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STRAITS SETTLEMENTS

ANNUAL REPORT



ON THE

BOTANIC GARDENS

AND

FOREST DEPARTMENT

FOR THE YEAR

1891

BY

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Director

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REPORTS ON THE GARDENS AND FOREST DEPARTMENTS,
STRAITS SETTLEMENTS.

BOTANIC GARDENS, SINGAPORE.

General Introduction.

1. The changes in the staff consequent on sickness have, to a certain extent, interfered with the progress of the Department. Mr. CURTIS, the Superintendent at Penang, left for 12 months' leave on a medical certificate in January, Mr. DERRY came from Malacca to relieve him, and it was necessary to employ Mr. HOLMBERG, of the Land Department, Malacca, in his place.

Mr. DERRY himself suffered a good deal from fever during his stay at Penang, and it will be a question whether the Superintendent's bungalow there should not be moved, as there are signs of the locality being malarious.

2. In the Botanic Gardens at Singapore, too, there was much sickness. The Chief Mandor, VINCENT CONIS, became seriously ill early in the year, and finally broke down in May with hemiplegia, and has, I regret to say, been pronounced incurable by the Senior Medical Officer.

The second Mandor, MOHAMMED ANIFF, in charge of the Experimental Gardens, was attacked with beri-beri, and was absent on sick leave for nearly three months.

The Herbarium Keeper, TASSIM DAUD, contracted a bad form of fever while with me in Pahang, which incapacitated him from work, not only at that time, but for some time afterwards.

Notwithstanding the unhealthiness of the year, a considerable amount of progress was made in all branches of work in Singapore, while the establishments at Penang and Malacca were kept well up to their last year's standard.

Visitors.

3. The number of visitors to the Gardens was as large as on former years, and there were an unusual number of Botanists, and Curators of other Botanical Establishments, who visited the Gardens. It is still found difficult to prevent visitors from gathering the flowers in the plant-houses and elsewhere. The depredators are mostly mail passengers, but there are not wanting residents in Singapore who have done damage in this way.

Aviaries.

4. The aviaries stand much in need of repair, and a large portion should be reconstructed on a more solid basis. I hope to do this shortly. A number of very interesting animals and birds were obtained during the year, and though some did not live long, owing to the poor condition in which they were received, others have adapted themselves well to their confinement, and are thriving well.

Among the more interesting mammals received, by purchase or presentation, were:—A new species of mouse deer (*Tragulus*) from Borneo; the small kind known as *pelandok* from Singapore—(a distinct species, the existence of which has been doubted by some Naturalists); the wawa (female) (*Hylobates agilis*), presented by Lieut. KELSALL; a distinct black species of *Hylobates*; a remarkable black *Semnopithecus*, stated to have come from Celebes; a pair of the large black and white squirrel (*Sciurus bicolor*), for whom a new round aviary cage was built; a pair of wild dogs from Pahang, presented by Mr. CLIFFORD, the male of which unfortunately died owing to an injury received when caught; several specimens of the slow loris; and a kangaroo rat, presented. Two common monkeys were bred in confinement.

5. Among the birds, a fine female of the Celebes cassowary was presented by Mr. ALFRED LEA, of Mindanao; a rare serpent eagle, presented by Miss WOODWORTH; a pelican (*Pelicanus philippinensis*), purchased; a Javanese wild cock (*Gallus varius*). Another species obtained last year, which is still living, has been shewn by Lieut. KELSALL to be undescribed, and he proposes the name of *Gallus atroviolaceus* for it. It is supposed to have come from Borneo.

6. Of reptiles, a large specimen of the monitor (*Hydrosaurus salvator*) was caught at Blakang Mati by Lieut. KELSALL, and presented to the Gardens. A python was also presented by Major ALEXANDER. A fine example of the deadly *Bungarus fasciatus* was captured by Mr. HOLE, at Pekan, and safely brought to Singapore.

Buildings.

7. A new plant-house, 100 feet long and 15 feet broad, was put up for the culture of pot-ferns at a cost of \$50. The middle house used for culture of seedlings was entirely reconstructed at a cost of \$75, and the potting and packing sheds rebuilt at a cost of \$50. The coolie lines were repaired at a cost of \$20, and new quarters for the Mandores were built at a cost of \$198.83 in the Experimental Gardens. The large plant-house will evidently require a very large amount of repair, many of the beams being rotten, although they are of ballow wood. It would be much better, and really more economical, to replace these and the posts with light spiral iron columns, although the primary outlay would be larger than the Gardens vote could stand.

8. The plants in this and in the orchid-house have done very well and looked bright all the year. The following are among the rare species seldom or never flowered in Singapore:—*Protamonium*; a new genus of *Scitamineæ* from Pahang; *Cattleya Trianae*, *C. intermedia* and *C. speciosissima*; *Lycaste Deppei*; *Lockhartia elegans*; *Catasetum tridentatum*; *Catasetum Bungerothii*; *Mesospinidium vulcanicum*; *Aspasia epidendroides*, from South America; *Cælogyne tomentosa*, *Cumingi*, *macrobulbon* and one or two new species; *Trichoglottis fasciata* and a new species from Kuala Lumpur; a fine new *Phalænopsis* near *Luddemanniana*, from the Philippines; *Cypripedium insigne* var. *exul*, a new plant from Bangkok,—were, among the Eastern orchids, rarely or never in flower here before.

Among other pot-plants of other orders of interest were:—*Didymocarpus quinquevulnerus*, a very fine new plant from Pahang, and *D. pyrolæflorus* (Mount Ophir); *Trichopus zeylanicus*; *Bragantia tomentosa*; *Pomazota sylvestris*; *Justicia*, new species from Pahang; *Schizocapsa*, from China; *Carex divaricata*; *Chamæcladon Griffithii* var. *argentea*, from Pahang; *Cryptanthus Beuckeri* and *Anthurium Decharidi*; and *Hippeastrum solandriiflorum*, from South America. Among foliage plants, a very beautiful *Strobilanthes*, introduced by Mr. BOXALL from Burma, attracted general attention.

Fernery.

9. This required reconstruction, as the roots of the shade trees had become too numerous, and usurped the soil intended for the ferns. It was, therefore, entirely re-made, a few trees cut out, and others thinned, and fresh ferns, with *Cypripediums* and other plants introduced, the result being that the rockery is much more picturesque and interesting.

Lake.

10. The island in the lake was thoroughly cleaned and replanted. The large fig tree in the centre was found to be quite dead, and its removal made so large a gap in the centre of the island that the whole of the plants on it were removed, and replaced by palms and pandanus, which will, when grown, produce a fine effect.

Palmetum.

11. A number of additional palms have been planted here, and there are now representatives of one hundred and sixty species, belonging to one hundred and two genera.

Propagation.

12. Another glass frame, larger than the previous one, has been built for striking cuttings and establishing newly imported plants. It has proved very successful, and seems especially suited to *Cattleyas* and other South American plants.

The large plant-nursery by the new lake has been enlarged, the soil here being exceptionally suited for nursery plants.

Flower Beds and Borders.

13. These have been replanted and manured and kept in good order, as have been the lawns. A small mowing machine was obtained in the early part of the year, and has proved very useful.

14. Some new round and crescent beds were made on the old herbaceous ground, and planted with shrubs illustrating the order *Rubiaceæ* (*Ixoras*, *Gardenias*, *Mussaendas*, etc.), and a little circular bed was made near the scitamineous border to contain the few plants of the order *Iridææ*, which thrive here.

Experimental Garden.

15. This garden has hitherto been under the Forest Department, and has suffered much from want of funds to develop it properly. It has now received a grant of \$1,000 for its maintenance, and consequently it is possible to develop it steadily and much progress has been already made in it. Samples of all the economic plants have been arranged in beds parallel to the main walk, and properly labelled. They are classified according to use. The first group consists of beverage plants:—Teas—Chinese, Assam and Paraguay, coffees, chocolate. Then follow groups of spices, gums, resins, guttas, dye plants, fibre plants, etc.

16. Above this the hill, formerly covered with grass and brushwood, has been cleared for a considerable space, and paths suited for riding or walking have been made. This hill, it is proposed to convert into an arboretum, containing examples of all kinds of trees arranged in natural orders, in the same manner as the arboretum of the Gardens at Buitenzorg. Already the early orders of the *Polypetalæ* are thus planted, spaces being left for additional trees, and the work will be continued as rapidly as possible.

17. During the year, many economic plants were sent out to various private persons and Botanic and other Gardens, besides a considerable number of seedlings of various plants raised for planting in the Singapore forests.

18. Among the more interesting introductions this year were the Bilian (*Eusideroxylon Schwageri*), of which a number of seeds were raised; Kapayang (*Pangium edule*), the true Sarsaparilla (*Smilax sarsaparilla*), and the English blackberry (*Rubus fruticosus*), which is doing very well, but has not shewn signs of flowers yet.

The Avocado pear fruited this year, but the fruits were poor in flavour.

19. As much interest is being taken in gambir just now, I made visits to various Chinese and Malay factories and plantations in Singapore and Malacca, and, with the aid of Dr. BOTT, Government Analyst, made experiments in preparation of the product, an account of which has been published in the *Bulletin of Agriculture* of the Straits Settlements. Experiments were also made in extracting the essential oil of the Sumbong plant (*Blumea balsamifera*) by distillation. A green camphoraceous oil was extracted, which may have a commercial value.

Reclaiming Waste Land.

20. In previous reports, I urged the reclamation of the waste swampy ground lying close to the Tyersall Road, and the Government granted \$1,000 to be expended in reclaiming and utilising this. The ground being low-lying and wet, a lake has been excavated to a depth of three or four feet, the excavated material having been used in the formation of the banks and a drive across the narrow portion of it. A brick overflow drain covered with slabs was made at a cost of \$50. There is also a walk round the lake shaded by a collection of bamboos of different kinds. A bridge will have to be made in the drive across to permit of the connection of the two parts of the lake, and the materials for this have been provided. A further grant was asked for the ensuing year in order to complete the work, but was refused. It will, however, in any case be necessary to finish the work, up to a certain point at least, and the funds for this must come out of the annual grant, which indeed can hardly afford it.

Flower Show.

21. A flower show was held in June last in the large plant-house as usual, but it was by no means as successful as in previous years, for not only were the exhibits poor both in quantity and quality, but the attendance, owing to repeated and prolonged deluges of rain, was very small. The result being a deficit of \$429.15, which had to be defrayed out of the Gardens vote.

22. It is obvious that, unless more interest is taken in horticulture by the residents in Singapore than at present, the show as an annual institution will have to cease. The Government would be hardly justified in spending so much money on an exhibition attended with so little beneficial result.

Outside Work.

23. In the early part of the year, the Department designed and planted some ornamental beds on a piece of public ground called Robinson Quay, after which the Public Works Department took it in charge.

Herbarium.

24. The work of incorporating the various collections made in the Straits has gone on as speedily as possible, and a very large number of specimens have been added to the herbarium. The largest and most important addition was that of the collection made during the expedition in Pahang, when upwards of two thousand specimens were obtained, among these are representatives of several new and interesting genera and many new species, besides many not hitherto known to occur in the Peninsula. A large number of specimens were also collected in Singapore, Johor, and Malacca, by myself. Mr. HOLMBERG acting for Mr. DERRY, who was superintending Penang in place of Mr. CURTIS, absent on leave, sent a number of specimens from Malacca, and a small number were presented by the Hon'ble D. F. A. HERVEY. From Borneo, Dr. HAVILAND sent 209 specimens, and Mr. R. W. HULLETT 91. Dr. KING sent 345 specimens from Perak and India. The Royal Gardens, Kew, presented 177 specimens from various Indian and other collectors. Baron F. VON MUELLER presented 440 Australian specimens.

25. A number of rattans with the native names, timbers and fruits were also collected during the year, but the absence of any place to store and preserve these specimens precludes at present any great strides being made in this direction.

26. Of specimens distributed to various collectors, 800 plants were sent to Dr. KING, 443 to the British Museum, a small number to the Royal Gardens, Kew, to Dr. BURCK, Buitenzorg, Professor HACKEL, and others.

27. Collecting apparatus was sent to several persons in Borneo and the Straits Settlements, who had promised to preserve specimens for the Herbarium.

Artist.

28. The Botanical Artist continues his drawings of plants of importance and interest in the Malay Peninsula. It is hoped shortly to prepare lithographic plates of some of the apocynaceous gutta-producing plants—the Willoughbeias, Alstonias, Dyera, etc.—and eventually also of the Palms and Pandani of the Malay Peninsula.

Expedition.

29. During the year, an exploring expedition visited Pahang with a view of reaching the lofty range of Gunong Tahan in the interior. The party failed, however, to reach the desired point, owing partly to sickness and partly to the difficulties of the route, which so delayed the expedition that the supply of provisions ran out. A large number of plants, both alive and in the form of herbarium specimens, were obtained, including very many rare and new species of much interest.

Coco-nut Trees Ordinance.

30. During the year, 128 notices were served on various owners of trees and plantations, requiring the destruction of decaying trees and rubbish. The owners complied with the notices without delay, and it was not found necessary to summons any for not doing so. The worst affected district was that of Kalang, where neglected, unhealthy plantations, and piles of old tan-bark were producing much damage to the more careful planters. The number of trees destroyed was 1,364, and 1,737 old stumps and fragments of coco-nut timber were removed and burnt or buried. There is still some work to be done in the Kalang district, but most of the other portions of Singapore are clean.

31. At the close of the year, evidence was received that the Inspector under the Ordinance—MUSAFFER ALI—had been receiving illegal gratifications, and otherwise acting fraudulently. He was summoned and found guilty on one count, was fined by the Magistrate, and dismissed from the service. The coolies under him worked well throughout the year.

32. The expenses in connection with the working of the Ordinance during the year were as follows:—

	\$ c.	\$ c.
Vote, ...		700.00
Salaries, ...	297.03	
Transport, ...	104.62	
Uniforms, ...	10.60	
Contracts for removing dead trees, ...	66.20	
Balance, ...	222.15	
	\$ 700.00	\$ 700.00

Exchanges.

33. Plants and seeds were received during the year from the following contributors:—

	Plants.	Seeds.	
Royal Gardens, Kew, ...	...	4	packages.
Botanic Gardens, Calcutta, ...	60	3	do.
Do., Ceylon, ...	12	22	do.
Do., Trinidad, ...	33	22	do.
Do., British Guiana, ...	...	3	do.
Do., Jamaica, ...	...	5	do.
Do., Grenada, ...	...	16	do.
Do., Saigon, ...	16	...	do.
Do., Natal, ...	...	34	do.
Do., Brisbane, ...	...	22	do.
Do., Port Darwin, ...	...	12	do.
Do., St. Petersburg, ...	...	4	do.
Do., Madras, ...	...	7	do.
Messrs. Veitch, London, ...	60	...	do.
„ Bull, London, ...	...	1	do.
„ Chatterjee, Calcutta, ...	...	14	do.
„ Reasoner Bros., Florida, U. S. A., ...	...	18	do.
„ Cannell & Son, England, ...	...	64	do.
„ Sander & Co., England, ...	81	...	do.
Dr. Keith, Siam, ...	6	...	do.
Baron von Mueller, Melbourne, ...	...	8	do.
Mr. C. Curtis, India, ...	100	22	do.
Mr. D. Guiceneuf, France, ...	...	2	do.
Mr. G. Peché, Maulmain, ...	80	...	do.
Mr. Hume Black, Brisbane, ...	...	51	do.
Mr. Van Huivel, Pontianak, ...	27	...	do.
Mr. M. T. Gibson, Borneo, ...	33	...	do.
Mr. Hole, Pekan, ...	1	1	do.
Mr. Boxall, India, ...	25	1	do.
Professor Vaughan-Stevens, Pahang, ...	33	2	do.
Lieutenant Kelsall, Selangor, ...	100	...	do.
The Hon'ble E. E. Isemonger, Malacca, ...	...	15	do.
Mr. H. H. Everett, Sarawak, ...	12	...	do.
Mr. J. F. Duthie, India, ...	...	12	do.
Mr. C. Gray, Madras, ...	15	...	do.
Mr. F. Griffith, do., ...	70	...	do.
Superintendent, Government Plantations, Perak, ...	...	1	do.
Mr. Cecil Wray, Perak, ...	109	...	do.
H. H. The Sultan of Johor, ...	600	...	do.
Mr. G. S. Dare, Singapore, ...	...	1	do.
Captain Ridout, do., ...	7	...	do.
Mr. Seah Liang Seah, do., ...	...	1	do.
Mr. M. Micholitz, do., ...	2	...	do.
	1,497	368	

34. Plants and seeds were distributed to the following recipients:—

	Plants.	Seeds.
Royal Gardens, Kew, ...	21	2 packages.
Botanic Gardens, Calcutta, ...	20	1 do.
Do., Ceylon, ...	...	1 do.
Do., Penang, ...	81	10 do.
Do., Trinidad, ...	...	16 do.
Do., British Guiana, ...	...	3 do.
Do., Fiji, ...	43	20 do.
Do., Brisbane, ...	...	1 do.
Do., Port Darwin, ...	...	1 do.
Do., Hongkong, ...	...	1 do.
Do., Buitenzorg, ...	...	1 do.
Do., Natal, ...	...	1 do.
Do., Grenada, ...	...	16 do.
Do., Dominica, ...	...	58 do.
Do., Saigon, ...	24	...
Do., Malacca, ...	338	...
The Hon'ble the Resident Councillor, Malacca, ...	75	...
Captain Floyteff, Imperial Russian Navy, ...	...	27 do.
Mr. Peché, Moulmein, ...	27	...
Messrs. B. S. Williams, London, ...	250	...
„ Sander & Co., do., ...	250	...
Lord Zetland, ...	17	...
Sir J. F. Dickson, K.C.M.G., ...	12	...
Public Gardens, Selangor, ...	500	...
Municipality, Singapore, ...	200	...
Mr. Louis Jacquet, Pulau Condor, ...	18	...
Mr. Goodhart, Sumatra, ...	10	...
Mr. Stephen, Rangoon, ...	...	7 do.
	<u>1,887</u>	<u>156</u>

Library.

35. The following publications were added to the Library during the year:—

- CLARKE—"Composite Indicæ," 1876.
- GRIFFITH—"Notulæ Asiaticæ."
- "Posthumous Papers," Part I, 1847.
- CROSS BEVAN & KING—"Report on Indian Fibres and Fibrous Substances," 1887.
- "Nederlandsch Kruidkundig Archief," 2nd Series, IV, 3, 2; 2nd Series, V, 2; 2nd Series, V, 3; 2nd Series, 1 and 2.
- "The Agricultural Record"—January, February, March, April, May, June, September, October, November, and Special Number 1890 Trinidad.
- MULLER—"Fragmenta Phytographiæ Australiæ"—17, 18, 19, 40, 66, 68, 69, 75, 80, 85, 86, 87, 94.
- "Observations on some Papuan and Polynesian Sterculiaceæ VIII.
- "Brief Report on the Papuan Highlands Plants gathered during Sir WILLIAM MCGREGOR'S Expedition, in May and June, 1889."
- TEYSMANN & BINNENDIJK—"Plantæ Novæ Horti Bogoriensis in Ins. Java."
- NEUMAYER, Dr.—Anleitung, 1888.
- HOOKE, Sir W.—"Botany—Enquiries regarding Botanical Desiderata."
- GRIESBACH—"Grundriss der Systematischen Botanik," 1854.
- BAILEY—"A Synopsis of the Queensland Flora"—3rd Supplement.
- "Barbadoes Agricultural Gazette," October, 1890.
- "Guide to the Royal Gardens, Kew."
- PRESTOE—"Catalogue of Plants in Royal Botanical Gardens, Trinidad," 1870.

- ENGLER, A.—“Loranthaceæ.”
 BROWN, R.—“Orchideæ and Asclepiadaceæ,” 1833.
 DELPIUS—“Prodromus d'una Monographia delle Piante Formicarie,
 Part III, 1889.
 SMITH & GRIFFITH—“Plants producing Seed without action of Pollen,”
 1839.
 GRIFFITH—“Icones Plantarum Asiaticarum.”
 “Grenada Agri-Botanico Bulletin,” December, 1890 (Liberian Coffee).
 “Journal of Mycology,” Vol. VI, No. 3, of the United States Department
 of Agriculture.

[The above were presented by the Royal Gardens, Kew.]

The following were purchased:—

- BECCARI—“Malesia,” Vol. III, fasc. IV, 1889.
 JUNGHUHN, Dr.—“Javansche Balanophoreen.”
 BALANSA, M. B.—“Graminées de L'Indo-Chine Français.”
 MIQUEL—“Illustrationes Piperacearum.”
 HANBURY, D.—“On the Species of Garcinia which afford Gamboge in Siam.”
 MIKLOUCHO-MACLAY—“List of Plants in use by the Natives of the Maclay
 Coast, New Guinea.”
 WHITE, D.—“A Botanical Description and Natural History of the Malabar
 Cardamom.”
 DE VRIESE, W. H.—“Mémoire sur les Rafflesia Rochussenii et Patma.”
 ROXBURGH, D.—“Account of Bassia butyracea.”
 PIERRE, L.—“Diploknema sebifera.”
 COLLA—“Memoria sul Genere Musa e Monografia del Medesimo.”
 DE CANDOLLE—“Monographiæ Phanerogamarum,” Vol. VII, 1891.
 “The Journal of the Linnean Society,” Vol. XXVIII, No. 194.

Presented by various Contributors.

- TREUB, Dr.—“Annales du Jardin Botanique de Buitenzorg,” Vol. IX, pt. 2,
 Vol. X, pt. 2.
 ————“Notes on the Cultivation and Preparation of Gambier.”
 ————“Verslag Hands Plantentuin te Buitenzorg,” 1890.
 Icones Plantarum,” Vol. X, pt. IV.
 BAILEY—“Catalogue of Plants in the two Metropolitan Gardens—The Bris-
 bane Botanic Garden and Bowen Park.”
 “Annual Report of the Department of Agriculture, Brisbane,” 1889, 1890.
 “Bulletin No. 8, Department of Agriculture,” Brisbane.
 DEPARTMENT of AGRICULTURE.—“Bulletin No. 4—Relative Merits of various
 United States of America Stocks for the Orange.”
 TRYON, H.—“Report on the Insect and Fungus Pests,” No. I, Queensland,
 1889.
 FAWCETT, W.—“Economic Plants.”
 ————“Bulletin” No. 22.
 “Bulletin—Botanical Gardens, Grenada—Vanilla.”
 FRELEASE—“Missouri Botanic Gardens.”
 “Report, Missouri Botanic Gardens, United States America,” 1890.
 GOODALE—“Some Botanic Gardens in the Equatorial Belt and in the South
 Sea.”
 ————“Some Museums.”
 ————“Some of the Possibilities of Economic Botany.”
 ————“Biology.”
 “Proceedings of the Tenasserim-Agri-Horticultural Society of Moulmein.”
 LAMB, S.—“Tobacco, its Cultivation in Northern Queensland.”

In addition to the above, the Annual Reports of the various
 Botanical Gardens, and also of the Forest Department of India have
 been received.

BOTANIC GARDENS, SINGAPORE.

Statement of Receipts and Expenditure for the year 1891.

RECEIPTS.		EXPENDITURE.	
	\$ c.	<i>Salaries.</i>	\$ c.
By Balance in Bank, ...	217 79	Herbarium Keeper, ...	179 50
„ Government Grant,	8,500 00	Head Mandor, ...	180 00
„ Sale of Plants and Flowers, ...	1,030 75	Extra do., ...	103 59
„ Interest, ...	33 18	Carpenter, ...	165 72
		Extra Carpenter, ...	54 72
		Mason, ...	76 96
		Printer (Label), ...	119 00
		Do., Apprentice, ...	33 13
		Peon, ...	95 50
		Aviary Keeper, ...	96 00
		Garden Police, ...	342 00
		Coolies, ...	2,762 67
			4,208 79
		<i>Bills for 1891.</i>	
		Purchase of Plants and Seeds, ...	147 20
		Manure and Cartage, ...	171 02
		Food for Birds and Ani- mals, ...	567 31
		Flower Pots and Tubs, ...	222 18
		Botanical Books and Her- barium Paper, ...	685 43
		Laterite and Gravel, ...	173 54
		Repairs to Buildings, ...	182 00
		Tools and Stores, ...	287 84
		Wardian Cases and Freight, Wood for Construction purposes, ...	104 00
		Bricks, Lime, etc., ...	217 78
		Director's Petty Expenses, Assistant Superintendent's Petty Expenses, ...	207 77
		Contribution to Flower Show, ...	192 40
		Miscellaneous, ...	429 15
			951 87
			4,746 89
		Balance, ...	8,955 68
			826 04
	\$9,781 72		\$9,781 72

FOREST DEPARTMENT, SINGAPORE.

Area.

1. The total area of the forest reserves now in Singapore is 14,509 acres 1 rood and 8 poles. This gives a decrease of 7 acres 1 rood and 15 poles from that of last year, due to the sale of a piece of land in the Bedok district valueless for forest purposes. The land fetched the sum of \$135.

Boundaries.

2. The boundaries have been well kept up and cleaned of grass and fern, and over the stream and swamps the bridges have been renewed. A large number of notice boards have been put up at salient points of the reserves to warn persons against trespassing therein. The whole of the reserves are now correctly surveyed and demarcated.

Forest Watchmen.

3. The same number of Forest Corporals, Lance-Corporals and Watchmen was employed this year as last, viz., 23 in all. All worked well, and no complaints were made against them. Khaki uniforms were supplied this year, in place of the blue serge suits last year, as the latter proved less satisfactory for jungle work. The distribution of the men is as follows:—For the Bukit Timah, Bukit Panjang, East Bukit Timah, Choa Chu Kang, Jurong, Pandan and Upper Tanglin reserves there are 1 Forest Corporal and five Watchmen. At Kranji and Sungei Buloh there are 1 Lance-Corporal and two Watchmen. At Bukit Mandai and Sumbawang 1 Lance-Corporal and two Watchmen. At Chan Chu Kang, Ang Mo Kio and Selitar one Lance-Corporal and four Watchmen. At Changi and Bedok one Lance-Corporal and two Watchmen. At Toas and Murai one Lance Corporal and two Watchmen.

Buildings.

4. Two new forest stations have been built—one at Chan Chu Kang and one at Kranji—with brick pillars and balloo posts, at a cost of \$253.90 each.

Farming Encroachments.

5. Two pepper encroachments in the Forest Reserves at Upper Mandai were given out on lease for one year for \$40, and one at Jurong was let for \$10. An encroachment of gambir at Sumbawang was let for \$25, making a total revenue of \$75.

The plants on these encroachments are now nearly effete and will soon cease to be leased. Meanwhile the trees of India rubber, and Renghas, planted among the crops, have taken good hold and are growing steadily and well.

Planting.

6. The work of planting waste land with valuable trees goes on as fast as possible, but it is not easy to get seeds of the more valuable trees in sufficient quantity for covering very large tracts.

Para Rubber (*Ilexca braziliensis*, Spruce) seeds were obtained from Kew and from the trees in the Experimental Garden, and a large number of plants raised. Eight acres of this valuable India rubber tree have been planted this year at Sumbawang, and the trees are thriving remarkably well. Rubber collected from the trees in the Experimental Garden was pronounced by Messrs. SILVER to be of very good quality. Fast as this plant grows, it will be nearly ten years before it is at the best stage for tapping. More seed is urgently required.

The Renghas plants (*Gluta Renghas*) raised from seed obtained from Pahang, are also growing with great vigour. Two acres have been planted at Jurong. The two-year old plants at Chan Chu Kang and Upper Mandai are now many of them over six feet tall.

This plant produces a very fine mahogany-like timber, but unfortunately it is disliked by the cutters on account of the poisonous character of the black varnish which exudes from it. The Malays give the name of Renghas to several trees all of the same family; of these the best timber tree is apparently the *Melannorhæa*, *Curtisi*, and *M. Wallichii*. The latter species occurs in Singapore, but is now very scarce. The former is a native of Penang.

All possess the poisonous properties of the *Gluta*, which is a great objection to them, but it seems that by no means all persons who deal with these trees are affected by them. In moving and planting the hundreds of *Gluta* seedlings here, there has only been one case of *Gluta* poisoning among the coolies.

In the Upper Mandai encroachments about five acres of various trees have been planted and all are doing well. Among them are *Sterculia clata*, *Pithecolobiums*, Inga Saman, Jack (*Artocarpus integrifolia*), Glam (*Melaleuca leucadendron*), Broad-leaved Mahogany (*Swietenia macrophylla*). The Jack suffers much from the ravages of *plandoks* (mouse deer), which are very fond of its leaves.

A quantity of cuttings of the Male Bamboo (*Dendrocalamus strictus*), were taken from plants in the gardens and have been planted at Sumbawang; they are doing very well. More are being struck, and it is hoped eventually to be able to supply the stems for lance handles in quantity. A number of seeds of the Bilian tree (*Eusideroxylon Schwageri*, Teysm) were obtained from Borneo, and having been planted a fair proportion germinated. Hitherto there has been some difficulty with this invaluable timber tree, but it was found that the seeds germinated better simply put a little way beneath the soil, and with the hard shell not cracked or split as had been tried previously. It is, however, not easy to procure the seed of this plant in quantity. I hope, however, to be able to obtain a further supply from Sandakan, where it is said to be plentiful.

During my explorations in Pahang, I explained to the natives my desire for seed in any quantity of *Dichopsis gutta*, and offered to pay a cent a seed delivered in Pekan. Many, especially of the Kelantanese, said that they could get plenty in the season and undertook to do so, but I am doubtful as to ever obtaining it. Two French experimenters visited Singapore with plans for extracting the gutta from leaves and twigs without destroying the tree. The methods adopted, however, were not successful, and I regret to say that, on my return from Pahang, I found that four of the best *Dichopsis* trees in the island had been cut down in one of the reserves, which loss was the more to be regretted as one or more of the trees were about to flower and a supply of seed might have been obtained.

Fires.

7. There have been only eight cases of fire in the reserves this year, as against twelve of the previous year. In the Ang Mo Kio reserve two fires occurred, in one an acre in the other case 70 acres of lalang and secondary jungle were burnt; at Changi there were three fires, in two of which about 30 acres of grass and brushwood were burnt; at Jurong a little grass was burnt; at Selitar also there was a small grass fire; and there was one at Pandan in which about 12 acres were burnt. Every effort to detect the incendiaries failed, but at Ang Mo Kio there was no reasonable doubt but that the grass was fired by Chinese grass-cutters, who were arrested afterwards cutting the young lalang shoots, and fined five dollars each, while at Changi it appeared that the Malays at Tanah Merah had ignited the grass to get the fluffy seeds of the lalang, produced after burning, for stuffing pillows.

