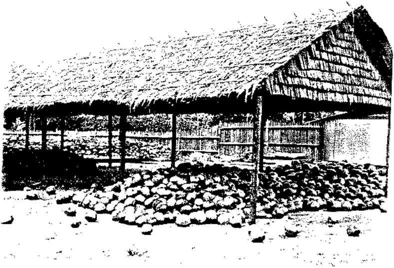
At the end of 6th year	..	average 10 nuts per tree, per annum	
..	7th	..	30	..
..	8th	..	40	..
Thereafter ..	..	..	50	..

Given reasonable cultivation, an average of 80 nuts per tree in the tenth year is readily obtainable, but for a conservative estimate it is deemed advisable, when calculating profits from a mature estate, to keep the maximum output per tree at 50 nuts. This allows a wide margin for unforeseen contingencies—drought in particular. When buying a plantation, many adopt 40 nuts per tree per annum as a safe average.

On native plantations, nuts are picked monthly, but on a properly organised estate there should be but three or four picking seasons in a year.

Husking. There are different methods of tearing the husk away from the nut. One method is by means of a crow bar or sharpened stake firmly fixed in the ground, pointed end up. The nut is smartly split on this, and the husk torn away, usually in three sections. Another hand method is by means of a parang or cutlass.

On a plantation where many nuts are handled, the most efficient and labour-saving system is by machinery.



Coconuts Ready for Husking

Copra. As is generally known, this is the commercial term for the dried kernel of the coconut. Only ripe nuts can be used for making this product, and they are kept unbroken for about three weeks after gathering, as the copra dries more quickly, gives a large percentage of oil, and should not turn mouldy. The standard number of nuts to one ton is 4,000. Copra contains from 60 to 75 per cent. of its weight in oil, the residue forming that excellent cattle feed known as "poonac."

There are various ways of drying copra, such as sun-drying, smoke-drying and hot-air-drying. The first of these is said to be the best, and sun-dried copra certainly commands the highest price. More time is taken up by sun-drying, but the process is natural; there is no charring of the copra: it is not permeated with smoke; its drying, though gradual, is thorough, and as a consequence there is obtained a large percentage of oil.

Copra should not be laid on the ground as it may become mildewed. An efficient and inexpensive drying house consists of a raised wooden platform on brick or iron columns, with a moveable sloping roof in two sections on rollers. When brought together, these form a complete cover to the platform on which the copra rests. They are closed at night or on the approach of rain.

Of course, sun-drying takes up much more time than can be afforded in these days of great demand; therefore, for commercial reasons a hot-air drying system becomes a necessity.

Care must be exercised in the choice of a system, as the quality of the copra depends on it. A hot-air process which takes about eight hours to dry the charge appears to give the best results.

The association with the hot air of antiputrefactive agents, such as sulphur-dioxide, to prevent fermentation and decomposition, contributes to improved quality and colour.

In "Coconut Cultivation and Plantation Machinery," a manual published by Crosby Lockwood & Son, particulars are given of mechanical processes for drying the copra, expressing its oil, and the treatment of the husk to obtain coir fibre—together with the detailed costs of production of a ton of oil and a ton of fibre in Malaya. The handbook treats, in a simple manner, the technical side of these products, and enters into closer details than are permissible in this brochure.

Coconut Oil.

At an oil-expressing factory, copra, having been broken down by means of disintegrators, is then charged into a steam-heated kettle, by which the meal is uniformly heated to about 35° to 45° C. before being pressed.

The copra meal to be pressed falls from the steam-kettle into cake moulds, lined with press cloths, folded to prevent lateral flow. The cake moulds are then slid between the presses, and, by means of a hydraulic ram, a pressure of about two tons to the square inch is applied. The expressed oil, as it flows from the presses, is pumped into tanks for clarification.

The factory costs for turning copra into oil are more than covered by the value of the residuary meal or poonac.

Coir Fibre. This is torn from the husks after they have been soaked to loosen the fibres from each other and the associated cellular matter. From the soaking tanks they pass through the crushing mills, where they are flattened. Still wet, they pass on to the extracting machines. The fibre obtained then passes through the finishers and willowing machines. It is then graded into "Bristles," "Mattress" or "Spinning" Fibre.

The amount of finished fibre obtained from coconut husk depends on the cultivation, but from various tests that the writer has had opportunities of studying, the husk from 1,000 nuts, weighing 1,700 lbs., gives approximately 400 lbs. of fibre of all grades. In some factories, where the fibres are specially selected and treated to provide the "horse-hair" substitute, the fibre obtained from the same weight of husk is about 300 lbs. The residuary dust, when dry, weighs about half a ton.

An approximate estimate of the net profit obtained from the fibre and residue of 1,000 nuts may be put in round figures at £1 sterling.

Fibre Residue. The residuary dust from the husk, after the fibre has been removed, is of value as a fertiliser or as fuel. In Europe, it is used largely for horticultural purposes. It is also now being made into card-board, and when this process is known in the tropics it may become of considerable commercial value. It is also used for making coarse felt.

Poonac. As explained above, the residue from the copra, after the oil has been expressed, is called "poonac." It represents about 32 per cent. of the original weight of the copra. It is a fertiliser of the highest grade, and is unequalled as cattle meal; indeed, used as cattle feed on the estate, it is returned to the soil in a highly nitrogenous form. Its value is about £7 per ton.

Desiccated Coconut. This is another form in which the kernel may be exported. The red rind is shaved off and the nut minced. It is then dried in a desiccator, and through sieves is sifted into three grades—fine, medium and coarse. It is largely used for cooking purposes, confectionery, and, in America, with all fruit salads. Two to three nuts yield about 1 lb. of desiccated nut, which sells at present at about 1s. per lb.

Pests and Disease. In the past, the Malayan plantations have been singularly free from pests and disease, exception being made to beetles—(the black species, *Oryctes rhinoceros*, and the red species, *Rhynchophorous ferrugineus*). These, however, with ordinary preventive measures, now well known in the East, should not give the planter any anxiety. Insecticides should be kept ready for immediate use on the estate, and pickers should be trained to detect disease or insect pests.

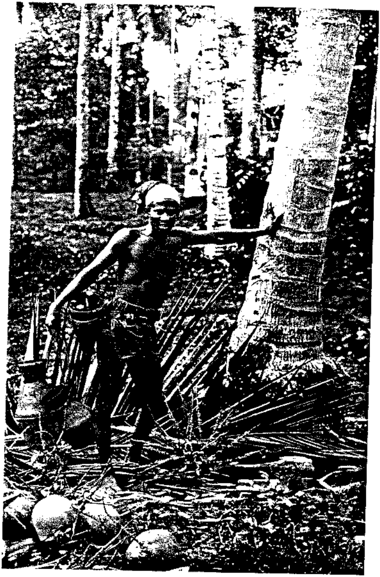
Such diseases as Bud Rot, Root Disease, Bleeding Stem and Short Leaf Disease are almost unknown in the Malay Peninsula. Nevertheless, the planter should endeavour to become familiar with their characteristics and a watchfulness kept for any unhealthy signs in the trees.

The Federated Malay States Government has drafted an Enactment to provide for the protection of trees, plants and cultivated products from disease and pests. The aims of the Enactment are to provide statutory means of combating the introduction of disease and pests, and to create power to make official inspection of estates.

Toddy. Natives extract toddy from the blossoms of the tree. The effect of this is said to be to advance young trees. The treatment, however, if adopted, should not be continued for more than a year, when the nuts should be allowed to mature without further interference.

Estimates. In the following estimates the endeavour is to give figures which apply to plantations where normal conditions exist. Much must depend on the organising power of a manager and his study of economy. Well-known and able planters in the Malay Peninsula state that £35 is the cost per acre to bring a coconut estate into bearing. Given no abnormal conditions, the writer maintains that £25 per acre is ample. How this figure is arrived at is shown in detail hereafter.

Again, in a recent publication, the cost of copra per ton on an estate in Selangor was given as £12 4s., whereas the price in the following detailed estimate, namely £8 12s. 8d. per ton, is borne



Tamil Coolie Collecting for Toddy, Seremban.

out, not only by generally accepted figures in Malaya, but by "Straits Plantations" Accounts for 1911, wherein the net cost per ton of copra is put at £8 15s. 8d.; also by the Government Inspector of Coconut Plantations, F.M.S., in his official pamphlet of 1911, wherein he gives the production cost of copra as £6 15s.; and again in September, 1913, the same official in a London periodical gives the cost of copra as $3.87 per pikul, or the equivalent of £7 11s. 8d. per ton.

The serious fall in the price of rubber led to close investigations into the all-in cost of production of the commodity, and this cost, in many instances, is to-day brought down to a level which, a year or so ago, some of our old planters would have pronounced impossible. Therefore, because the selling price of copra is now exceptionally high, there seems to be no reason why its cost of production should not be kept at the minimum.

Of the important ingredients of the soil, 1,000 *Nuts remove approximately the following :—*

	Husk. lbs.	Shell. lbs.	Kernel. lbs.	Milk. lbs.	Total. lbs.
Nitrogen	3.70	0.54	4.41	—	8.65
Phosphoric Acid $P_5 O_2$ ..	0.84	0.07	1.40	0.12	2.43
Potash K_2O	13.52	0.71	3.73	0.77	18.73
Lime CaO	1.82	0.09	0.21	0.16	2.28
Sodium Chl. N.A.C.L. ..	20.23	0.24	0.35	0.54	21.36
Total ..	40.11	1.65	10.10	1.59	53.45

A comparison of the Coconuts grown in the Middle East and in the West Indies gives the composition of each as follows :

	Malay Nuts.	West Indian Nuts.
Husk	34% ..	57%
Milk	24% ..	12%
Shell	12% ..	13%
Meat	30% .	18%
	100%	100%

APPENDIX

To bring into bearing an estate of 500 acres. Planting distance, 30 ft. × 30 ft. = 48 trees per acre.

1st Year.	Exchange 2s. 4d.		£	s.	d.
Land and Buildings					
Land premium to Government, 500 acres at $3	$1,500		175	0	0
Survey fees	500		58	6	8
Quit rent	500		58	6	8
Manager's bungalow and furniture	2,500		291	13	4
Coolie lines	1,000		116	13	4
Tools	300		35	0	0
	$6,300		£735	0	0
Development, etc.					
Felling, 500 acres at $7	$3,500	=	408	6	8
Burning, 500 acres at $1	500		58	6	8
Collecting and stacking trees up to 5in. in diameter, 500 acres at $6	3,000	=	350	0	0
Lining and measuring 500 acres at $1.50	750	=	87	10	0
Holing, 500 acres at $3	1,500	=	175	0	0
Planting and filling in, 500 acres at $1.50	750		87	10	0
Nurseries, 500 acres at $0.50	250		29	3	4
Selected seed, 40,000 at 8 cents	3,200	=	373	6	8
Roads and drains, at $3	1,500		175	0	0
Fencing, at $3 per acre	1,500		175	0	0
Medical requirements	500		58	6	8
Superintendence, 1 European at $300 per month	3,600		420	0	0
Servant Allowance					
1 cook, at $15 per month	180		21	0	0
1 house servant, at $12 per month	144		16	16	0
1 postman, at $25 per month	300		35	0	0
Monthly weeding for 10 months of year at $1.50 per acre per month	7,500		875	0	0
Contingencies	1,000		116	13	4
Transport	300		35	0	0
	$36,274		£4,231	16	4
Add 6 per cent. interest	2,177		253	19	0
	$38,451		£4,485	18	4

Brought forward	$38,451 = £4,485	18	4
2nd year.					
The cost of upkeep, development, and all-in charges should not exceed (including 6 per cent. interest)	14,648 =	1,709	0	0
3rd year.					
All-in cost (weeding put at 80 cents) (including 6 per cent. interest) ..	14,005 =	1,739	0	0
4th year.					
All-in cost (weeding put at 50 cents) (including 6 per cent. interest) ..	14,083 =	1,643	0	0
5th year.					
All-in cost (weeding put at 40 cents) (including 6 per cent. interest) ..	14,332 =	1,672	0	0
6th year.					
All-in cost (weeding put at 30 cents) (including 6 per cent. interest) ..	10,724 =	1,251	1	8
	$107,143 =	£12,500	0	0
		or £25 per acre		

PLANT FOR TREATING 10,000 NUTS PER DAY FOR FIBRE.

2 Soaking Tanks, 20ft. × 8ft. × 6ft. deep.
5 Coarse Fibre Extractors.
1 Special Fibre Extractor.
2 Chain Conveyors.
2 Baling Machines.
2 Willowing Machines.
Shafting, Pulleys, etc.
1 Colonial Boiler, 12 h.p. Nominal.
L. Steam Engine, 10 h.p. Nominal.

Estimated Cost (new) £850
Total Cost, laid down at Estate £1,300
If Spinning Yard required, add £300

COST OF ONE TON OF COPRA TO PLANTATION OWNER.

BASIS OF 4,000 LARGE NUTS = 1 TON COPRA.

Estate upkeep—based on 500 acres—25,000 trees at 40 nuts per tree = 1,000,000 nuts = 250 tons Copra per annum.

STANDING CHARGES	Administration Charges £500	$4,200
	Quit Rent	1,000
	Management	3,000
	Servant Allowances	180
	Medical Requirements	500
	Weeding (30 cents per acre per month) ..	1,800
	Manuring (allowing partly for use of poonac and fibre residue	1,000
	Cattle Food, Factory Hands and Cattle Drivers	1,500
	Sundries	720
	Depreciation on Buildings and Machinery ..	1,000
		$16,000

		Nuts. Per 1,000	Copra. Per Ton
$16,000 on the above output of 1,000,000 is		$16.00	
To this is added:			
CROP CHARGES	Picking	.50	
	Collecting in Field	.20	
	Carting from Field to Shed, Wear and Tear of Rolling and Live Stock	.30	
	De-Husking	.50	
	Breaking and Extracting Copra	.40	
	Stacking and Weighing ..	.15	
	Charging and Discharging Drier	.13	
	Fuel (reduced if husks are consumed)	.20	
	Sundries and Renewals at Factory	.12	
		$18.50	£8 12 8
			$18.50 × 4

NOTE.—This cost of production as affected by Standing Charges should be reduced as the output increases, approximately as follows:

		Per 1,000 Nuts	Per Ton of Copra
Av. 40 Nuts per tree	1,000,000 Nuts ..	$16.00	
	Crop Charges ..	2.50	
		$18.50	£8 12 8
" 50 " "	1,250,000 Nuts ..	12.80	
	Crop Charges ..	2.50	
		$15.30	£7 2 8
" 60 " "	1,500,000 Nuts ..	10.66	
	Crop Charges ..	2.50	
		$13.16	£6 2 8

To the above must be added the Export Duty of 2½ per cent. *ad valorem*, or 1½ per cent. if the plantation is in the East Coast District of Pahang.

EQUIVALENTS.

1 Ton of Copra = 2,240 lbs., or 16.8 pikuls, or 150 gallons of oil.

1 Ton of Copra = 3,696 Malay Coconuts (for estimating, adopt standard of 4,000 large Nuts).

1 Pikul of Copra = 133⅓ lbs., or 220 Nuts.

1 Ton of Oil = 240 gallons, or 5,013 Nuts.

1 Pikul	..	61.76125 Kilos.
1 Cwt.		50.84 Kilos.
1 Kattie	..	1⅓ lbs.
1 Kilo		2.205 lbs.
1 Maund		80 lbs.
1 Kandy		500 lbs.

One Square Mile	640 Acres
One Acre	43,560 Square Feet
One Acre	4,840 Square Yards
One Acre	10 Square Chains
One Bouw	1¾ Acres
One Hectare	2.471 Acres

The Malay Mail

Established 1896.

AN ENGLISH NEWSPAPER

Published Daily and Weekly in Kuala Lumpur, the capital of the Federated Malay States, and the centre of the principal Rubber Planting District in Malaya.

"The Malay Mail" was the first daily newspaper published in the Federated Malay States.

The paper affords a valuable advertising medium, having a circulation all over the Federated Malay States. Advertising Rates on application.

SUBSCRIPTION RATES

(For Cash in advance)

Daily Edition (Postage 1/2 per month extra). 6 months, 32/-; 3 months, 17/6; one month, 5/10.

Weekly Edition (including postage), 6 months, 21/-; 3 months, 10/6; one month, 3/6.

All communications to be addressed to:

THE MANAGER,
Malay Mail Press Co.,
Kuala Lumpur, Selangor, F.M.S.

or to the Sole European Agents:

THE FAR EASTERN ADVERTISING AGENCY, LTD.,
Craven House, Kingsway, London, W.C.

GUTHRIE & CO., Ltd.

SINGAPORE

General Merchants

Secretaries and Agents to Rubber Plantation Companies, Bank, Shipping and Insurance Agents.

ESTABLISHED 1821.

GOVERNMENT, &c.

Government of British North Borneo.
Singapore Electric Tramways.
The Island Trading Co., Ltd.
The British Borneo Petroleum Synd., Ltd.

BANKING.

Coutts & Co.
London County & Westminster Bank, Ltd.
Drummond's.
Ulster Bank, Ltd.
Herries, Farquhar & Co.

INSURANCE.

London Assurance Corporation.
Western Assurance Co.
Triton Assurance Co., Ltd.
Manufacturers' Life Insurance Co.
Phœnix Assurance Co., Ltd.
Hong Kong Fire Insurance Co., Ltd.
Imperial Marine Transport & Fire Insurance Co., Ltd.

COALING & SHIPPING.

Cory Bros. & Co., Ltd.
Eastern & Australian S.S. Co., Ltd.
Osaka Shosen Kaisha.

RUBBER COMPANIES.

Bangawan Rubber, Ltd.
Banteng (Selangor) Rubber Estates, Ltd.
Bukit Kajang Rubber Estates, Ltd.
Brunei (Borneo) Rubber & Land Co., Ltd.
Changkat Salak Rubber & Tin, Ltd.
Cheviot Rubber Estates.
Galang Besar Rubber Plantations, Ltd.
Kamuning (Perak) Rubber & Tin Co., Ltd.
Kawie (Java) Rubber Estates, Ltd.
Kinanis Rubber, Ltd.
K.M.S. (Malay States) Rubber & Coconut Plantations, Ltd.
Labu (F.M.S.) Rubber Co., Ltd.
Linggi Plantations, Ltd.
Membakut Rubber, Ltd.
North Borneo State Rubber, Ltd.
Port Dickson-Lukut (F.M.S.) Rubber Estates, Ltd.
Rangoon Para Rubber Estates, Ltd.
Semlayan (F.M.S.) Rubber Co., Ltd.
St. Andrew (Malay) Rubber Estates, Ltd.
Sungei Buaya (Sumatra) Rubber Co., Ltd.
London & Colonial Rubber & Produce Investment Corporation, Ltd.
The Selangor United Rubber Estates, Ltd.
Tobacco Co. of British North Borneo.
United Sua Betong Rubber Estates, Ltd.
United Temiang (F.M.S.) Rubber Estates, Ltd.

Telegraphic Address: "GUTHRIE."

Branches at PENANG, KUALA LUMPUR, KLANG, PORT SWETTENHAM and LONDON.

Also MEDAN, SUMATRA.

GUTHRIE & CO., Ltd.

Eastern and General Merchants

SINGAPORE

Branches at Penang, Kuala Lumpur, Klang, Port Swettenham and Medan, Sumatra

Commercial Agencies include the following:—

GENERAL COMMERCIAL

"Red Hand" Brand [illegible].

"Dragon" and "Devil" Brands of Explosives.

"Elephant" Brand Undershirts.

"Izal" Disinfectants.

Milner's Safes.

GILLINGHAM PORTLAND CEMENT COMPANY LIMITED
LONDON
PORTLAND CEMENT
REGISTERED TRADE MARK
WORKS: GILLINGHAM KENT

Webster's Canvas and Twines.

Hall's Distemper.

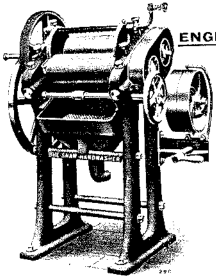
Gosnell's Cherry Blossom Soaps and Perfumes.

Mackie's White Horse Whisky.

Tennent's Beer.

"Solignum" Wood Preservative.

ENGINEERING



SHAW'S RUBBER-WASHING MACHINERY.

Marshall's Engines and Boilers.

National Gas Engine Co.'s Gas Engines.

Petter's Semi Diesel Oil Engines.

Hayward-Tyler & Co.'s Steam Pumps.

Caillet's Monorails.

Daimler Motor Cars.

Lacre Motor Lorries.

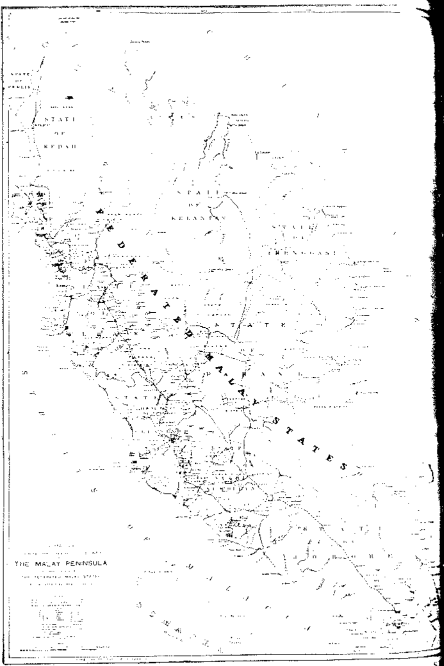
A.C. Light Cars.

Rudge Motor Bicycles.

Seamless Steel Boats and Launches.

Marine Motors.

[illegible] Water Filters.


THE MALAY PENINSULA
STATE OF PERLIS
STATE OF KEDAH
STATE OF KELANTAN
STATE OF TRENGGANU
FEDERATED MALAY STATES
STATE OF PAHANG

SPORT AND MOTORING IN MALAYA

MALAY STATES INFORMATION AGENCY
88, CANNON STREET LONDON, E.C.

Big-Game Shooting

By

THEODORE R. HUBBACK

AND

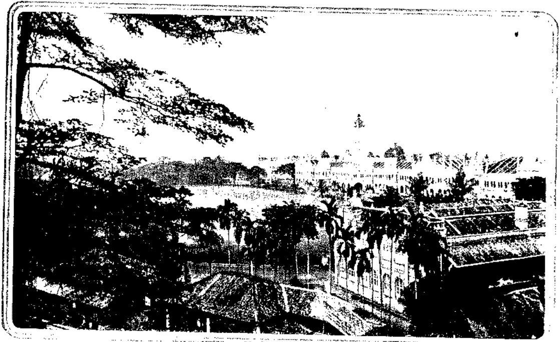
Motoring in Malaya

By

J. H. M. ROBSON

MALAY STATES INFORMATION AGENCY,

88, CANNON STREET, LONDON, E.C.



Kuala Lumpur, the Capital of Federated Malay States.

A. C. Harper & Co

KUALA LUMPUR, KLANG and PORT SWETTENHAM

AGENCIES

Insurance

Lloyd's, London
Commercial Union Assurance Co., Ltd.
South British Insurance Co., Ltd.
London & Provincial Marine and General Insurance Co., Ltd.
Federal Life Assurance Co. of Canada.
Yangtze Insurance Association, Ltd.
Motor Union Insurance Co., Ltd.
United Swiss Marine Insurance Co., Ltd.