Prosecutions.

8. There were 16 cases in all instituted during the year for cutting and removing timber, etc., and fines to the amount of \$127 inflicted, besides \$16.15 paid in to the Government for the value of the timber cut. Two cases were withdrawn, one being connected with the reopening of an old cart track at Changi, and one being a case of tree cutting by a Government contractor, who paid the value of the trees cut down to clear a piece of ground for landing road metal from the Tampenis River. In two cases summonses were issued—one against an Eurasian for cutting trees and making tiger pits at Changi Loyang, by which the lives of the forest watchmen were endangered; he was convicted and fined five dollars and costs: the other was issued against four Malays for cutting young trees at Tanjong Penjuru, convicted and fined four dollars and costs. In two cases the defendants were cautioned and discharged, in one case for cutting lalang in the other for cutting pitcher plants the stems of which are used for tying bundles. In the remaining 10 cases fines amounting in the aggregate to \$110 were inflicted.

Licenses for Timber cutting.

9. During the year, several portions of mangrove swamp have been let for cutting firewood, fishing-stakes, and pepper posts. The firewood-cutting licenses brought in \$178, and a license issued for 1,500 fishing-stakes fetched \$60. The prices charged by the Forest Department were considerably higher than those of the other departments, but there is no difficulty in getting the Malays and Chinese to take out as many licenses as are desirable. Thus the permits for a single man to cut bakau for firewood are \$4 for two months, being an increase of one dollar above that of the other departments, and permits for fishing-stakes granted at the Land Office at \$20 per 1,000 stakes were readily taken up from the Forest Department at \$40 a thousand. One cause of this is that the more accessible of the Government mangroves have been very heavily cut, so that the timber is at present small and hardly worth the cutting, while the Forest Reserves, hitherto not having been cut to any extent, produce plenty of good wood. But in any case the profit made by the cutters is quite large enough to allow of the increased charge.

Bakau swamp forest is more popular for firewood-cutting on account of its accessibility by water, which is a much less expensive form of carriage than that by land, and the trees grow close together and have not to be sought for at considerable distances apart. The wood is very suitable for firing, and very good fishing-stakes can also be found in the swamp.

The principal woods cut are Blukup (*Rhizophora mucronata*), Tumu (*Kandelia Rheedii*) and Akit (*Rhizophora conjugata*). A strong man can cut in a day 300 bundles of split firewood, tied up, and ready for sale. Each bundle contains five pieces 15 inches long and about an inch thick: one hundred bundles sold on the spot fetch 10 cents, and sell in Singapore for 25 cents. Engine firewood is of larger size, the pieces being 2 feet long and 4 inches thick and weighing about 3 catties. These fetch 40 cents per hundred on the spot, and 65 cents in town.

Fishing-stakes are cut of various sizes and are sold according to size. A stake nine fathoms long sells for 35 cents, and six fathoms long 25 cents, that is \$250 to \$350 per thousand. The license to cut these costs \$40, so that the profit is fairly large, but it must be remembered that the expenses of bringing the stakes to the village are often very great. The stakes are usually brought down by raft, and from Sungei Buloh, where a license was issued this year, to Telok Blanga it takes ten days to bring them down. One headman and six others can cut 1,000 rollers in a month. Each cuts for himself, and pays a commission of a dollar to the headman, who is responsible to the *Towkay* for the 1,000 stakes, the *Towkay* advancing the money for the license, and pays the cutters according to the agreement, viz., 35 cents for 9 fathoms, and 25 for 6 or 7 fathoms. The *Towkay* sells them again to the fishing stake owners, at a higher price, viz., 45 cents for nine fathoms and 35 cents for 6 to 7 fathoms. In this way he makes a very considerable profit, and as he pays for the license the increased charge affects him only and does not affect the hard-working cutter.

Bakau bark generally used for tanning in Singapore, is not at present procured from the Forest Reserves, as the Malays bring it from the Peninsula in large boats or tongkangs. It is sold by the cart-load, at \$13.50 per cart. The barks used are Blukup, Tumu and Akit, and also Pagar Anak (*Ixonanthes icosandra*), which is not a mangrove tree.

Besides the above-mentioned trees, the following contribute to the formation of the mangrove forests:—

Nirek (*Carapa moluccana*), a very hard timber, but large trees are almost invariably hollow internally. The bark has a reputation as a medicine for dysentery.

Tengar (*Ceriops Candolleana*).

Busing (*Bruguiera caryophylloides*) also called Bakau Puteh.

Lenggadi (*B. parviflora*, Wt.).

(*B. eriopetala*).

Teremtam (*Lumnitzera coccinea*), good timber.

Stada (*Podocarpus neriifolia*, Don.).

Expenditure for 1891.

Vote,	...	...	...	...	\$4,000
Salaries,	...	...	...	...	\$2,838.58
Buildings,	...	...	...	...	507.80
Uniforms,	...	...	...	...	147.00
Miscellaneous,	...	...	...	...	605.23
Balance,	...	...	...	...	1.39
					<hr/>
					\$4,000
					<hr/>
					<i>Revenue.</i>
Bakau Timber,	...	...	...	...	178.00
Fishing-stakes,	...	...	...	...	60.00
Pepper encroachments,	...	...	...	...	50.00
Gambir do.,	...	...	...	...	25.00
Rattans,	...	...	...	...	8.00
					<hr/>
					Total, ... \$321.00
					<hr/>

HENRY N. RIDLEY,
Director of Gardens and Forests, S. S.

APPENDIX A.

GARDENS AND FOREST DEPARTMENT, PENANG.

Leave of absence having been granted on account of ill-health, I was absent from the Settlement from January 26th to December 25th. During that time Mr. DERRY took charge and, I regret to find, suffered much from fever. It is a matter for serious consideration whether it would not be better to remove the present quarters to a more salutary spot.

Forest Reserves.

No additions have been made during the year, but the existing boundaries have been re cleared where necessary, and regularly patrolled by the Guards, who instituted during the year fifty-nine prosecutions for illicit timber cutting and encroachments, as against fifty in the previous year. In forty-eight cases the offenders were punished, and the others dismissed with a caution.

2. The Station at Penara Bukit, which has become quite uninhabitable, has been reconstructed under the supervision of the Public Works Department at a cost of \$400, and minor repairs done to the Station at Telok Bahang.

3. The nursery and village reserve at Kubang Ulu, Province Wellesley, has, during the year, been transferred from this Department to the charge of the District Officer of Bukit Mertajam, to be used, I presume, chiefly for raising shade trees to plant up the principal roads.

4. The total expenditure in connection with maintenance of Forest Reserves and Kubang Ulu Nursery for the year amounts to \$2,300 as shown in statement of expenditure annexed.

Waterfall Garden.

5. This garden continues to maintain its popularity both with residents and visitors passing through. The development of trees, &c. is most noticeable after an absence of nearly a year.

6. Considerable progress has been made in the construction of side drains, with stone and cement, in the steeper portions of the grounds where the wash is considerable.

7. A new culvert, one hundred and twenty feet long and two feet broad, has been built to carry off the rain-water from Government Hill Road, which will, it is hoped, give a better chance of establishing an avenue of *Polyalthia longifolia*, from the entrance gate to the garden office.

8. Some new beds and a circular path have been laid out around the Band Stand, which is an improvement to this part of the grounds.

9. Portions of the main roads have been metalled, and the foot-paths periodically weeded and put in order. Bridges and plant sheds have been repaired, and the usual routine work in connection with beds, borders, &c. attended to.

10. The Swimming Bath, which was opened on the 1st January at a merely nominal charge, has been well patronized, and yielded a revenue of \$180.05, which considerably more than covers salary of care-taker and other incidental expenses, besides giving an ample water supply to the plant nursery.

11. The revenue from plant sales is more than in any previous year, the total amount collected being \$312.91, as against \$220 in 1890, and \$75 in 1889.

12. The new Municipal Reservoir in course of construction at the top of the garden, and the consequent cartage of all material for the work over the garden roads, render impossible for the present that state of neatness desirable in a public garden. The ultimate result of this work, as regards its general effect on the appearance of the garden, will depend largely on the extent to which the Municipal Commissioners co-operate in making up the surrounding, &c. when the work is complete. At present it is anything but an ornament.

13. Through the kindness of the Director of the Royal Gardens, Kew, and of Messrs. VEITCH, SANDER, and LOW, I obtained and brought with me from England a large and valuable collection of plants which form a grand addition to those already in cultivation here. The whole amounted to over three hundred plants, and occupied fifteen cases, most of which were opened and watered at intervals during the voyage. The losses were inconsiderable, and entirely the result of a few cold nights before getting to the Straits of Gibraltar. In the appendix I have given a list of the plants obtained, and it is understood that, as opportunities occur, Malayan plants will be sent to those contributors in exchange.

Bungalow Garden and Experimental Nursery.

14. The Tennis Court in front of the new wing to Government Bungalow laid out at the beginning of the year, was ready for use about the middle of May.

15. Of annuals and other flowering plants, a fair display was maintained. Achimenes, Pansy and Larkspur did well in pots, and Dahlia, Coreopsis, Ageratum and Cornflower in beds.

16. Owing to the bungalow being more frequently occupied than formerly, a larger stock of pot plants is necessary for decorating the corridor and rooms, and the same holds good as regards roses and other flowers for cutting.

17. During a stay of two months in Gwalior on my way to England, I obtained from the Superintendent of State Gardens a collection of acclimatised vegetable seeds, which were at once forwarded to Penang. The Overseer reports that some kinds, especially onions and cucumbers, gave better results than has been obtained from English or Continental saved seeds. A further trial will be made this year, and if the result is equally good, a supply will be obtained for distribution among Chinese market gardeners. The English vegetables grown in Gwalior during the cold weather are equal in every respect to the best obtainable in England.

18. The roads and paths were maintained in good order, side drains repaired, and other routine work attended to.

19. The avocado or alligator pear, known also as vegetable marrow or midshipman's butter, fruited for the first time this season. The trees look well and promise to be as easy of cultivation as any of our native fruits.

Preservation of Coco-nut Trees.

21. The Inspector and two men were employed nine months in Penang and three months in Province Wellesley.

22. One hundred and six notices were served on persons having on their premises dead trees or rubbish likely to prove breeding places for beetles; and as the result 2,073 dead trees and 109 heaps of rubbish were destroyed.

In addition to the above, many trees were destroyed as soon as the owners' attention was called to the subject.

23. Four prosecutions were instituted in Province Wellesley, and the offenders fined \$5 each for neglecting to comply with the terms of the Ordinance.

Six Summons served in Penang had not been decided at the end of the year.

24. In connection with the work of the Department, the Acting Assistant Superintendent visited the Dindings, Singapore, Kedah and Langkawi; and also supervised the work of planting, &c. of Residency grounds, the laying out of new Cemetery, and planting of shade-trees within Municipal limits.

General.

25. The total expenditure of the Department amounted to \$10,086.40, as shown in the Statement annexed.

C. CURTIS,

Assistant Superintendent of Forests.

Penang, 18th January, 1892.

Revenue and Expenditure of the Forest and Gardens Department, Penang, 1891.

REVENUE.	EXPENDITURE.	\$	c.
Grant—Maintenance of Forest Reserves, ... \$2,300.00	Salaries of Forest Guards,	683	58
	" Office Asststant and Messenger,	245	05
	Forest Guards' Uniform,	72	00
	Maintenance of Boundaries,	486	50
	" Kubang Ulu Nursery,	242	25
	Reconstruction of Station,	400	00
	Repairs to Station,	9	06
	Rent of Temporary Quarters,	18	00
	Materials for Herbarium,	54	91
	Purchase of Books,	21	40
	Boat-hire and Cartage,	57	55
Oil for Station,	9	70	
		2,300 00	
Grant—Maintenance of Waterfall Garden, ... \$4,500.00	Salaries,	3,057	99
	Purchase of Plant and Seeds,	163	49
	" Pots and Tubs,	171	99
	" Tools, &c.,	133	11
	Improvement of Side Drains,	66	49
	Material for Plant Cases,	82	55
	" General Repairs,	70	99
	" Plant Sheds,	119	92
	Repairs to Bridges,	227	57
	Cartage,	68	85
	Freight,	33	01
	Road Metal,	87	18
	Paint,	22	69
	Expenses in connection with Swimming Bath,	45	60
Petty Expenses,	69	00	
Miscellaneous,	27	06	
Balance,	52	51	
		4,500 00	
Grant—Maintenance of Grounds of Government Bungalow and Experimental Nursery, ... \$2,000.00	Salaries,	1,756	66
	Purchase of Plant and Seeds,	31	00
	" Pots,	15	36
	" Tools,	38	26
	Repairs to Plant Shed,	10	97
	Manure,	143	50
	Miscellaneous,	3	54
Balance,	0	71	
		2,000 00	
Travelling and Personal Allowances, ... \$700.00	Pony Allowance,	408	75
	Transport and Field Allowances,	142	32
	Expenses in connection with Journey to Singapore,	30	65
	Expenses in connection with Visit to the Dindings,	10	16
	Expenses in connection with Visit to Kedah,	5	40
	Miscellaneous,	55	49
	Balance,	47	23
		700 00	

*Revenue and Expenditure of the Forest and Gardens
Department, Penang, 1891,—Continued.*

REVENUE.	EXPENDITURE.													
Expenses of carrying out the provisions of the Coco-nut Trees Preservation Ordinance, \$700.00.	<table style="border: none;"> <tr> <td style="font-size: 3em; vertical-align: middle;">{</td> <td style="padding-left: 0.5em;">Salaries,</td> <td style="text-align: right;">547 35</td> </tr> <tr> <td></td> <td>Transport,</td> <td style="text-align: right;">139 50</td> </tr> <tr> <td></td> <td>Balance,</td> <td style="text-align: right;">13 15</td> </tr> <tr> <td></td> <td></td> <td style="border-top: 1px solid black; text-align: right;">700 00</td> </tr> </table>	{	Salaries,	547 35		Transport,	139 50		Balance,	13 15			700 00	\$ c.
{	Salaries,	547 35												
	Transport,	139 50												
	Balance,	13 15												
		700 00												
Total Receipts from Plant Sales, Swimming Bath, &c. (Paid into Revenue Account), \$498.01	Grand Total Expenditure,	\$10,086 40												

C. CURTIS,

Assistant Superintendent of Forests.

Penang, 18th January, 1892

*List of Plants brought from England by the Assistant Superintendent
of Forests and Gardens, Penang, December, 1891.*

Contributed by the Director, Botanic Gardens, Kew.

<p>Anthurium Galeottii. " leuconeurum. " hybridum. " affine. " Miqueliana. " emarginatum. " Hookerii. " acaule. " Binotii. " Andreanum. " radicans. Aglaonema Mannii. Philodendron Mamei. Nephtytis liberica. Dorstenia arifolia. Dieffenbachia imperialis. " grandis. Stenospermation Wallisii. Brehonia spinosa. Mimusops balata. Brunfelsia (?) from St. Lucia. Chrysophyllum majalis var. montana. Courataria exigua. Dracæna Hookeriana. " fragrans. Gustavia exigua. Philodendron selloum. Impatiens platypetala. Begonia Md. Lionel. Steudneria discolor. Cyclanthus cristatus.</p>	<p>Dorstenia elata. Alloplectus vittatus. Scutellaria mocciniana. Begonia socotrana. Salvia azurea. " Bethelli. Jamaica banana. Agave rigida. " heteracantha. " ferox. " marmorata. " Bennetii. " francoisini. " americana lutea. " viridis marginatus. " filifera superba. " potatorum. " Hookerii. Aloe heteracantha. " saponaria. " tricolor. " mitræformis. " glaucescens. " N. Sp. from Turk's Island. " sp. Galpin. Achimenes tubiflora. Cyrtanthus obliquus. Crinum Moorei. " americanum. " sp. (longifolium?) Watson, 183-87. " Kirkii. Clistocactus colubrina.</p>
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List of Plants brought from England by the Assistant Superintendent of Forests and Gardens, Penang, December, 1891,—Continued.

Contributed by the Director, Botanic Gardens, Kew,—Continued.

Cereus flagelliformis.	Hæmanthus carneus.
Ceropegia Sandersonii.	" natalensis.
Beschorneria superba.	Kniphofia Northiæ.
Ceropegia Monteiroæ.	Patersonia cœrulea.
Cannas dwarf.	Pilocereus mexicanus.
Dyckia princeps.	Puya Webberii.
" floribunda.	Phyllocactus (seedling).
" rarifolia.	" J. T. Peacock.
Eucomis bicolor.	" longipes.
Euphorbia canariensis.	" anguligera.
Furcroea, sp. Shea.	Stenomesson luteoviride.
Gasteria triangularis.	" incarnatum.
" verrucosa.	Scilla natalensis.
" carinata.	Urceolina pendula.
" maculata.	" gloriosa.
" dicta.	Veltheimia viridiflora.
" subnigricans.	Aristolochia gigas, var. Sturtevantii.
Hæmanthus Katherinæ.	Impatiens Hawkerii.
" albiflos.	

Contributed by Messrs. James Veitch & Sons, Royal Exotic Nursery, Chelsea.

Adiantopsis radiata.	Cheilanthes hirta.
Adiantum œmulum.	Cibotum princeps.
" amabile.	" Schiedei.
" ancitense.	Davallia decora.
" Birkenheadii.	" retusa.
" cuneatum grandiceps.	Gymnogramma Laucheana.
" cyclosorum.	" Massonii.
" daphnitis.	" tartaricum.
" Flemingii.	Lastrea lepida.
" fragrantissima.	" pallens.
" glaucophyllum.	Nephrolepis Bauseii.
" Henslovianum.	" cordata compacta.
" Lambertianum.	Nothochlœna chrysophylla.
" Legrandii.	" nivea.
" Luddemannianum.	Osmunda japonica corymbifera.
" macrophyllum.	Platyloma flexuosum.
" mundulum.	" tenuifolium.
" Pacotii.	Polypodium refractum.
" pulverulentum.	Polystichum triangulare laxum.
" reniforme.	Hymenodium crinitum.
" rhodopyllum	Pteris Bauseii.
" rubellum.	" leptophylla.
" Seemanii.	Selaginella grandis.
" scutum roseum.	" Lyallii.
" tinctum.	" Emiliana.
" Veitchii.	Pteris Victoria.
" venustum.	Adiantum Maresii.
" Waltoni diffusum.	" macrophyllum, var.
" Weigandii.	Pteris Smithiana.
" Williamsii.	Lomaria gibba rosea.
" Feeii.	Areca lutescens.
Asplenium cicutarium.	Araucaria excelsa.
" formosum.	Anthurium Brownii.
" pteroides.	Medinilla Curtisii.
" rutœfolia.	Nepenthes Curtisii.
Blechnum brasiliensis.	Impatiens Hawkerii.
" corcovadense.	Hybrid rhododendrons.
Cheilanthes elegans.	Caladium fine vars.

*List of Plants brought from England by the Assistant Superintendent
of Forests and Gardens, Penang, December, 1891,—Continued.*

Contributed by Messrs. H. Low & Co., Clapton Nurseries.

Angrecum citratum.	Oncidium crispum.
„ articulatum.	„ tigrinum.
„ hyaloides.	„ Marshallianum.
„ sesquipedale.	„ ornithorhynchum.
Cattleya Mossiæ.	„ cucullatum.
„ Trianae.	Phalœnopsis denticulata.
„ Eldorado.	Pilumna fragrans.
„ Gaskelliana.	„ nobilis.
„ Percivaliana.	Rodriguezia secunda.
Epidendrum vitellinum majus.	Lælia purpurata.
Grammatophyllum Ellisii.	„ Dayana.
Lycaste sp.	Cattleya intermedia amethystina.
Maxillaria grandiflora.	Epidendrum ciliolare.
Oncidium papilio majus.	Odontoglossum citrosmum.

Contributed by Messrs. F. Sander & Co., St. Albans.

Cattleya Trianae.	Epidendrum macrochilum.
„ maxima peruviana.	Ocidium hastatum Roezlii.
„ Mendelii	„ splendidum.
„ labiata autumnalis vera.	„ roraimense.
„ Mossiæ.	„ crispum.
„ Bowringiana.	Chysis aurea.
„ Gaskelliana.	„ bractescens.
„ velutina.	Angrœcum leonis.
„ Schofieldiana.	„ Sanderianum.
„ gigas.	Lycaste lanipes.
Lælia harpophylla.	Zygopetalum Mackayii majus.
„ anceps.	„ crinitum.
„ grandis.	Miltonia spectabilis.
Trichopilia coccinea.	Dendrobium Leechianum.
Angulca Ruckerii.	Cyrtopodium St. Ledgerianum.
Mouletia Brockhurstiana.	Renanthera Storeii.
Dendrobium phalœnopsis Schroederianum.	Phajus Humboltii
Leptotes bicolor.	Cypripedium caudatum.
Odontoglossum citrosmum.	Lycaste aromatica majus.
„ vexillarium.	Dendrobium Foelschii.
„ grande.	„ dicuphum.
„ Harryanum.	„ undulatum.

C. CURTIS,

Assistant Superintendent of Forests.

Penang, 18th January, 1892.

APPENDIX B.

GARDENS AND FOREST DEPARTMENT, MALACCA.

MALACCA,

18th January, 1892.

SIR,—1. I have the honour to submit my report on the Forest Department, Malacca, for the year 1891.

2. Mr. DERRY left for Penang on the 21st January, 1891, and I was left in charge till 4th January, 1892.

3. The principal work of the year has consisted of maintenance, general nursery work and planting, experimental cultivation, and clearing land.

4. The main drive has been kept in good repair by the Garden staff, and the entrance from Batu Berendam Road has been widened and raised and a new bridge built, so as to be above the water level during the rainy season.

5. To the avenue of specimen local trees on the part of the drive which entirely belongs to the Garden, the following have been added:—Kembang Semangkok, Mer-sawa, Kempas Sawang, Klat Nasi Nasi, Kluet, Malbira, Kabu Kabu Utan, Rambahan Bukit, Merbaju, Kuayah, Kanidai, Pisang Pisang, Kranji Burong. Penagah Lilin has also been planted during the year.

6. Thirteen flower-beds have been formed on one side of the main drive, and clumps of trees and shrubs planted.

7. A collection of ornamental shrubs and flowering plants for supplying Govern-ment grounds, and for general distribution, has been maintained throughout the year.

8. The nursery work is shown in the following analysis:—

Seeds sown.	Cuttings planted.	Seedlings transplanted.	No. of kinds.	Trees prepared for box planting.	No. of kinds.
102	4,337	19,471	20	6,551	53

9. Altogether 3,777 trees have been planted during the year, which leaves a balance at the close of the year:—

Forest trees ready for planting, ...	2,298
Fruit trees and other economics, ...	1,762
Total, ...	4,060

10. An area of about 7 acres has been cleared at Bukit Sabukor Garden, through which a new road 400 yards in length from the main drive to the Assistant Superintendent's Quarters was made, and the following trees planted:—

<i>Myristica fragrans</i> , ...	Nutmeg, ...	40
<i>Caryophyllum aromaticum</i> , ...	Clove, ...	119
<i>Achras sapota</i> , ...	Chiku, ...	27
<i>Nephelium Lappaceum</i> , ...	Rambutan (Merah & Gading),	96
<i>Ananassa sativa var.</i> ...	Mauritius Pine-apple, ...	297
<i>Areca catechu</i> , ...	Areca-nut, ...	81
<i>South American Tapioca for experiment,</i>	Oronoque, ...	104
	Buck-stick, ...	100
	Bitter-stick, ...	102
	Camache, ...	104
	Red Sourise, ...	121
Total, ...		1,191

11. All the available land suitable for experimental cultivation has been cultivated throughout the year.

12. Egyptian cotton, annatto, tea, nutmeg, castor oil, Mauritius hemp, and chocolate have been grown on the land adjoining the lake.

13. Egyptian cotton (*Gossypium arboreum*) made very little progress in its growth, the soil of the Settlement generally is not rich enough for its cultivation.

14. Annatto (*Bixa orellana*) has grown well and could be cultivated readily in almost every part of the Settlement, but there is little demand for it.

15. Hybrid Assam tea (*Thea chinensis*, var.) has grown well and is now in full bearing, some of its seeds have been sown and germinated, the seedlings removed from the nursery bed and prepared for box planting.

16. Nutmeg (*Myristica fragrans*) grows satisfactorily on the hill sides, but it requires liberal manuring.

17. Castor oil (*Ricinus communis*) Calcutta variety grows well and fruits freely, but it was badly attacked by beetles lately and died. Its cultivation has now been discontinued.

18. Mauritius hemp (*Furcræa cubensis*) grows with great vigour in the nurseries, and several hundred plants have been planted near the lake. There are about 8,000 plants in the nurseries which could be transplanted.

19. Chocolate (*Theobroma cacao*).—Chocolate plant has proved very capricious in Malacca, whole plantations going off without any apparent cause, except the attacks of leaf insects, while here and there a solitary plant will for many years survive its fellows and go on bearing heavy crops of fruits. Therefore its cultivation has been discontinued in Malacca.

20. Liberian coffee.—Coffee requires very liberal manuring. Coffee planted on the ordinary soil without manure has not proved a success.

21. Cloves (*Eugenia caryophyllata*).—Some of the plants in the Garden, planted by Mr. DERRY, are now about 14 feet high, and in full blossom. The dry red soil of the Settlement suits cloves admirably.

22. Maltese lemons, nut-megs, Indian mahogany, camphor, West India crab-wood, Mauritius hemp, Ceylon and Mauritius pine apples are growing well and made favourable progress during the year.

23. A large supply of seeds of the common fruit trees such as durian, binjeh, pulasan, mangosteen, duku, langsat, rambutan, rambei, were sown in the middle of the year, and a large number of seedlings transplanted and prepared for box planting.

24. A portion of the shabby looking coolie line in the nursery near the lake collapsed a few months ago, and the remains of the building were removed and the spot cleared. A piece of jungle land about 2 acres in extent on the slope of the hill on the other side of the lake has been cleared, excavated and levelled, on which a new kapong-bark-wall coolie-line 60 × 25 feet with Mandor and Printer's Quarters has been built. The main posts are of eight-sided Tras Balau, Penagah Lilin, Tampinis and Sapan of 14 inches in diameter, and the other materials of hardwood scantlings 3 to 7 inches in diameter and the roof of double rumbia attaps. Three kitchens have also been erected.

25. Want of space in which to grow the increasing collection of plants necessitated the erection of an additional plant-house in the nursery for the cultivation of ferns, palms, and a great variety of other plants. This is a ventilated roofed house 40 × 18 feet, the materials being hardwood scantlings 7 inches in diameter, and the roof of double nipah attaps.

26. A new cart road 600 yards in length from the Assistant Superintendent's Quarters to the new coolie-line running pallel with the lake has been made at the close of the year.

27. The Garden staff and the Forest watchmen have been assisted by a band of extra coolies in clearing the brushwood between the lake and the new road, about 14 acres in extent, and a portion of it has been planted with 541 Nibong (*Oncosperma tigillaria*) and 45 Kabong palms.

28. Owing to the unusually heavy rainfall, the general works of maintenance, especially of roads and paths, absorbed a larger amount of labour than usual.

Forest Reserves.

29. The principal works of the year consisted of preservation and maintenance of boundaries.

30. The number of fires which occurred this year within the Forest Reserves was two—one at Ayer Keroh which burnt down about 15 acres of lalang and brushwood in patches; and another at Sungei Udang which destroyed about 2 acres of lalang. Both fires, I believe, originated from the burning of lalang grass. The rapid and easy ignition of grass on hot days makes it exceedingly difficult to detect the offenders or to prevent the destruction.

31. There were three prosecutions—two for cutting and removing timber from the reserves, and one for theft of fruit from the Bukit Panchor Reserve. Three persons were arrested and convicted, and fines to the amount of \$26.09 inflicted, of which \$6.09 was paid.

32. The total number of Forest watchmen employed was 24, comprising one Corporal, eight Lance Corporals, fourteen Constables, and one Orderly. All worked well, and there were no complaints against them. They were supplied with uniforms this year.

33. About one-third of the useful timbers planted up on the watershed of the water works died, and the rest have grown well. Owing to much sickness and excessive rainfall at Ayer Keroh, I was unable to get coolies to clear the lalang and plant some more useful timbers on the watershed. It was very fortunate that I had not planted them, as a great fire occurred on the 13th of October last and burnt down all the lalang and brushwood on the land where I intended to plant the forest trees.

34. Additions have been made to three Forest Stations during the year at a cost of \$897.28.

35. The wood-oil trees in the Sungei Udang Reserve have been farmed to a Malayman of the name of DALI, at \$36 per annum, who paid the rent in advance regularly.

36. In October last, I purchased 1,500 Sagu Rumbia (*Sagus laevis*) seedling plants for \$20, and planted them on the nursery opposite the new cooly-line, where they are growing well.

37. It has been proposed to take in the Bukit Kuan and Bukit Katil hill chain as mentioned in Mr. DERRY'S report for 1890, but as I had to do the Land Office work as well, I was unable to attend to the above work. During the year, I demarcated, subdivided and registered 579 holdings in the Mukims of Padang Semabok and Ujong Pasir and also attended to applications for lands for tapioca cultivations, etc., etc.

38. Bukit Panchor Reserve.—The Forest watchmen have been assisted by a band of coolies in reclearing three and a half miles of old boundaries, at a cost of \$30.

39. Batang Malaka Reserve.—Three miles of new boundary line have been opened, at a cost \$17.50.

40. Batu Tiga Reserve.—Half a mile of boundary line has been reopened at a cost of \$2.25.

41. Ayer Panas Reserve.—Two and a half miles of boundary line have been re-cleared, at a cost of \$20.75.

42. Two hundred and twenty-eight dried specimens of plants were collected during the year and forwarded to the Director of Gardens and Forests, Singapore; some

are of rare kinds. A large number of dried specimens of grasses and sedges were also collected for the Hon'ble D. F. A. HERVEY, who, I believe, took them with him to England.

Exchanges.

43. Plants and seeds have been exchanged largely with Botanic Gardens, Singapore, and also with Botanic Gardens, Penang.

Total exchanges inwards—plants 723, seeds 44 kinds; outwards—plants, 10,651, seeds, 33 kinds.

44. Attached are statements of Revenue collected and Expenditure for the year under review.

Revenue for the year 1891.