Shipping

Straits Steamship Co., Ltd.
Ocean Steamship Co., Ltd
Norddeutscher Lloyd
Nederland S. S. Co
China Mutual Steam Navigation Co., Ltd.
A. Currie & Co.'s Indian & Australian Line of Steamers
American Asiatic Steam Ship Co., Ltd.
American & Manchurian Line
Hamburg America Line
Indra Line
Bucknall Steamship Line, Ltd

Oil

Asiatic Petroleum Co. (F. M. S.), Ltd
Anglo Saxon Petroleum Co., Ltd

General

De Dion Bouton Cars
Metallurgique Cars
Swift Cars & Cycle Cars
Waverley Cars
Carr & Co. (Biscuits)
Nobel's Explosives Co., Ltd
Dunlop Rubber Co. (Far East) Ltd.
John Crabbie & Co.'s (Scotch Whiskey)
The "Star" Cycle & Fittings Co., Ltd
Victoria Malay Rubber Plantation Co., Ltd.
[illegible] & "Globe" [illegible] British Port and [illegible]
[illegible] Ltd
Austin Motor Cars
Humber Cars
Vulcan Cars
Royal Enfield Motor Cycles
[illegible] Passenger Vehicles
The Borneo Co., Ltd.
St. Pauli Breweries Co., Ltd.

PREFACE

THE two articles published in this pamphlet form part of "An Illustrated Guide to the Federated Malay States," edited by Mr. C. W. HARRISON, of the F.M.S. Civil Service. Since Mr. ROBSON'S article was written, the road system throughout the Malay Peninsula has been considerably extended, while the use of the motor car has become more general from end to end of the Peninsula. Facilities have increased for the execution of repairs and for the supply of petrol, remote districts being thus rendered more accessible to the motorist. In the Federated Malay States alone, there are over 2,300 miles available for motoring, passing through tropical scenery of great beauty, and touching populous centres where the tourist is assured of good food and comfortable quarters for the night.

Mr. THEODORE HUBBACK, as the author of an authoritative work on the principal forms of big-game shooting in Malaya, is able to give the best advice to anyone contemplating a hunting expedition in the forests of the Peninsula.

We are indebted to Messrs. ROWLAND WARD, LTD., for permission to reproduce three illustrations from Mr. HUBBACK'S book. Other illustrations are from photographs by Messrs. LEONARD WRAY, J. B. SCRIVENOR, L. LEWTON-BRAIN, and KLEINGROTHE.

T. H. R.

Transport Elephants, Raub, Pahang.

BIG-GAME SHOOTING

By THEODORE R. HUBBACK,

Author of "Elephant and Seladang Hunting in Malaya."*

Introduction. There is a certain fascination about the expression "Big-Game Shooting" which appeals to most Britishers, and a country which provides such shooting will invariably be sought after by a certain section of the sport-loving community from our Island home.

Malaya has been visited up to the present by very few sportsmen in search of Big Game, chiefly because very few people know anything about the country as a field for the big-game hunter, and also because the many difficulties to be encountered have frequently proved on enquiry to appear so great that the would-be hunter-visitor has turned his attentions to some better known locality.

But the difficulty of obtaining a trophy generally enhances its value to the possessor, and those who are prepared to face a certain amount of hard work and inconvenience, and are well posted up with the information that is necessary to enable them to organise a hunting trip, should be able to obtain trophies that will well repay them for the hard work, energy and time expended.

Equipment, Rifles, etc., etc. The sportsman who contemplates coming to Malaya to shoot big game will probably be already equipped with a battery, but perhaps a few hints on what class of rifle is suitable will not be out of place. It will be shown later on in this article that most of the opportunities to shoot at big game that may occur in the dense jungle that one

* Rowland Ward, Limited, London.

hunts in will be within a limit of twenty-five yards, very frequently much closer than that. It will be at once apparent that when facing dangerous game at such near quarters a powerful weapon is absolutely essential. Some years ago, before the advent of cordite rifles, the few local sportsmen when in pursuit of big game armed themselves with the heaviest rifles that they could obtain, ranging from four bores to twelve bores; the twelve-borites, however, did not as a rule prove so successful as the devotees of the heavier guns. Shooting in dense forest, the discharge of an eight-bore rifle burning ten to twelve drams of black powder resulted in the gunner being enveloped in a thick smoke through which he could see nothing for several seconds, and the vicinity of which, if he was a wise man, he left as quickly as the thick undergrowth would allow him. Nowadays all this is changed, and to those who can afford to supply themselves with cordite rifles the terrors of the black smoke of the eight bore are no more. A good battery for a shooting trip in the Federated Malay States would consist of two cordite rifles .450 or .500 bore, a twelve-bore shot gun, or ball and shot gun. Rifle cartridges should be put up in hermetically sealed tins containing not more than ten cartridges in each case, and an exceptionally strong cartridge bag should be obtained with a very large flap to keep one's cartridges dry during the heaviest rains. Camp equipment may consist of a great deal or very little according to the requirements and the purse of the hunter. It must, however, be remembered that the lighter the camp outfit the better chance one has of getting about the country quickly, the less difficulty one will have in obtaining carriers, and the more likelihood one has of getting up to game. It is quite unnecessary to take tents. The Malays who would be with the party can in a very short time put up a most respectable shelter, made out of small jungle saplings and the leaves of one of the many ground palms that can be found in almost any part of the virgin forest; so a very cumbersome and expensive item is dispensed with. The following light camp outfit would prove quite sufficient to provide the hunter with all the comfort that he would require. An American camp bed, camp chair and camp table, an aluminium canteen such as is sold at any of the large London stores, a couple of waterproof sheets about seven feet square, two pillows, a muslin mosquito net, which should be specified as sandfly proof, a good rug, a couple of small hurricane lamps, and the outfit would be complete. A good addition to the equipment would be a small camera which would be able to reproduce the pleasant spots that lie hidden far away in the depths of the Malayan forest, but only one of those specially built for the tropics should be taken. Most of the provisions required on a hunting trip for the white sportsman have to be taken with the expedition. The Malay carriers can generally find

Photo by

A Baby Malayan Tiger.

their own stores, which consist of little more than rice and dried fish.

Provisions should be put up in boxes about the size of whisky cases, but should not weigh more than 30 pounds apiece, for in the event of one having to transport these cases through the jungle with Malay coolies, 30 pounds a man will be found to be about their limit. There is, however, a better way of carrying one's goods through the jungle should a long journey be contemplated, and that is by making the Malays take with them the native carrying baskets which are known as *ambong* or *galas*. This basket is made of split rattan or bamboo, and is constructed so that it can be strapped on to the back of the coolie, and is also supported by a broad bark strap across the man's forehead. All sorts of stores can be placed in these baskets, from one's canteen to one's tinned fish or meat, and it would be found most convenient to the sportsman who intended going on a trip to see that his Malay carriers were provided with them before they set out on their journey. Such baskets are commonly used by Malays and can be found in almost every village.

Trackers and Carriers. Before starting out on any expedition after big game the sportsman must arrange to take with him a good Malay hunter, who will be able to take him to the most likely places for the game, who must be a first class tracker, and must also have a very considerable local knowledge of the jungle. It must be borne in mind that all hunting in Malaya is done on foot. The game has to be followed up with the help of native trackers until it is found, and when the shot is taken the hunter is frequently within a dozen yards or so of his quarry, probably in dense jungle, and always unable to see his game quite distinctly.

A few head of game may have been obtained by sitting up over salt licks at night, or by waiting on a built platform at the side of some well-known game track, where the gunner would be well out of danger in case of accidents, but this way of obtaining trophies cannot appeal to any real lover of the word "sport," considering that it is quite impossible to bag one's game by legitimate methods.

To engage the services of a good Malay tracker is a most difficult business. The older generation of Malays is passing on and the younger generation are not the men their fathers were where hunting and woodcraft are concerned. The only way to obtain the services of a good tracker is to inquire through the nearest official source if such a man is to be found in the district. If so, and he has a good reputation, engage him to go with you on your trip and make the best terms possible.

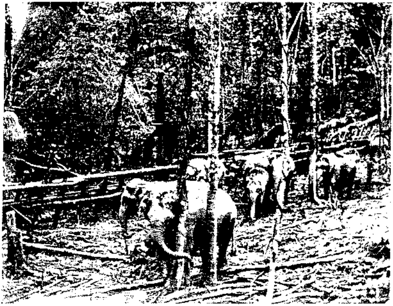
A first-class man will have to be paid between \$20 (£2 6s. 8d.) and \$30 (£3 10s.) a month. He would find his own food out of this, but will want an advance before he starts to provide himself with necessaries for his journey and to leave some money behind at his home. A Malay never has any money. Carriers have also to be engaged, the number of which will depend on the amount of baggage, which again depends a great deal on the length of time that one intends to devote to hunting. Should the party be working from a river, where the bulk of one's goods would be transported by boat, extra carriers would be engaged at the villages where news was obtained that game was in the vicinity. Malays can generally be engaged who will undertake the duties of carriers—provided that they are only very lightly

House Boat on the Pahang River.

loaded—for a wage of from 40 cents. (11d.) to 50 cents. (1s. 2d.) a day, but will want a small advance before they can be persuaded to leave their homes. When working from a river the boatmen who are engaged for the rowing or poling of the boat are engaged under the same circumstances as the carriers, and will act as carriers when a trip is made inland in search of game. Under such conditions two men would probably be left in charge of the boat, or if the boat was left at the landing-place of a village one man would suffice; all the rest of the party would take what was necessary for the "commissariat," and depart up country or wherever news of game took one. If Malay coolies are treated like children, are not asked to do much work or carry more than 25 to 30 pounds a day, are allowed to amuse themselves as they think best when the day's work is over, even though their singing does set one's teeth on edge, the sportsman will find that he can manage fairly well with them, and that they will enter into the spirit of the expedition as far as their intelligence will allow them to do so; but if, on the other hand, they are treated at all harshly or even like what they really are, paid servants, they will spend most of their time sulking, and will not help towards the enjoyment of the trip.

The writer has found that it is an excellent plan to engage Malay coolies for a long trip on a monthly wage plus their rice, an allowance of a catty ($1\frac{1}{3}$ pounds) of rice a day being an ample ration. The other articles of diet they would find themselves. If Malay carriers have to find their own rice on a long trip they either seriously upset one's arrangements by running out of rice at some critical juncture, or else are continually bothering one for small money advances. Twelve dollars (£1 8s.) a month and a rice allowance on a long trip, or 50 cents. (1s. 2d.) a day without a rice allowance on a short trip, will prove to be the best terms that can be made. In some districts it is possible to get Malays to work for 40 cents. (11d.) a day and find their own food, and before making arrangements as to wages inquiries should be made from the nearest headman as to what are the ruling rates in the district. Always remember in dealing with Malays that they have made a fine art of indolence, that they must be treated like children; make up your mind to put up with both these serious drawbacks, and even a stranger in the land will be able to manage them.

The Game. Big-game shooting in Malaya means the hunting of elephant, seladang (the local type of *Bos Gaurus*), and rhinoceros. Tigers and leopards are fairly numerous in many localities, but the chances of hunting them are very remote; beating for them, owing to the extreme denseness of the jungle, is impossible, and the only way to obtain a feline trophy is to sit up over a kill and take one's chance. It is not practicable to follow the system of tying up baits and waiting for one of them to be killed; tigers have far too much wild game to keep them in food to give them much time to get into the habit of hunting domestic animals, and a tied-up bait would probably be left untouched for weeks. Of course, there might be exceptional cases (where a tiger or leopard had taken to the village cattle) when a tied-up bait might prove successful, but such cases would be extremely rare. Sometimes one hears of a bullock or a buffalo having been killed near a village, but even when one does hear of it the news generally comes too late



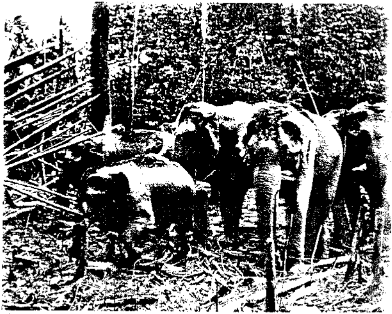
Wild Elephants in a Kubu (Corral), near Tapah.

to enable one to do anything, or the carcase has been removed by some over-zealous native before one has time to make arrangements to sit up for the tiger.