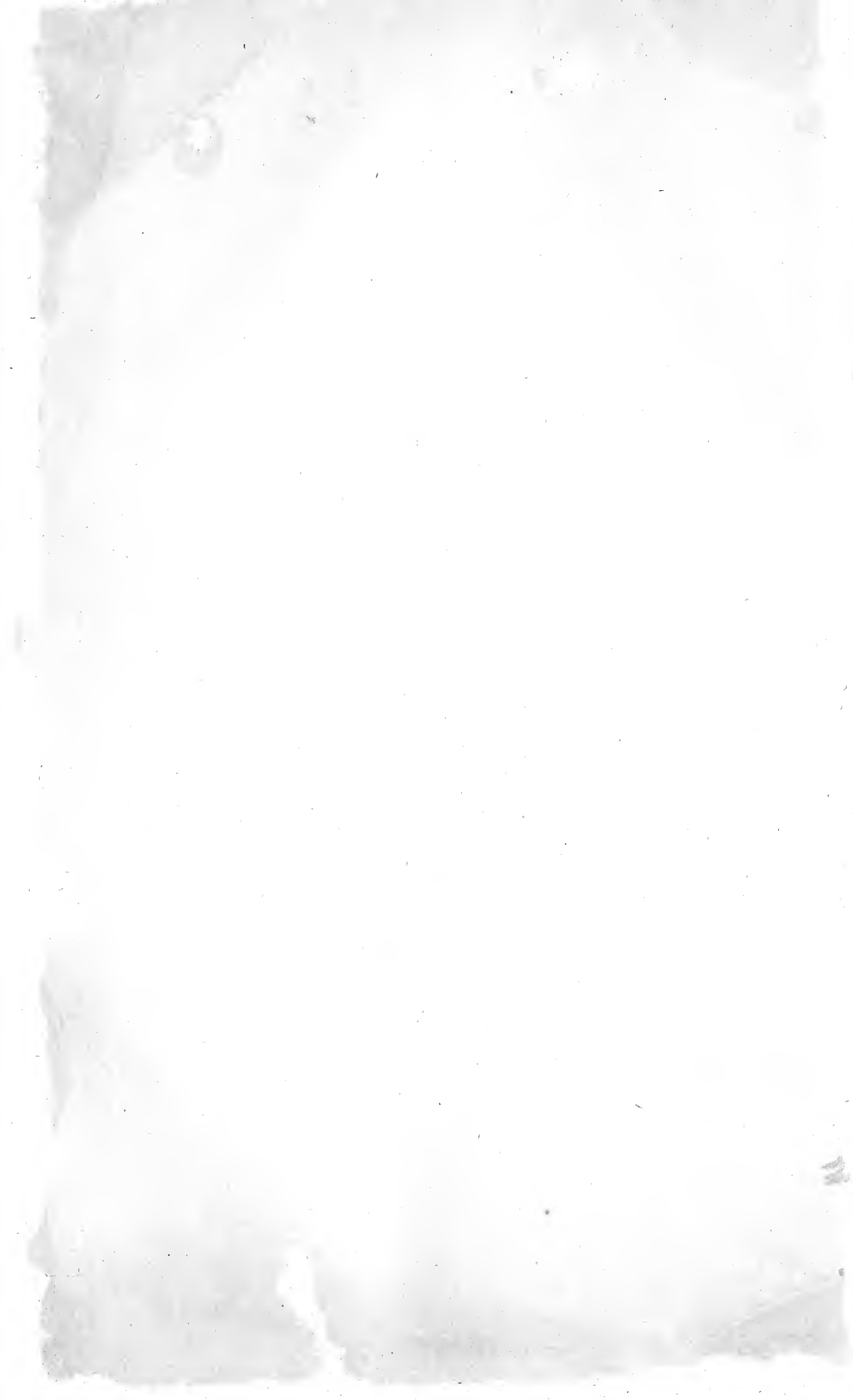
Revenue collected during 1891:—	\$	c.	\$	c.
By sales from Bukit Sabukor, ...	119	49		
Do. Government Reserves, ...	263	42		
			382	91
Timber supply for use of P. W. D., ...	100	45		
Trees supplied for Government ground buildings, ...	39	40		
			139	85
Total, ...			\$522	76

Expenditure for the year 1891.

Vote. ...	\$	c.	\$	c.
	6,000	00	6,000	00
Forest Watchmen, ...	2,283	01		
Garden, ...	1,390	82		
Ayer Panas Reserve, ...	20	75		
Batang Malaka Reserve, ...	17	50		
Batu Tiga Reserve, ...	2	25		
Bukit Panchor Reserve, ...	30	00		
Bukit Sabokor Garden, ...	35	00		
Pony Allowance, ...	431	99		
Field Allowance, ...	10	00		
Do., Mandor, ...	2	83		
Personal Allowance, ...	30	00		
Transport, ...	18	20		
Cartage, ...	95	28		
Freight and Shipping, ...	87	50		
Incidental Expenses, ...	15	56		
Herbarium Expenses, ...	36	53		
General Maintenance, ...	285	49		
Tools and Implements, ...	18	43		
Purchase of Plants and Seeds, ...	54	90		
Do. 2 Bullocks and a Cart, ...	110	00		
Uniforms, ...	126	00		
Building a cooly-line with Mandor and Printer's Quarters attached, ...	190	89		
Building a ventilated Plant-house, ...	47	60		
Manure, ...	99	90		
			5,440	83
Balance, ...			559	17
			\$6,000	00

P. J. HOLMBERG,

Acting Assistant Superintendent of Forests, Malacca.



STRAITS SETTLEMENTS.

Paper to be laid before the Legislative Council by Command of
His Excellency the Governor.

REPORT ON THE GARDENS AND FORESTS DEPARTMENT, STRAITS SETTLEMENTS.

BOTANIC GARDENS, SINGAPORE.

Staff.

1. The resignation of VINCENT CONIS at the beginning of the year, left a vacancy in the Upper Garden which was filled by COORAY, a Cinghalese, from the Agricultural College in Ceylon, who gives satisfaction.

The Mandor, RASIP, formerly in charge of the Upper Garden was transferred to the Economic Garden, and for a short time his services were required as an interpreter in Pahang during the war. MOHAMMED ANIFF was transferred from the Economic Garden to the Upper Garden, but as he proved indolent it is proposed to dismiss him.

Visitors.

2. The number of visitors was as large as usual, and the band performances once a month on moonlight nights proved highly attractive. There was less damage done by theft in the Gardens and plant-houses than in previous years.

Aviaries.

3. During the year a number of animals and birds were purchased or presented. Among the most important additions were:—One female Malay bear (*Helarctos malayanus*) presented; one deer (male) (*Rusa equinus*), presented; two remarkable varieties of the large squirrel (*Sciurus bicolor*), purchased; guinea-pigs (*Cavia porcella*); a rhinoceros hornbill (*Buceros rhinoceros*), presented by Mr. J. HILTY; an owl (probably *Bubo sp.*) said to have come from the Philippines, purchased; an egret (*Ardea sp.*); a serpent eagle (*Spizaetus sp.*); a brahminy kite (*Haliastur indus*) purchased; two pelicans (*Pelicanus philippinensis*) purchased; one lesser frigate bird (*Phaethon minor*); one large python, purchased, and others presented; one *Dipsas cynodon* presented by Mr. HUTTON; one hamadryad (*Ophiophagus elaps*) captured; and one river turtle (*Trionyx sp.*) captured in Singapore, which has been put into the lake.

The only remaining wild dog and a fine sea-eagle were killed by poison administered maliciously; though there was little doubt as to the offender, the Police were unable to procure any evidence in the matter. This is the third case of malicious poisoning of the animals in the Gardens within the last few years. The ease with which poison can be procured in Singapore, and the difficulty of the Police in bringing home cases of this kind make it by no means easy to protect the animals from this treatment.

Buildings.

4. The cooly lines were re-erected and improved at a cost of \$140. A small house was put up for the Kling coolies on the Economic Gardens, at the corner near Dalvey Road, so that this part of the Gardens may be protected from depredation. The large plant-house was repaired at a cost of \$225.

New or Rare Plants.

5. During the year, many new plants were obtained from various countries, and from different parts of the Malay Peninsula, chiefly from Perak, Mount Ophir and Johor. Among the orchids never or rarely previously seen in flower here before, were the following:—*Dendrobium phalaenopsis*; *Eria Kingii*; *Liparis latifolia*;

Nephelaphyllum pulchrum; *Angræcum sesquipedale*; *Stanhopea grandiflora*; *Fernandezia acuta*; *Peristeria elata*; *Leptotes bicolor*; *Rodriguezia secunda*; *Brassia cordata*; *Oncidium papilio*; *Cirrhopetalum m. koyanum*; *Podochilus uncifera*; *Arundina revoluta*.

The two new *Cypripediums*, *C. O'Brienianum* and *C. Chamberlainii*, were received in exchange. Of plants of interest other than orchids may be mentioned as having flowered this year:—*Didymocarpus atrosanguineus*; *D. semitorta*, (from Mount Ophir); *D. longipes*, (Mount Ophir); *Aristolochia Roxburghiana*, (Pahang); *Leea amabilis*, (Langkawi); *Hypericum chinense*; *Canscora* new species (from Kuala Lumpur); *Impatiens platypetala*, (Sumatra); *I. mirabilis*, (Langkawi); *Aglaonema costatum*, (Langkawi). A very fine new *Begonia* from Tringganu, and two other species from Pulau Aor and Perak respectively were also introduced. The *Victoria regia*, plants of which were formerly in one or more of the lakes, died out last year, and seeds since received have not germinated, so that now for the first time for many years the Gardens do not possess this plant. A very fine tree in the Economic Gardens, apparently an undescribed species of *Mangifera*, was struck by lightning at the close of the year but it does not appear to be much injured.

Lakes.

6. The big lake in the Gardens was drained off and thoroughly cleaned. This would have been soon necessary in any case, but it was found requisite to do it this year as a crocodile which escaped about two years previously had taken up its quarters in the lake, and defied all efforts to catch it. It at length became dangerous, having seized one of the coolies while drawing water so that it was considered advisable to drain off the lake to destroy it.

The new lake near the Tyersall Road was completed and planted with water lilies and other aquatics. The bridge across it was made and railed and the drive through the palmetum across the bridge into the Tyersall Road was finished. A *Hibiscus* hedge was planted on the outside and much work was done in removing unsightly trees and planting others in this part of the Garden.

Economic Gardens.

7. The arboretum on the upper part of the hill known as the Military Reserve has progressed favourably. Over ten acres was cleared of fern and brushwood and *changkolled* over. The plots for the different orders of plants have been marked out and labelled and from *Dileniaceae* to *Loganiaceae* have been planted up with trees and shrubs, all of which have grown remarkably well, as the soil here is very good. Grass has been encouraged to grow and has been planted between the trees to prevent the excessive denudation caused by the rainfall.

8. The arranged collections of economics have been added to and continued, and many cuttings and seedlings of useful plants have been raised.

9. A large number of economic plants have been sent out to various parts of the world both to private persons and to Botanic and Agricultural Stations.

10. The Avocado pear fruited well this year, and a further supply of seed has been received from Kew and from Trinidad. The Cola-nut (*Cola acuminata*) has flowered but failed to set fruit. *Styrax Benzoin* also flowered for the first time for many years.

Attempts are being made to introduce finer classes of pine-apples into Singapore, and in answer to letters the Gardens received suckers of English hot-house pines from Kew and of West Indian strains from Trinidad. The Brazilian pine known as *Abacaxi* has also been promised but not yet received.

Some plants of the Borneo Camphor tree (*Dryobalanops camphora*) were obtained by the plant collector in the Indau district of Johor, apparently the only locality for it in the Malay Peninsula. Unfortunately most did not recover the effects of the long and difficult route by which they were brought down.

11. The barks of several of the mangrove trees are used here in tanning and it seemed possible that some use might be made of an extract of the bark. Experiments have been made with several of these barks, but no record has been kept as far as I am aware as to what trees the bark was derived from.

I boiled in a copper pan ten cattles of the bark of the Tengah (*Ceriops candolleana*) and the same amount of Blukup (*Rhizophora mucronata*) and from each obtained a quantity, (10 per cent.), of a red brown astringent extract, which was easily hardened into a shining black brittle mass.

Samples of these extracts I sent to England in order to get an opinion as to their possible value, but have not since received any reply. Mangrove bark extract

(from some other mangrove tree) was last year sent home from Jamaica, but was not taken up by the trade, apparently from want of knowledge as to the value of its tanning properties. As the extract is so easily made, and the bark is practically a waste product at the wood-cutting depôts in the mangroves, it seems worth while to try if its manufacture cannot be taken up for profit.

12. The large seeds of *Millettia atropurpurea*, a tree abundant in many parts of the Peninsula, were forwarded to the Gardens by Mr. HILL of Linsum Estate, with a suggestion that they might be utilised as a manure. The seeds were ground up and mixed with the soil and some plants of *Coix lachryma-Jobi* were planted in a pot with them, an exactly similar pot of the same plant in similar soil without the grounded seeds being put alongside for comparison. At first the unmanured plants grew much more rapidly than those with the manure, but eventually the latter caught them up and were even a little stronger and healthier, but the result did not show any great value in the *Millettia* seeds as a manure.

13. The cultivation of indigo by the Chinese has lately increased to a considerable extent, but the dye is only used locally and has not been exported. There seems to be an idea current that Singapore indigo will not set, but always remains liquid. This is quite an error, as it is easily dried and made into a fine powder. Samples of this have been sent to England to be appraised, but it is hardly probable that the dye as prepared by the Chinese with the most rudimentary apparatus and in the most careless way can be of good quality. Still as this climate has certain advantages over that of India for the cultivation of the plant, it may be well worth the attention of the planter. A Bulletin treating of the plant as grown here will be published as soon as the decision of the home authorities as to the sample sent is received.

14. During the year, Mr. DERRY in Malacca made some experiments in extracting pine-apple fibre, which gave a good result, but the expense of the manufacture of the best quality seems to leave a comparatively small profit. Similar experiments have been made here, and long-leaved pines have been selected and cultivated for this purpose.

15. Enquiries have been made lately for a material for brush-making to replace Piassava fibre now becoming scarce. Mr. BULKELEY, a gentleman much interested in the trade, visited the Gardens to make investigations on this point, and after examination considered that selected fibres of the sugar palm (*Arenga saccharifera*) would possibly supply the want. As the supply of these fibres throughout the Peninsula is very large and no use is at present made of them, an important trade might be opened up should they be found suitable. Specimens of these fibres and others from the leaves of the sago palm, areca-nut and coco-nut are being prepared, and when the series is complete, it will be submitted to experts.

16. Further experiments in ringing the gutta percha tree (*Dichopsis gutta*) have been tried with greater success than on previous occasions. It is a very difficult tree to propagate by cuttings, probably on account of the slowness of its growth. Great interest has been taken in its cultivation lately, which has been stimulated by attempts to form companies for the extraction of the gutta from leaves and twigs.

Artist.

17. The Artist continued his useful work of making careful drawings of the plants of importance economically or botanically of the Malay Peninsula.

Herbarium.

18. A very large series of specimens have been added to the herbarium, which is now becoming a truly representative one of the Malayan flora.

In the early part of the year the Director visited the Dindings, and the Larut Hills, and the Kuala Kangsa district, whence an extensive series of plants both dry and living was obtained, much assistance being given by the Perak Government. Later the Mount Ophir range was explored and a considerable number of the plants peculiar to that district obtained, including many novelties, among which was a species of *Balanophora*, the first recorded plant of this order met with in the Malay Peninsula. In August, Mr. LAKE of the Johor civil service and Lieutenant KELSALL, R.A., traversed the Peninsula from Kuala Sedili to Batu Pahat, and by permission of His Highness the Sultan of Johor, a plant collector accompanied the expedition. Good and important collections were made along the Sedili and Sembrong Rivers, on the high range of Gunong Janeng, and at Batu Pahat. With Mr. LAKE also the collectors visited Gunong Pulai and obtained a characteristic collection. In December the Director visited, while absent on leave, the ridge of Gunong Panti, and

collected there and at Kota Tinggi a number of specimens. Mr. T. FEILDING, during his stay in Singapore, obtained a number of specimens from Muar, Kuala Indau and from the eastern islands of Pulau Aor, Pulau Tinggi and Pulau Dayong, lying off the east coast of Johor and a small series of orchid specimens was sent to the Gardens from Batu Pahat by NONGCHIE, Gardener to the Sultan of Johor. By these collections the flora of Johor hitherto almost a blank in the herbarium is very fairly represented.

A good number of plants were collected in Singapore by the forest watchmen; 316 specimens were sent from Penang by Mr. CURTIS; 236 from Malacca by Mr. DERRY; and about 40 from the Hon'ble D. F. A. HERVEY; 79 specimens chiefly from Perak from Dr. KING. From Borneo, Dr. HAVILAND presented 382 specimens including a good series of his valuable collection from Kinabalu; 367 specimens from various East Indian collectors were presented by Kew; and 478 from the collections of WALLICH, BEDDOME and THWAITES were received from the British Museum. Specimens of 430 flowering plants and 20 Algæ were received from Baron VON MUELLER from Australia. The total number of specimens received, most of which were mounted and arranged in the cabinets was upwards of five thousand.

The number of specimens sent to various Museums is as follows :—

2,902 to the British Museum.
 695 to the Royal Gardens, Kew.
 1,425 to Dr. KING, Calcutta.
 369 to Baron F. VON MUELLER.
 40 mosses to V. BROTHERUS.
 20 Melastomaceæ to M. COGNIAUX.

A few specimens were also sent to the Perak Museum and to the Pharmaceutical Society.

The whole of the order *Anonaceæ* was sent on loan to Dr. KING to aid him in elaborating that order for the materials for the Flora of the Malay Peninsula, and were returned by him critically named.

Several new cabinets were purchased, and most of the old ones were repaired and altered so as to be more dust and insect-proof.

Owing to the large accessions in the herbarium and library of late years it was found requisite to enlarge the office, and a sum of \$500 was voted for the ensuing year to pay for part of the needed alterations.

Coco-nut Trees Preservation Ordinance.

On the dismissal of the former Inspector, MUSSAFER ALI, M. A. BAKAR was employed as Inspector under the Act, with one cooly. Inspections were made over the greater part of the island from time to time, and 278 notices to cut down trees and remove stumps and rubbish were served. The number of dying trees condemned and destroyed was 1,887, and 4,050 stumps and pieces of dead trees were removed, and burnt or buried. Twenty notices were served on owners of tanneries requiring them to burn the refuse bark, in which the beetles were breeding, and five notices were served on owners of piles of cow-dung, and four on saw-mill owners requiring the removal of decaying saw dust. In all but ten cases the notices were speedily complied with, but great difficulty has been experienced in the case of one of the saw-mills, in which the accumulation of saw dust for many years is so enormous that it is almost impossible to dispose of it. It covers a tract of ground of a very large extent to a depth of over four feet. To burn it on the spot would be almost impossible, and were it possible would cause great risk of firing the mills and other houses on the adjoining property, while to throw it into the sea, will be a long and expensive work. This, however, is being done. This mill has been doubtless the cause of a great deal of damage to the adjoining coco-nut plantations.

Although a great deal of work has been done in the Kalang district, it still remains the worst in Singapore. This is owing partly to the saw-mills and tanneries and partly to the small patches of neglected ground, the owners of which are either too poor to remove the trees themselves, or have disappeared and cannot be traced. Still there is a marked improvement here, but as the vote for last year was insufficient to employ an adequate number of coolies to destroy the dead trees and stumps on the property belonging to the poorer classes here, a good deal of work has still to be done.

Ten summonses were taken out against persons not complying with the notices served. In four cases an extension of time was allowed, and the work completed, and in two cases the defendants could not be found, so that they had to be struck off. In the remaining four, fines were inflicted to the amount of \$24 in all.

Expenditure.

	\$	c.	\$	c.
Vote, ... ..			...	700 00
Additional Grant asked for, ... ..			...	43 00
Salaries,	451	16		
Transport,	89	33		
Uniforms,	14	00		
Contractors for removing and destroying trees and stumps,	188	35		
Balance,		0 16		
	\$743	00	\$743	00

Exchanges.

Plants and seeds were received during the year from the following contributors:—

	Plants.	Seeds.
Royal Gardens, Kew,	48	1 box.
Botanic Gardens, Calcutta,		9 packages.
Do., Ceylon,		8 do.
Do., Trinidad,	27	17 do.
Do., British Guiana,		6 do.
Do., Jamaica,		8 do.
Do., Grenada,		11 do.
Do., Brisbane,		1 do.
Do., St. Petersburg,		70 do.
Do., Buitenzorg,		1 do.
Do., Mauritius,		12 do.
Do., Hongkong,		7 do.
Do., Fiji,		2 do.
Do., Hanoi,		1 do.
Do., Antigua,		1 do.
Messrs. Cannell & Son, England,	38	56 do.
„ Dammann & Co., Naples,		42 do.
„ Sander & Co., England,	21	... do.
Baron von Mueller, Melbourne,		23 do.
Mr. Goodhart, Sumatra,	20	... do.
Mr. Baker, Perak,		8 do.
Mr. Micholitz,	28	1 do.
The Hon'ble A. L. Donaldson, Singapore,		2 do.
Mr. Larken, Johor,		1 do.
Mr. C. Hose, Sarawak,	100	... do.
Mr. Pryer, Borneo,	12	2 do.
Mrs. Phillips, Singapore,	1	... do.
The Hon'ble D. F. A. Hervey, Malacca,		2 do.
Mr. R. Little, Singapore,	1	... do.
Mr. Robinson, Norfolk Islands,		2 do.
Sir G. Elphinstone, Perak,	1	... do.
Mr. Vade, Singapore,		3 do.
The Hon'ble G. S. Murray, Singapore,	12	... do.
Mr. Hilty, Singapore,	13	... do.
Mr. von Ravensway, Singapore,	72	... do.
Mr. Pereira, Singapore,	15	... do.
Miss Ridley, England,		1 do.
Major-General Berkeley, England,	25	... do.
Mr. Lake, Johor,	12	... do.
Mr. Gueritz, Borneo,	50	... do.
	496	308

The usual inter-departmental exchanges were very heavy, some thousands of young seedlings were received from Malacca. Duplicates of most of the rare and interesting plants brought from England by the Assistant Superintendent of Forests, Penang, mentioned in last year's Report, were received from Penang.

Plants and seeds were distributed to the following recipients:—

	Plants	Seeds.
Royal Gardens, Kew, ...	34	... packages.
Botanic Gardens, Calcutta, ...	100	... do.
Do., Trinidad, ...	...	19 do.
Do., Antigua, ...	...	9 do.
Do., British Guiana, ...	...	10 do.
Do., Bangalore, ...	...	9 do.
Do., Fiji, ...	...	9 do.
Do., Lagos, W. Africa, ...	...	10 do.
Do., Mauritius, ...	...	50 do.
Do., Hongkong, ...	...	10 do.
Do., St. Petersburg, ...	...	14 do.
Messrs. Sander & Co., England, ...	400	... do.
Major-General Berkeley, England, ...	17	... do.
Messrs. B. S. Williams, ...	150	... do.
Mr. Voute, Java, ...	22	... do.
Dr. Buysmann, ...	...	8 do.
Mr. Goodhart, Sumatra, ...	30	... do.
Messrs. Boustead & Co., ...	2	... do.
Superintendent Government Plantations, Perak, ...	100	... do.
Dr. F. Kamienski, Odessa, ...	25	50 do.
Mr. F. Griffith, Madras, ...	32	... do.
His Excellency C. V. Creagh, Borneo, ...	6	... do.
Mr. W. B. Pryer, Borneo, ...	25	... do.
Mr. G. Pechè, Moulmain, ...	25	... do.
His Majesty the King of Siam, ...	100	... do.
St. Andrew's House, Singapore, ...	100	... do.
Mr. Brindaboon Ghose, Calcutta,	10 do.
Mr. J. Ravensway, Singapore, ...	7	... do.
	<hr/>	<hr/>
	1,175	208
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Library.

The following publications were added to the Library during the year:—

Presented by the Royal Gardens, Kew:—

- PIERRE, L.—“Flore Forestiere de la Cochin Chine,” 14th Fasc., 1889.
 Do., do., 15th Fasc., 1890.
 BAKER, J. G.—“New Ferns,” 1874-91.

Presented by the British Museum:—

- NEES AB ESENBECK—“Systema Laurinearum,” 1836-1840.
 REICHENBACH LUDWIG—“Nomenclator Botanicus Hortensis.”
 WIKSTROM—“On Daphne,” 1820.
 CUNO—“Enumeratio Methodica Plantarum.”
 BLANCO—“Flora de Filipinas,” 1837.
 PRESL—“Tentamen Pteridographiæ,” 1836.
 CRANTZ—“Institutiones Rei Herbariæ,” Tomes 1 and 2, 1766.
 JACQUIN—“Collectanea,” 1, 2, 3, 4 Supplements, 1786-89.
 VAHL—“Symbolæ,” pars. 1, 2 and 3.
 WENDLAND—“Botanische Beobachtungen,” 1798.
 SIEBOLD and ZUCCARINI—“Flora Japonica,” (text only) 1835-70.
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 HOST—“Icones et Descriptiones Graminum Austriacorum,” 1801-09.
 LAMBERT—“Catalogue Botanical Museum,” 1842.
 TREUB, Dr.—“Slands Plantentuin te Buitenzorg,” 18 Mei, 1817; 18 Mei, 1892.
 KAMIENSKI, Dr.—“Lentibulariaceæ.”
 NORDSTEDT. OTTO—“Australasian Characeæ,” by Baron von Mueller.
 SÁNYÁL—“A Handbook of the Management of Animals in Captivity in Lower Bengal.” (Presented by Mr. W. Davison).
 OYSTER, Dr.—“Catalogue of North American Plants Paolo Kansan, U. S. A.,” 1888.
 HART, H. L.—“The Agricultural Record Trinidad, July, August, December, 1890,”—Sur l'Isonandra Percha on I Gutta. (Presented by M. Sérullas.)

HENNINGS, P.—“Fungi Novo Guineensess.”

The following were purchased:—

HOOKEK, Sir W. I.—“Icones Plantarum” Vol. I—new series; Vols. II, III, and IV.

LEONARD and CHRISTY—“Dictionary—Materia Medica,” 1892.

CURTIS—“Botanical Magazine,” Vols. 17-70.

MIQUEL—“Illustrationes Flor. Archip. Ind.”

KORTHALS—“Verhandlingen.”

The usual periodicals and the Annual Reports from the various Botanical Gardens were received.

BOTANIC GARDENS, SINGAPORE.

Statement of Receipts and Expenditure for the year 1892.

RECEIPTS.		EXPENDITURE.			
	\$ c.		\$ c.	\$ c.	
By Balance in Bank, ...	826 04	<i>Salaries.</i>			
„ Government Grant,	8,500 00	Herbarium Keeper, ...	205 87		
„ Sale of Plants and		Mandor, ...	165 96		
Flowers, ...	1,061 08	Assistant Mandor,	4 25		
„ Interest, ...	39 73	Carpenter, ...	164 46		
		Assistant Carpenter,	86 38		
		Printer, ...	120 00		
		Assistant Printer,	61 00		
		Peon, ...	96 00		
		Aviary-keeper,	96 00		
		Mason, ...	50 00		
		Police, ...	346 50		
		Coolies, ...	3,209 91		
				4,606 33	
		<i>Bills.</i>			
		Manure and Cartage, ...	371 38		
		Food for Birds and Ani-			
		mals, ...	754 14		
		Pots and Tubs, ...	312 28		
		Purchase of Plants and			
		Seeds, ...	368 38		
		Purchase of Botanical Books			
		and Herbarium Paper, ...	1,116 01		
		Repairs to Buildings, ...	467 42		
		Tools and Stores, ...	568 64		
		Wood for Construction			
		purposes, ...	378 12		
		Bricks, Lime, etc., ...	120 90		
		Laterite and Gravel, ...	346 66		
		Director's Petty Expenses,	173 54		
		Assistant Superintendent's			
		Petty Expenses, ...	131 78		
		Miscellaneous, ...	255 42		
				5,364 67	
		Balance, ...		9,971 00	
				455 85	
				\$10,426 85	
	\$10,426 85			\$10,426 85	

FOREST DEPARTMENT, SINGAPORE.

Area.

1. No additional land was taken over this year, so that the area remains at 14,509 acres 1 rood and 3 poles.

Staff.

2. The same number of Forest Watchmen was employed as last year, viz., 23 in all. All worked well.

Buildings.

3. Four Forest Stations have been re-built, viz., at Changi, Bukit Timah, Sungai Jurong and Bukit Mandai, at the expense of \$290.43 each.

Farming.

4. One pepper encroachment only was leased this year, the others and the old gambir plantation having ceased to be sufficiently productive to let.

Licenses.

5. Passes for cutting mangrove for firewood, fishing stakes and rattans were given out in the reserves of Seletar, Sungai Jurong, Changi, Kranji, [Sungai Morai, Toas and Pandan, and brought in a revenue of \$470 under the following items:—

Mangrove—firewood, ...	...	\$310
Fishing Stakes, ...	...	139
Rattans, ...	...	14
Lalang, etc., ...	...	7
		\$470

Planting.

6. The planting up of waste land has been carried on as rapidly as possible throughout the year.

At Bukit Mandai 2,090 young plants of Para Rubber (*Hevea brasiliensis*) were planted and 1,950 of these are growing very well and strong. With them 50 seedlings of *Castilloa elastica* have been planted. This covers an area of 13 acres of previously useless land. In a few years these trees should produce a revenue from the sale of the India-rubber and will also be of value in producing a good stock of seed.

At Upper Mandai 400 seedlings of the broad-leaved mahogany (*Swietenia macrophylla*) have been planted together with 500 seedling oaks (*Quercus*) covering an area of 10 acres. There are great hopes of the success of this mahogany in the Peninsula. It grows well and strongly and does not seem at all inclined to die down on account of poverty of soil as the common mahogany does. The oak gives a useful timber with a good figure.

The fireguard at the 12th mile, Kranji, has grown well and the lalang has been kept down so that there is now but little fear of damage from fire here. Along the upper portion of the hill, an area of 15 acres has been planted up with various trees, upwards of 2,050 in number, including Penaga (*Myristica elliptica*), a good timber; Saga (*Adenantha pavonina*), a rapid growing tree which will aid in keeping down the grass; (*Cassia siamea*); Rasak (*Vatica russak*), a good timber much in request and getting scarce; Ebony (*Maba buxifolia*), known as "kayu arang" (300 plants); Kranji (*Dialium*), three species, 700 trees, all good timbers, indeed equal in strength and durability to any timber in the Peninsula; and 540 other trees in small lots.