The writer once had a chance of having a shot at a tiger in this way which was spoilt by the greed of a Malay villager. Living at a place called Durian Tipus, in the Negri Sembilan, a Malay named Alet, who often went hunting with the writer, came early one morning and informed him that an elephant had been in a clearing opposite his house all night making a most infernal noise, and wanted to know what was to be done. Preparations were set on foot to go down to the kampong, but before a start had been made another messenger arrived saying that it was not an elephant that had been making all the noise during the night but that a tiger and a big boar had been fighting: the tiger had killed the pig and had dragged the carcase out of the clearing up a hill into the big jungle. Here was a good instance of the reliability of a Malay's information. Abu had stated that he had seen the tracks of a big bull elephant, so by his own showing this brilliant specimen could not tell the difference between the tracks of an elephant and a tiger. Of course he had not really been to the place at all or seen the tracks, while the second messenger had. When the scene of the disturbance was inspected it was found that there had been a right royal fight, and no doubt the tiger had had a very tough job to vanquish his victim, which was a huge boar with most formidable tusks. Hardly any of the boar had been eaten, with the exception of a pound or two of flesh from his neck, but it was marked in many places by both claw and tooth of its powerful foe. The boar was lying in a fairly open piece of jungle, within twenty yards or so of a large anthill, which would have been a good place to wait for the tiger, and orders were given that at three o'clock that afternoon the writer would return and sit up for the tiger. Unfortunately, there were some Sakais who lived close to the house of Abu, and these people went down to a Chinese shop, which was likewise unfortunately handy, and told the story of the tiger and pig fight. The Chinaman, ever ready to make two or three hundred per cent. profit, offered to give the Sakais a couple of dollars if they would bring the pig's carcase down to the shop. Abu, who claimed the pig, told the Sakais that they could have the carcase if they gave him half the money, and the tragedy was complete. When the writer visited the clearing in the afternoon he met the carcase of the boar on its way down to the Chinese shop—it never reached there, and Abu reflected for some days on the extraordinary ways of the white man. The tiger was not seen again in that locality for some months.

" Even living in the country these are the only chances that one gets, and they are rather outside chances which will scarcely ever come the way of the visitor. On a shooting trip the game will have to be searched for and tracked until found. A lucky chance may give the hunter the opportunity of sitting up for a tiger, but such chance should in no way be counted on.

Elephant and seladang, on the other hand, can be found with fair certainty in many places in the Federated Malay States, and although with the opening up of the country one has to go farther a field to reach the hunting districts, facilities for travel



WILD ELEPHANTS IN A KUBU NEAR TAPAH.

have so much improved since the advent of the automobile that one is able to reach a district in a day which a few years ago would have taken three or four to reach. There is now little hunting to be obtained in Selangor or Negri Sembilan: the greater portion of these countries have been opened up with roads and railways, and it would not be worth the while of the visitor to try and obtain game in either of them. In Perak elephants are still to be found near the coast, and in Upper Perak seladang, rhinoceros and elephant can still be obtained but the State where by far the best shooting is likely to be accomplished is the eastern State of Pahang. Very little of Pahang has been opened up, and there are many valleys which are sparsely populated, are well watered, and hold quantities of big game. The State of Pahang is watered mainly by the Pahang river, which is the name given to the river made by the junction of the Tembeling and Jelai rivers; there are numerous other smaller rivers which help to swell the broad flood of the Pahang, notably the Krau, the Semantan, the Triang, the Bera, the Jinka, the Jumpol, the Luit, and the Lepar. All these, which are navigable for small boats for some distances from the main river, lead one to good hunting grounds, and a trip of a couple of months spent in Pahang in search of big game would, with reasonable luck, result in success.

It must, however, be remembered that the hunting is difficult, that although there is plenty of game to be found it is not always easy for the visitor, who would presumably be ignorant of the language, to get the village Malays to work for him, and many disappointments must be expected before good trophies are obtained. The best rewards will come to those who work the hardest and will put up with the many inconveniences that the jungle is bound to present to those unaccustomed to its vagaries; the trophies are there, and although it may mean waiting for several weeks for the opportunity, come it will to those keen enough to endure "the rough and the hard."

The Elephant.

The wild elephant, from its immense size and magnificent trophy, will be the prize which will probably appeal most to the hunter, although the seladang presents more difficulties to bring successfully to bag; always excepting the hunter who is in search of special trophies, when he will most likely find it more difficult to obtain a really good specimen of an elephant in the Malay jungle than he will a seladang.

When making inquiries about big game, reports will often be received from natives that elephants have been near the villages, and in many cases the news bearers will state there is a herd containing a big bull or a solitary bull that carries big tusks. In the majority of instances these reports are entirel incorrect, in all cases they are exaggerated and in most events they are based on no personal knowledge of the case at all. No reliance can be placed on the news that one casually receives from the Malay villagers, and the following notes may be of use to help the visitor to avoid many disappointments.

The writer's experience tends to prove to him that in only very exceptional cases do the old bulls come into the cultivated areas, and then only for a night, or at the most two. They have to be searched for farther afield, near the hill clearings of the Sakais, or up the uninhabited rivers, or along old jungle tracks far from the abode of man. There are, of course, exceptions to this rule, but it is best to work on that basis when searching for the big bulls. Do not believe the reports of Malays regarding the size of elephants or the size of their tusks; they exist merely in the imagination of the villager's mind. He has in ninety-nine cases out of a hundred never seen the beast at all, let alone his tusks.

Where an elephant is reported to have done considerable damage to cultivated crops, and to be continually hanging about the vicinity, and provided the report has some spice of truth in it, the beast is probably a young tusker carrying small tusks, which will not exceed 30 pounds a pair in weight. More frequently, the damage done to standing crops is the work of a herd in which there may or may not be a small tusker; there is hardly ever a big one with these marauding herds.

A small herd is frequently reported as a solitary elephant, probably designated as a *gajah tengkis*, which generally is meant to convey that the beast has one small foot and will prove invulnerable if fired at. The simple villager, having seen the track of elephants and probably noticing different sized footprints, at once remembers the stories that he has heard of a terrible elephant with a small foot, and the yarn hatches at once. The only way to verify the conflicting statements that one continually hears from Malays when searching for big game is to go oneself and spy out the land, or, if one has a reliable tracker, send him and await his report, being always prepared to find that the entire story is a fabrication. Work on the basis that the really big bulls must be searched for in the back country, that the medium-sized bulls are occasionally to be found near the villages, especially during the rice season when the crops are coming into bearing, that the herds seldom contain a bull worth shooting, that all native reports must be taken with a very large grain of salt and a large stock of patience, and the hunter will with a little luck come across something worth shooting.

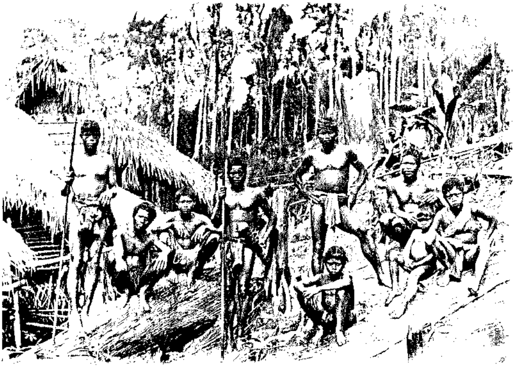
A wild elephant is an easy beast to approach in the thick jungle of Malaya, provided one precaution is observed, and observed continually. Never get to windward of the beast that you are stalking, and you can get as close to him as you like. This sounds very simple advice and possibly unnecessary advice, but it is much easier to write about than to carry out. Except in the very early morning, the wind in the jungle never remains in the same quarter for more than a few minutes at a time, and it is useless to take the position of the wind and then work one's stalk on the assumption that the wind is likely to remain where it was at the moment you ascertained its direction. The thick jungle, intermingled with patches of slightly clearer undergrowth, with an occasional open space where some giant of the forest has blown over or died from old age, produces during the slightest breeze a continual series of eddies which no amount of care can altogether overcome. The writer has always made it his practice to ascertain the position of the wind, which may be taken to mean the ever-changing eddies, by striking matches every minute or so while approaching an elephant. After following up the fresh tracks of an elephant until the signs of fresh droppings indicate that the quarry is near at hand, it is as well to test the wind to put one on guard should the eddies be following the line of the elephant's footprints. No really systematic wind testing can take place until the exact whereabouts of the elephant has been found out by the sounds which he makes when feeding, when sleeping, or when just idling along doing nothing. In the former case one may frequently hear one's quarry as far away as a quarter of a mile, in the other cases one may get very close indeed without hearing him. A sleeping elephant—that is an elephant sleeping lying down, they frequently sleep in an upright position leaning against a tree—makes very little noise. He occasionally lifts his ear and lets it down again with a sound smack which can be heard quite a long way off; he also often rolls up his trunk and unrolls it again, making a noise like air escaping through water, but this noise can only be heard at quite close quarters. When he is resting standing up he is very hard to locate, occasionally flapping his ears, and even then with such a very languid air that they hardly make any noise at all. If he is doing anything but feeding one requires a certain amount of luck to be able to ascertain his whereabouts before he gets one's wind. A solitary elephant does not, in the Malay jungle, feed at regular hours, so it is impossible to judge beforehand what one is likely to find him doing at any given time of the day: on a hot, dry day he will probably not be feeding during the middle of the day, but that is as far as one dare trust him.

Supposing that the conditions have been favourable, and that one's tracker has brought one up to within about a quarter of a mile of a good sized solitary elephant which is feeding, the

[illegible] [Elephant and Seladang Hunting in Malaya.

A DEAD ELEPHANT.

crack of a branch will probably be heard, and the hunter would immediately halt and listen for further indications of the author of the noise—monkeys make a great deal of noise in the jungle which is frequently mistaken for that made by an elephant by any but the most experienced trackers, but the noise made by an elephant is never mistaken for that made by monkeys. Another branch cracks and one's doubts dissolve, one's pulse quickens, and the critical time is drawing near for which one may have waited for weeks. Now test the wind and, if blowing, in the direction of the elephant make a wide detour to avoid him, continually testing the wind and tacking accordingly. Sometimes the eddies change so quickly that even with the greatest precautions the elephant will get one's wind and vanish, with or without noise, as his temperament may decide; but let us suppose that in this case all goes well and presently, with a steady wind blowing in our faces, we see the great brown mass of what is evidently a big bull elephant. Even in the lightest jungle that this part of the world produces it will probably be necessary to approach within twenty-five yards of one's quarry before there is the least likelihood of being able to see his tusks. We will again suppose that everything is favourable and at twenty yards distance the bull proves to be well worthy of the hunter and carries a good pair of sizeable tusks, which will look quite a golden yellow colour in the shade of the jungle. Possibly the approach has brought one up in a good position. He is standing broadside on and his ear can be distinctly made out. The actual earhole should be localised and a bullet placed very slightly in front of it. This should prove immediately fatal, the beast probably dropping so quickly that the gunner would be unable to see him fall. But it must not be supposed that the approach will often, if ever, be quite as simple as this, and a few notes as to what may happen, what has actually happened to the writer times without number, may be a help to those who follow. It might almost be taken as a golden rule never to attempt the frontal shot, the shot at the base of the trunk, in the dense jungle that elephants are nearly sure to be in when found. The writer in no way wishes to disagree with the many great authorities who have laid down that this shot is one of the most effective against the Asiatic elephant, but local conditions are such that what proves a valuable shot in other places proves on actual experience almost useless here. The spot to aim for successfully to kill an Asiatic elephant by the frontal shot lies in the middle of the forehead at the base of the trunk which is well defined by a large bump. This spot is about three inches above the eyes which more or less define its position. Now to localise this spot it will be readily understood that one has to know the position of the eyes as well as be able to see clearly the point one aims for in the centre of the bump; in other words, one requires to see the whole of the bump as well as the eyes, which resolves



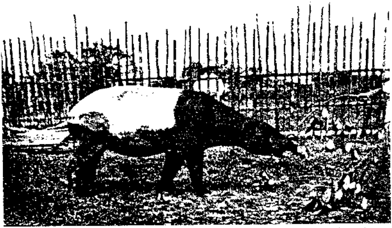
A TYPICAL GROUP OF SAKAIS.

itself into a very large portion of the head. It is almost impossible ever to get such a clear view of an elephant's head in the thickness of the jungle, with the result that, if taken, the frontal shot is guessed at, with what result I need scarcely state.