A nursery was started at Bukit Timah in which 6,000 seeds of Belian, (*Eusideroxylon schwageri*, Teysm.) have been planted, and seedlings of this most valuable tree raised from a small quantity of seed were planted here and there in other reserves.

Along the edges of all the newly planted ground, a border of Gelam trees (*Melaleuca leucadendron*) has been planted and is coming up well.

During the past two years many acres of worthless grass land have been planted up with timber trees, which in a year or two will be able of themselves to keep down the lalang, which otherwise would choke them. Unfortunately the vote for the Forests for next year (1893) has been so reduced that not only can no more

planting be done but it will be impossible to properly weed and clean the trees already planted. This is the more to be regretted as it has been at last found possible to induce the Natives to bring for sale at cheap rates seed and seedlings of the most valuable timbers. Belian seed too has been, through the aid of Mr. PRYER of Sandakan, sent in large quantities, and did funds permit it would be possible to plant many acres of worthless ground with this tree which produces probably the best timber in the Oriental region.

The tree is being cut down wholesale in Borneo and exported, but in Singapore the wood is very expensive, and, with the destruction that is going on, will ere long be even more so. There is an idea in Singapore that it is too hard to work, but the great use of it in Borneo shows the fallacy of this. Like all good timbers it is of course very hard, and the Chinese carpenter finds it more profitable to work with the softer and inferior woods, not only on account of their being easier to cut but also because they soon perish and have to be replaced. There is no reason except that of expense why the timbers of at least the more important buildings should not be of Belian instead of softer and more perishable woods.

No one who visits the saw-mills of Singapore can fail to be struck with the poor class of timber to be seen there now, many planks are cut from the sap wood of the inferior classes of Meranti and Seraya, and every year must see a still poorer supply of good timber, as the Siak, Johor and Bornean forests are being heavily denuded. It would, therefore, seem advantageous to plant up the worthless lalang fields with seedlings of such timbers as Belian, Kranji, Rasak and the like, in order that by the time all the good accessible woods are destroyed, a fresh supply may be ready.

Nor would any future time be more suitable than the present while the seed of these trees is still procurable. Belian seed which, if properly planted and looked after, would develop into valuable timber, is wasting in the Bornean forests. Kranji fruit is imported in quantity into Singapore merely for eating, the seed being practically destroyed. It was formerly abundant in Singapore, but was in such demand for coffins that the Chinese practically exterminated the tree, shipping the wood to China. Both trees grow rapidly and well here, and at a small expenditure might be planted extensively.

Fires.

7. There were eight fires during the year, some of considerable extent. One broke out at Bukit Panjang, and burnt about 150 acres of lalang and medium sized trees. It had been raised by two Chinese for the purpose of clearing a small patch of grass on their property in order to plant pine-apples. They were arrested and fined \$25 apiece; one paid the fine, the other suffered a month's imprisonment.

At Bedok 40 acres of grass were burnt in February; at Jurong one acre of grass and fern; at Chan Chu Kang two acres of grass were burnt in July. In the Changi reserve there were no less than four fires, about 32 acres of grass, fern and small trees being burnt.

Prosecutions.

8. There were 15 cases of prosecution for cutting and removing timber, grass, etc. Of these, four defendants were cautioned and discharged, and in one case the defendant absconded. The remainder were convicted and fines to the amount of \$141.50 inflicted, out of which, \$65 was paid.

Expenditure.

Vote, ...	...	...	...	\$4,000 00
Salaries, ...	...	...	...	\$2,748 17
Buildings, ...	...	...	...	871 28
Uniform, ...	...	...	...	147 00
Miscellaneous, ...	...	...	...	226 77
Balance, ...	...	...	...	\$ 6 78

Revenue.

Encroachment, ...	...	...	...	\$ 15 00
Sales of Forest Produce, ...	...	...	...	470 00
				\$485 00

HENRY N. RIDLEY,
Director of Gardens and Forests, S. S.

APPENDIX A.

GARDENS AND FORESTS DEPARTMENT, PENANG.

1. The only important change in the staff was caused by the death of Mr. P. NIEUKEY, who had been Overseer of the Waterfall Garden almost from its commencement. MAHOMED HANIFF, now in the last year of his apprenticeship, is acting as Overseer on probation.

2. After a further trial of five months, during which the health of myself and family suffered severely from fever, it was found necessary to vacate the Garden bungalow and rent quarters as convenient to the work as possible. Thinning out the jungle in the neighbourhood of the bungalow had no effect whatever in making the bungalow more healthy. I am thankful to say that the change has proved most beneficial, as none of my family have since suffered from fever, and myself only slightly, caused in my case by exposure such as would induce fever almost anywhere in the tropics.

Maintenance of Forest Reserves.

3. In this branch of the Department the work of the year consisted principally in the performance of Police duties, and the re-clearing of boundaries. Forty-three persons were prosecuted for various offences, the more important being timber cutting, encroachment, and setting fire to Crown forest. Of this number, thirty-two were convicted and fined in sums varying from one to fifty dollars; the total amount aggregating \$314.

4. Since January, 1889, up to which time great leniency was shown, in order that the villagers and hill cultivators principally concerned might become acquainted with the limits within which timber cutting or cultivation is prohibited, and which had been defined during the two previous years, two hundred and fourteen persons have been prosecuted, and it is safe to assert that had no conservancy measures been taken up to the present, there would now be but little old forest remaining in Penang.

5. During the last three months of the year, thirty-seven miles of boundary were gone over and re-cleared where it had become overgrown with *lalang*, *resam*, &c. It is principally on abandoned land and along the edges of clearings that difficulty is experienced in keeping the boundaries open. In old jungle there is scarcely any trouble.

6. In this connection I may point out that satisfactory maps of each separate reserve are much needed.

Waterfall Garden.

7. Perhaps the most noticeable of the many improvements effected during the year is the re-placing of two wooden bridges over the main stream with new ones of iron and granite. One of these old bridges was in existence before the land was acquired by Government for the purpose of forming a public garden, and the road was laid out so as to utilize it, but for the past two years it has been in so unsafe a condition that carriage traffic has been suspended, greatly to the inconvenience of visitors. The new one has been built a few feet higher up the stream, and the approaches improved by altering the curve on one side, and cutting down the road to an easier gradient on the other.

8. The second bridge was built by the Garden coolies about five years ago, and the masonry is still in good condition. What has now been done is to replace the wooden beams with an iron frame-work, granite pillars at each end, and an iron railing. At the same time it has been raised about eighteen inches which has afforded an opportunity of improving the gradient of the road.

9. Various other works of importance have been carried out, including the cutting down and sloping a steep cliff, thirty feet high, close by the main bridge, and re-metalling 9,448 superficial feet of carriage road. The development of the surroundings of this slope will be gone on with in 1893.

10. Several beds of annuals and shrubs have been re-planted, some of the former three times, supply of plants being maintained in pots and boxes for this purpose so that the beds are not long out of flower.

11. In no previous year has there been so much colour in the Garden, and this is in a great measure due to the liberal use of hybrid varieties of Indian shot (*Canna indica*), obtained in Europe during my visit in 1891. These have been propagated extensively from the original thirteen varieties brought out, and several hybrids of merit have been raised here during the year.

12. The lily pond has been deepened, and the *Victoria regia* continues in good condition.

13. A few nutmeg and clove trees have been planted near the turning to the bungalow, where there were already durians, betel-nut and other interesting things for which the Island is famous, so that now visitors from steamers, who have often very little time to spare, will be able to see these trees in one place without loss of time.

14. In the Chitty Temple nursery a collection of "Pisangs" (*Bananas*) have been planted and labelled distinctly with the local names, for the purpose of comparing their relative merits, and of affording a supply of young plants to correspondents.

15. Consequent on the Municipal Commissioners laying the main from the new Reservoir across one of the Garden roads, at a height of about three feet above the level, it became necessary to make a detour involving the cutting of about six hundred lineal feet of new carriage road. This was brought to the notice of the Commissioners, and also the damage done to other parts of the Garden road by carting over it all the material required for constructing the Reservoir. The Commissioners agreed to re-metal the road referred to and to supply the necessary labour for cutting the new portion, supervision to be undertaken by the Garden staff. When completed this will afford an easier means of access to the Reservoir and upper portion of the ground.

16. No considerable addition has been made to the area of the Garden, but much has been done towards developing the land already included by planting additional groups of flowering trees, palms, &c. and by reducing to more effective proportions the clumps of jungle left standing when the first clearing was made.

17. The plant sheds, of which there are four, exclusive of the shelter, near the band-stand and those in the nursery, are a source of never failing interest to visitors and residents of Penang. These have been numbered for convenience of reference, and a notice board placed at the entrance gate indicating the route by which these sheds, waterfall, swimming bath, &c. can be most conveniently reached.

18. No. 1 is an octagonal shed with a water tank, rockery and fountain in the centre, and is such as in an English nursery would be termed a show-house. Moderate sized palms in pots and tubs surround the water tank, and the side beds are filled with a great variety of ornamental foliage, flowering plants, ferns, &c. which are changed from time to time. Four new wings, each 16 x 20 feet, have been added, and more lightly shaded than the centre, and a pretty regular display of annuals and other flowering plants is kept up in these.

19. No. 2 is situated just at the end of the lower bridge. It is a span-roofed shed 88 x 40 feet principally devoted to aroids, the whole of which are planted out among rockwork. The posts and roof have been entirely renewed during the past year and a re-arrangement of the plants made, those that had grown too big being removed to the shady ravine leading to the swimming bath. For effectiveness and economy in labour this system of planting among rockwork has much to recommend it.

20. Shed No. 3 opposite the entrance to the plant nursery, erected about six months ago, is devoted to orchids and ferns in pots. It has a double span roof and covers an area of 42 x 58 feet. The covering is made of Bertam chicks and attaps, and the beds on which the plants are set is built of rough stones, the interstices planted with small ferns, mosses, &c. In Table C I have given a list of some of the interesting plants, from a decorative point of view, that flowered in the Garden during the year, many of which were placed in this shed during the time they were in flower. *Angrecum sesquipedale*, *Habenaria carnea*, *Cattleyas*, *Calanthes* and *Dendrobiums* were much admired.

21. Shed No. 4 is situated in the upper portion of the grounds and the plants, consisting of local tree ferns, aroids, begonias, &c., are all planted out in the same manner as No. 2.

22. The principal trouble in connection with these plant sheds is the perishable nature of the material used, but with the amount granted for maintenance of this garden it is not possible to do more than has been done. Light T and angle iron structures, such as are used all over India, with the modifications rendered necessary by difference of climate, would, as I have pointed out in previous reports, be more ornamental, prevent the destruction of many valuable plants by the falling of rotten supports or unavoidable accidents during repairs, and prove cheaper in the end.

23. The demand for plants has been largely in excess of previous years, and although the prices charged are very moderate, \$612.24 was received and paid into Revenue account, as against \$312.91 in the previous year.

24. The swimming bath has not been so well patronized as in 1891, the falling-off being principally in annual subscriptions. The total amount received is \$117.95; against \$180.05 in 1891.

25. A large number of plants and seeds have been exchanged, much to the advantage of the Garden; the additions to the orchid collection especially being of great value. A list of the principal donors and recipients is given in Appendix C annexed.

Government Hill Gardens.

26. Fruit trees in the Experimental Nursery were manured about the beginning of the rains, but no fruit of any importance has yet been produced. A small plantation of Liberian coffee and nutmegs was made in this nursery in March, but the former were soon attacked with leaf disease.

27. The routine work of maintaining the Garden and grounds in connection with Government bungalow has been carried on much as in previous years. A fair display of flowering plants in beds, and in pots for the decoration of the corridor, &c. has always been available, and occupants of the bungalow have been supplied daily with vegetables.

Coco-nut Tree Preservation.

28. The Inspector with one climber and one notice server has been employed alternate months in Penang and Province Wellesley, and the work has been satisfactorily performed.

Four hundred and sixty-nine (469) notices were served ordering the destruction of 5,815 dead trees, or portions of trees, and 60 heaps of refuse likely to prove breeding place for the beetles.

29. In the majority of cases these notices were complied with, but in 88 cases it was found necessary to enforce the law, and fines were inflicted amounting altogether to \$198.

General.

30. Press of work in the Waterfall Garden, especially since the death of the late Overseer, prevented much time being devoted to the collecting of plants.

A hurried trip to Pulau Langkawi in the month of April yielded a good result, a great many of the plants collected having been exchanged for South American and African orchids.

31. Brief visits were also paid to the Dindings, Kedah, and Perak in connection with the work of the department, and a few plants obtained on each occasion.

32. The Director of Gardens and Forests visited this Settlement in February, and afterwards proceeded to Perak; while he remained in that State his collections of living plants were forwarded to the Penang Gardens to be established, and subsequently a portion were sent on to Singapore.

33. A good deal of work was got through at the Residency, principally by the aid of convict labour. This consisted in raising the ground on the Tramway side and of planting a screen of quick-growing trees to shut off the buildings belonging to this Company. Clumps of shrubs were planted on the land raised, and a number of fruit trees planted in the background.

34. As in former years, the supervision of planting shade trees, and Dato Kramat Garden has been undertaken for the Municipality. The laying out of the new Cemetery has also been completed.

35. The total expenditure of the department for the year amounts to \$9,657.63, and the revenue received from sale of plants, &c., \$753.24. The total amount of fines in connection with the preservation of forest reserve and coco-nut trees amount to \$512, as shown in Table A annexed.

C. CURTIS,

Assistant Superintendent of Gardens and Forests.

Penang, 23rd January, 1893.

TABLE A.

Revenue and Expenditure—Gardens and Forest Department, Penang, 1892.

REVENUE.	EXPENDITURE.	
	\$	c.
Grant—Maintenance of Forest Reserves, ... \$2,300.00	Salaries of Forest Guards, Apprentice and Messenger,	997 62
	Salaries of Coolies re-clearing Boundaries &c.,	233 10
	Maintenance of Kubang Ulu Nursery,	258 20
	Tools and Material,	28 17
	Oil for Stations,	16 80
	Repairs to Boat,	5 05
	House Rent,	210 00
	Plants and Seeds,	79 32
	Materials for Herbarium,	36 82
	Cost of Periodicals,	20 00
	Transport, &c.,	52 40
	Miscellaneous,	6 00
		1,943 48
Balance,	356 52	
	2,300 00	
Grant—Maintenance of Waterfall Garden, ... \$4,500.00	Salaries of Gardeners and Coolies,	3,237 04
	Plants and Seeds,	86 54
	Pots,	92 50
	Tubs and Baskets,	31 64
	Planks for Plant-cases, &c.,	69 46
	Material for extending Plant Shed No. 1,	40 88
	" renewing Plant Shed No. 2,	161 48
	" new Orchid Shed,	101 78
	Corrugated Iron for Drying Shed,	19 96
	Cartage,	99 00
	Freight,	31 22
	Road Metal,	110 40
	Laying on Water to Plant Sheds,	27 42
	Tools and Material,	249 30
	Petty Expenses,	116 20
Miscellaneous,	24 40	
	4,499 22	
Balance,	0 78	
	4,500 00	
Grant—Maintenance of Grounds of Government Bungalow and Experimental Nursery, ... \$2,000.00	Salaries,	1,614 96
	Seeds,	46 04
	Pots,	48 42
	Tools,	55 62
	Manure,	114 20
	Temporary Quarters,	116 56
	Transport,	1 60
	1,997 40	
Balance,	2 60	
	2,000 00	

TABLE A,—Continued.

Revenue and Expenditure, Gardens and Forest Department,
Penang, 1892,—Continued.

REVENUE.	EXPENDITURE.	
		\$ c.
	Pony Allowance,	390 19
	Gharry hire,	33 64
	Passage, Personal Allowances, &c. in connection with Visit to the Dindings,	32 70
Travelling and Personal Al- lowances, \$700.00	Passage, Personal Allowances &c., Perak,	52 50
	Expenses and Allowances in connec- tion with Visit to Langkawi, ...	19 75
	Expenses and Allowances, Kedah, ...	12 75
	Field Allowance,	8 00
	Balance,	549 53
		150 47
		700 00
	Salaries,	544 40
Expenses of carrying out Provisions of Coco-nut Trees Pre- servation Ordinance, ... \$700.00	Allowances,	120 00
	Petty Expenses,	3 60
	Balance,	668 00
		32 00
		700 00
Plant Sales, \$ c.		
Receipts from Swim- ming Bath,		117 95
Sales of Confiscated Timber, &c.,		23 05
Grand Total,	Grand Total Expenditure,	\$9,657 63
		753 24

TABLE B.

A List of the Principal Contributors and Recipients of Plants and Seeds.

CONTRIBUTORS.	REMARKS.
Superintendent of Royal Botanic Gardens, Calcutta, ...	Miscellaneous plants.
Director of Botanic Gardens, Buitenzorg, ...	Palm seeds and orchids.
Director of Gardens and Forest Department, Singapore, ...	Miscellaneous seeds and plants.
Superintendent of Botanic Gardens, Hongkong, ...	Seeds.
Superintendent of State Gardens, Gwalior, ...	Roses, ferns, &c.
Superintendent of Gardens, Saharanpur, ...	Guava seeds.
Messrs. F. Sander & Co., England, ...	Orchids.
Messrs. Jas. Veitch & Sons, England, ...	Miscellaneous plants and seeds.
Mr. H. G. Batten, Mergui, ...	Orchids, &c.
Messrs. Hughes, Do., ...	Orchids.
Sir Graeme Elphinstone, Perak, ...	Orchids, &c.
Mr. G. Pechè, Moulmain, ...	Orchids.
Mr. W. Scott, Perak, ...	Australian seeds.
Messrs. Baldwin, Do., ...	Miscellaneous plants.
Mr. J. C. Ravensway, Singapore, ...	Orchids.
Mr. E. C. Harte, Penang, ...	Australian seeds.
Mr. A. T. Bryant, Dindings, ...	Miscellaneous plants.
Mr. L. Hawkins, Do., ...	Do.
Mrs. Pole Carew, Ceylon, ...	Orchids.
RECIPIENTS.	
Director of Royal Gardens, Kew, ...	Miscellaneous plants.
„ of Botanic Gardens, Buitenzorg, ...	Do.
„ of Royal Botanic Gardens, Calcutta, ...	Do.
„ of Gardens and Forest Department, Singapore, ...	Do.
Superintendent of State Gardens, Gwalior, ...	Do.
Right Rev. Bishop Hose, Sarawak, ...	Cannas, &c.
His Honour Mr. Justice Goldney, ...	Ferns, &c.
Sir Graeme Elphinstone, Perak, ...	Nutmegs.
Messrs. Jas. Veitch & Sons, England, ...	Miscellaneous.
Messrs. F. Sander & Co., Do., ...	Do.
The Hon'ble the Resident Councillor, Penang, ...	Do.
The Resident of Perak, ...	Vegetable seeds.
Mr. G. Pechè, Moulmain, ...	Ferns, &c.
Mr. L. Hawkins, Dindings, ...	Nutmegs and coffee.
Mr. J. C. v. Ravensway, Singapore, ...	Miscellaneous plants.
Mrs. Mower, Rangoon, ...	Begonias, &c.
Mr. S. P. Chatterjee, Calcutta, ...	Bananas, &c.
Mrs. Pole Carew, Ceylon, ...	Orchids.
Superintendent of Lower Perak, ...	Seeds.

TABLE C.

*A List of the more important Plants and Trees flowered in the
Botanic Gardens, Penang, 1892.*

NAME.	REMARKS.
Achimenes hyb. vars., ...	In flower nearly all the year.
" tubiflora ...	...
Acrotrema costatum, ...	...
Aerides virens, ...	...
" odoratum, ...	...
Amorphophallus sp. n., ...	Collected in Langkawi.
Angrecum bilobum, ...	} Madagascar orchids of great interest, especially A. sesquipedale.
" scottianum	
" sesquipedale,	
Arisema anomalum, ...	Collected in Perak; recently figured in "Botanic Magazine."
" fimbriatum, ...	Habitat uncertain until I found it abundant in Langkawi.
Anthurium Dechardii, ...	} Nearly always in flower.
" ferrierense,	
" Andreanum,	
Aristolochia elegans, ...	Very free flowering climber.
" ridicula, ...	...
" sp., ...	...
Amaryllis hyb. vars., ...	Many plants from Veitch's seed.
Arundina bambusifolia, ...	} Siam.
" sp., sepals and petals white	
Aphelandra fulgens, ...	...
Æchmea fulgens, ...	...
Æschynanthus Wallichii, ...	Beautiful basket plant.
" marmorata, ...	...
Aster, ...	Best from Indian saved seeds.
Bignonia magnifica, ...	} Two excellent climbers; seldom out of flower.
" Chamberlaynii,	
Bauhinia acuminata, ...	...
Brassaia actinophylla, ...	...
Brownea grandiceps, ...	...
Bœa sp. n., ...	Collected in Langkawi.
Bougainvillea glabra, ...	...
Cattleya aurea, ...	} Cattleyas are among the most lovely of the orchid tribe. Several species do well here with pro- per attention, especially as regards water.
" gigas, ...	
" trianæ, ...	
" Lawrenciana,	
" intermedia, ...	
" eldorado, ...	
" Mossiæ, ...	
" Gaskelliana,	
" Schroederæ,	
" speciosissima,	
Cyrtopodium niveum, ...	} A great number of these flowered.
" bellatulum,	
" insigne var. exul,	
" insigne Lowii, ...	
" barbatum, ...	
" haynaldianum, ...	
Crossandra undulœfolia, ...	One of the best bedding plants.
Crypteronia pubescens, ...	Tree with catkin-like flowers.
Cyrtodeira fulgens, ...	} Largely used as rock plants.
" chontalensis,	
Calanthe vestita, ...	} Several hundreds grown annually and flower from November to February.
" rubens, ...	
" " var. alla, ...	
" regnieriana, ...	
" veratrifolia, ...	
" Veitchii, ...	
" limatodes, ...	

TABLE C,—Continued.

A List of the more important Plants and Trees flowered in the Botanic Gardens, Penang, 1892,—Continued.

NAME.	REMARKS.
<i>Cœlogyne Parishii</i> , ...	
„ <i>Cumingii</i> , ...	
„ <i>asperata</i> , ...	
„ <i>pandurata</i> , ...	
„ <i>sps.</i> , ...	Several of botanical interest.
<i>Crinum Mooreii</i> , ...	
„ <i>pedunculatum</i> , ...	The plant referred to in Fl. Br. Ind.
<i>Clerodendron macrosiphon</i> , ...	} Free flowering useful shrub.
„ <i>nutans</i> , ...	
<i>Calophyllum inophyllum</i> , ...	} Ornamental trees.
<i>Cinnamomum iners</i> , ...	
<i>Cassia fistula</i> , ...	
<i>Canna indica</i> , ...	Most useful for beds or borders.
<i>Dillenia ovata</i> , ...	Handsome tree.
<i>Dendrobium chrysotoxum</i> , ...	
„ <i>Dearii</i> , ...	} Most of the dendrobiums from Borneo, Java, the Philippines and Lower Burma do well in Penang.
„ <i>secundum</i> , ...	
„ <i>moschatum</i> , ...	
„ <i>Pierardii</i> , ...	
„ <i>densiflorum</i> , ...	
„ <i>cretaceum</i> , ...	
„ <i>Farmerii</i> , ...	
„ <i>formosum</i> , ...	
„ <i>fimbriatum</i> , ...	
„ „ <i>oculatum</i> , ...	
„ <i>Dalhousianum</i> , ...	
„ <i>tortile</i> , ...	
„ <i>sp. from Sikkim</i> , ...	
„ <i>Bensonii</i> , ...	
„ <i>phalanopsis</i> var. <i>schroederianum</i> ...	
„ <i>dicuphum</i> , ...	
„ <i>Veitchii</i> , ...	
<i>Didymocarpus lacunosa</i> , ...	Native species recently figured in "Botanic Magazine."
„ <i>cordata</i> , ...	Collected in Langkawi.
„ <i>crinita</i> , ...	
„ <i>sps.</i> , ...	Several unnamed.
<i>Dianthus smensis</i> , ...	Good beds.
Daisy, ...	} Fairly good beds.
Dahlia, ...	
<i>Eucharis amazonica</i> , ...	Grown in every garden.
„ <i>candida</i> , ...	
<i>Eranthemum</i> <i>sps.</i> , ...	Several.
<i>Eria</i> <i>sps.</i> , ...	Several, mainly of botanical interest.
<i>Epidendrum</i> <i>sp.</i> , ...	
<i>Faradaya papuana</i> , ...	Useful climber.
<i>Gloriosa superba</i> , ...	Collected in Penang; rare.
<i>Gesnera</i> , ...	} Many varieties.
<i>Gloxinia</i> , ...	
<i>Gomphrena striata</i> , ...	} Good beds.
„ <i>purpurea</i> ...	
<i>Gaillardia hybrida</i> , ...	Good beds.
<i>Globba</i> <i>sps.</i> , 3 unnamed, ...	Collected in Perak and Penang.
<i>Hibiscus sinensis</i> , ...	Many varieties; used for beds and hedges; always in flower.
<i>Helichrysum</i> (everlastings), ...	
<i>Habenaria carnea</i> , ...	Very fine orchid.
<i>Impatiens sultanii</i> , ...	Always in flower.
„ <i>Hawkerii</i> , ...	
„ <i>sp.</i> , unnamed, ...	Received for I. Hawkerii.
„ <i>mirabilis</i> , ...	

TABLE C,—Continued.

*A List of the more important Plants and Trees flowered in the
Botanic Gardens, Penang, 1892,—Continued.*

NAME.	REMARKS.
<i>Ipomea superbiens</i> , ...	Free flowering shrub.
<i>Ixora Duffii</i> , ...	
<i>Jacaranda mimosæfolia</i> , ...	Handsome flowering tree.
<i>Jatropha</i> sp., ...	
<i>Jasminum</i> sps., ...	Several.
<i>Lælia Dayana</i> , ...	
<i>Lycaste Skinnerii</i> alba, ...	
„ <i>aromatica</i> , ...	
<i>Leea</i> sps. 2, ...	Unnamed.
<i>Lagerstræmia floribunda</i> , ...	Fine tree.
<i>Lonicera</i> sp. (Honeysuckle), ...	Good beds.
<i>Medinilla javanica</i> , ...	
„ sp., ...	
<i>Mussænda</i> sps., ...	
<i>Oncidium crispum</i> , ...	
„ <i>papilio majus</i> , ...	
„ <i>ornithorhynchum</i> , ...	
„ <i>splendidum</i> , ...	Very fine.
<i>Phalanopsis violacea</i> , ...	
„ <i>cornu-cervi</i> , ...	
„ <i>amabilis</i> , ...	Many of thees grown.
„ <i>grandiflora</i> , ...	
„ <i>tetraspis</i> , ...	
„ <i>sumatrana</i> , ...	
<i>Phajus alba</i> , ...	
„ <i>grandifolius</i> , ...	
<i>Piper magnoliæfolia</i> , ...	
<i>Plumbago capensis</i> , ...	Good beds.
<i>Petunia nyctaginioeflora</i> ...	Fairly good beds from December to June.
<i>Phlox Drummondii</i> , ...	
<i>Phyllobæa</i> sp. n., ...	Collected in Langkawi.
<i>Ruellia rosea</i> , ...	Good beds.
<i>Renanthera</i> sp., ...	
<i>Russelia juncea</i> , ...	
„ <i>floribunda</i> , ...	
<i>Saraca indica</i> , ...	Fine tree.
<i>Saccolabium Hendersonii</i> , ...	
„ <i>curvifolium</i> , ...	
„ <i>Blumii</i> , ...	
<i>Spathoglottis Wrayii</i> , ...	Fine variety with 12. 14 bls. on a scape.
„ <i>plicata</i> , ...	
„ <i>alba</i> , ...	Pulau Sembilan.
<i>Spathodea campanulata</i> , ...	Fine flowering tree.
<i>Sericographis squarrosa</i> , ...	
<i>Salvia splendens</i> , ...	
„ <i>azurea</i> , ...	
<i>Streptocarpus</i> hyb. vars., ...	Flowered many, but the climate is too moist.
Sunflower, ...	
<i>Torenia Fournierii</i> , ...	Good beds.
<i>Tainia penangiana</i> , ...	
<i>Tecoma stans</i> , ...	Useful flowering shrub.
<i>Trichopilia coccinea</i> , ...	
<i>Tacca cristata</i> , ...	
„ <i>pinnatifida</i> , ...	
<i>Veronica rosea</i> , ...	} Good beds.
„ <i>alba</i> , ...	
<i>Vanda tricolor</i> , ...	
„ <i>suavis</i> , ...	
„ <i>gigantea</i> , ...	
„ <i>insignis</i> , ...	
„ <i>Hookerii</i> , ...	
<i>Victoria regia</i> , ...	
<i>Wormia Burbidgii</i> , ...	
„ <i>suffruticosa</i> , ...	
<i>Zygopetalum Mackayii majus</i> , ...	

C. CURTIS,

Assistant Superintendent of Gardens and Forests.

APPENDIX B.

GARDENS AND FORESTS DEPARTMENT, MALACCA.

Revenue.

1. The revenue collected during the year has exceeded that of any preceding year. Sums (now received) amounting to \$74 were not received in time to be credited to collections for 1892, and are, therefore, carried forward to 1893 account.

2. The account for the year closed as follows:—

Sales from Experimental Garden, ...	\$162.62	
Sales from Forest Reserves, ...	342.83	
		\$505.45
Value of Timber supplied for Government use, (P. W. D.), ...		538.79
Total, ...		<u>\$1,044.24</u>

REVENUE DETAILED.

3. *Experimental Garden.*

Sale of Nutmeg Plants, ...	\$ 55.47
„ Clove „, ...	52.77
„ Liberian Coffee, ...	12.00
„ Ornamental Plants, ...	6.20
„ Fruit Trees, ...	13.65
„ Fruit Crop, ...	18.00
„ Plantains (fruit), ...	4.53
	<u>\$162.62</u>

Forest Reserves.

Tents on Damar, ...	\$ 86.27
Kabong Palm (tali hijau and toddy), ...	20.21
Rent on Wood-oil, ...	21.00
Sale of Timber, ...	36.85
Sale of Fruit, ...	178.50
	<u>\$342.83</u>
Total, ...	<u>\$505.45</u>

Experimental Garden.

4. Nursery Work.—The Garden has been maintained in good order throughout the year and the usual nursery work and experimental cultivation continued.

5. The nursery work is shown in the following analysis:—

Seeds sown.		Cuttings planted.	Seedlings transplanted.	Prepared for sale or planting.	Planted.	Sold.
No. of kinds.	Seeds counted.					
78	19,636	1,696	6,763	11,067	11,099	2,223

Balance remaining available for planting or distribution:—

Forest trees, ...	1,129
Fruit trees, ...	1,515
Miscellaneous economics, ...	1,860
Total, ...	<u>4,504</u>

6. The following trees have been planted permanently in the Garden—(a) for timber supply or stock, (b) for shade purposes or experiment:—

(a)—Mentangor bunga (<i>Chrysophyllum</i> sp.), ...	...	350
Tampines (<i>Slætia sideroxylon</i>),...	...	275
(b)—Buah kēras, (<i>Aleurites molluccensis</i>), ...	...	32
Cacao (<i>Theobroma cacao</i>), ...	...	32
Cloves (<i>Eugenia caryophyllata</i>), ...	...	43
Nutmegs (<i>Myristica fragrans</i>), ...	...	105
Tea—hybrid Assam (<i>Camellia thea</i> var.), ...	...	838
		Total, ... 1,675

Experimental Cultivation.

7. Cloves (*Eugenia caryophyllata*) has been cultivated with success from the nursery-bed to the commercial product. The plant is well adapted for general cultivation, and if taken up by Natives would form an important subsidiary industry. The market price of cloves compares favourably with pepper, while the cost of production of the latter is four times higher than the former. Planted on high land where the roots cannot reach water, and without shade, cloves flower in about four years. The commercial product is the unopened flower-bud which should be dried in a partially shaded place, and when dried, the product is ready for market. Some of the Garden trees planted in 1888 are now 15 feet high and are flowering freely. From seeds collected in January, a stock of 1,758 plants have been raised. Of these, 43 have been planted, 735 sold, and the remainder 960 will be sold when strong enough.

8. Nutmegs (*Myristica fragrans*) grow well in the Settlement with liberal cultivation, but are not of easy culture in the young stage, and have the further disadvantage of taking from 8 to 10 years before fruiting. During the year, 105 plants have been planted, and 795 plants sold.

9. Tea Hybrid Assam (*Camellia thea* var.).—About one-third of an acre of land has been cleared and planted with tea, (838 plants) raised from seeds grown in the Garden. The young plants are growing freely and promise well. The stock plants, two years ago, suffered from the attacks of white ants, but have been free from this pest throughout the year.

10. Liberian coffee (*Coffea liberica*).—Several attempts have been made in the Settlement to grow coffee on abandoned tapioca lands, as might be expected, without success. Some splendid specimens may be seen wherever the attempt has been made, proving, beyond doubt, the hardihood and adaptability of the plant to the soil and climate, if cultivated under suitable conditions.

A few plants have been maintained at the Garden as stock plants, 400 young plants sold, and a supply of seedlings raised for general distribution.

11. Mauritius hemp (*Fourcroya cubensis*).—Fibre producing plants might be cultivated with advantage on much of the land in Malacca now covered with brushwood and which is too poor for such a crop as coffee. A suitable plant must be a lover of shade, as the brushwood once felled—bearing in mind the poverty of the soils referred to—such lands soon become too arid and impoverished to sustain a crop more than two or three years. Mauritius hemp has not proved itself to be adapted to these conditions; about ten per cent. produce long leaves, and the remainder pole before the leaves are long enough to be valuable for fibre.

Miscellaneous Plants.

12. West Indian crabwood (*Carapa guyanensis*); Satin wood (*Chloroxylon swietenia*); Cuba least (*Paritium elatum*); Balsam of Copaiva (*Copaifera gorskiana*) have all grown well, and a tree of Camphor (*Cinnamomun camphora*) is now flowering.

13. Pine-apple fibre (*Ananassa sativa* var.).—Experiments on this and on the fibre of *Musa sumatrana* (Pisang Karok) were made during the year, a report on which will be published in the next Bulletin.

Exchanges.

14. Plants and seeds have exchanged with the following establishments:—
 Botanic Garden, Singapore, outwards—cuttings 200, seeds 100, plants 140
 and seedling gëlam trees 6,500; inwards—seeds 3 packets, plants 50.
 Botanic Gardens, Penang, inwards—seeds 15 packets.
 Botanic Gardens, Bangalore, inwards—seeds 1 packet.
 TAN HUN GUAN, Malacca, inwards—half gallon coffee seeds; outwards—1
 gallon tea seeds.

Forest Reserves.

15. Excepting a part of the unsettled frontier which forms part of a reserve boundary between Batang Malaka and Nyalas, the whole of the reserves have now been demarcated.

16. Batang Malaka Reserve.—Owing to my absence on duty in Penang during the year 1891, this reserve has remained undemarcated until the present year. The work has now been completed, and boundaries extending over four miles have been opened at a cost of \$35.75. The reserve is entirely hilly; the hills are:—Bukit Punggor, 1,303 feet, Bukit Batang Malaka, 1,419 feet, Bukit Jus, Bukit Bembun, 1,601 feet, and Bukit Nyalas about 1,200 feet. The Malacca River has its source in these hills, as well as several smaller streams. The area of the reserve is approximately 3,000 acres, it is well wooded, and I expect to find some young plants of gutta percha, as this district has been famous for its *getah* trees, and a few young plants have been found near the reserve boundary.

17. Brisu Reserve.—Pending the completion of a survey of this district, it has not been possible to complete this reserve earlier. All private rights have now been excluded from the reserve, and boundaries extending twelve miles opened at a cost of \$180.75.

18. The reserve is divided into two blocks, making a total area of 3,440 acres. Several small hills are included within the reserve, the most important are:—Bukit Putus, Bukit Jelutong, Bukit Baling, 614 feet, Bukit Senggeh and Bukit Peninjau, 280 feet. The smaller block is well wooded with mostly Seraya (*Hopea cernua*), but the larger block contains younger jungle.

19. Bukit Bruang Reserve.—A fire broke out amongst the lalang near Ayer Keroh, damaging a plantation commenced in 1892, but about seventy per cent. of the trees have since revived. The vacancies have been re-filled during the year, and the plantation extended. Including the ground re-planted, about twenty acres have now been planted at a cost of \$355.70.

20. The following seeds and trees have been planted:—

In plantation:—

Leban seeds (<i>Vitex pubescens</i>),	...	...	22 gallons.
Kledang (<i>Artocarpus sp.</i>),	...	...	1,050 plants.
Merebau (<i>Azelia palembanica</i>),	...	...	320 do.
Tampines (<i>Sloetia sideroxylon</i>),	...	...	890 do.
Tembusu (<i>Fagraea peregrina</i>),	...	...	1,200 do.
Leban (<i>Vitex pubescens</i>),	...	...	4,550 do.
Poko Perak (<i>mangifera sp.</i>),	...	...	80 do.
Getah Terap (<i>Artocarpus blumei</i>),	...	...	50 do.
Keranji papan (<i>Dialum platysepalum</i>),	...	...	60 do.
Keranji burong (<i>Dialum indicum var.</i>),	...	...	40 do.
Mersawah,	...	...	20 do.
Mentangor bunut (<i>Chrysohyllum sp.</i>),	...	...	75 do.
Ribu-ribu,	...	...	40 do.
Kembang sa-mangko' (<i>Sterculia scaphigera</i>),	...	...	105 do.
Chempedak (<i>Artocarpus chempedak</i>),	...	...	60 do.
Kayu malaka (<i>Phyllanthus emblica</i>),	...	...	30 do.
Poko sena (<i>Pterocarpus indicus</i>),	...	...	70 do.
			8,640

Planted on separate ground:—

Rattans,	...	...	124 do.
Pandans (<i>Mankuang paya</i>),	...	...	360 do.
Kabong (<i>Arenga saccharifera</i>),	...	...	300 do.

Total, ... 9,424

21. Merlemau Reserve.—The watchmen have been assisted by a band of fifteen men in re-bridging the swampy portions of this reserve, and a new boundary, three miles long, instead of a swampy one, opened at a total cost of \$179.25.

22. Other Reserves.—Inspection-paths extending over eight miles have been opened at Bukit Sadanan Reserve at a cost of \$57.50. Portions of the boundaries of Batu Tiga Reserve readjusted at a cost of \$36.50; and a foot-path to the top of Bukit Panchor opened at a cost of \$36.

Prosecutions.

23. Two cases of illicit wood cutting occurred during the year, both were of a petty nature and only nominal fines inflicted.

Fires.

24. Excepting the fire mentioned at Bukit Bruang, no other fire has occurred on reserved lands.

Expenditure.

25. A statement of expenditure for the year is attached:—

Expenditure during the year 1892.

	\$	c.
Forest Watchmen, ...	2,362	07
Experimental Garden, ...	1,487	09
Personal Allowance, ...	60	12
Pony Allowance and Pony Hire, ...	429	52
Field Allowance (Assistant Superintendent), ...	216	00
Field Allowance (Mandor), ...	9	50
Bullock-cart, ...	24	78
Tools, Implements, Pots, ...	43	93
Maintenance, ...	121	86
Incidental, ...	47	29
Freight and Shipping, ...	29	70
Uniform, ...	6	30
Office and Herbarium, ...	150	20
Rent of Quarters (Forest Watchmen), ...	24	00
Purchase of Plants and Seeds, ...	72	80
Manure, ...	15	80
Bukit Sadanan Reserve, ...	57	50
Batu Tiga Reserve, ...	36	50
Batang Malaka Reserve, ...	35	75
Bukit Bruang Reserve, ...	355	70
Merlemau Reserve, ...	179	25
Brisu Reserve, ...	180	75
Bukit Panchor Reserve, ...	36	00
Sungai Udang Reserve, ...	14	00
Balance, ...	3	59
	<hr/>	
Total,...	\$6,000	00

R. DERRY,
Assistant Superintendent of Forests.

Malacca, 30th January, 1893.

BRITISH RESIDENT'S OFFICE,
Taiping, 5th April, 1892.

TO THE COLONIAL SECRETARY,

SIR,—I have the honour to acknowledge the receipt of your letter, Gov. ^{12,869}/₉₁, regarding the extension of the cultivation of padi and the introduction of other grains in the Straits Settlements and Native States, and calling for reports from District Magistrates.

2. I caused copies of your letter to be extensively circulated, and now enclose reports and replies, as noted in the margin. In order to avoid any longer delay in complying with the Governor's instructions I forward these reports in original, with the request that they may be returned to me.

BENDANG.

3. Some idea, a very rough one, can be obtained of the acreage of bendang, or land suitable for wet rice fields, in Perak from the following table, but the return is approximate merely, and it is more than probable that, with scientific irrigation, a very much larger area can be made available :—

District.	Under Bendang Cultivation.	Remaining available for Bendang.
	Acres.	Acres.
Krian	40,000	60,000
Selama	1,000	Not returned.
Matang	10,000	100,250
Larut	9,775	73,390
Upper Perak	1,300	300/500 *
Kuala Kangsar	4,000	10,000
Kinta	A few hundred.	10,000
Batang Padang	"Small extent."	"Many thousands."
Lower Perak	2,000/3,000	"Unlimited."

- i. District Magistrate, Krian, 9, 1, '92.
- ii. District Magistrate, Krian, 19, 1, '92.
- iii. Dist. Magst., Upper Perak, 20, 1, '92.
- iv. Dist. Magst., Lower Perak, 5, 2, '92.
- v. Assist. Dist. Magst., Selama, 15, 2, '92.
- vi. District Magistrate, Kinta, 15, 2, '92.
- vii. Dist. Mag., Matang, 24, 2, '92.
- viii. Dist. Mag., Batang Padang, 14, 3, '92.
- ix. District Magistrate, Kuala Kangsar, copy enclosed, 1, 4, '92.
- x. Assistant Indian Immigration Agent, 6, 2, '92.
- xi. Supt. Govt. Plantations, 15, 2, '92.
- xii. State Com. Lands, 20, 2, '92.
- xiii. Mr. T. Hill, 25, 1, '92.
- xiv. Mr. Kho Bu Ann, 24, 2, '92.

It may be noted that the yield of padi per acre varies from 525 to 900 gantangs, and, taking half the figures for rice, it would be quite safe to say that there is land enough available in Perak, exclusive of ladang, to produce from 200,000 to 300,000 tons more rice than is at present raised.

4. The recommendations of the District Magistrates all point to the policy of Government opening up the available, but still uncultivated, bendang land by the expenditure of public funds on bridle-tracks, roads, irrigation works, drains, water-gates, and so forth. This expenditure would prove remunerative by attracting rent-paying padi cultivators from neighbouring unprotected Native States of the Peninsula, from Sumatra and from Banjarmasin (Borneo), and, eventually, by keeping in the country a considerable portion of the large sums, said to have amounted to \$1,531,249 in 1890, now expended by the inhabitants of this State in the purchase of foreign rice.

5. In this view I fully concur, and though, during the continuance of heavy expenditure on railways, the Government of Perak is not in a position to lay aside any large sum for giving to it effect, still the matter might well be taken into immediate consideration, and the District Magistrates be instructed, in consultation with the District Engineers of the Public Works Department, to prepare reports on the question, specifying the acreage of land they recommend should be opened, with maps and estimates of cost.

6. The majority of the District Magistrates recommend, as a further inducement to new settlers, that land should be leased rent free for three years, after which the customary quit-rent of 50 or 60 cents an acre would be payable annually.

* At Jah, a new station in disputed territory.

The State Commissioner of Lands is opposed to this form of encouragement ; but, as the matter has recently been fully discussed in the correspondence respecting the incidence of taxation ($\frac{8929}{91}$), I need not now further refer to it, beyond expressing my opinion that, though the concession has, without doubt, worked well in different parts of the State, yet, if irrigation works and roads are undertaken by the Government on a comprehensive and thorough basis, the inducement of free rents will probably be found to be unnecessary.

7. The progress of padi cultivation in each district will depend, to a very great extent indeed, on the interest displayed by the District Magistrates, and I would suggest that they be called upon to furnish periodical returns shewing, amongst other things, the acreage of available bendang land, the acreage actually under cultivation at the time of return, and whether smaller or larger than at the corresponding previous period, the state of irrigation works, crop prospects, with the addition of general remarks. Returns relating to the immigration and movements of foreign agricultural settlers would also be useful. The Malays of Perak are exceedingly indolent, contented and unambitious, but a good deal could be done towards increasing the area of padi cultivation with our present population by the judicious and persistent exercise of the personal influence and authority of the District Magistrates and Native Chiefs. Some of our best rice cultivators are Patani people, of whom considerable numbers have settled in the State. From a rough return I have had prepared, it appears that 2743 agricultural settlers (men and women) entered the country during 1891, of which number all, save 152, are of Malay origin. A little more than half of the total number settled in the Krian district.

8. The Superintendent of Government Plantations makes a suggestion that Government should itself open a large area of bendang. This, I think, is worthy of some consideration. The labour to be employed might be either Malay or Chinese, and, when once the experiment was proved a success, there would be no difficulty in finding some enterprising person to relieve the Government and take over the property on terms mutually advantageous.

9. Could Chinese rice planters be introduced as settlers on a large scale, the problem would be in a fair way of solution. Their methods of cultivation are far superior to those of the Malays, and would probably admit of two crops being produced annually, against one by the native method. Efforts have been made by Government to induce a flow of Chinese agricultural settlers, but hitherto little has been effected. The Resident approved of the following terms, which have been published in the form of a circular in Chinese—viz., the lease to each Chinese family of not more than five acres of land, free of rent for the first three years, and then subject to an annual quit-rent of sixty cents an acre, and if necessary, pecuniary assistance will be given on the security of a trustworthy Chinaman; but to this circular there has been little or no response. Towards the end of 1891 a lengthy circular was drawn up in Chinese enumerating the advantages held out to Chinese immigrants by the State of Perak, both as a mining and as an agricultural field. In Larut there are some six Chinese families cultivating padi, having been induced to do so by the completion by Government of irrigation works in the direction of Ayer Kuning.

The District Magistrate of Krian reports that there are some two hundred Chinese engaged in rice cultivation in his district, but that in bad seasons this number is reduced by one half, and he anticipates that in a few years a considerable acreage will be under padi cultivation by Chinese. I should, perhaps, remind His Excellency that Krian, and the same may almost be said of Matang, is exclusively an agricultural district, with an entire absence of mining.

An experiment of planting padi, on quite a small scale, with Chinese labour, has been made by one Kong Lim, in the Kuala Kangsar collectorate, and the Collector reports that the result has been encouraging and that it is proposed to repeat operations on a larger scale.

The very influential Chinese gentleman referred to in the Acting Assistant Indian Immigration Agent's report as having applied for a thousand acres of land in Lower Perak, to be brought under rice with Chinese labour, has discovered that he cannot raise the necessary capital, but he may yet do something on a smaller scale.

I have asked the opinion of the Bishop of Malacca, who numbers so many Chinese Christians amongst his flock, and he gives it as his conclusion that the "Chinese will never take to padi fields. Hard labour is too highly remunerated to

make padi cultivation pay." I do not go all the way with the Bishop, though, naturally, agriculture finds itself handicapped by mining in Perak.

10. In 1882 a Roman Catholic mission commenced a Tamil settlement on 400 acres of land, granted on favourable terms, in the Krian District. The colony is fairly prosperous, and now numbers 550 men, women, and children; the principal product cultivated by the community is padi. There are some Indian settlers in Teluk Anson, but they have not turned their attention principally to rice.

11. When I was in charge of British North Borneo, a settlement of Hakka Christian Chinese was inaugurated, with the assistance of one of the Basle Missionaries in Hong Kong. It has proved a success, and though the settlers have chiefly occupied themselves with vegetable, garden and fruit cultivation, and not with padi, the experience there gained may be of interest, and I enclose a copy of the report with which Mr. L. P. Beaufort, the Acting Governor of North Borneo, has been so good as to furnish me.

12. An effort is being made to establish Siamese agriculturists in Larut; a temple has been erected and a Siamese headman appointed. I consider the prospects are fairly good, but much depends upon the sympathy and interest displayed by the official whose duty it is to supervise the experiment.

13. Not only would the introduction of Chinese and Siamese cultivators increase the area of padi cultivation, but it may be expected that the example of their superior modes of cultivation, resulting in increased production per acre, would in course of time be appreciated and gradually imitated by the natives, whom no amount of lecturing and advice would induce to depart from the practice of their forefathers.

14. An impetus would be given to padi cultivation were husking machinery, which could be easily worked by water power (as in Japan), erected in a suitable locality, and padi bought from the natives and advances given to cultivators to assist them in extending their operations, as in Siam. At present padi is husked by being laboriously pounded in large wooden mortars by the women, at a great expenditure of time and labour, which would be more profitably spent in increasing the acreage under cultivation. The crops of padi in any one district are probably, at the present time, insufficient to incite any private individual to undertake the venture, and the initiative in this also would rest with the Government.

LADANG.

15. The reports do not refer to dry rice cultivation, which is discouraged by Government owing to the destruction of valuable timber for which it is responsible, and to its being a temporary and not a permanent culture. Rich jungle is destroyed and one crop only taken off the land, which is then allowed to grow up in small jungle of valueless trees, known as bluker in Perak and as chena in Ceylon, and the land, if ever used again, cannot be re-cultivated until it has remained fallow some seven years. As is well known, European planters avoid bluker or chena, as they require untouched virgin soil. There is, however, no objection to bluker land being re-used for padi culture. One advantage of ladang is that the crops ripen quickly and are not liable to the attacks of the rats, which are such a destructive pest in the case of bendang.

LEGISLATION.

16. Special legislation affecting both bendang and ladang padi will be found in the following Orders of Council, copies of which are annexed:—

No. 17 of 1889, Bendang Land, Kuala Kangsar.

No. 6 of 1890, Discouragement of Ladang Cultivation.

No. 14 of 1890, Bendang Cultivation.

Order No. 17 empowers the District Magistrate of Kuala Kangsar, "in cases where a sufficiently large community of natives are willing to open up a tract of forest for the cultivation of bendang, to release the land from quit-rent for three years."

Order No. 6 enacts that no jungle, except secondary growth of not more than six years' standing, shall be felled for ladang cultivation, and the test of secondary growth of the specified age is its ability to be felled with a simple parang or golok, without the necessity for using axes or bliong. Persons offending against this order, *or using for ladang land which was granted for permanent agriculture*, are liable to a penalty, as also are the Penghulus who may have connived at such offences.

Order No. 14 enables industrious peasants whose crops are injured by fire or vermin, owing to the neglect of their neighbours to clear their land properly, to sue for and recover damages.

xv. Mr. Beaufort,
5, 12, '91.
xvi. Mr. H. Walker,
5, 12, '91.
xvii. Mr. G. L. Davies,
22, 12, '91.

xviii.

xix.

xx.

It further authorises District Magistrates, on the request of a majority of two-thirds of the Penghulus or of the padi planters, to frame rules, subject to confirmation by the Resident, prescribing the dates on which the various operations of planting and harvesting on bendang lands shall take place, and to impose penalties for the breach of such rules.

The object of the Order is to ensure simultaneous cultivation of all bendang land in occupation, so as to prevent the harbouring of vermin, especially of rats, which are a scourge in this country.

It is, however, quite possible to fill the statute book with enactments of this kind, and with very little result unless the District Magistrates bestir themselves and rouse the indolent and fatalist Malays to action.

SEED.

17. The District Magistrate, Krian, makes a good suggestion, to the effect that he be permitted to purchase some 5,000 gantangs of seed padi from Kedah, Siam, and Burmah, to be distributed for planting next season. The experiment would be of interest and value. The Acting Assistant Indian Immigration Agent points out that the natives are alive to the importance of obtaining new seed, and interchange seed amongst one another.

xxi. April 1st, 1892.

I enclose copy of a memorandum by Mr. W. Scott, Inspector of Mines, on the subject of Straits and Rangoon grain.

The State Commissioner of Lands recommends that the question of improved modes of cultivating padi and of the selection of the best variety of seed should be taken up by an expert, either in the Colony or the Native States, but I think it possible that these questions have already engaged the attention of the British authorities in India and Burmah, who would be glad to communicate the conclusions at which they have arrived. Doubtless, too, much valuable information is at the disposal of the Netherlands Indian Government in Java.

DHOLL AND RAGI.

18. On the subject of the trial of dholl, ragi and other Indian food grains I am not in a position to offer any opinion, knowing nothing of the nature of these cereals nor of the soil and climate necessary for their successful cultivation.

19. I beg to express my regret that, owing to my absence on official duty in Upper Perak in February and March, this report has been delayed, and is less full than I should have wished to make it.

I have, &c.,

W. H. TREACHER,

Acting British Resident.

I.

KRIAN, 9th January, 1892.

TO THE SECRETARY TO GOVERNMENT,

TAIPING.

SIR,—I have the honour to inform you that if I am permitted to cut about nine miles of drain, and form a foot-path with the soil excavated, I can open up some thousands of acres of valuable padi land in this district, which will be unoccupied for ever unless means of getting at it are provided. I send this in view of the recent letter from Singapore on the subject of rice culture; a full report of the area cultivated, available and alienated in my district will be sent to you as soon as possible.

2. The cost of the nine miles of bridle-paths would be trifling. No new roads have been made here since I was in charge in 1884, so no new jungle opened. Banjer Malay settlers, seeing last and this year's excellent crops, will get their friends over from Sumatra in hundreds, with their families. I strongly recommend the Government to favourably consider this scheme, and I can guarantee an enormous increase in population, cultivation, and, in consequence, a considerably improved fixed annual revenue. Clearing the jungle will commence as soon as the path is begun, and the first crop will be taken off the land next padi season, and it will provide a lot of work for new settlers meantime.

I have, &c.,

ED. J. BREWSTER,

Collector and Magistrate, Kinta.

II.

KRIAN, 19th January, 1892.

TO THE SECRETARY TO GOVERNMENT,

TAIPING.

SIR,—In reply to your memorandum No. C. S. $\frac{7263}{91}$, with a copy of His Excellency the Governor's letter to the British Resident, Perak, No. $\frac{12869}{91}$, dated 7th January, 1892, and 18th December, 1891, respectively, on the rice culture question, I have the honour to report that in my district some 40,000 acres are now under cultivation, and that last year and this the crops have been excellent, the best land producing 1200 gantangs to the orlong.

2. I have, approximately, 60,000 acres of available land for rice-growing unopened for want of means of access. I have already written you on this subject, letter No. $\frac{15}{92}$.

3. When in charge of this district in 1884-85, I opened up three or four roads (bridle) of 8 to 10 miles each; land on either side was immediately taken up, and now has a permanent population growing rice. I believe I am correct in saying that not one hundred yards of new road through jungle have been opened since then.

4. I have recently, in company with the Assistant Indian Immigration Agent, travelled over many miles of the district, through the cultivated and unopened portions. I have given him a map showing the various roads and principal points bearing on this question, so I will not trouble you with another copy here.

5. I think it would be a very good thing if this Government would allow me to buy some 5,000 gantangs of seed padi from Kedah, Siam and Burmah, to be distributed for planting next season. The introduction of new good seed is, of course, always wise.

6. On the question of ragi and dholl culture I cannot give much information: if they will grow in low, flat, swampy land then I should say Krian would suit them. The former is grown here in small quantities on drier land near dwellings, but not to any extent. I believe the price of it is about 13 cents a chupak; in an ordinary season rice is about three and four cents here.

7. In conclusion, it should be borne in mind that Krian and Kurau are essentially padi-growing districts, and that wherever Government has provided means of

getting on to the land it has been taken up and permanently occupied. For some unaccountable cause, no new tracts have been opened for six or seven years. If the Government will allow me to take advantage of the present dry season, I can open up anything between one and twenty miles of bridle paths through untouched forest, and I have not a doubt that, in view of the present crop, thousands of acres will be at once taken up and cleared.

8. I might mention that I have about 21,000 acres issued to sugar-cane growers, a large portion of it cultivated, and 3000 acres just applied for.

I have, &c.,

ED. J. BREWSTER,

Collector and Magistrate, Krian.

III.

JANING, 20th January, 1892.

TO THE SECRETARY TO GOVERNMENT,

TAIPING,

SIR,—In reply to your Circular C. S. $\frac{7263}{91}$, attached to a copy of a letter from the Honourable Colonial Secretary, No. $\frac{12869}{91}$, I have the honour to report as follows.

2. Many and successful irrigation works have been carried out in different parts of the district, some with aid from Government, but mostly by the people themselves. It will probably not be considered necessary for me to enumerate them all when I state that the whole of the 1,200 or 1,300 acres of bendang in the district are artificially irrigated, and nowhere do we depend on the rainfall.

3. In Upper Perak more than twice as much padi is grown than is wanted for local consumption, and upwards of 2,000 gantangs of rice are annually sent down river for sale.

4. In the mukims of Lenggong and Temelong, to the south of Janing, every man has as much bendang land as he can cultivate, and, as the population increases, we may possibly find another 200 or 300 acres capable of irrigation.

5. The mukim of Kenering is too mountainous, and the available land of too small an area, for it ever to become a rice-producing district. Many experiments have been tried with dams, water-wheels and ditches, but none have been successful.

6. In the new mukim of Ringat, through which the road from Janing to Temungoh now passes, I am convinced that I am within the mark in saying that over 5,000 acres of land is convertible into rich bendang; and I have good reason for expecting an influx of Patani Malays from Temungoh and elsewhere to settle there. Any money spent on irrigation in this neighbourhood will be extremely well invested, and I regret that the small sum I asked for in this year's estimates was not allowed.

7. Speaking of the province to the north of Janing, over which the Government of Perak does not exercise such jurisdiction as, it is to be hoped, it shortly will, I have only to say that there is a very much greater extent of the richest bendang land imaginable than there are people to cultivate. In former years a much larger area was worked than is now the case, but it is reasonable to suppose that with increased means of communication, and sense of confidence in the administration of justice, the people would again occupy the land.

I have, &c..

H. BERKELEY,

Acting Collector and Magistrate, Upper Perak.

IV.

TELUK ANSON, 5th February, 1892.

TO THE SECRETARY TO GOVERNMENT,

TAIPING.

SIR,—With reference to your Memorandum of 15th January, 1892, covering Colonial Secretary's Memorandum, Governor $\frac{12869}{91}$, of 18th December, 1891.

2. In regard to the extent of padi land in the Lower Perak district, I should not be prepared to say that there was more than 2,000 to 3,000 acres under cultivation, and as to the extent available for extending the cultivation, this is practically unlimited. In the present unopened state of the country it is impossible to estimate the area.

3. My views on this important subject have been so often brought before the Government, and are so well known, that I would only refer to the correspondence *re* the Indian immigration scheme; also in regard to the introduction of Chinese settlers; also in my minute of 2nd October, 1891, on the mode and incidence of taxation in the Native States, and also on the subject of the introduction of Siamese padi planters.

4. Briefly, I would say that the Government should grant free passages, land rent free for three years, sustenance on guaranteed work for six months, with drainage of land, irrigation, and roads and paths.

I have, &c.,

NOEL DENISON,

Superintendent, Lower Perak.

V.

SELAMA, 15th February, 1892.

TO THE SECRETARY TO GOVERNMENT,

TAIPING.

SIR,—I have the honour to report in answer to Circular No. $\frac{7263}{91}$.

2. In this district there are about 1,000 or more acres of padi land under cultivation, but the supply is not equal to the demand, there being a quantity of rice imported from Parit Buntar.

3. A great deal of land is still available, but, in order to bring it into cultivation, outsiders must be induced to take it up. To do this we must hold out some inducement to them, such as giving the land for three years rent free. I feel sure, if this were done, that a large amount of land would be taken up at once, as, until a few years ago, these terms were given and answered very well.

4. In some parts of Kedah, land is let for a number of years rent free, which has induced many people to settle there in preference to Selama.

I have, &c.,

F. BEDE COX,

Acting Asssistant Magistrate, Selama.

VI.

BATU GAJAH, 15th February, 1892.

TO THE SECRETARY TO GOVERNMENT,

TAIPING.

SIR,—In reply to your memorandum of the 7th January, forwarding a letter from the Colonial Secretary on the subject of the rice supply of the Colony and Native States, I have the honour to report that up to the end of 1890 but little attention was paid to padi planting in this district, as the Kinta population are almost exclusively miners, and they have had little experience in padi planting.

2. In 1891, however, some Sumatra Malays at Gopeng, under the auspices of Imam Prang Jeberumun, have taken up about 100 acres of land for wet padi, and have been most successful, as they are now harvesting a very heavy crop of rice, and will make a large profit, owing to the very high price of padi in this district.