The shot *par excellence* is undoubtedly the ear shot, but here again a word of warning is necessary. Old elephants have very tattered ears which are so dilapidated that when they flap them forward they hang like a curtain with heavy tassels, and in very thick jungle one of these tatters may be easily taken for the ear hole. If the brain is missed, the elephant, having been fired at from the side, will probably be stunned and will fall over, but will recover himself much more quickly than one would suppose, and will be up and away before it is even realised that he has got up. A bullet that misses the brain by being too far back is much more likely to stun the beast badly than one that has been placed too far forward, and if the elephant has fallen at the shot but shows convulsive movements of the legs or trunk it will only be a question of seconds before he is up and off. Fire immediately at him if there is the slightest doubt, but do not attempt to find the brain, fire into the body between the fore legs or, if he is on his knees, directly behind the shoulder. The chances of rectifying the first mistake are infinitely greater by doing this than by again attempting to put a bullet in the extremely small area of the brain. Firing with a cordite rifle, three or four shots can be made within ten seconds if the hunter is quick with his gun, and an initial failure may be turned into a success.

In the event of being unable to take the ear shot, owing to the denseness of the jungle or the position of the head, the shoulder shot should be tried, but should be taken from slightly behind the beast so that the bullet will rake forward into the heart or lungs. This shot will frequently result in a subsequent chase, as it is most difficult to localise the position of the heart or lungs when so little of the beast that one is firing at can be seen; of course a bullet placed in the heart will quickly prove fatal, and a bullet through the centre of the lungs equally so, but a bullet that merely reaches one lung, or which even passes through both lungs high up, will require to be supplemented before the beast is brought to bag. In attempting the shoulder shot if it is possible to approach the beast from behind and get a view of the light patch of skin which shows up just behind the junction of the foreleg and the body: this patch can only be seen when his fore leg is stretched forward in the act of making a step: a bullet placed in this patch, firing from a position slightly behind that which would be taken up for the ear shot, would prove almost instantly fatal.

The following up of a wounded elephant in the Malayan jungle is a very tedious and at times a very trying affair.



THE MALAYAN TAPIR.

An elephant wounded in the head and allowed to get away without any subsequent body shot will certainly not be seen again for two days, possibly not for a week, despite the fact that you are following him as hard as you can go. It is difficult to make one's Malay followers take in the situation. At first they believe that the wounded elephant, which they know actually fell over, is going to die of the wound, and they follow cheerfully enough, expecting to come across his carcase every few yards; but when, after tracking him for a day or so, they find that his tracks, which at first were exceptionally short, have gradually lengthened out into a strong stride that he seems to be gaining on [illegible] farther and farther away, the Malays soon decide that it is foolishness to follow any more, and consequently sulk for the rest of the journey.

Perseverance will often bring the hunter up to the elephant again in the course of a few days, and if the beast is a big one and is finally bagged, the sportsman will probably in years to come look back on that period of fatigue and discomfort as some of the finest hunting he ever had in his life.

The Seladang.

Although the elephant has a much larger distribution than the seladang, the latter practically not being found on the coast at all, any visitor coming to this country to shoot would probably make such inquiries as would enable him to go to a district where he would be able to get news of both elephant and seladang.

The procedure would be much the same as with elephants, and most of the previous remarks concerning the hunting of the elephant would equally apply to seladang. In isolated places, generally the clearings of Sakais, seladang undoubtedly come down and feed off the standing crops; in fact, in some places the writer has seen the crops strongly fenced to keep out seladang, generally with no success, and much rice and Indian corn have been trampled down. But as a rule the seladang is an exceptionally shy animal, and where much disturbed is most difficult to get up to even with the greatest precautions. It is generally presumed that the best bulls are to be found by themselves, and the track of a solitary animal is always followed up in preference to those of a herd; but it is more than probable that old bulls which are generally the masters of some herd in the vicinity are more frequently to be found with the herd, and that the majority of solitary bulls that are found far away from the main body of seladang are young bulls unable to hold their own against the heavier old bulls. Very old bulls may be entirely solitary, but they are, in the writer's opinion, few and far between.

The tracking of a seladang is a much more careful affair than the tracking of an elephant, a seladang being able to take care of himself with the help of his eyes and ears much better than an elephant can. It is not necessary or even usually possible to test the wind when tracking a seladang; one seldom knows where he is until you see him or hear him rushing off alarmed. It is most difficult to distinguish the bulls from the

Mr. T. R. Hubback and dead Seladang shot at Ulu Serdau, Negri Sembilan.

cows in the jungle, and mistakes are made at times even by the most experienced men. It is, of course, simple enough to distinguish a very large bull and to know that it is a bull; where the trouble lies is in mistaking the old cows for bulls, especially as they may often be found a little way from the herd. There is absolutely no difference in the colour of the old beasts, an old cow is just as black as an old bull; the only sure test is the size of the dorsal ridge, which in the old cows is never developed like it is on the old bulls. The horns, if they can be clearly seen, are an infallible test, but the dorsal ridge is much more noticeable in the jungle and can nearly always be distinguished. The horns of a big cow, with the help of the lights and shades of the forest, may appear quite large and be mistaken for those of a bull; the dorsal ridge, never.

The horns of an old bull are much corrugated at the base; the tips, which are black, are frequently worn away and stripped of the outer covering of horn, and that portion of the horn which lies between the base and the tip is generally of a dark olive green colour. This makes them very difficult to pick up in the jungle, and the head of an old bull can seldom be seen quite distinctly. On the other hand, the horns of a young bull are not much corrugated at the base, are of a light yellow colour shading off to black at the tips, in fact, very readily attract the eye, and have led to Malays continually saying that they have seen a seladang so old that its horns (they generally add its head, too) were quite white. A seladang that is successfully stalked, that appears to have the top of its back flapping about as if it was loose, that does not appear to have much to look upon in the way of horns, is, in most cases, a prize worth getting; the very bulk of the beast seems to dwarf his height, and the oldest bulls in thick jungle do not make as good a show as their younger brethren.

Seladang will generally be found resting during the middle of the day, and when tracking them between the hours of 10 a.m. and 2 p.m. the hunter must be prepared to find them lying down in thick covert, when they are most difficult to see and have to be approached with the greatest caution. In the early morning seladang in certain localities can sometimes be found in open clearings, and good opportunities may present themselves, but they seldom remain in the open after 7 a.m., except on dull or wet mornings, when they occasionally stay out as late as 9 a.m.

In the evening also they occasionally visit the clearings, but it is frequently dusk before they are seen. Sekadang often visit salt licks, the localities of which will be known to the Malay tracker. These licks are excellent places to go to to pick up tracks, those of any sekadang in the vicinity probably being found there. In localities where they have been much disturbed, however, they fully realise the danger of the salt licks and travel long distances after their visits, the tracking of a beast from a

BUKIT CHANDAN, PERAK, FROM KOTA LAMA KANAN.

salt lick often being a long affair; on the other hand, if a lick is visited which has been left unvisited by man for some months, it is quite possible that the beast may be found lying up close to the salt lick, and every precaution should be taken in approaching the spot.

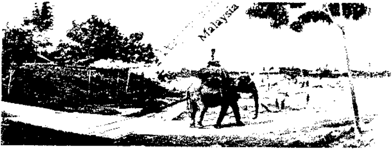
The Rhinoceros. There are two species of rhinoceros to be found in the Malay Peninsula, the Javan and the Sumatran; the former is scarce, and has only been recorded from the northern State of Perak, and probably does not exist in Pahang at all. No special comments are necessary concerning the hunting of rhinoceros; they are not numerous anywhere, the most likely places to find them being in the mountain ranges.

where a great deal of climbing must be undertaken. They are very shy, and will prove difficult beasts to come up to when once disturbed, but they seem to be easy to approach so long as they do not get one's wind, and should be stalked with the same precautions observed when following an elephant.

In the State of Perak, near the coast in the vicinity of the Dindings, there were at one time large numbers of the Sumatran rhinoceros, and they can still be found there, but in most parts of the Malay Peninsula they are only to be found near the mountain ranges.

Malays often report the presence of a rhinoceros on the evidence of the tracks of a tapir, which they carelessly mistake for the tracks of a rhinoceros ; the track of the latter, which distinctly shows the broad blunt-ended centre toe-nail, should never be confounded with the track of a tapir, which is smaller, and which has four toes on the front foot—a rhinoceros only has three—the largest toe-nail on the fore foot being much more pointed than the centre toe-nail of a rhinoceros.

Tapir are fairly common over the centre Peninsula, but are not likely to be sought after by sportsmen. They carry no trophies, are extremely shy, and although interesting animals can scarcely be classed as " Big Game."

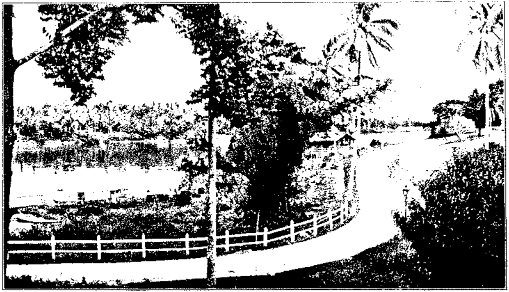


MOTORING IN MALAYA

By J. H. M. ROBSON.

PROVINCE WELLESLEY (opposite Penang) and the Federated Malay States on or adjacent to the west coast of the Malay Peninsula possess an excellent road system of over two thousand miles. The roads in Malacca territory are not so good, but are passable. The best time for motoring in Malaya is during the dry season, which lasts from April to September. The temperature, which varies between 70° to 90° F. in the shade, is about the same all the year round.

Type of Car. No special type of car is required for Malayan roads, but the more efficient the water cooling system the better. Two ladies, attended by a native, have travelled through the Peninsula on a 10 h.p. single cylinder Adams car (*vide* "Autocar" of November 16, 1907, in which a useful route map is shown). The journey has also been done on de Dions of all sizes, Alldays, Daimlers, Fiats and other cars. De Dion cars are to be met with all over the Peninsula. For two people not overburdened with luggage, a 9 h.p. single cylinder de Dion would be a suitable little car, because it is economical to run and well understood in the local garages. On the whole, however, a more suitable type of car for comfortable touring would be the 14-20 h.p. Siddeley, fitted with dual ignition—a class which would include such cars as the 15 h.p. Zedel, the 15 h.p. Napier, the 14 h.p. Vulcan, the 16 h.p. Humber, etc. Cars with only a 6-inch clearance from the road are not suitable for use in Malaya. There is no speed limit, and the road surfaces are good, but the roads themselves are somewhat narrow, and in many places form an unending succession of sharp corners, which may hide slow-moving bullock carts. In Selangor, Pahang, Negri Sembilan and Malacca there are long and difficult hills to negotiate. An average of eighteen miles an hour would be quite enough for strangers to attempt. Accumulators can be charged at Penang, Kuala Lumpur and Singapore, but cannot be recommended for use on a touring car in the tropics. Dry cells can be purchased wherever petrol is obtainable. Cars fitted with Bosch high tension magneto seem to give little or no trouble, but dual ignition (magneto and dry cells) is strongly recommended. Cape cart hoods are in general use, but unless there is a lady passenger long journeys are often undertaken with the hood down. A Stepney wheel or detachable wheels or rims are necessary, and two complete spare tyres should be carried in addition. A Gabriel horn is recommended, and a spare petrol tank on the footboard may be found useful. A light waterproof cover to place over the car at night in places where no building is available should be included in the outfit. Metal non-skids on the back wheels are a protection against cast bullock shoes, which have very sharp edges. Petrol, costing from 1s. 5d. to 2s. a gallon, can be obtained in Penang, Taiping (Tate & Co.), Ipoh (G. W. Wilson), Kuala Lumpur (Harper & Co. and Zacharias & Co.), Klang, Seremban, Malacca (a Chinese shop), Singapore, and numerous smaller towns, of which a list will be found at the end of this article. Strangers will experience no difficulty in finding any of these petrol depots, as all depots selling "Shell" petrol exhibit a prominent yellow signboard, such as is used in the United Kingdom. Repairs can be done at Penang, Taiping, Ipoh, Kuala Lumpur, Seremban and Singapore. A very few words of Malay will carry travellers all through the Peninsula, but it is advisable to engage a Malay driver or cleaner to assist with tyre renewals, etc. He should not be allowed to drive or adjust a strange car. The cleaning will probably be of a somewhat perfunctory nature, but Malays are good-tempered and obliging. Such a man could probably be engaged through Messrs. Young and Co., Barrack Road, Penang, or through Messrs. Wearne & Co., motor-car dealers, of Singapore (say $10—£1 3s. 4d. a week, and expenses). An English chauffeur would have to be treated as one of the party, except in the large towns, and his expenses would be the same. Cars with a long wheel-base are not suitable for Malayan roads; 8 ft. 6 ins. to 9 ft. would be found convenient.



Road near Perak River, Kuala Kangsar.

Conveyance of Car.

Special arrangements would have to be made in London for the conveyance of car on ocean-going steamers by which the passengers themselves travelled. It is better to do this and carry letters to the local shipping agents rather than rely entirely on these gentlemen, who, although personally willing to oblige, might be in possession of printed instructions which would prevent them accepting an uncrated car.

Personal Outfit.

Many of the helmets and topis sold in London are quite unsuitable for use in the tropics and serve only to proclaim the stranger! A pith topi with quilted khaki cover and a strong strap to go right under the chin is the best form of head-covering when motoring in Malaya. Such a topi can be obtained at the Army and Navy Stores under the name of "Cawnpore Tent Club." A pair of dark glasses will protect the eyes from the glare of the sun and add considerably to the comfort of the traveller. The most workmanlike outfit for the motorist is a khaki coat and breeches, with spiral putties and light boots. The coat should be cut as a Norfolk jacket or tunic, with a loose military stock collar. A gauze singlet, short thin flannel drawers, thin socks, a Burberry rain coat, and a cap for the evenings would complete the outfit. A less workmanlike but equally suitable outfit would be a *very light* English coat and waistcoat over a soft-fronted shirt, with light flannel trousers. The ordinary flannel trousers in use at home would be found too hot and too heavy for Malaya. Except that a topi is advisable, ladies can gauge their own requirements by remembering the hottest day they have known in England. Local washermen are of the rough and ready order, with emphasis on the rough. Light grey, fawn, or mauve colours are recommended in preference to plain white for travelling. A revolver is not necessary, but there is no harm in carrying one. A licence, which is obtainable at any police office, costs only a shilling or two.

Route. First Day.

Travellers bringing a motor car to the Island of Penang will have no import duties to pay beyond a two-dollar (4s. 8d.) wharf fee, but a call should be made at the chief police office to obtain information about a car licence. This licence will hold good in the Federated Malay States. If sent on in advance by cargo steamer to save expense, or it in a crate, the unloading of the car can be entrusted to Messrs. Young & Co., Barrack Road, Penang. A pocket Malay vocabulary, maps and local literature can be obtained at Messrs Pritchard & Co., Beach Street. The streets of George Town, Penang, are too narrow and congested for comfortable driving but the

PERAK RIVER FROM THE HIGH COMMISSIONER'S RESIDENCE, KUALA KANGSAR.

suburban and island roads are excellent. The Eastern and Oriental Hotel is not far from the jetty used by the railway ferry steamer which conveys cars across to the mainland (fee $2 — 4s. 8d.). Careful steering is required when driving cars on and off these steamers. The first early morning steamer should be taken, full information about which can be obtained at the railway offices or hotel. It is advisable to book passage for car on ferry boat in advance.

Second Day. By taking the first steamer of the day travellers can pass right through Province Wellesley in the cool of the early morning, and breakfast at Parit Buntar (25 miles) or Bagan Serai (another nine miles) in Perak. To save time a telegram should be sent to the resthouse keeper of the selected place from Penang, advising him of expected arrival and number of people requiring food. There are so many roads in Province Wellesley that travellers would do well to inquire frequently if they are on the direct road to Parit Buntar. In the Federated Malay States signposts are to be found at the more important road junctions. From Bagan Serai to Taiping is another 22 miles, which can be managed before lunch. Bagan Serai is the headquarters of the Krian Irrigation Works, which have provided the Malays with a large extent of well-watered country for rice growing. The travellers will see more Malays in this part of the country than anywhere else on the main roads of the Peninsula. There is a resthouse at Taiping, situated on the road to the railway station and opposite King Edward VII. School. It may be advisable to fill up with petrol before proceeding to Kuala Kangsar which is 23 miles further on. A start should be made about 4 p.m., so there is not much time to see Taiping.

Kuala Kangsar is a beautiful spot where the Sultan has his home, and will well repay a short walk between 5.30 and 6.30 p.m., and again next morning at 6.30 a.m. The resthouse is situated above the town, close to the Club and Government Offices. A telegram from Taiping is not absolutely necessary, but advisable. There is one long, precipitous hill when nearing Kuala Kangsar which requires careful driving, but it is the only hill of any importance to be met with for the first two days on the mainland.

Total mileage, second day, 70 miles.

Chief features: Fine roads, Malay cultivation and the headquarters of a Malay district.

Third Day. A start at 8.30 a.m. for the first stage of 32 miles from Kuala Kangsar should bring the traveller within sight of Ipoh an important tin-mining and trade centre before 11 a.m. The Enggor pontoon bridge, four miles from Kuala Kangsar, looks more terrifying than it really, as motor cars cross it daily, but before attempting to cross it should be seen that no other vehicle is on the bridge, as it is impossible for two to pass. The road is good all the way. Luncheon can be obtained at the Ipoh railway station refreshment room, or at the hotel. When in the neighbourhood of Ipoh opportunity should be taken of visiting one of the large tin mines there, which can most conveniently be done between 2 and 4 p.m., before the coolies stop work for the day. In order to avoid delay a visit to G. W. Wilson or Wearne & Co., at Ipoh, for a

GOLF AT TAIPING, PERAK.

supply of petrol should be made on arrival in the morning. Ipoh is essentially a Chinese town, and is one of the most rapidly growing centres of Malaya. Two daily papers are published giving the usual Reuter's telegrams. There are branches of the Chartered Bank of India, Australia and China both here and at Kuala Lumpur. A visit to the club in the evening will bring the travellers into touch with their fellow countrymen who live and work in this part of the world. Letters of introduction are always useful, but failing these, a personal call on the Secretary of a social club will usually be found sufficient to secure the privileges of visiting membership. The resthouse at Ipoh is often full, so it is advisable to inquire by wire from Penang if rooms will be available on the day required, either at the rest-house or at the excellent hotel. Should no accommodation be available there will be no hardship in continuing the third day's journey for about another twelve miles to the pretty little town-ship of Batu Gajah, where, as elsewhere except in Ipoh, there is not likely to be any difficulty about resthouse accommodation. In any case the run out to Batu Gajah makes a pleasant evening drive, but in view of the dust nuisance (to other people) the pace should be moderate.

Total mileage, third day, will depend on whether the night is spent at Ipoh or Batu Gajah, and the amount of local travelling done in the neighbourhood of Ipoh.

Chief features: Crossing the Perak river, view of tin mine worked by Chinese coolies, and Ipoh town.

Fourth Day. Starting from either Ipoh or Batu Gajah in the early morning the well-built town of Kampar can easily be reached in time for breakfast (24 miles). This place is also a great mining centre and a smaller edition of Ipoh. From Kampar to Sungkai, passing through Temoh, Tapah, and Bidor, is 31 miles. Lunch can be taken here or at Tanjong Malim, but travellers are recommended to go straight on to the latter place before stopping because the last 30 miles, after passing Sungkai, is a lonely stretch of road devoid of human habitations. Like all Perak roads, it has an excellent surface, but winds about a good deal and is flanked on both sides by heavy jungle. It reminds one of a road through a well-wooded park. If Kampar is reached and breakfast there finished by 9 a.m. it is quite feasible to run straight through to Tanjong Malim (70 miles). The village of Sungkai, which is passed on the way, is growing rapidly in importance, having many rubber estates in the vicinity. Tanjong Malim is a small town where there is quite a good rest-house. This place is on the boundary between Perak and Selangor. The numbering of the milestones will be *from* Kuala Lumpur after leaving Tanjong Malim. A comfortable rest can be taken after lunch before proceeding on the last stage to Kuala Kubu (sixteen miles). This place is the starting point for a main road which crosses the mountain range [illegible] east coast State of Pahang. Pratt's spirit in seven-ga[illegible] drums, which are not returnable, may be obtained [illegible] in advance from Penang to Messrs. Zacharias & Co., [illegible] Lumpur, asking them

Through the Hills

to send the required supply, care of S[illegible]master, Kuala Kubu, by first train. Prices vary from tim[e] to time, but at present Messrs. Zacharias & Co. charge $7.25 [illegible] 10s. 11d.) per drum ex godown. It should be mentioned, [illegible] that supplies of

"Shell" petrol in two-gallon cans, returnable at any agency, may now be obtained from agents at Kuala Kubu, Raub, and Bentong.

Total mileage, fourth day, 110 miles.

Chief feature: Park-like road through the jungle.

Fifth Day. The suggested trip for the fifth day will take the travellers across the main range of the Peninsula by one route, and bring them back by another, leading direct to Kuala Lumpur, the capital of the Federated Malay States. It is a long journey, and a route which will necessitate careful driving, but the magnificent forest scenery should not be missed. Starting in the early morning from Kuala Kubu, there is a steady pull uphill on a gradient of about 1 in 30 for about fifteen miles, in a distance of 21 miles, to a place called the Gap, which is the boundary between Selangor and Pahang, and where there is a resthouse. From this point there is a drop down for about thirteen miles to the little village of Tras, and thence another ten miles leads to Raub, where there is an old-established gold mine. The road itself is excellent, but it forms an unending succession of corners, is not too wide, and is flanked in places by precipices. Although not actually dangerous—public service motor vehicles driven by Malays pass up and down every day—the trip is not recommended for nervous people. For others the grandeur of the jungle scenery is well worth the climb. Brakes should be examined before starting, and on descending grades the car should be kept well in hand. Times should be arranged so that neither the up nor down motor omnibus is actually met on the road. Necessary information on this point can be obtained from the Stationmaster at Kuala Kubu, and motor traffic signals should be noted at the Kuala Kubu and Gap resthouses. Gabriel horns are useful on this road. The return journey, after an early lunch at the Raub resthouse, would be on the same road to Tras and Tranum (eleven miles) and thence to Bentong (total 30 miles). From Tranum to Bentong the road is very tortuous. From Bentong the climb up to the Pass has an average gradient of 1 in 40, with lengths of 1 in 30. On the Selangor side of the Pass there is a short length of 1 in 26, and the rest 1 in 30. Careful driving is necessary. Distance from Bentong to Kuala Lumpur 50 miles. Or the day's journey may be shortened by omitting the visit to Raub, turning off at Tranum.

ON THE KUALA KUBU-KUALA LIPIS ROAD.

twelve miles from the Gap, and proceeding direct to Bentong for lunch. Two tins of petrol may be required at Kuala Kubu before undertaking the suggested Pahang trip, but of course this will depend on the tank and mileage capacities of particular cars.

There is good hotel accommodation at Kuala Lumpur, visitors being catered for by the Station, the Grand Oriental and Empire Hotels. There are no garages attached to these places; visitors generally leave their cars at one or other of the town garages.

Total mileage, fifth day, 124 or 102 miles.

Chief features: Magnificent jungle scenery on thickly wooded hills.

Sixth Day. Apart from overhauling the car, taking a rest, and doing a little shopping, the Museum, Public Gardens, Golf Links, Government Buildings, Polo Ground, Schools, Hospitals and so on are all worth visiting when in Kuala Lumpur. A daily paper is published in the afternoon giving latest Reuter's telegrams, etc. There are quite a number of enthusiastic motorists in the Capital, and a stranger

MOTOR SERVICE: KUALA KUBU-KUALA LIPIS.