3. Since receiving your Memorandum I have consulted the various Malay chiefs and Chinese headmen in Kinta on the subject of padi growing, and having the successful experiment of the Gopeng Sumatra Malays to point to, I found them, as a rule, very willing to render assistance to the Government in this direction. They say that, if the Government will assist by irrigating the land, they are quite willing to bring in people to take it up. The Datoh Penglima, Kinta, and Toh Muda Wahab offer to bring in a large number of Patani and Kelantan Malays. Imam Prang and Raja Mahmud say they can get a considerable number of Sumatra men, while several of the Chinese towkays say they are willing to try padi planting with Chinese coolies, who, they expect, will be able to obtain two crops of rice in a year.

4. The question, therefore, in this district is one of irrigation. But, until I can obtain an estimate of the cost of irrigation works, I cannot make any recommendation as to whether the Government should undertake the work or whether it would be desirable to leave it to private enterprise.

5. The area of land available for padi cultivation in Kinta is, roughly, some 10,000 acres. Of this, 5,000 acres are situated in the Kampar valley, 3,000 acres near

Pengkalen Pegoh, and 2,000 acres in Sungei Raia mukim. The Kampar land could easily be irrigated by bringing the water of the Kampar river some five miles. The Pengkalen Pegoh land can be irrigated with water from the Penjih river, and would require a water-race of some two miles in length. Toh Muda Wahab has made part of this race, and proposes to bring the water in himself, but, although he has spent some money, he has not taken up the work seriously.

The Sungei Raia land can be irrigated by bringing the water of the Raia river some two and a half or three miles. None of these works would be very costly, and I have no doubt that a reasonable water-rate, collected from the planters, would soon repay the cost of construction; but I am not in a position to furnish estimates, as my opinion is only founded on a knowledge of the country, and I have no engineering opinion to go by.

6. I have now the honour to recommend that the Public Works Department be instructed to make the necessary surveys, and to furnish estimates of the cost of the dams and water-races which will be necessary to irrigate these three blocks of land, and I shall then be able to furnish an estimate as to the number of people who will take up padi land and as to whether the Government would be justified in undertaking the expense of construction. The department can, I have no doubt, easily supply an officer for this duty, as, owing to the late reduction in the Estimates, they are not at present pressed with work.

7. I have not been able to obtain any information on the question of dholl and ragi cultivation, as the Indian population in this district are either road coolies or cattle keepers, and plant nothing.

I have, &c.,

J. B. M. LEECH,
Collector and Magistrate, Kinta.

VII.

COLLECTOR AND MAGISTRATE'S OFFICE,
Matang, 24th February, 1892.

TO THE SECRETARY TO GOVERNMENT,
TAIPING.

SIR,—In reference to the Acting Colonial Secretary's letter, dated 18th December, on the subject of the rice supply, I have the honour to inform you that the Land Office surveyor roughly computes the area of the flat land in the Matang district at 147,000 acres, of which, I should think, a quarter would be mangrove swamp on the coast and the banks of the numerous rivers and creeks intersecting the district, and not available for agriculture, which would reduce the above acreage to 110,250 acres. From this must be deducted about 10,000 acres already under cultivation, leaving, say, 100,000 acres still available for hendang cultivation.

2. Besides this, there must be about 8,000 acres of hill land suitable for coffee tea, &c., and there is a great deal of capital pepper and gambier land, and some plantations of the former are doing very well in the Temeloh district, and its cultivation is spreading.

3. The steps necessary to open up this fine land are, in my opinion, by the introduction of new settlers; but to induce them to migrate from their own countries and start on their arrival opening up new jungle, which all entails a considerable amount of expense and tax on their slender means, sufficiently attractive prospects must be held out to them, such as land rent free for, say, three or more years; and after they have arrived, a good deal of fostering care and interest in their welfare on the part of their District Officers and assistants, and a particularly watchful eye kept on the headman over them, lest he should be tempted to push his own advantage at their expense.

4. This concession of land, three years rent free, has just been conceded, at my request, in this district to *bonâ fide* new settlers, with the result that 130 men have taken up land, about five acres each, and 500 more are shortly expected, so this policy seems to speak for itself.

5. I may mention that I adopted this policy at the Dindings in 1884-86, and when I left there was a large number of new settlers, whom I had induced to come and settle in that sparsely peopled and unhealthy country by these means.

6. I am very strongly of opinion that, in this connection, money should be freely allowed to the District Officers, quite independent of the Public Works Department, for the purpose of making foot or bridle-paths, to make it possible to get at the land. I do not mean that money should be given on the basis on which the Public Works Department ask for money for bridle-paths—Matang to the railway was \$4,000 per mile, for instance—but I think it should be given on the scale on which the Resident allowed us last year, as a supplementary vote, \$3,900 to construct 26 miles of bridle-path at \$150 per mile. These preliminary foot and bridle-paths are of the greatest use wherever they go; the suitable land is taken up, and they can later on, if required, be made into a better class of road.

7. In the same way, when it is found that a drain or canal, to carry off surplus water, will lead, without doubt, to land in quantity being taken up, the money should be forthcoming; both the paths and drains should be looked upon as remunerative works, bound to pay for themselves in time.

8. I think it an excellent idea to attempt to introduce such grains as dhol and ragi. The latter is, I believe, the staple food of millions in Southern India, and is so easily cultivated that I should think it would commend itself to the somewhat indolent Malay, being sown broadcast and being simply dependent on rain to make it grow like other dry grains, no irrigation whatever being required.

I beg to suggest that a supply of these seeds be supplied to all District Magistrates, with instructions as to their cultivation.

I have, &c.,

ARTHUR T. DEW,
Collector and Magistrate, Matang.

VIII.

BATANG PADANG,
14th March, 1892.

TO THE SECRETARY TO GOVERNMENT,

TAIPING.

SIR,—In reply to your Circular No. $\frac{7263}{91}$ I have the honour to report as follows.

2. Of land available for padi cultivation there is a very large area in this district; the valleys of the Bidor, Sungkei, Slim and Bernam rivers contain many thousands of acres of land suitable for this, besides which there are smaller areas in the Chenderiang, Batang Padang, Bikum and other valleys.

3. The padi lands of this district possess a great advantage over much of the lands of the coast country in the facility with which, at a small cost, they can be irrigated with a never failing supply of fresh water, thus rendering the crops independent of rain.

4. Padi is grown to a small extent in all the mukims of the district, and the rice is acknowledged to be of very good quality. The average yield per acre is very large: the Penghulu of Slim this year returned the average crop of his mukim at one thousand gantangs per orlong. The chief rice producing mukims in this district are Slim and Ulu Bernam. The former produces more than sufficient for the support of the population of the mukim. The padi fields of this valley are very fine: the soil is excellent and the water supply abundant. The population is composed chiefly of Sumatra Malays, who, however, have been long settled here, and the Penghulu is an active man who understands the cultivation of this grain and who is interested in his mukim.

5. The chief thing necessary to make this a great rice producing district is population. At present the whole population is only about eleven thousand, scattered over something like 1,800 square miles, and when it is remembered that of this population 3,000 are Sakeis and the majority of the remainder are miners, it will be seen how very sparse the population is.

6. As people come in and take up the land, assistance should be given in the way of irrigation works, the expenses of which might be recovered by charging a slightly increased rent for such lands as are benefited by these works. I am of opinion that these works should be carried out by the Government, instead of assisting by means of advances to the people, as has been done hitherto. A very great step will have been gained when the people have been taught to use light ploughs.

C

7. So far, very little has been done in the way of padi planting here. At Ulu Bernam a large water-course was constructed and a dam commenced across the Bernam river, but the work was never finished. In Slim a small advance was made to the Penghulu to introduce water to some lands above the level of the valley; the work is completed and the land will be cultivated this year for the first time. In Sungkei an advance was made to two men, but not much has yet been done. The Penghulu of Chenderiang, Raja Idris, received a loan from Government some years ago, and has irrigated a considerable area of land, but finds that there is great difficulty in persuading his people to plant it, as they say it is better to mine for tin and buy rice than to grow it.

I have, &c.,
 CECIL WRAY,
Collector and Magistrate, Batang Padang.

IX. [Copy.]

TAIPING, 1st April, 1892.

TO THE SECRETARY TO GOVERNMENT,
 TAIPING.

SIR,—With reference to Circular Governor $\frac{12869}{91}$ of the 18th December, 1891, on the subject of the rice supply of the Native States, I have the honour to inform you that the Malays in the Kuala Kangsar district seldom or never plant more padi than is sufficient for their own consumption, and very frequently, when the crops are damaged by rats or otherwise, they have not sufficient for that. I do not think, however, that anything would induce them (Kuala Kangsar Malays) to plant more: they are too well off, and there are so many other ways in which they can earn sufficient for their livelihood with less labour than the cultivation of padi entails.

2. The only place in the district where padi is grown for sale is Jenalik, one of the valleys through which the new road from Kuala Dal to Kota Tampan passes. The people there are of Petani extraction, and are thrifty and more systematic in their method of planting than the Perak Malays, and if something were done to induce more of them to settle in the district it would tend greatly to promote the cultivation of padi. The Toh Sedika Raja, who now has charge of the northern portion of the district, has considerable influence with the Petani people, and he assures me that he would be able to bring in a large number of families if the Government would lend them a little pecuniary assistance at the commencement. So far as my experience goes, I have found that the advancing of money to Malay settlers does more harm than good, for they generally do no work so long as it lasts, and when it is all spent try to get out of the place to avoid repayment; but with a responsible Native Officer, such as the Sedika Raja, to see that the money is properly spent, I think that the Government might make advances to Petani settlers without any risk, and with great advantage to the district.

3. With regard to the land available for the cultivation of bendangs, a good deal of it has already been taken up, but only a portion of this is cultivated. It is difficult to suggest any remedy in such cases, unless it were that the owners should be compelled to make arrangements for the cultivation of the whole of the bendang land in their possession, or, as I believe was once suggested, made to inform the Penghulu at the commencement of each season of the area they intend to cultivate, and that the latter should give the balance of their land, if any, to any one that wished to cultivate it, for that season. It is very doubtful, though, if the latter arrangement would answer, and it would be sure to lead to a good deal of ill-feeling amongst the people.

4. Beyond that already alienated there is a large area of land which, with a small expenditure for the construction of bunds and aqueducts, might be irrigated and turned into excellent bendang land. In some places they have already been made and allowed to get out of repair, and in others they have been partly constructed and then abandoned owing to difficulties encountered in the way of rocks and the inability of the people to take proper levels. These, I think, should be repaired and completed; but a qualified officer might first be sent to take levels and make an estimate of the cost and of the area of land that would thus be rendered available for padi planting. When the irrigation works were completed the land could be sold, and the price realised would probably more than compensate the Government for the expense they had been put to.

5. In the Kuala Kangsar district the Chinese never attempted to cultivate padi until last year, when Kong Leng (the General Farmer's agent in Kuala Kangsar), by way of experiment, purchased a few acres of bendang land adjoining his pepper estate. He employed Chinese labour in planting it, and he says that, notwithstanding the damage done to the crops by the rats, which have been unusually numerous this year, the results are so satisfactory that he is convinced there is a large profit to be made here in the cultivation of padi. He is now trying to bring in Chinese agriculturists, and has applied for an extensive area of forest land which he says can be easily irrigated and turned into padi land. He thinks that if he can get in one batch of Chinese rice planters he will have no difficulty in getting others to follow. I think that he, too, should be assisted by Government and given every encouragement. If he cultivates padi extensively and makes a large profit out of it, as he is convinced he will do, other Chinamen will follow his example, and when they have once made their bendangs and expended a certain amount of capital on them they are not likely to abandon them as the Malays do.

I have, &c.,

A. BUTLER,
Collector and Magistrate, Kuala Kangsar.

X.

INDIAN IMMIGRATION OFFICE,
Taiping, 6th February, 1892.

TO THE SECRETARY TO GOVERNMENT,
TAIPING.

SIR,—I have the honour to forward my report on padi cultivation in the districts which I have visited.

I left Taiping on the 9th ultimo for Parit Buntar, where the largest area of padi land is under cultivation in this State. I went to Mr. Brewster's, and he was very kind in giving me all the information he had with regard to padi cultivation.

On the afternoon of the 10th ultimo we drove over a portion of his district and saw some exceedingly good padi growing, a good deal of it just coming into ear and giving promise of being likely to give a very heavy crop. On Monday, the 11th ultimo, we went down the Krian boundary road, and almost the whole way down this, on the left-hand side, we saw very fine crops indeed. In this district the land is laid out very well indeed and systematically—that is, there are large drains cut, of about 15 feet in width, which run almost all round it and intersect it every 3000 feet or so, and other drains are cut at right angles to these again every here and there, and from off these again there are little drains which lead into the several fields, so that each planter can let in whatever water he may require. The large main drains have here and there got water-gates let into them, which is a great boon to the district, as they can be opened when there is too much rain, and again at the first approach of dry weather they can be closed up, and the water in this way kept on the land.

The following day, Wednesday the 12th ultimo, we drove to Bagan Serai. From Simpang Lima to Bagan Serai there is only a very little of the ground planted. I believe the ground is not quite so good as that at Krian, but here and there I saw some very good-looking padi, and should think, if the land were laid out, that it would be taken up, especially after the good crop coming on this year.

On Thursday morning, 13th ultimo, Mr. Brewster and I walked for about five miles up the Selama road, where we found only a small quantity of land that had been planted in padi—only, say, about 200 to 300 yards deep on either side of the road; this, I think, is because nothing has been done hardly in the way of making drains or footpaths into the jungle. Mr. Brewster says it is in this district that he wishes to open up the land, and that if the Government will allow him to dig drains and simply use the earth that comes out of them for making footpaths, that he can open up thousands of acres, and that, what is more to the point, he can get people to take up the land, and he would like to begin at once. I attach a map of this district showing this land, which Mr. Hill has made out for me.* The jungle would have to be felled and burnt off, drains, &c., dug and water-gates erected; but I should think this would cost the Government very little, and the outlay would soon be recovered by the rents paid for the land when it was taken up. This ought to be done in a thorough way,

* Not printed.

and properly laid out by plan—thus, say, large drains run in at right angles to the Selama road at about 2,000 or 3,000 feet apart, with smaller drains at every 1,000 feet, and, at right angles to these again, medium size drains at every 1,000 feet and smaller ones at, say, 500 feet. In this way the land would be thoroughly under control, as far as the water is concerned, which is, of course, the principal thing to look to; and then water-gates would have to be put up at suitable places. Three or four of these would be sufficient for a very large extent of country, as the land is, of course, very flat. At 11.30 a.m. the same day we started down the Sungei Siakap road as far as Kuala Kurau. For the first three-quarters of the way down this road, "seven miles long," there is only a little cultivation on either side of the road, except at the very beginning, where there is a sugar estate on the one side and the Tamil Roman Catholic Mission on the other. The last quarter of the road near Kurau has got a beautiful stretch of padi on it on either side—on the right side stretching right away to Kuala Tanjong Piandang and Bagan Tiong. On the banks of the Kurau river padi is also planted and looks well. We returned to Bagan Serai by the Chinese launch, which we were fortunate enough to catch at Kurau, and arrived at Bagan Serai at 5.30 p. m. We also visited the Rev. Father Diridollon, who is in charge of the Tamil Mission. He has got a good deal of his land cultivated by his people; it looked fairly well, but he complained of it having been much damaged by rats during the early stages of its growth. Father Diridollon says he can get 50 people down from India, who are friends of his Tamils, at \$1 per head, and hopes to do so this year, as he is desirous of opening up a larger quantity of land. His people appear to be very poor, and any little assistance the Government could give him would help to get his land opened up.

It appears very evident to me that unless the Government will do something to open up the country, no large extent of land will ever be taken up by Malays or the natives generally, as they are not in a position financially to do so. Why I say this is because I believe most of the roads in the Krian district have been opened now for the last six years and on most of them one only sees cultivation near the roadside in accessible places. There is also another serious drawback to this district—that is the want of good drinking water. On the banks of the Kurau it is all right, but inland, during the hot dry weather, there is no fit drinking water to be found, and very often when a long spell of dry weather sets in the people are attacked by cholera, which, on occasions, has been fearfully fatal, and the people have simply fled the district as from the plague. I believe a scheme for bringing water down to this district has already been started, but I hear it is not to be carried out this year. It is a very necessary work if the Government wishes to get planters into the district. With regard to its general adaptability, I think the Krian district the most suitable place I have ever seen for padi, with the one exception, which is its want of drinking water.

On the 23rd ultimo I left Taiping for Teluk Anson, where I arrived on the morning of the 25th ultimo. I called on Mr. De Mornay and found Mr. Denison had gone to Changkat Jong and was not expected for two days. Mr. De Mornay very kindly offered to shew me all there was to be seen round or near Teluk Anson itself, in the way of padi cultivation. The first morning we walked along the new railway trace, where we saw only very small patches of padi planted here and there; it was only of medium growth and the ground it was planted on appeared to be too much drained and dried up for successful planting. The land on the opposite side of the River Bidor I liked very much, and should think it would grow anything almost; but it struck me that it would be rather heavy work turning it into good padi land, as the jungle was very large, and it would be difficult to keep sufficient water on the land. The following day we visited the land that has been given out to the Tamil settlers, but they have only a small area in padi, and I think it will always be difficult to get them to plant much land as long as wages remain so high as they are at present, 40 cents per day being easily earned on the railway works, and even more by the coolies, who do odd jobs in the town.

The next day Mr. De Mornay took me along the Selabah or Changkat Jong road, which Mr. Denison is having made to open up communication with Changkat Jong. The land in this direction is very similar to what I had already seen; after going about four miles the land had the appearance of being much lower and better adapted for padi, but, so far, very little of it appeared to have been taken up. I do not think this land would be so easily worked as padi land as the Krian land, as when once a crop were taken off this land heavy brushwood would grow up, whereas the water at Krian would keep this down and only grasses would grow there. On Wednesday, 27th

ultimo, Mr. Denison returned. He told me that he was most anxious to get his lands taken up, and wished me to go with him to visit some of the other parts of his district where there were good padi lands. Mr. Denison says that a very influential Chinaman has applied to him for 1,000 acres of land for padi cultivation, and that he proposes planting 300 acres each year, with Chinese coolies, whom he proposes to bring down from Burmah. This will be a great thing if it is carried out, as, if successful, it should induce others to do likewise. I should like to go round with Mr. Denison and see other parts of his district.

With regard to the offer of the Singapore Government to get seed as a help to the country, I can say very little. The seed here appears to be very good, but of course it is always a good thing to change seed as often as possible, but I believe the natives are fully alive to the benefit of doing this, and exchange seed amongst themselves.

The Singapore Government also mentions dholl and ragi as cultivations which might be introduced. I do not know anything of either of these cultivations, as there are no people planting them here. One Tamil has a small patch of ragi, but simply plants it as a curiosity. Dholl is greatly used by several classes of the people, but is considered more as a luxury here. Ragi, I was told, would be preferred to rice by the Tamils if it were as cheap, but at present it is only sold at one or two shops in the town, and at four times the price of rice.

I have, &c.,

A. B. STEPHENS,
Assistant Indian Immigration Agent.

XI.

PLANTATIONS DEPARTMENT,
Kuala Kangsar, 15th February, 1892.

TO THE ACTING SECRETARY TO GOVERNMENT,
TAIPING.

SIR,—I have the honour to forward my report on the question of promoting the cultivation of padi in the Malay Peninsula.

2. My remarks must be limited to this State, and I find it impossible to obtain the necessary information to report on the land available, and the extent of land already under cultivation, at such short notice. The District Officers will have reported on this part of the question more fully than I could have done in months.

3. That padi is not cultivated in such quantities as formerly is well known, and the reason for this is twofold—

(i.) The Rajas no longer derive their incomes from the taxation of padi, and do not, in consequence, force the natives to cultivate it, as they did before the British came to the State.

(ii.) The lazy and unambitious temperament of the Malays, who do not so much begrudge the small rent charged by Government on their padi lands as resent having to pay rent at all.

If padi was taxed as in Ceylon, I do not think the Malays would cultivate it even in as small quantities as they now do.

4. I would suggest that land formerly under padi cultivation should be offered rent free to natives of the State for one year. There are thousands of acres of padi land now lying fallow, and this might induce many to plant padi who would not do so if charged even a nominal rent. In this way, land now lying idle might be brought under cultivation, and a rent charged the following year, when the planting would be comparatively easy, as there would be no clearing required.

5. I would further suggest that Government itself should cultivate padi on a large scale. If the Malays and others can afford to clear forest land, pay rent, plant padi and yet find the industry profitable, surely the Government, with the means of obtaining sufficient labour, no rent and efficient supervision could cultivate padi and make it a paying concern. To effect this, labourers would have to be employed in sufficient numbers to plant enough padi to make an appreciable difference in the out-turn. I am informed on good authority that all the padi grown and not required by the cultivator is sold as soon as it is ripe, and consequently at its cheapest. Government could store its padi in suitable buildings and sell, when the local crops are exhausted, at a reasonable profit, and thus prevent famine prices, which were universal a few months ago.

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6. The experiment would be beneficial in more ways than one. It would bring agriculturists and padi planters to the country, make land now uncultivated valuable property, and keep enormous sums of money in the State which are now paid away annually for the purchase of rice.

7. The previous schemes for introducing agriculturists have failed simply from being on too small a scale. To insure success in this, it would be necessary to plant thousands of acres, and the miles of fine land round Teluk Anson would be most suitable for the experiment, and the crops would have to be stored against high prices. If sufficient land were planted (and it is available) the State might not only become independent of foreign markets but might also become one of the rice supplying countries of the world, and derive a large revenue from padi, instead of paying away large sums of money for rice, and being dependent on other and uncertain markets for the staple food of its people.

8. In my opinion, after the Government had established the immigrant planters in the country, and when they saw what profits could be made by the industry, there would no longer be any need for Government to plant themselves, as these people would apply for sufficient land to grow padi enough to meet any local demand.

I have, &c.,

OLIVER MARKS,
Superintendent Government Plantations.

XII.

NO. $\frac{109}{92}$.

LAND DEPARTMENT,

Taiping, 20th February, 1892.

TO THE SECRETARY TO GOVERNMENT,

TAIPING.

SIR,—In accordance with the instructions of the British Resident, I have the honour to forward the following report on the question of encouraging padi cultivation in the Native States.

2. Since the year 1881, when I relieved Mr. Denison as Collector and Magistrate, Krian, I have had special opportunities of studying the question, and during the time I was in charge of that district the land revenue, derived almost entirely from padi cultivation, rose from \$16,256 in 1881 to \$23,889 in 1884, since which year it has declined until 1890, when it fell to \$8,757. Last year it rose again to \$22,307.

3. The steady yearly increase which culminated in the record of \$23,889 in 1884 was due to the influx of padi planters. The ordinary method for these new settlers to acquire land was as follows.

4. A number of the more well-to-do settlers had a good deal more land than they could cultivate themselves: they had, therefore, to find men to rent their land, and for this purpose introduced new settlers to whom they gave advances until the crop was harvested, when the tenants repaid their advances and rent in padi, calculated at a very low rate. The usual rent for padi land was a kuncha (160 gantangs) per orlong—*i.e.*, 120 gantangs per acre, delivered at the landlord's house. So large was the yield in good years that, after repaying the advances and rent, in a year or two the tenant had saved sufficient padi to keep himself and his family for a year, and also to acquire a plot of new land for himself. Four dollars was the cost of a 5-acre block—*i.e.*, \$1 for the agreement for a lease and \$3 for the rent, which had to be paid in advance. In a couple of years, if he was industrious, he would himself be able to let some of his land to other new-comers.

5. In 1885 the crop partly failed, and also the rapid development of the padi industry in Krian stimulated the District Officers in other districts, principally Lower Perak, Larut and Kuala Kangsar, to open up their districts in the same way. The consequence was that not only was land granted rent free for three years, but in some cases advances of rice were given to new settlers, the result being that many of the new settlers introduced into Krian by their predecessors to cultivate their surplus land were induced to emigrate to these other districts and begin opening new land on their own account, before they had served the apprenticeship as tenants and become familiar with the seasons and methods of cultivation in this country. Last year, a cycle of fat years having apparently begun in 1889, the peculiarly favourable position of Krian with regard to the market again asserted itself, and prosperity has again been restored.

6. The land suitable for wet padi cultivation is about the most difficult imaginable for moving about in; facilities for transport are therefore the first desiderata for the opening up of a new padi district. Metalled cart-roads are a luxury, but frequent bridle-paths (banks raised above the level of the surrounding country) are a *sine qua non*.

7. The conclusions that I draw from the foregoing are that granting land rent free for three years for encouraging padi cultivation is a mistake, and tends to pauperise the grantees, as it has done in many cases, to my certain knowledge; that the most that should be given is to postpone the payments of rent until the crop has been harvested. It is better that new settlers should serve an apprenticeship, for the first year or two working on the land of others, until they have acquired experience and the small amount of capital necessary to support them until they have saved their first crop.

8. This, of course, would not apply to the introduction of a new industry such as pepper, which takes three or four years before any return is obtainable, and for which the necessary school in which to educate the new-comers does not exist. In the same way, where a new race, such as Chinese, Siamese, &c., is to be introduced, or a perfectly new district to be opened, it is probably necessary to make special arrangements until the first nucleus of a colony has been established, after which, however, I would on no account give assistance, beyond perhaps assisted passages.

9. Speaking broadly, the whole of the alluvial plains between the foot hills and the coast on this side of the Peninsula, from Province Wellesley to Johor, are specially suitable for wet padi cultivation. The land I speak of has been reclaimed from the sea in recent geological times, and is almost quite flat. To make it available for padi cultivation the first thing is to construct a bund inside the edge of the padi scrub, which forms a belt along the coast between the mangrove and the nibong forests. This bund, with the ditch on the inland side, forms a bank to keep out the sea water, which is fatal to padi, and a path for the people, and the ditch from which the bund is constructed forms a catch drain, into which drains should be led, running more or less at right angles to the coast, and about half a mile apart. These drains serve the purpose of regulating the surface water on the lands, there being water-gates at their lower ends by which flood water is let off, or, in case of drought, the water is retained. They also form a means of transport by which the settlers remove their produce by the means of tiny sampans. I put these drains at half a mile (40 chains) apart, as experience shows that for this alluvial land $2\frac{1}{2}$ chains frontage by 20 chains deep forms a convenient shape for a block of five acres. If the drains are closer the water is apt to drain off too quickly.

10. In the early days in Krian the people themselves had to make these subsidiary drains after the Government had constructed the bund; but if the Government was to do this in suitable localities, I have no doubt that settlers would not be long before they took up the land, and, in my opinion, the Government would spend money much more advantageously in constructing these agricultural paths and drains than in foregoing rent or making advances to settlers. These drains and bunds could be made for from 10 to 20 cents per foot run.

11. In addition to the alluvial land on the coast, of which I have been speaking, there are also considerable tracts of suitable land along the banks of the rivers inland. To open these for cultivation, irrigation works on a small scale, such as dams and water-courses, are necessary, which the Government should make, and if the cost was anything considerable, it might be recovered by an assessment on the land benefited. To make these lands accessible, cart-roads are required, as in these cases the sea is not available as a highway.

12. I have no doubt that the methods of cultivation might also be improved—*e.g.*, scattering the grain broadcast, as is, I believe, done in some places, instead of the tedious plan of transplanting young plants by hand which maintains here.

13. The question of cultivation, classes of grain, &c., should, I consider, be taken up by an expert, such as the Superintendent of Government Plantations in Perak, or Superintendent of Forests and Gardens in the Colony, who should have time and scientific knowledge to bring to bear on the subject. It is a well known fact that the Malays grow a large variety of padi for their own use, and are very ready to try a new variety if given it. It is, however, questionable whether they have the best seed for growing rice in quantity for the market, as for that purpose an even, uniform, prolific grain is necessary. There are many other questions which might be settled

were a scientific expert to study the matter—*e.g.*, the idea prevails among the Malays that one heavy, and therefore slow growing, crop in the year is more profitable than two crops of the light padi, which matures quickly. Another idea is that in the rich fat lands which we have in the coast districts, were the land ploughed, the growth of straw would be increased at the cost of the grain.

14. I consider that if an expert took the matter up as I suggest, he should establish a model farm where experiments could be tried, and to which an agricultural school might with advantage be attached, where students would be taught the best way to grow not only padi, but also fruit, &c., and from which seeds and plants might be distributed. If properly managed, an institution of this sort should, after a time, be self supporting.

15. In conclusion, I may add that if some means could be devised to introduce Chinese padi planters, with their wives, to settle in the country, the problem would be settled, as where Chinese do grow padi they get nearly double the crops the Malays do; and again, the Malays are, as a rule, much more successful padi planters than the Tamils.

I have, &c.,

C. LEECH,

State Commissioner of Lands.

XIII.

SEREMBAN, SUNGAI UJONG,
January 25th, 1892.

TO W. H. TREACHER, ESQ., C.M.G.

SIR,—I have the honour to acknowledge your memorandum of the 15th January asking for suggestions upon the extension of padi planting in the Malay Peninsula.

From the Circular which you were good enough to forward to me it appears that it is only contemplated to work with available aboriginal peoples or such as are here already. In my opinion, the inducements are so small, and the alternatives so many, that it will be found difficult to extend padi or grain cultivation, until, as in Malacca, Penang (more gardens than padi) and Province Wellesley, the population becomes not only adequate by natural progress and increase for the more remunerative sources of employment, but also more in proportion to the area of the land that it is now sought to bring under cultivation.

To sum up the local sources from which cultivators are to be brought, I would submit that there are insufficient inducements to follow the cultivation of food grains, whilst the inducements to follow other lines of life are so many and attractive. But, locally, something might be done by giving land and assistance to young married raiats that emigrated from Penang, Province Wellesley and Malacca to settle in the Native States, and if some advantages were offered of a similar nature to Malays from Sumatra and other places, men and women might also be attracted. To any one that has visited the extensive padi fields of Province Wellesley, Malacca, Kedah, and the smaller ones of Penang, it is apparent that the life is not entirely without attractions to the peoples of this country.

I trust that you will not consider a few words upon the importation of communities amiss.

There are overstocked famine-threatened districts both in Ceylon and Southern India from which it would be possible, I feel sure, by bringing some communities, to induce others to follow to what, to them, must appear an El Dorado of peace, wealth and comfort.

The circumstances under which these communities might be successfully introduced would in many respects be similar. There should be an English or European director of the community—for choice, a young civilian—who has been well known to the people for two or three years, not only intimate with their language, their ways, their castes and customs, but also personally known and looked up to by the people, whom he should induce to follow him.