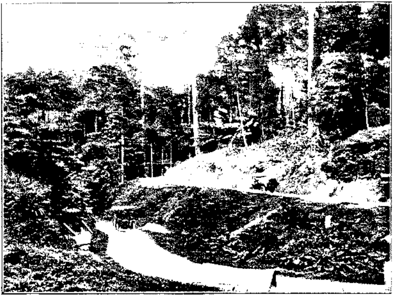
uld have no difficulty in getting into touch with one or other of on, who would be only too pleased to afford assistance and information. About an hour's run from Kuala Lumpur are some ous sulphur baths attached to the *Dusun Tua* resthouse, which reputed to be of therapeutic value for people with rheumatic ndencies. Apart from the hot baths there is no special attraction at this place. If sufficiently interesting the stay at the pital might be extended to two days, but this must be left to dividual inclination. On the assumption that one day suffices, rrangements should be made to leave on the seventh day, after seven o'clock breakfast, to make a circular trip of the chief ubber-growing districts.

Seventh Day. Returning north along the Batu Road for eighteen miles to a small town called Rawang, a steep hill has to be negotiated at the tenth mile. Between the eighth and twelfth milestones there are many corners, and the road is generally hilly. Just before reaching Rawang Railway Station a turn to the left is taken leading to Kuala Selangor, on the coast. Distance from Kuala Lumpur 49 miles. The road is hilly for about half the distance between Rawang and Kuala Selangor, but on reaching the rubber belt it becomes flat. Cars are left at the foot of the hill on which the Kuala Selangor rest-house stands. The run after lunch from Kuala Selangor to Klang (28 miles) is on a perfectly flat road, flanked by some of the finest rubber estates in Malaya. The milestones record distances from Klang on this section. The Klang resthouse, where a halt may be welcomed for tea, is situated near the railway station. There are two routes from Klang to Kuala Lumpur. The shorter one following the railway line out of the town is recommended (30 miles). For about half-way the milestones record distances from Klang, but on reaching the boundary of that district the record is from Kuala Lumpur.

Total mileage, seventh day, 107 miles.

Chief feature: View of rubber estates.

Eighth Day. After breakfasting in Kuala Lumpur, lunch can be arranged for at Seremban, the capital of Negri Sembilan. Leaving Kuala Lumpur, *via* Market Street, Yap Ah Loy Street, and Cross Street, and passing Sultan Street Railway Station on the right, the main road is reached leading to the suburb of Pudu. From this point there are two alternative routes to the town of Kajang, one straight on, *via* Cheras, and the other by turning off to the right at the Pudu Police Station and passing through the important mining centre of Sungei Besi. The latter is about four miles longer, but avoids a bad hill. On reaching Sungei Besi it is necessary to turn down one of the two streets on the right and then turn to the left to get on to the main road. Passing Serdang and the rubber estates, the road to Kajang is easily followed. Distance by direct route



MOTOR CARS ON THE PAHANG TRUNK ROAD.

fifteen miles, or *via* Sungei Besi nineteen miles. From Kajang the road runs direct to the Selangor boundary at Beranang, passing through Semenyih *en route*. Kajang to Beranang, thirteen miles. From this point the milestones record distances from Seremban, to which place the road, passing through Setul and Mantin, is good except for a long severe hill beyond Mantin. The gradient of this hill section is nothing out of the way for Malaya, but there is the usual unending succession of corners. One or two of them require careful negotiation. Total distance, Kuala Lumpur to Seremban, 44 miles by direct route, or 48 miles *via* Sengei Besi. Seremban is a prettily situated town, with a nice little resthouse near the railway station. After lunch here a visit should be paid to the P.W.D. office to inquire if accommodation is available at the Port Dickson Sanatorium (to avoid staying at the Port Dickson resthouse, which is some distance from the bathing beach), and arrangements should be made to reach Port Dickson by the new direct road (about 24 miles) by 5 p.m., as the best time for bathing is between 5.15 and 6.15 p.m.

Total mileage, eighth day, 68 or 72 miles.

Chief features: View of Seremban town and sea bathing at Port Dickson.

Ninth Day. The return journey to Seremban would be along the sea shore for eighteen miles to Pasir Panjang, then six miles to Linggi, a planting centre, followed by 24 miles of give-and-take road to Seremban. Total 48 miles. After lunch there remains 25 miles to bring the travellers to their next halting place, a good resthouse at Kuala Pilah, the headquarters of a Malay district. The surrounding scenery of this place is quite pretty. One severe hill has to be negotiated between Seremban and Kuala Pilah, and it is well to inquire at what times motor omnibuses are likely to be on the hill section. Travellers should be careful when leaving Seremban to ascertain if they are on the right road.

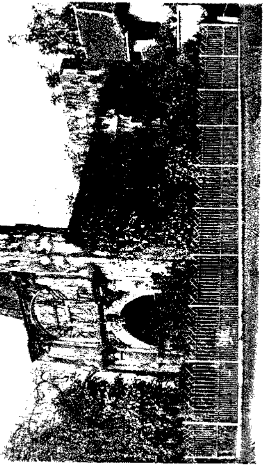
Total mileage, ninth day, 73 miles.

Chief features: Coast road and a Malay district.

Tenth Day. By this time the travellers will have obtained a general idea of the Federated Malay States, and there only remains a visit to the old-world town of Malacca. From Kuala Pilah to Tampin (24 miles) the road is good, but when Malacca territory is entered a certain amount of jolting and shaking may be experienced, as the road is bad. From Tampin to Malacca the distance is 24 miles. There are two resthouses at Malacca, one outside the railway station and the other facing the sea. The railway resthouse is nearer the bathing place at Tanjong Kling than the Malacca resthouse. There is a Government bungalow at Tanjong Kling, and permission to use this bungalow for bathing purposes can be obtained at the Public Works Office in Malacca town. The road to Tanjong Kling is flat and rather pretty.

Total mileage, tenth day, 48 miles.

Eleventh Day. The last day on the road would be a return journey to Tampin, from which place the car can be sent by goods train to the Singapore docks, the travellers following by train. The car might not be delivered in Singa-



Gateway of Old Portuguese Fort, Malacca.

pore till the 13th day, but the travellers would probably like to have two clear days for seeing Singapore. If proceeding to China and Japan there would be no difficulty in catching the succeeding mail steamer to the one left at Penang.

The map and tables of distances included in this book will enable travellers to shorten or lengthen the tour at will, and, of course, longer daily distances might be attempted, for instance:—

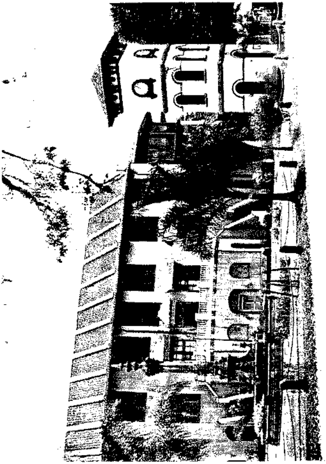
First day	..	Penang.
Second day	..	Ipoh, 111 miles.
Third day	..	Kuala Lumpur (direct), 148 miles.
Fourth day	..	Kuala Lumpur.
Fifth day	..	Tampin via Seremban and Kuala Pilah, 90 miles.
Sixth day	..	Arrive Singapore (by train).
Seventh day	..	Car do.

For people who intend to visit Rangoon, Madras or Calcutta after touring in Malaya, the trip should commence from Singapore, or even if returning to Ceylon there is a slight advantage in starting from Singapore by railway, in that cars are landed at Singapore direct on to a wharf and can then be sent straight through to Tampin by train. On the whole, too, the roads improve going northwards, and the tour finishes without having to catch and change trains. All steamers do not go alongside the Penang wharf, so it would be advisable to get there a day in advance in order to arrange for a tongkang (sea barge) for taking car to steamer.

For the benefit of people who would prefer to start from Singapore, the outlined tour may be briefly set down as follows:—

First day	..	Arrival at Singapore. Forward car by goods train or local passenger train to Tampin.
Second day	..	Leave by train for Tampin.
Third day	..	Tampin to Malacca, 24 miles.
Fourth day	..	Malacca to Kuala Pilah *via* Tampin, 48 miles.
Fifth day	..	Kuala Pilah to Port Dickson *via* Seremban, 73 miles.
Sixth day	..	Kuala Pilah to Kuala Lumpur *via* Seremban, 68 or 72 miles.
Seventh day	..	Kuala Lumpur to Rawang, Kuala Selangor, Klang and back to Kuala Lumpur, 107 miles.
Eighth day	..	At Kuala Lumpur.
Ninth day	..	Kuala Lumpur to Kuala Kubu *via* Bentong and Tranum, 102 miles.
Tenth day	..	Kuala Kubu to Ipoh, 110 miles.
Eleventh day	..	Ipoh to Taiping, 55 miles.
Twelfth day	..	Taiping to Penang, 56 miles.

Compared with daily trips undertaken when touring in Europe, some of the suggested daily mileages may appear to err on the side of extreme moderation, but the conditions are so very different here that after allowing for longer runs on one or two days,



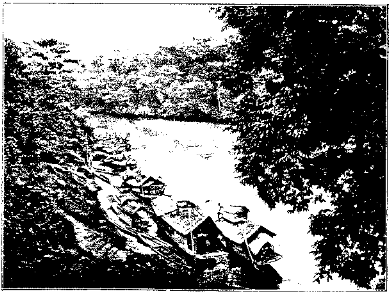
Stadthaus and Clock Tower, Malacca.

any middle-aged man or lady would probably find the shorter runs quite sufficient, especially if stoppages are made at the different little towns and villages *en route*. The mileages given are approximately correct, but deviations, corner cuttings and such like improvements are being systematically carried out and this renders distances quoted liable to revision. Travellers are warned against consigning a car to any small railway station without first inquiring if there is an unloading dock. Some of the stations have no facilities for loading and unloading cars. Cars can be hired in Singapore at $4 (9s. 4d.), $5 (11s. 8d.), and $6 (14s.) an hour, but rates are not advertised for extended tours. It might be possible to obtain a fairly decent car for a fortnight at a cost approximate to the freight out and home of a private car.

MOTOR SPIRIT can now be obtained at the following places :—

TOWN.	DEALER.	RETAIL PRICE PER IMPERIAL GALLON.	
PENANG ..	Chin Seng & Co. (and others) ..	60	cents.
Parit Buntar ..	Tan Low Heng ..	70	,,
TAIPING ..	Tate & Co. ..	70	,,
,, ..	Taik Ho & Co. ..	70	,,
Kuala Kangsar	Guan Seang Bee ..	70	,,
Sungei Siput ..	Kong Seng Leong ..	75	,,
T. Rambutan ..	Sin Seng Bee ..	75	,,
Ipoh	G. W. Wilson ..	75	,,
,, ...	C. F. F. Wearne & Co. ..	75	,,
Batu Gajah ..	Hoe Choon ..	70	,,
Gopeng ..	Ban Poh Leong ..	75	,,
Kampar ..	Ban Hoe Hin ..	70	,,
Tapah	Hock Bee Hin ..	70	,,
Bidor	Ban Eng ..	70	,,
Sungkai ..	Sin Hong ..	72	,,
Tanjong Malim	Sin Teik Soon ..	75	,,
TELUK ANSON	Hamilton & Physick ..	65	,,
,,	H. Melbye ..	65	,,
Kuala Kubu ..	Ban Joo ..	75	,,
Rawang ..	Kong Kee ..	70	,,
Raub	Yong Joo Long ..	85	,,
Bentong ..	J. B. Hugh ..	80	,,
Klang	A. C. Harper & Co. ..	65	,,
Kajang ..	Sin Hock Loo ..	70	,,

TOWN.	DEALER.	RETAIL PRICE PER IMPERIAL GALLON.
KUALA LUMPUR	A. C. Harper & Co.	65 ..
..	Federated Eng. Co.	65 ..
..	Federal Garage	65 ..
..	Morgan's Agency	65 ..
..	Central Malaya Eng. and Motor Works	65 ..
..	Cycle & Carriage Co.	65 ..
..	Webber's Garage	65 ..
Port Dickson ..	McClymont & Co.	65 ..
Seremban ..	Do.	70 ..
Malacca ..	Do.	75 ..
.. ..	Ee Bee & Co.	75 ..
.. ..	Keng Hin & Co.	75 ..
.. ..	Geok Kum & Sons	75 ..
Johore Bharu ..	Sahil & Co.	65 ..
SINGAPORE ..	C. F. F. Wearne & Co.	60 ..
.. ..	Chin Huat Hin, etc.	60 ..