The native headmen should all be selected and appointed by him, for some years at any rate. The administration of the community should be entirely upon the lines that the people had been used to in their own country, and that so much so that the greater plenty of this should be the only reminder that they had left their own homes;

leaving it to time to so modify the administration of the community that after a lapse of many years the good of the two countries—that from which they came and that in which they were—might be found assimilated.

Any introduction of new observances and new customs that are possible to avoid are to be deprecated, as in inducing the raiat to look round and not only change his location, as in coming here, they would also tend to induce a feeling of unrest, eventuating in his changing his means of livelihood, no difficult matter in rich mineral countries like these. I am of opinion that not less than 300 (preferably 500) people would soon be absorbed in various ways.

The inducements that these countries to such a community could hold out would be great, and I am of opinion that it would eventually be financially successful, provided that preliminaries were well arranged. But who is there that will inaugurate such a policy? for if it fails the obloquy goes to the man who started it, and, if successful, the merit to his successor.

I have, &c.,

THOS. H. HILL.

XIV.

NEBONG TEBAL,

24th February, 1892.

TO W. H. TREACHER ESQ., C.M.G.,

ACTING BRITISH RESIDENT, PERAK.

SIR,—In reply to your memorandum of January 15th, enclosing a copy of a letter from the Hon. Colonial Secretary on the subject of the extension of the cultivation of padi and other grain food and asking for suggestions on the subject, I have the honour to make the following observations.

I think the first consideration is to obtain complete control over the drainage of any padi district, so that the necessary amount of water may be retained on the land during the planting season, and effectually removed as the crop ripens and after it has been gathered in, thus bringing the soil into a condition to receive the full benefit of the action of the sun and air in sweetening it and rendering it fit for future cultivation.

I am aware that in the Krian district (with which I am more immediately acquainted) a certain number of water-gates have been recently erected, but these appear to be of a somewhat impracticable construction, and the drains in connection with them are in many cases so much silted up that it is impossible to obtain satisfactory results. Should there be an exceptional rainfall during the planting season it is very necessary to get rid of the superfluous water quickly, as four days is sufficient to kill the young plants if they are entirely submerged during that period.

I think the Government might expend some money wisely in making experimental planting of other grains in different districts, and, where the results are satisfactory, should make arrangements to enable the natives to procure seed cheaply, and issue simple instructions as to best season for planting, treatment of growing crop, &c. By means such as these, much might be done to improve the general condition of agriculture in the country, to the equal benefit of the people and the Government.

I have, &c.,

KHO BU ANN.

XV.

GOVERNMENT HOUSE,

Sandakan, 5th December, 1891.

TO W. H. TREACHER, ESQ., C.M.G.

DEAR SIR,—As you are aware, I was not in Borneo when the Hakka settlement was opened, but I have obtained some information upon it from Mr. Henry Walker, which I have pleasure in forwarding to you. I am sending this open to Mr. G. L. Davies, in order that he may add anything he may think likely to be useful to you.

That the people are happy and prosperous now I have no doubt whatever, and the fruit and vegetables they grow are excellent. In fact, the production must now be in excess of the local requirements, and I am casting about to find a market for them. The people are reported as industrious and well behaved, and on the occasion of a visit

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to Kudat I was present when the Rev. W. H. Elton and his lay reader married two of them in the temporary church in the presence of a very considerable congregation. I believe that having a clergyman among them does help to keep them together, and with the Bishop of Malacca backing your efforts I have no doubt of the successful end of your movements.

* * * * *

Should you be in want of any further information on this or any other subject that it is in my power to procure for you, I trust that you will not hesitate to command my services, which will be most willingly and readily put at your disposal.

I am &c.,

L. P. BEAUFORT.

XVI. [*Enclosure.*]

TO THE ACTING GOVERNMENT SECRETARY.

The terms on which we obtained Hakkas were—payment of passage money; advances of food or money, at the rate of \$3 per single man and \$6 per married couple per month, which were continued until the vegetable gardens were supplying stuff for sale. Each man had one acre lotted out, and I employed the men and women in clearing the jungle, building houses for themselves, and while so working I believe I paid them a little more than the advance (as I would have done to other coolies).

By the time I stopped the advances I had so established the Hakkas that they really had some interest in going on with their gardens. They had poultry and pigs, and I had given them coffee and pepper (very little pepper) and fruit trees, pineapples, and bananas. Out of 96 souls settled in 1883 (February) the number remaining in 1886 was about 50, who were sufficient to keep up the clearings, the others having found employment in Kudat, &c., and the whole community was a thriving one. They sent money to China to bring down their relations, and in 1890 I reported the number established near Kudat to be nearly 1,000, cultivating nearly 100 acres.* Both the figures are much larger now, probably double.

N.B.—The *advances* were never reclaimed, and I note that the men received \$10 each in China for tools, and two married men received \$5 each. The total amount advanced to the 90 men, women and children was \$2,778, and no advances were made after April, 1884. This sum, \$2,778, included passage money, building material, freight on plants, &c.

And the whole success of the settlement was due to the people being promptly employed on clearing and planting their own land, and thereby obtaining a substantial interest in it.

HENRY WALKER,

Commissioner of Lands.

P.S.—The terms on which they were to acquire a grant was on payment of 25 cents per acre per annum.

XVII.

GOVERNMENT OFFICES, LABUAN,
22nd December, 1891.

TO W. H. TREACHER, ESQ., C.M.G.,
ACTING BRITISH RESIDENT, PERAK.

DEAR SIR,—The Hakka settlement in January, 1884, looked like being a complete failure—only 29 men, women and children were left, and they talked of going. Measures were taken which caused them to stop, and they were informed that their advances would cease in four months. The Hakkas began then to really work, and being visited continually were kept up to the mark. There are now some 800 Hakkas (men, women and children) round Kudat who are cultivating about 500 acres of land. The original settlement may therefore be considered to have answered well.

The faults to be avoided are:—

(i). Placing the settlement too far from the town where the people sell their

* Mr. G. L. Davies says 500 acres. *Vide post.*

produce; also placing it too far from the house of the European who supervises their work.

(ii). Getting Hong Kong loafers instead of country people.

(iii). Giving assistance in money. Tokens should be used instead, and certain shops authorised to accept these tokens for food, clothing or tobacco; the opium shops should of course not be included.

(iv). A man's maintenance money should be stopped after one warning, should his work not be satisfactory, and the settlers should be made to understand clearly from the first that this rule will be strictly carried out.

(v). Giving too small a quantity of land. I consider that each family should get at least ten acres. No Chinaman will take an interest in the country for one acre; the original Kudat Hakkas were got to take up work in earnest by being promised as much land as they could work and a reserve of as much again, so that they might have land for their relations when they were able to afford to get them down from China.

The success of the Kudat settlement was in a great measure due to the liberal way in which the Hakkas were treated in the matter of land after 1883. The Chinese strongly object to taking land on a rent, and the first thousand settlers should be allowed to buy land at \$1 per acre.

I am, &c.,

G. L. DAVIES.

XVIII.

ORDER IN COUNCIL NO. 17 OF 1889.

BENDANG LAND, KUALA KANGSAR.

Passed by His Highness the SULTAN of PERAK in Council on the 19th day of February, 1889.

HUGH LOW, *British Resident.*

1. The Government of Perak, being desirous of encouraging the cultivation of "bendang" land in the district of Kuala Kangsar, it is hereby notified that, in cases where a sufficiently large community of natives are willing to open up a tract of forest for the cultivation of "bendangs," it shall be lawful for the Collector and Magistrate to release the said land from quit-rent for three years.

Land may be released from quit rent for three years.

2. In such cases it shall be necessary for the people who apply for the land to enter into an agreement before the Penghulu that they will bring the land into *bonâ fide* cultivation within three years of the date of agreement. The land can then be allotted to the applicants by order of the Collector and Magistrate, and permits issued.

Applicants to enter into an agreement.

3. In case of any applicant failing to cultivate his allotment, the land may, by the Penghulu's order in writing, be cultivated by other members of the community, all expenses incurred in opening it up, other than that of actual planting, being borne by the defaulter, and being recoverable from him by the Penghulu as an ordinary debt. The crops shall be the property of the persons who planted them.

Procedure on failure to cultivate an allotment.

4. At the termination of the three years, should he still fail to cultivate the land, it shall be sold by auction, and the proceeds, if any, after payment of compensation to the person entitled for permanent improvements, be confiscated to Government.

After three years uncultivated allotment may be sold.

5. Any portion of the land being allowed to revert to jungle after it has once been brought under cultivation may be sold by auction, on an order from the Collector and Magistrate, after it has stood fallow during one padi season, and the proceeds of the sale confiscated to Government, the condition of the sale being that the purchaser becomes subject to these rules.

Land reverting to jungle may be sold.

By Command of the Council of State,

W. H. TREACHER,

Secretary to Government.

KUALA KANGSAR,

19th February, 1889.

XIX.

ORDER IN COUNCIL NO. 6 OF 1890.

DISCOURAGEMENT OF LADANG CULTIVATION.

Passed by His Highness the SULTAN of PERAK in Council on the 16th day of January, 1890.

F. A. SWETTENHAM,

British Resident.

Preamble.

With the object of discouraging the cultivation of ladang and encouraging permanent agriculture, the following Order will be enforced throughout the State of Perak:—

What jungle may be felled for ladang.

2. On and after the 1st January, 1890, no jungle, except secondary growth of not more than five or six years' standing, shall be felled for ladang cultivation, and, to ascertain what jungle may be cleared for this purpose, the following test shall be applied: jungle that can be felled with a parang or golok may be cleared, but jungle that cannot be felled without the use of an axe or biliong may not be cut for ladang cultivation.

Fee for permit.

3. The fee for a permit to fell jungle for ladang cultivation shall be fifty cents for every acre or part of an acre.

Penalty.

4. Any person committing a breach of this Order or using land for ladang cultivation which was granted for the purpose of permanent agriculture shall be liable, on conviction before a Magistrate, to a fine not exceeding fifty dollars for every acre or part of an acre so felled or cultivated, and any Penghulu who knowingly allows a breach of these regulations to be committed in his mukim shall be liable to the penalty herein provided.

Penghulu liable.

Jungle may be felled for permanent agriculture.

5. Nothing in this Order is to be interpreted as prohibiting persons from felling jungle for the establishment of permanent cultivation.

XX.

ORDER IN COUNCIL NO. 14 OF 1890.

BENDANG CULTIVATION.

Passed by His Highness the SULTAN of PERAK in Council on the 1st day of October, 1890.

F. A. SWETTENHAM,

British Resident.

Whereas it is necessary to encourage the cultivation of Bendang Land in the State, it is hereby ordered as follows:—

1. From and after the 1st December, 1890, any registered owner of bendang land, or person holding under him, whose growing crops are damaged by fire or by vermin, notwithstanding the exercise of due and customary care and precaution on his part, shall be entitled to sue and recover damages from the owner of any adjoining or neighbouring bendang land, or person holding under him, who shall have neglected to clear and burn off his land, in the customary manner, should there be, in the opinion of the adjudicating Magistrate, reasonable grounds for the presumption that the damage occasioned by such fire or vermin is due, in whole or in part, to the omission so to clear and burn off such adjoining or neighbouring bendang land.

2. Cases brought under this Order shall be heard and determined by a Magistrate of the first or second class, assisted by at least one Native Magistrate or Penghulu.

3. The word *vermin* shall mean and include pigs, rats mice, and insects.

4. In districts or sub-divisions of districts, when requested to do so in writing by a majority of two-thirds of the Penghulus, or of the padi planters, it shall be lawful for the District Magistrate to frame rules prescribing the dates on which the various operations of planting and harvesting padi on bendang lands shall take place, and imposing penalties for breaches of such rules.

5. Such rules, after being approved and confirmed by the British Resident, and after publication in the *Government Gazette*, and after being posted up, in the Malay language, for the space of a fortnight, on the mosque, or other conspicuous building or place in the villages affected thereby, shall have the force of law for twelve months.

6. Such rules shall deal with the following subjects, and no others : .
- I. The dates on which nurseries, irrigation, planting out, fencing, and burning stubble shall be commenced and completed.
 - II. The nature and dimension of the fences, if any, and the portion of each fence to be completed by each planter, where bendang fields are contiguous.
 - III. The temporary occupation of fallow or abandoned land.
7. All previous Orders on the above subjects are hereby repealed.

XXI.

TAIPING, 1st April, 1892.

TO W. H. TREACHER ESQ., C.M.G.,
ACTING BRITISH RESIDENT.

SIR,—I have the honour to forward a short report on my enquiries about the rice in Perak, Straits Settlements and Rangoon. You will see that there is very little of the Perak rice sold in the market, it being principally disposed of as padi.

2. Padi grown in Perak is worth \$2.15 per bag. A bag of padi usually contains 30 gantangs.

3. The Perak rice is only used by Malays. It is very seldom brought into the market for sale here in small quantities. If the rice was sufficient that is grown in Perak, the Chinese would be very glad to buy it, because it would be a big saving in transport.

4. The Straits rice is \$3.40 per pikul. A good deal of the Straits rice is sold in the Taiping market; it varies in price, the best being sold at \$3.60. I am informed that the rice grown in the Straits is better than the Rangoon, but not sufficient for the demand.

5. Rangoon rice, I am informed, is mostly used by the miners, who use it chiefly for making kanji, which is greatly used by the Chinese miners. When it is cooked, owing to the large grain, it yields more rice in the pan than the Straits rice. The Cantonese prefer the Straits rice. If there were more rice grown in Perak and brought into the market, it would be the means of keeping the prices down. The Rangoon prices lately have been very high, on account of bad crops in Burmah. On my way to England I visited Rangoon, went up country and saw several padi fields, which extended for 50 or 60 miles in length. In looking round, I often thought of Perak, and reflected on the hundreds of acres of land which could be utilized for padi. I may mention several of the valleys from the foot of the path at Bukit Gantang, through Trong to Sungei Tinggi, which could be used for planting padi and which has been proved not to be tin-bearing land; also going south from Trong to the Ulu Bruas. There are hundreds of acres could be planted in padi in various other places which I could mention. I am very sorry I have had no more time or I might have sent more information in than now.

I have, &c.,

W. SCOTT,
Inspector of Mines.

BRITISH RESIDENT'S OFFICE,

Taiping, 27th April, 1892.

TO THE HON. THE COLONIAL SECRETARY,
STRAITS SETTLEMENTS.

SIR,—Referring to my letter No. $\frac{1761}{92}$, enclosing reports on the subject of the extension of the cultivation of padi and other food grains, I have the honour to transmit copy of suggestions for legislation put forward by H.H. the Sultan, but received too late to be forwarded with the other enclosures in my letter above quoted.

I have, &c.,

W. H. TREACHER,
Acting British Resident.

F

TRANSLATION
OF DRAFT ORDER IN COUNCIL FOR THE GUIDANCE OF THE AGRICULTURAL
POPULATION OF PERAK.

1. It having been ascertained that there is a large enough area of agricultural land in the State to afford a sufficient food supply for the entire population, and the Council having observed that distress arises yearly amongst the people owing to their inefficient methods of cultivation, it is hereby ordered that all people of every nationality who are settled in the State shall take up bendang land to the extent of not less than $1\frac{1}{2}$ acres per man or per family.
2. All bendang land which is thus taken up must be properly and diligently cultivated, the object in view being the cultivation by the people of sufficient rice for their own consumption, and to avoid being dependent on other countries.
3. With regard to the method of cultivation, every planter must commence and continue to work at the same time, from felling and clearing the land to planting the seed. They will not be allowed to work at irregular seasons, as they please. Notice of the dates on which all bendang work is to be commenced will be issued by the District Magistrates through the Penghulus of the various mukims.
4. When irrigation is necessary, or when difficulties arise which prove too great for the planters to overcome, the Government will assist as may appear expedient, but planters must not make light of assistance afforded by Government.
5. When new land, which has never been cultivated before, is taken up for *bonâ fide* cultivation, Government may grant it rent free for three years. All land, whether new or old, if abandoned, or insufficiently cultivated for over three years, will revert to Government, and Government will re-allot the land to whosoever may desire it.
6. Penghulus are instructed to watch carefully all bendang cultivation in their respective mukims, and in the event of any one committing a breach of these regulations, the Penghulu shall report the fact to the District Magistrate, who will punish the offender with a fine not exceeding \$

Land $\frac{2,861}{92}$.

RESIDENCY, PERAK,
Kuala Kangsar, 23rd June, 1892.

TO THE HON. THE COLONIAL SECRETARY,
STRAITS SETTLEMENTS.

SIR,—In the absence of the British Resident, and as merely his *locum tenens*, I have the honour to enclose, without making any recommendations, certain correspondence on the subject of the introduction of Chinese agricultural settlers into Perak, namely :—

(i). Copy of a letter from the ex-State Commissioner of Lands (Dr. Leech), dated the 28th April, stating that he has been informed by Father Gazeau, a Roman Catholic priest stationed in Larut, who ministers to a number of Chinese converts, some of whom are successfully cultivating pepper and other agricultural products, that in the Fui Chew province of China there has for the last four years been a failure of the padi crops, with much consequent distress, and that it is thought, were the inhabitants informed that they could obtain padi land on easy terms in Perak, they would flock into the country, but that the idea prevails amongst them that on their arrival here they would be enslaved.

Dr. Leech was informed that the Government had already inserted a detailed communication concerning Perak in two Chinese newspapers and also circulated it extensively throughout the State (your papers, Perak $\frac{8,617}{91}$), and that the Bishop of Malacca had recently expressed an opinion contrary to that of Father Gazeau, saying that he considered that, as long as tin mining was such a remunerative business, the Chinese would not take to padi planting in Perak.

(ii). Copy of a letter from the Bishop of Malacca referred to above, dated 14th December, 1891.

(iii). Copy of a letter from the ex-State Commissioner of Lands (Dr. Leech), dated the 16th May, enclosing one from Father Gazeau, dated the 13th May, in which

the Father lays down six propositions, to which if effect be given, he is of opinion that the introduction of Chinese agriculturists would be ensured. Briefly, the propositions amount to this, that the Government should pay for the passages of the men and their families and advance the money to start on, without interest, and recoverable by a 10% tax on the produce of the land, and that in the intervals of harvest the men should be allowed to work lampan without payment for "passes." In Larut at present the fee for passes is \$5 per man for six months, but there is a proposal to reduce this to \$5 per annum, it being found advantageous to encourage lampan working under certain conditions.

2. Dr. Leech, in his letter above quoted, recommends that an experiment should be made on the lines suggested by Father Gazeau, and that one of the China lines of steamers should be communicated with.

3. In 1891 the British Resident (Mr. Swettenham) issued notices that Government would grant to Chinese agricultural families lots of five acres in Larut, free of premium and free of quit-rent for three years, after which the quit-rent would be at the rate of 60 cents per acre per annum, and that pecuniary assistance would be given to settlers well recommended.

In Kuala Kangsar the District Magistrate was authorised to offer similar terms as regards land, premium and quit-rent and an advance of \$40 a family, provided 20 families were introduced within three months of the next Chinese New Year—*i.e.*, 9th February, 1891.

Somewhat similar terms were offered in other districts, but hitherto with no result, and a Chinaman who had shown interest in the matter now states that he could not introduce settlers under \$100 per family, and seems to have given up his project.

4. In paragraph 9 of my report on the extension of the cultivation of padi, 5th April, 1892, (your paper, Perak $\frac{3,954}{92}$), I have alluded to these notices, and at the same time I pointed out that there are already Chinese engaged in padi culture in some of the districts.

5. As to Father Gazeau himself, the Government has at different times lent him \$600 for the purpose of introducing and assisting settlers, and the result is reported to me, up to date of 13th June instant, as 60 to 80 acres of land taken up, about 60 men employed, 20 acres fully planted up, chiefly with pepper and some with coffee, and quit-rent paid at the rate of 60 cents per annum on all the land taken up, except in the case of one lot on which the quit-rent is at the rate of ten cents per acre.

6. The only security that Father Gazeau can offer is the land granted by Government.

I have, &c.,

W. H. TREACHER,

Acting British Resident.

I.

LAND DEPARTMENT,

No. $\frac{412}{92}$.

Taiping, 28th April, 1892.

TO THE SECRETARY TO GOVERNMENT,

TAIPING.

SIR,—I have the honour to report, for the information of the British Resident, that the Reverend Mr. Gazeau told me quite recently that he heard from China that in the Fui Chew province for the last four years that the padi crop has failed, due to floods, and that great want prevails there. That could these people be convinced that suitable padi land was to be had here for the asking they would flock into the country as padi planters, but that the idea prevails there that if they come here they will be made slaves of.

Could any means be found to overcome this prejudice, one of the great wants of the State would be overcome—*viz.*, a population to cultivate the available rice-growing land at present idle.

I have, &c.,

C. LEECH,

State Commissioner of Lands.

II.

BISHOP'S HOUSE,
Singapore, 14th December, 1891.

MY DEAR MR. BELFIELD,

I could not sooner answer to your official letter, in which you were asking me to do something for the introduction of labourers in the district of Krian, on account of my being on a tour of Confirmation.

You know that I have always taken the greatest interest in such a matter, and in a long conference with the Governor not later than Monday last I urged the taking in hand the cultivation of all the available land for padi, in order to render the Peninsula quite independent for rice from Rangoon, Siam and Saigon. That which has been done in Province Wellesley, in Krian district and Malacca may easily be done on the littoral and in the interior, and for this we have only to get some more Indians, but the authorities are in India quite opposed to emigration.

This we can overcome with our people, but as we are missionaries we cannot possibly become responsible for the money which may be advanced to the natives of India who may choose to come to this country. We may only promise to help in India and here in supervising, in encouraging, but we cannot employ the funds at our disposal for pure mission purposes. You have at Bagan Serai Father Diridollon, who will help you with all his power, and he has a great authority on the people, being more firm than Father Fee. You have at Taiping Father Gazeau, who will as well do whatever is in his power to supervise the Chinese in his district. I give both of them full liberty to assist the emigrants, and I only recommend them not to take any responsibility for the money other than to offer a faithful record of the receipts and disbursements.

It is well known that in Bagan Serai for many years the crop has been destroyed by rats. The Assistant Resident, at Parit Buntar, told me of the deficit he had in the collection of quit-rent on account of this plague. The country being now open, and the land being freed from the trunks of trees, will leave less shelter for the vermin, but, however, Father Fee had to feed the poor people, who very nearly got discouraged and were to leave the place. For a Tamil man who can earn 24 or 26 cents a day it is easier to live as a coolie than as a raiat. It is cheaper for him to buy rice in the bazaar than to grow it—therefore if we want to have padi cultivation, we must encourage the Indians, for Chinese will never take to padi fields. Hard labour is too highly remunerated to make padi cultivation pay. And yet, let the communication between Burmah, Siam and Cochin China be intercepted we are reduced to starvation, and this is not an impossibility in time of war. So you see that I am quite willing to give you any assistance in my power. Please give me particulars, and I am at once ready to give instructions to my missionaries.

Believe me,
Yours very sincerely,
EDWARD,
Bishop of Malacca.

III.

DEPARTMENT OF LAND AND MINES,
Taiping, 16th May, 1892.TO THE SECRETARY TO GOVERNMENT,
TAIPING.

SIR,—In continuation of my letter No. 412, of 28th April, 1892, I have the honour to forward a letter from the Rev. Mr. Gazeau, proposing a scheme for the settling of Chinese padi planters in Perak, and to recommend that free passages be offered to the relatives (wives and children in most cases) of *bonâ fide* settlers who can produce certificates of character from the Rev. Mr. Gazeau or other missionaries, who would undertake to look after these immigrants.

2. The settler wishing to bring his family here would produce certificate stating the number of people he wanted to import, their ages and sex. This certificate should be filed and passage-note given to the man, on the production of which in Hong Kong some shipping company, with which arrangements had been made, would provide them with passages to Taiping.

3. The passage from Hong Kong to Penang is, I believe, \$9.50 for an adult, and I would recommend that arrangements be made with Messrs. Mansfield, Bogaardt & Co.,

who are the agents for both the Holt's line of steamers and the "Lady Weld," that these immigrants be brought on here at once without being landed in Penang, and their passage money be paid when they land in the State.

4. In paper marked "Land $\frac{1261}{91}$," the principle of assisting Chinese settlers was recognised, and they were offered land rent free for three years and monetary assistance to make a start. The present proposal is the only way I see to make this scheme a success. The amount being spent on it could always be known by the number of passage-notes given.

5. As an experiment, I have the honour to recommend that \$1,000 be devoted to this purpose as an experiment, and that Messrs. Mansfield, Bogaardt & Co. be communicated with to ascertain if they will assist the Government, and perhaps consent to a reduction of passage rates.

I have, &c.,
C. LEECH,
State Commissioner of Lands.

IV.

KLIAN PAU, *13th May, 1892.*

SIR,—I see that the plan I have until now employed to get agriculturists from China has been unsuccessful, because the men who could be engaged have no money to pay their passage, or because they do not trust the men already sent, as being unknown to them.

So I believe the only way to succeed is to send men to bring out their families, or their friends who will trust them. For that, perhaps, the following propositions would be the best.

1. The Government should make agreement with a steamer company to bring the families from China.

2. In such case the Chinese who will go to bring out families will receive from the Government a ticket which will enable him and the families to go on board at Hong Kong, for passage to this place.

3. The payment for their passage will be made only at their arrival here.

4. The farmers will be induced to settle in the same place, but they may be allowed to go to any other place.

5. The Government should advance money without interest, and recover the amount by a tax of 10% on the harvest or on the produce of the gardens.

6. The Government should allow them to work the San Sa without permit, whenever it is not the harvest season.

7. I have written shortly as, if desirable, I can give verbal explanations regarding the same.

Yours faithfully,
V. GAZEAU.





COLONIAL SECRETARY'S OFFICE,
Singapore, 12th September, 1892.

SIR,—I am directed by the Governor to inform you that His Excellency's attention has been called to the report of Mr. N. DENISON (printed as No. IV of the Perak Reports on the Cultivation of Padi, etc.) dated the 5th February, 1892.

2. His Excellency is of opinion that upon an important matter of this sort, to which the Governor has specially directed the attention of the Residents of Native States, a fuller report was to have been expected from an Officer holding the post of Superintendent of Lower Perak. Mr. DENISON is mistaken in supposing that upon any subject his views are sufficiently well known to enable a report to be dispensed with in his case.

3. While requesting you to call upon Mr. DENISON to furnish a proper report, I am to say that it is assumed that no Officer of his experience would recommend that Government should grant free passages, remit land rent for three years, maintain cultivators on guaranteed work for six months, and undertake the drainage of land besides constructing irrigation works, roads and paths, unless he were prepared to prove by carefully worked-out calculations that the expenditure would be recovered either by actual repayment or by increased revenue within a reasonable time. You will be good enough, therefore, to call upon Mr. DENISON for these calculations.

4. I am to request also that you will instruct the State Auditor to prepare a statement for submission to His Excellency shewing all advances made for the purpose of the encouragement of cultivation and immigration in the district of Lower Perak in the last ten years, the sums repaid, and the amounts written off as irrecoverable.

I have, &c.,

W. E. MAXWELL,
Colonial Secretary, S. S.

To The Acting Resident, Perak.

RESIDENCY, PERAK,
Taiping, 17th October, 1892.

SIR,—In reply to your letter number Perak ³⁹⁵⁴ of the 12th September, I have the honour to enclose an interesting report by Mr. NOEL DENISON, Superintendent, Lower Perak, dated the 10th October, on the subject of the encouragement of padi cultivation and the introduction of the agricultural settlers, with an account of the schemes inaugurated in the District of Lower Perak.

2. Attached to the report is copy of a statement by the State Auditor of advances made on account of Immigrants in that District during the last ten years, as called for in paragraph 4 of your letter under reply.

* * * * *

I have, &c.,

W. H. TREACHER,
Acting British Resident, Perak.

TO SECRETARY TO GOVERNMENT.

From the annexed statement it appears that the total amount advanced during the past seven years for the introduction of settlers into Lower Perak amounted to	\$13,654.94
of this sum has been repaid... ..	4,104.59
	<hr/>
	\$9,550.35
while there is still outstanding, secured and recoverable ...	2,361.10
	<hr/>
	\$7,189.25

2. This embraces the total expenditure on schemes for immigrants and their introduction.

<i>No. 1.</i> —Pepper plantation at Kerut near Bandar, say ...	\$3,172.28
Less refund	231.28
	<hr/>
	\$2,941.00
<i>No. 2.</i> —Kling Immigrant planters at Telok Anson, say ...	\$4,831.35
Less refund	1,494.40
	<hr/>
	3,336.95
<i>No. 3.</i> —Padi planters and settlers at Sungei Setiawan and Telok Anson	\$3,301.31
Less refund... ..	2,009.41
	<hr/>
	1,291.90
<i>No. 4.</i> —Settlers Sungei Nibong and Batak Rabit ...	\$652.70
Refund	167.50
	<hr/>
	485.20
<i>No. 5.</i> —Banjermasin and Javanese settlers at Telok Anson	\$1,697.30
Refund	202.00
	<hr/>
	1,495.30

\$9,550.35

Of this sum of \$9,550.35, \$2,361.10 is still recoverable and is being daily paid up. If this sum, which is secured on the land, be deducted

2,361.10

there will remain a balance due to Government of

\$7,189.25

being an expenditure over seven years of \$1,027, or \$85.58 per mensem.

3. I will deal with each of these schemes consecutively in their order as enumerated above.

No. 1.—Pepper Plantation, Kerut near Bandar.

With reference to the pepper plantation at Kerut, in justice to myself I may say that this pepper speculation had little, in fact nothing whatever, to do with the introduction of immigrants. It was a pepper plantation pure and simple, and the outlay was not great on the estate itself. Sir HUGH LOW approved of opening a pepper plantation in Lower Perak, and MOHAMMED ZIN of Kota Setia was sent in 1886 to Achin to bring in Achinese pepper planters under a Government agreement published 3rd March, 1886, and to purchase pepper plants.

4. MOHAMMED ZIN returned with a *prahu* full of plants and Achinese, but the plants were all dead when they arrived, and Sir HUGH from Kuala Kangsa re-ordered a further supply of plants from Selangor from Messrs. HILL & RATHBORNE. It turned out that the plants were cut in the wrong manner, and as the planters refused to receive them, they proved useless.

5. I have no papers before me and I have to trust to memory, but this is certain, the estate at Kerut was abandoned by order of Government in 1887, the last payment on account of the Kerut Estate was in October, 1887.