MALAY HOUSE-BOATS AT KUALA LIPIS, PAHANG RIVER.

PENINSULAR TRUNK ROAD, PENANG TO MALACCA.*

Penang																																				
Parit Buntar	25																																			
Simpang Lima	28	3																																		
Bagan Serai	34	9	6																																	
Kamunting	53	28	25	19																																
Taiping	56	31	28	22	3																															
Padang Rengas	71	46	43	37	18	15																														
Kuala Kangsar	79	54	51	45	26	23	8																													
Enggor Pontoon Bridge	83	58	55	49	30	27	12	4																												
Salak North	87	62	59	53	34	31	16	8	4																											
Sungei Siput	93	68	65	59	40	37	22	14	10	6																										
Chemor	101	76	73	67	48	45	30	22	18	14	8																									
Ipoh	111	86	83	77	58	55	40	32	28	24	18	10																								
Sungei Raia (Kampung Kepayang)	118	93	90	84	65	62	47	39	35	31	25	17	7																							
Gopeng	123	98	95	89	70	67	52	44	40	36	30	22	12	5																						
Kampar	135	110	107	101	82	79	64	56	52	48	42	34	24	17	12																					
Temoh	142	117	114	108	89	86	71	63	59	55	49	41	31	24	19	7																				
Tapah	149	124	121	115	96	93	78	70	66	62	56	48	38	31	26	14	7																			
Bidor	157	132	129	123	104	101	86	78	74	70	64	56	46	39	34	22	15	8																		
Sungkai	166	141	138	132	113	110	95	87	83	79	73	65	55	48	43	31	24	17	9																	
Slim	191	166	163	157	138	135	120	112	108	104	98	90	80	73	68	56	49	42	34	25																
Tanjong Malim	205	180	177	171	152	149	134	126	122	118	112	104	94	87	82	70	63	56	48	39	14															
Kalumpang	209	184	181	175	156	153	138	130	126	122	116	108	98	91	86	74	67	60	52	43	18	4														
Kuala Kubu	221	196	193	187	168	165	150	142	138	134	128	120	110	103	98	86	79	72	64	55	30	16	12													
Serendah	235	210	207	201	182	179	164	156	152	148	142	134	124	117	112	100	93	86	78	69	44	30	26	14												
Rawang (Bandar [illegible])	241	216	213	207	188	185	170	162	158	154	148	140	130	123	118	106	99	92	84	75	50	36	32	20	6											
Batu	254	229	226	220	201	198	183	175	171	167	161	153	143	136	131	119	112	105	97	88	63	49	45	33	19	13										
Kuala Lumpur	259	234	231	225	206	203	188	180	176	172	166	158	148	141	136	124	117	110	102	93	68	54	50	38	24	18	5									
Cheras	270	245	242	236	217	214	199	191	187	183	177	169	159	152	147	135	128	121	113	104	79	65	61	49	35	29	16	11								
Kajang	274	249	246	240	221	218	203	195	191	187	181	173	163	156	151	139	132	125	117	108	83	69	65	53	39	33	20	15	4							
Semenyih	280	255	252	246	227	224	209	201	197	193	187	179	169	162	157	145	138	131	123	114	89	75	71	59	45	39	26	21	10	6						
Beranang	287	262	259	253	234	231	216	208	204	200	194	186	176	169	164	152	145	138	130	121	96	82	78	66	52	46	33	28	17	13	7					
Setul	294	269	266	260	241	238	223	215	211	207	201	193	183	176	171	159	152	145	137	128	103	89	85	73	59	53	40	35	24	20	14	7				
Seremban Road	302	277	274	268	249	246	231	223	219	215	209	201	191	184	179	167	160	153	145	136	111	97	93	81	67	61	48	43	32	28	22	15	8			
Kampong Bar[illegible]	322	297	294	288	269	266	251	243	239	235	229	221	211	204	199	187	180	173	165	156	131	117	113	101	87	81	68	63	52	48	42	35	28	20		
Tampin	334	309	306	300	281	278	263	255	251	247	241	233	223	216	211	199	192	185	177	168	143	129	125	113	99	93	80	75	64	60	54	47	40	32	12	
Malacca	358	333	330	324	305	302	287	279	275	271	265	257	247	240	235	223	216	209	201	192	167	153	149	137	123	117	104	99	88	84	78	71	64	56	36	21

TRUNK AND BRANCH ROADS PENANG TO KUALA KANGSAR AND GRIT.

PENANG.																						
25	PARIT BUNTAR.																					
34	9	Tanjong Piandang.																				
35	10	7	Kuala Kurau.																			
39	14	19	13	Sungei Gedong.																		
28	3	6	7	11	SIMPANG LIMA.																	
34	9	14	8	5	6	BAGAN SERAI.																
56	31	36	30	27	28	22	Selama.															
56	31	36	30	17	28	22	18	Pondok Tanjong.														
58	33	38	32	19	30	24	27	9	Batu Kurau.													
53	28	33	27	14	25	19	28	10	12	KAMUNTING.												
56	31	36	30	17	28	22	31	13	15	3	TAIPING.											
63	38	43	37	24	35	29	38	20	22	10	7	Matang.										
67	42	47	41	28	39	33	42	24	26	14	11	4	Port Weld.									
83	58	63	57	44	55	49	58	40	42	30	27	26	30	Dindings Boundary (Batu Hampir).								
90	65	70	64	51	62	56	65	47	49	37	34	33	37	7	Bruas (Chenderong Klubi).							
107	82	87	81	68	79	73	79	61	63	54	51	50	54	24	17	Parit.						
71	46	51	45	32	43	37	46	28	30	18	15	18	22	36	43	50	PADANG RENGAS.					
79	54	59	53	40	51	45	54	36	38	26	23	26	30	41	51	58	8	KUALA KANGSAR.				
83	58	63	57	44	55	49	58	40	42	30	27	30	34	48	55	69	12	11	Kati.			
104	79	84	78	65	76	70	79	61	63	50	47	51	55	69	76	90	32	32	21	Lenggong.		
127	102	107	101	88	99	93	102	84	86	73	70	74	78	92	99	113	55	55	44	23	Lawin.	
111	119	124	118	105	116	110	119	104	103	90	87	91	95	109	116	130	72	72	61	40	17	Grit.

TRUNK AND BRANCH ROADS.
KUALA KANGSAR TO TANJONG MALIM.

KUALA KANGSAR.																										
ENGGOR PONTOON BRIDGE.	1																									
SALAK NORTH.	8	4																								
SUNGEI SIPUT.	14	10	6																							
CHEMOR.	22	18	14	8																						
Tanjong Rambutan.	42	38	34	28	20																					
Tambun.	36	32	28	22	14	6																				
Ipoh.	32	28	24	18	10	10	4																			
SUNGEI RAIA (Kampong Kepayang).	39	35	31	25	17	17	11	7																		
Menglembu via Batu Gajah.	35	31	27	21	13	13	7	3	49																	
Lahat.	38	34	30	24	16	16	10	6	46	3																
Papan.	41	37	33	27	19	19	13	9	15	6	3															
Tronoh.	48	44	40	34	26	26	20	16	19	15	12	9														
Pusing.	42	38	34	28	20	20	14	10	13	7	4	3	6													
Siputeh.	45	41	37	31	23	23	17	13	16	11	7	6	3	3												
Batu Gajah.	44	40	36	30	22	22	16	12	10	9	6	5	9	3	6											
GOPENG.	44	40	36	30	22	22	16	12	5	21	18	16	20	14	17	11										
Kota Bahru.	53	49	45	39	31	31	25	21	14	30	27	25	29	23	26	20	9									
Kuala Dipang.	51	47	43	37	29	29	23	19	12	28	25	23	26	21	21	18	7	16								
KAMPAR.	56	52	48	42	34	34	28	24	17	33	30	28	31	26	29	23	12	21	5							
TEMOH.	63	59	55	49	41	41	35	31	24	40	37	35	38	33	36	30	19	28	12	7						
Chenderiang.	68	64	60	54	46	46	40	36	29	45	42	40	43	38	41	35	24	33	17	12	5					
TAPAH.	70	66	62	56	48	48	42	38	31	47	44	42	45	40	43	37	26	35	19	14	7	8				
Bidor.	78	74	70	64	56	56	50	46	39	55	52	50	53	48	51	45	34	43	27	22	15	16	8			
SUNGKAI.	87	83	79	73	65	65	59	55	48	64	61	59	62	57	60	54	43	52	36	31	24	25	17	9		
SLIM.	112	108	104	98	90	90	84	80	73	89	86	84	87	82	85	79	68	77	61	56	49	50	42	34	25	
TANJONG MALIM.	126	122	118	112	104	104	98	94	87	103	100	98	101	96	99	93	82	91	75	70	63	64	56	48	39	14

THE FINEST STORE EAST OF SUEZ

Little's

SINGAPORE.—The Singapore premises of Messrs. JOHN LITTLE & Co., Ltd., designated "The Finest Store East of Suez," are situated in the central part of the town, and tourists will find after a long, hot round of sight seeing, that a short stay of inspection in Little's cool and airy show-rooms, with perhaps a cold tiffin, a refreshing cup of tea, or a delicious ice cream, will be not the least pleasant part of the day's outing. Some idea of the size of Little's General Store can be imagined when it is stated that the premises have a floor space of over three-and-a-half acres. The Store is fitted up in the most modern manner, and every possible want is catered for in goods from the best markets in the World.

KUALA LUMPUR.—Some little time ago, Little's acquired a site of 12,400 square feet, with a frontage of 320 feet towards the New Embankment Road, and of over 110 feet towards Ampang Street. On this site has been erected an imposing three-storey building, on the lines so successfully carried out in Singapore. Electric Lifts and Fans are provided, also a Refreshment Room for the convenience and comfort of visitors and customers. John Little's bring their resources, through the medium of their catalogues, to your doors, enabling you to draw on the most complete, modern, and fairly priced collection of merchandise in the F.M.S. This places "Out-station" customers on an equal footing with those who shop personally at Little's.

CATALOGUES POSTED FREE.

Little's

KUALA LUMPUR PREMISES.

THE FINEST STORE IN THE F.M.S.

GUTHRIE & CO., Ltd.

Eastern and General Merchants

SINGAPORE

Branches at Penang, Kuala Lumpur, Klang, Port Swettenham and Medan, Sumatra

Commercial Agencies include the following:—

GENERAL COMMERCIAL

"Red Hand" Brand Cement.

"Digger" and "Devil" Brands of Explosives.

"Elephant" Brand Undershirts

"Izal" Disinfectants.

Milner's Safes

GILLINGHAM PORTLAND CEMENT COMPANY LIMITED
LONDON
PORTLAND CEMENT
WORKS, GILLINGHAM, KENT

Webster's Canvas and Twines.

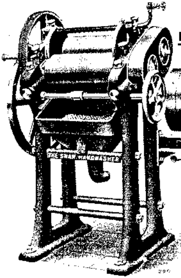
Hall's Distemper

Gosnell's Cherry Blossom Soaps and Perfumes.

Mackie's White Horse Whisky.

Tennent's Beers

"Solignum" Wood Preservative



"SHAW'S RUBBER-WASHING MACHINERY."

ENGINEERING

Marshall's Engines and Boilers

National Gas Engine Co.'s Gas Engines.

Petter's Semi-Diesel Oil Engines.

Hayward-Tyler & Co.'s Steam Pumps.

Caillet's Monorails.

Daimler Motor Cars

Lacre Motor Lorries.

A. C. Light Cars.

Rudge Motor Bicycles

Seamless Steel Boats and Launches.

Marine Motors.

Royle's Water Filters.