6. Kerut was visited four or five times by Sir HUGH, who took great interest in it. The pepper trees were very fine, and the estate might have done well, but the communication with it was bad in the extreme, and supplies could only with difficulty be brought up the small Kerut stream. The proposal to make a two or three mile road from Bediman on the Kinta River was over-ruled. Sir HUGH having lost so much money over pepper plants, cuttings and transport was not inclined to

launch out further, and as already pointed out, in 1887 the estate was closed, the pepper cuttings grown on the estate selling well.

7. I think then, that this pepper speculation can hardly be looked on as a scheme for the introduction of settlers, and if this is allowed, I would submit that this amount be deducted from the amount of \$7,189.25, and the sum to be actually accounted for by me may stand at \$4,248.

No. 2.—Kling Immigrant Padi Planters.

8. It was originally intended to introduce 100 padi planting families from India to Telok Anson. The original cost of the introduction of Indian immigrants was \$4,831.35
and they have refunded, say \$1,494.40
Balance due to be refunded secured and recoverable, 865.80

2,360.20

\$2,471.15

9. This sum is, therefore, what may be reckoned the cost of the introduction of the present Indian immigrants.

10. But from this sum of \$2,471.15, there should be a deduction of \$1,200 for expenses incurred, clearing land, building houses and preliminary expenses according to agreement for introducing 25 more Indian settlers who were never sent. This sum of \$1,200 cannot fairly be brought into account against the cost of the present immigrants, for the expenses were incurred for settlers who never arrived, owing to the abandonment of the scheme at head-quarters. With this deduction of \$1,200 the actual cost will stand at \$1,271.15.

11. For this sum, 24 settlers were introduced, and placed on the land, occupying 39 acres, the land rent on this at 60 cents per acre would amount to \$24, or a little under 20 % on the outlay.

12. In addition to the amount refunded, say, \$1,494.40, about \$120 has been received for agreements for leases, permits, boundary stones, survey fees, &c., and this might go to the credit of the cost of introducing these immigrants.

13. It is a matter of very sincere regret to me that this experiment of introducing Indian settlers was not given a full and fair trial. The original intention was to introduce 100 families, a less number would not have sufficed to carry out a proper clearing of the jungle and a settlement on the land.

14. Instead of the 100 families agreed to, only 24 were sent, and I was instructed to prepare land for 25 more families, and these were again to be followed by two further batches of 25 families each. But the scheme was barely set on foot when it was abandoned at head-quarters, and I was left to face the difficulty as I best could. It was useless to press the conditions of the agreement as against the immigrants, when the Government failed in carrying out their portion of the contract, and the immigrants were allowed to go their own way, the only thing left to me to do was to recover such of the advances as I could, and in time the small balance outstanding will, in one way or another, be recovered.

15. Even under the present disadvantages, there are many hopeful signs which make it more regrettable that the scheme was not carried out in its entirety. From the time the scheme was abandoned three or four years ago *no assistance of any kind has been given to the present Indian settlers*, they have been under no supervision, and they have been repeatedly called upon to pay up instalments of their advances, yet no less than 9 of the original settlers have paid up the whole of their advances to Government, their land is under cultivation, under agreements for leases, representing 17 acres, which may be valued at \$120 an acre or, say, \$2,000. Some of the settlers have sold their land, but I may say nearly always to Klings who now hold the land.

16. Of the remaining fifteen, two have died, one of these has transferred his land to another Kling, and it is under complete cultivation; two only of the settlers have absconded. The remaining 11 settlers are all still on the original land, which is more or less under cultivation, and may be estimated at 17 acres valued at \$50 per acre, say, \$850, and these 11 remaining settlers are slowly and steadily paying off their advances.

17. If the scheme had been properly carried out and not reduced to a minimum as it has, the indirect benefit to Government would have been great. The original object in introducing Indian immigrants to Lower Perak was that families of Indians

might settle at Telok Anson. The men, after their land was opened and their houses erected, might seek employment anywhere in the State or in the neighbouring Colony, having earned their money, they would have returned to their families on their holdings at Telok Anson, put their land in order, and returned to work in the same way as the Indian cooly from Madras now does.

18. The difference would be that the Perak Indian would not return to his native land, and the labour and money earned would remain in the country, and it was hoped that this small colony might have developed into a larger scheme of settling a permanent population in the State.

19. That this has been partially done may be seen at Telok Anson by any one who will visit the small Kling colony now established there by these few settlers. There is a perfect Kling community settled on that portion of the promontory on the western side of Telok Anson where the first settlers came, and had the original plan been carried out, the whole of the promontory would have been occupied by Kling families, and the whole promontory, say, 350 acres, could have been irrigated for padi planting with little cost or trouble. Even in its present state a visit to the Kling community at Telok Anson as now established would, I think, prove interesting.

No. 3.—Padi Planters and Settlers at Telok Anson and Setiawan.

20. This is entered in the statement in one sum—\$3,301.31—but it should more properly be divided in two, say, \$2,000.46 advanced for Telok Anson, and \$1,300.85, Setiawan.

Both these settlements have repaid their advance, thus:—

Telok Anson,	\$2,000.46
Less refunded,	1,036.30
	<hr/>
	\$964.16

21. For this sum we have about 250 acres paying land rent for the last four years, while taking the value of the land at the very low rate of \$30 per acre, we have a total of \$7,500.

22. The land revenue collected from this land, from all sources, from the commencement of the venture to 1891, equals about \$1,640.

23. In 1888 the settlers on these lands paid Government no less than \$830 for passes to cut gutta (\$10 per pass per man), mortgaging their land for this purpose, but not \$50 in gutta was collected, none being met with. This blow seriously affected the progress of the settlement, which it has taken it a considerable time to recover, and ruined not a few of the settlers.

Sungei Setiawan,	\$1,300.85
Less refunded,	972.50
	<hr/>
	\$328.35

24. I have not the figures as to Sungei Setiawan before me, and there is nothing to be gained in going minutely into the present standing of this settlement.

25. The settlers have lately paid off no less than \$693.80 of advances by constructing a cart-road at Setiawan for the Public Works Department.

26. There are now some 3,300 acres entered on the rent-roll, and I may add that the demarcation of new land, which is now being carried out, will add another 1,000 or 1,500 more.

27. The population at Setiawan, which originally could be reckoned as "nil," was by the last Census in 1891 no less than 1,137, but this number has been added to by recent arrivals during the past year.

<i>No. 4.—Settlers at Sungei Nibong and Batak Rabbit,</i>	\$652.70
Refunded,	167.50
	<hr/>
	\$485.20

28. The sum of about \$400 was the cost of an attempt to open a padi planting at Sungei Nibong at the mouth of the Perak River in 1883; the balance advances given to place a few settlers at Batak Rabbit on the road from Telok Anson to Utan Melintan in Bernam. These small latter advances have been repaid.

29. The balance—\$485.20—was expended in assisting Penghulu HAMID of Krian to open up Sungei Nibong in the Bagan Dato *Mukim*. In 1883, before I went home on leave, I had, through the agency of Penghulu HAMID, who had formerly assisted me in the same way at Krian, brought in from Kedah some 10 or 12 families, and settled them at Sungei Nibong. But during my absence in 1884 cholera broke out in a severe form in Lower Perak, and Telok Anson was almost abandoned. The Sungei Nibong settlement, after the Penghulu had carried away his family, and after the death, I think, of his wife from cholera, broke up in a panic, but not before three or four deaths had occurred from cholera.

30. On my return from leave, I found that no attempt had been made to resuscitate the settlement and nothing more was done in the matter. According to the terms of the agreement Penghulu HAMID was responsible for the advances, but considering the heavy loss the Penghulu had personally sustained and the circumstances of the case, the Government decided not to press for payment. I may add that some \$80 of the balance of \$485.20 outstanding is the price of a path or bund, regarding which there was a dispute, but which was finally also written off.

No. 5.—Advances to Banjermasin and Javanese Settlers,

say,	...	...	...	...	\$1,697.30
Refunded,...	...	...	...	...	202.00
					\$1,495.30

31. These advances have all to be repaid. They are made to the extent of \$14 or \$21 per settler, being the price of the felling of 2 or 3 acres at \$7 per acre. The advance is made as the felling is done, and this assists the settler until the paddy crop comes in and the advance is repaid. I have had no trouble so far in recovering the advances. If the land is abandoned, which it seldom is, being close to Telok Anson, another person is easily obtained to take up the land with the amount of the advances expended on it. No title to the land is given until it is cleared and the advance repaid. These advances are not to be granted to any extent, and are only given on the recommendation of the Penghulu and under his guarantee.

32. I have now entered, I think, fully into the different schemes in which I have been interested for introducing settlers into the State, and when the balance of advances now outstanding, say, \$2,361.10, is repaid and the loss on the Kerut Estate deducted, the total expenditure under advances irrecoverable may be reckoned at about \$4,300. I think the work done at Sungei Setiawan and Telok Anson will show, on inspection, that the money has been fairly expended.

33. The whole of these settlers have been brought in on the system of the remission of land-rent for three years, the greater majority of them on free passages. I have in every way assisted the settlers with work. The Kelantan men at Stiawan worked off \$693.80 by constructing a cart-road for the Public Works Department; nearly all the roads at Stiawan have been made by settlers, and they are now so engaged at the present time.

34. Javanese settlers, introduced by me, are now working, not only for the Public Works Department, but on the railway, and the same may be said of some of the Indian immigrants. In every way I have assisted in finding employment for the settlers.

35. In regard to the introduction of paddy planting, unless proper and systematic drainage and irrigation are carried out under official control, I almost despair of seeing paddy planting carried out in the State on any large scale. Irrigation and drainage cannot be carried out by the spasmodic efforts of individuals. It is, in my opinion, this want of systematic drainage at Krian that mainly led to the continued failure of the paddy crops in the Krian district.

36. I regret that I cannot furnish the detailed calculations called for by the Hon'ble the Colonial Secretary. It would be impossible for me to find data to arrive at a proper conclusion; it would necessitate my having to go through the Lower Perak books for the last ten years. I have explained the system on which I introduced settlers into Lower Perak, which embraced free passages, land-rent free for three years, supplying the settlers with all the work I could, and doing what was possible in regard to drainage and roads. Though there was no irrigation, I have accounted, to the best of my ability, for the money expended by me on this purpose, and I have now only to show what are the results to the district generally.

37. In 1884 I found the land-rent (not general rent) at Lower Perak only \$174: in 1891 it had risen to \$8,352. This year this sum has already been exceeded, and

in 1893 the revenue, when the land which is now not paying rent falls in, will be still greater. The acreage of land under cultivation at Setiawan alone, which four years ago was "nil," is now 3,300 acres on the register, and it would not surprise me to see this raised to 5,000 when the demarcation is completed there at the close of the year. I have explained above what the expenditure has been on this settlement, and I think that this speaks for itself.

38. As to the profits which may be looked to by the State in supporting the introduction of paddy planting, I would now propose the following for favourable consideration.

39. If the Government will undertake to open up 500 acres of land for paddy—that is fell, clear stump, road, drain and irrigate the same in a systematic manner—I am sure the whole of the land would either be rented or sold as soon as it had been brought into this condition.

40. I have made careful enquiries, and I estimate the cost of opening an acre of land as above, say, \$45, that is:—

Felling	...	...	...	\$ 8
Clearing and stumping	...	...	...	30
Roading and drainage	...	...	...	7
				\$45

and thus the total cost of 500 acres would be \$22,500.

41. For this sum there would be 500 acres which would be eagerly taken up at cost price, paying Government 60 cents per acre land-rent, or \$300, equal to 13½ % on the outlay.

42. I have gone into this matter with the Dato Laksamana and Saiyid ABUBAKAR, the Penghulu here. The former has expressed his willingness to take up 100 acres of the land thus opened if the price does not exceed \$50 per acre, and he will pay for the same at the rate of \$1,000 per annum. The Penghulu assures me that the whole of this land would be taken up at Telok Anson alone.

43. The Dato stipulates that the land taken up for this experiment should be on the Selaba Road in what is called the Bendang Siam in preference to Bagan Dato. His reason is that this is almost virgin soil and could be more easily superintended and would sell quicker than land at a distance. The Penghulu is of the same opinion, and points out that the land is free of heavy jungle covered with what is called *sialit* and *menderung* "grasses," which shows its suitability for padi planting, is easily and economically irrigated, being well watered and accessible in every direction.

44. If this experiment proved a success, it might be tried in other places. I do not see how Government could be a loser, for even the money expended in opening this padi land would be circulated in the district, and would, in one way or the other, benefit the State, for some of it would certainly return to the Government coffers under revenue in one form or another.

45. I think if this scheme is to be, as now proposed by me, favourably considered, I could find guarantors of good standing to take up the whole of the land thus opened and prepared by Government, provided the price did not exceed \$50, and this it certainly should not, especially at Telok Anson.

N. DENISON,
Superintendent, Lower Perak.

Telok Anson, 10th October, 1892.

*Statement of Advances, Refunds, etc., made on account of Immigrants,
Lower Perak, for the last ten years.*

Item.	Object.	Period.	Advanced.	Refunded.	Written off.	Balance due at this date.	Remarks.
			\$ c.	\$ c.	\$ c.	\$ c.	
	Pepper planters....	1886/91	3,172.28	231.28	2,941.00	...	
	Kling immigrants,	1886/90	4,831.35	1,494.40	2,471.15	865.80	Superinten- dent Lower Perak re- ports recov- erable.
	Paddy planters, ...	1886/92	3,301.31	1,215.61	1,291.90	793.80	Since adjust- ed.
	Settlers, Sungei Nibong and Batak Rabit Road, ...	1883/85	652.70	167.50	485.20	...	
	Banjermasin Settlers, ...	1891/92	1,697.30	202.00		1,495.30	
	Total,...		13,654.94	3,310.79	7,189.25	3,154.90	

AUDIT OFFICE, PERAK,
September 28th, 1892.

R. D. HEWETT,
State Auditor.

PRELIMINARY REPORT BY THE BRITISH RESIDENT, SELANGOR.

[No. $\frac{218}{92}$]BRITISH RESIDENCY,
Selangor, 7th March, 1892.

SIR,—I have the honour to report, for the information of His Excellency the Governor, that I was at Kuala Selangor on the 3rd instant, and saw the principal inhabitants there. I took notes of a discussion which took place on the subject of the promotion of agricultural enterprise, and enclose a copy for the perusal of His Excellency.

2. I make no recommendations regarding the matter at present, as I have the whole question under consideration, and shall shortly deal with it in an answer to His Excellency's recent Circular letter.

I have, &c.,

W. E. MAXWELL,
*British Resident, Selangor.**Kuala Selangor, 3rd March, 1892.*ENCOURAGEMENT OF PADI CULTIVATION,
KUALA SELANGOR DISTRICT.

1. I have to-day seen the following headmen at Kuala Selangor:—

Raja JAFAR.
Raja DOLLAH.
Imam PRANG PERKASA.
Haji AHAMAD.
Haji SAMSUDDIN.
Haji MOHAMMED.

2. Raja JAFAR, as the spokesman of the Kuala Selangor Penghulus, complains that cultivation is little attended to, and that if he attempted to bring pressure to bear upon cultivators to induce them to work their land, they reply that they have no capital and cannot afford to give time to work which is not immediately remunerative. Consequently they go off to other occupations—fishing, timber-cutting, attap-making, etc.—and leave their fields untilled. The agricultural resources of the district are great, but it has been little opened up and is little known. Chinese capitalists are not forthcoming who will make advances to padi-planters on the security of their crops, as in Province Wellesley. There is no chance of getting loans, except from Government. If Government will make advances to cultivators the Penghulus will see that they are rightly applied and will be personally responsible.

3. The Resident asks what advance would be thought sufficient for a family.

4. Raja JAFAR says \$25; Imam PRANG PERKASA says \$15; Raja JAFAR calculates that to be successful a cultivator must devote himself steadily to his land for four months, seeking no other occupation or source of income. He has also to buy seed-corn.

5. The Resident says that \$3 or \$4 a month will support a family easily, and that Government might perhaps lend seed-corn and make proportionately smaller cash advances.

6. Raja JAFAR says that he would want assistance for 20 or 30 families at Pasangan; Raja DOLLAH, Jeram, 50 or 60 families; Imam PRANG PERKASA, Telok Piai, 30 families; Haji AHAMAD, Asam Jawa, 30 families; Haji SAMSUDDIN, Sungei Kalkati and Sungei Tengeh, 20 or 30 families; Haji MOHAMMED, Panchang Pedena, 20 or 30 families.

7. Haji MOHAMMED says that he would not like to guarantee the payment of an advance, and would rather ask the Government to exempt cultivators from land revenue for a term. The Resident replies that the revenue of the State is contributed almost exclusively by the Chinese, and that it must be understood that Malays must pay their share, and that payment of land revenue will be insisted on. Imam PRANG PERKASA says that his experience is that Malays care nothing for land which costs them nothing. If they have to pay revenue they think the land worth cultivating. The Resident says that the experience of the last four years in Malacca has shewn the truth of this.

8. Speaking of Jeram, where padi-cultivation suffers from drought, the Resident enquires whether it is not possible to make a fresh-water canal from Sungei Buluh to the coast, providing a water-gate so as to irrigate the fields. The general opinion is that this could be done.

9. The Resident says that he will refer this matter to His Excellency the Governor.

W. E. MAXWELL,
British Resident, Selangor.

REPORT ON LAND SUITABLE FOR PADI CULTIVATION IN THE
DISTRICT OF KUALA LUMPUR.

LAND OFFICE, KUALA LUMPUR,
4th March, 1892.

SIR,—I have the honour, in compliance with instructions contained in Col. Sec. No. $\frac{772}{91}$, to forward a report on land suitable for padi cultivation in the District of Kuala Lumpur.

2. The area of padi land already under cultivation in the various *mukims* of the District is as follows:—

Kuala Lumpur,	Nil.
Pataling,	Nil.
Setapak,	700 acres.
Batu,	230 „
Ulu Klang,	20 „
Ampang,	30 „

Total, ...980 acres.

3. A great part of the low land of the District is taken up with mining leases, many of which are unworked and might be resumed with advantage.

4. *Mukim* of Kuala Lumpur.—In this *mukim* there is no vacant land which can be considered suitable for padi-planting.

5. *Mukim* of Pataling.—There are only two pieces of vacant land to my knowledge in this *mukim* adapted to the purpose. One, a swamp about 30 acres in extent, lies on the right of the Pataling-Cheras Road between one and two miles from Pataling Station. This is, I am informed by the Penghulu, already being encroached on by miners. The other lies to the left of the same road and includes about 40 acres. Irrigation can be obtained by the construction of a dam across a small stream in the neighbourhood. I cannot, however, say how such a dam may interfere with mining sluices in the neighbourhood. The cost is estimated by the Penghulu at about \$100.

6. *Mukim* of Setapak.—This *mukim* has always been the great centre of padi cultivation in this District. This may be ascribed to the fact that it has until recently been the policy of the Government to discourage mining in this *mukim*. Seven hundred (700) acres are, as above stated, already taken up, while a dam and *tali ayer* (water-course), now being constructed on the Gombak River, under the supervision of the Penghulu, will provide irrigation for about four hundred acres more. In addition to this there are about fifty acres of land at present vacant in Ulu Gombak, which can be watered from the Sungei Pusu stream. A part of this, however, is included in a 1,000-acre block applied for by Mr. E. V. CAREY, from Ceylon, for coffee-planting purposes.

7. *Mukim* of Batu.—I do not know for certain of any good padi land in this *mukim* not yet taken up. There is suitable land in the neighbourhood of Messrs. HILL & RATHBORNE'S Lease No. 815, but I cannot say at present whether it is included in that Lease. The proprietors have been called on to show their boundaries.

8. *Mukim* of Ulu Klang.—The only suitable land available, to my knowledge, in this *mukim* lies to the right of the Genting Bidei Road, and may be about thirty or forty acres in extent. The distance from any market is considerable, and the land is at present covered with thick jungle. It would probably be difficult to find settlers to take it up.

9. *Mukim* of Ampang.—There is an area of about thirty acres to the left of the Ampang Road, about a mile from the new reservoir, but nothing should be done in this neighbourhood until the completion of the water-works now under construction.

10. As regards the encouragement of cultivation of these vacant areas, I am of opinion that the best and only legitimate method is a low assessment.

It is always impolitic to artificially foster the cultivation of inferior soil, and the vacant land of this District can only be so described, so far as padi-planting is concerned. First class padi land in this District yields only three hundred *gantangs* per acre. This would be regarded as a very poor crop in the padi districts of Province Wellesley and Krian, where a return of at least six hundred *gantangs* per acre is always looked for from the best land.

Dholl and ragi are alike unknown in this district.

11. I am told by Tamils of whom I have made enquiries, that dholl requires a high sandy soil such as is not to be found in the neighbourhood.

Ragi, I believe, can be grown under the same conditions as padi itself.

12. The great obstacle to the scheme propounded is one much felt in this and other inland Districts of the State, and to which the small land-holder in the Colony is seldom, if ever, subjected. I allude to the complete subordination of agricultural to mining interests.

13. By section 23 of the new Land Code, a reservation is made in favour of Government of all mineral rights, with full liberty to work the same, land-holders receiving compensation for surface damage only.

14. This is necessary for the protection of the Government against the customary holders themselves, but the Government should be chary of exercising its right of resumption under this clause.

15. I have above ascribed the progress of padi-planting in the Setapak *mukim* to the discouragement, until recently, of mining enterprise in the neighbourhood.

16. During the latter part of last year, however, an application (Chinese Secretary '王'), was made by Towkay AH YEOK for permission to acquire for mining purposes some of the best padi land, held under customary title in Setapak, and his application was favourably entertained.

17. The occupiers of this land are one and all reluctant to surrender their holdings, and decline to allow themselves to be provided for elsewhere. It is impossible to overrate the diffidence which has been inspired by this threatened resumption. It is, in my opinion, the most severe blow that can be dealt to the scheme of customary tenure so far as this District is concerned. I trust that it may be understood that I am not seeking to criticise the action of the Government in the matter.

18. I merely desire to point out the impossibility of encouraging small agriculturalists in a mining district, unless a certain area of land, permanently reserved from the encroachment of miners, is to be set apart for them. Security of title has always been found the first essential to the creation of a class of peasant proprietors, and until this is given, it appears to me futile to consider the question of assisting them in any other way.

I have, &c.,

L. P. EBDEN,
Collector of Land Revenue,
Selangor.

REPORT BY THE SENIOR DISTRICT OFFICER, KLANG,
ON PADI CULTIVATION.

GOVERNMENT SECRETARY.

1. I have given this matter careful inquiry and thought, and it strikes me that nothing but very tempting State help will encourage or incite the people here to take an interest in the cultivation of a product, the success of which is very precarious. In a comparatively newly opened up country, the seasons are irregular, and the enemies to cultivation of this nature great. Birds and wild pigs can, by combined and cheap efforts, be driven away; then comes the elephant which not only eats all he can, but destroys all on his way through a field.

2. Bananas, yams and vegetables are not dependent on season, to a certain extent require less care, are more productive, bring in quick returns, and are less open to the attacks of birds and animals than padi. In addition, when the land is cleared for cultivation of this sort all varieties of fruit plants can be put into it which do not interfere with the cultivation of the other products, and eventually a fine, valuable, fruit-yielding plantation is seen where a few years before only a yam or banana patch existed; our Malays, therefore, prefer this sort of cultivation.

3. It takes six months before padi comes into bearing, during which time a padi-planter will have to maintain his family. At the lowest estimate it will take \$4 a month to feed a Malay family, and the man must have \$25 to commence with, to feed his family until his crop comes home.

4. To start with, therefore, it is necessary to tempt our Malays to make a beginning, and I recommend:—

(1)—That he should be allowed to plant on the same terms formerly offered to gambier and pepper planters, that is, for three years, free of quit-rent.

(2)—That a loan of \$25 be given to each family-man wishing to plant padi, on the recommendation of the Penghulu, who should be held responsible for repayment of the loan, every year, for three years.

5. I have recommended the loan for three years simply because it will take all that time on so small an advance, to get a swamp into a regular *sawah*—first year, fell and burn; second, root up small stumps and heap for firing against hardwood and larger trees; and the third year, the land ought to be ready for the buffalo plough.

6. Small advances to Malays and even Sakais have already been tried in the Klang District for padi-planting, and with careful supervision it has been found that no loss accrued to Government, and a large quantity of padi was produced.

7. Irrespective of that taken up by SWORD & MULLINGHAUS, Messrs. HILL & RATHBORNE, and the Sago and Padi Co., I estimate that there are about 45,000 acres of splendid land in the District still available for padi, which, with dams and sluices, could be converted into huge *sawahs*.

8. Seed should be supplied to the planter free of cost, and I recommend a variety of Java padi be supplied them the first year, which yields a crop in four months.

C. H. A. TURNEY,
Senior District Officer, Klang.

30th December, 1891.

REPORT ON PADI CULTIVATION IN THE DISTRICT OF KUALA
LANGAT, DURING 1891.

DISTRICT OFFICE,
Kuala Langat, 4th January, 1892.

SIR,—I have the honour to forward the Report called for in your letter No. $\frac{172}{91}$.

2. There may be said to be three kinds of padi cultivation:—

- i. Wet Padi.
- ii. Dry Padi.
- iii. Wet Ladang.

3. As to the first, I may at once say that at present there are no regular wet padi-fields (*sawah*) in the District, but at the same time it is only the padi which requires water that is grown.

4. All the land, with the exception of Bukit Jugra and the hills at Ulu Sepang, consists of flat, low-lying, swampy land, and no hill padi is grown.

5. The present system of planting consists of what I may call wet *ladang*. During May or June a block of secondary growth is felled, cleared and burnt, and in June nurseries are made, and as soon as they have attained a height of about a foot are planted out as in the case of *sawah* padi.

6. The chief difference is that in the case of *sawah* the land is cleared and opened for permanent cultivation, and that dams are constructed to irrigate the crops. In the case of what I speak of as wet *ladang*, the ground is only roughly cleared and stumps of trees, etc. are not removed, and the water supply necessary for a successful crop is altogether dependent on the rainfall.

7. This is the most popular form of cultivation in this District, and now that the Government have again permitted it, a large area is under cultivation. During the present year I estimate that about 1,200 acres are under this form of cultivation, in this District.

8. The Langat Malays like the cultivation for the following reasons:—They have been accustomed to it all their lives, very little labour is necessary, the expense is almost nil, and the results are usually satisfactory.

9. The chief causes of failure are the ravages of mice and birds, both of which sometimes destroy whole fields at a time.

10. As to the area of land available for wet padi cultivation, I estimate that not less than 150 square miles of virgin forest in this District are suitable for this cultivation.

11. On the second question asked in the Hon'ble Colonial Secretary's paragraph 3, I do not feel myself able to suggest any definite plan, but judging from the results attained by the introduction of settlers into the country in previous years, it appears evident that if any new settlers are to be assisted by Government, the Government must be prepared to find these men work, for, at any rate, part of every year for the first three or four years, and must be prepared to risk the loss—some part, at any rate—of any money advanced.

12. As to the settlers themselves, I understand the Tamils are the most easily obtained, but personally I should greatly prefer to see good padi-planters, more nearly allied to the Malay population, introduced, say, from Burma or Siam.

13. These latter would, I think, in a comparatively few years intermarry and become one people with the Malays, whereas in the case of Tamils a much longer time must elapse before this can take place, if it ever does.

14. I take it for granted that whatever races are introduced they should not be of a people who are able or inclined to work in mines, for it must be hopeless to expect people who can earn more money in a short time in mining to continue to plant padi. For this reason I have not suggested Chinese padi-planters.

15. I have had some conversation with Chinese who have been long resident in this District, and although they all praise the soil and acknowledge it to be most suitable for padi, yet they say that if Chinese padi-planters were introduced, they would continually abscond to the mines, or would learn to smoke opium and neglect their fields.

16. The Malays already in the country are not numerous enough to plant padi on any large and permanent scale, even had they the knowledge or inclination to learn, which they have not.

17. The only suggestion I can make for this District is:—

- i. That the Government introduce the settlers, of whatever nationality may be decided on.
- ii. Settle them on a land between Jugra Hill and Sepang.
- iii. That they be employed whenever they want work, from the day they land in the country, in the construction of a road from Jugra to Sepang.
- iv. That each family on landing receive about \$10 to enable them to put up houses for themselves.
- v. That their passage here and the \$10 advanced to each family on landing be a free gift.

- vi. That all who are able, work for 7 or 14 days in the month on Government road at 25 cents per day, and that the rest of the month be spent in clearing and opening up their land.
- vii. That as soon as the land is ready for planting the Government be prepared to assist them further with bufaloes, bullocks, ploughs, &c., as a loan, to be repaid in three equal instalments, the first instalment falling due the third year after the loan.
- viii. That in no case shall one family receive more than \$50 altogether in this way; and that any three single men in partnership shall be considered as one family.

18. I do not recommend that land rents be remitted for three years as was formerly done, but at the same time I do not think any money whatever should be collected for rent or titles from settlers for the first year.

19. In favour of the scheme I have here sketched out I would put:—

- i. The increase in the padi cultivation of the District.
- ii. The construction of a very necessary road between Jugra and Sepang, distant about 25 miles from each other; and
- iii. The opening of the country generally.

Against it are:—

- i. The large cost to Government of the undertaking; and
- ii. The risk incurred; for I take it, to be of any practical use, this must be done on a very large scale, and a certain number of the settlers are sure to die, abscond or be unable to repay their loans.

20. It will be seen that this sketch of a scheme only covers the land available between Jugra and Sepang, but it must not be forgotten that all the land between Jugra and Klang, on the one side, and Jugra and Reko on the other, is also available for padi cultivation.

I have, &c.,

D. G. CAMPBELL,
District Officer,
Kuala Langat.

REPORT BY THE ACTING DISTRICT OFFICER, ULU LANGAT, ON
PADI CULTIVATION.

o

KAJANG,

12th January, 1892.

[No. $\frac{39}{92}$.]

SIR,—In accordance with instructions contained in your letter No. 772 of 22nd December, 1891, I have the honour to forward the following report with regard to land available for padi cultivation in the Ulu Langat District.

2. The following is an estimate of the quantity readily available for cultivation and not yet planted.

On the West of the District along the right bank of the Langat River from Kuala Semenyih to Kajang,	2,000 acres.
On the North at Kuala Lui,	200 „
On the North-East at Ulu Langat,	300 „
On the East from Kuala Semenyih,	3,000 „
Along Semenyih River to Kuala Batangsi and from Kuala Beranang along the Beranang River to the Sungei Ujong Boundary,	1,500 „
	Total, ... 7,000 acres.

3. In addition to this there is much land which, in course of time, with some labour expended on water-courses, could be brought under cultivation.

4. As the system of customary tenure under the Land Code comes to be better understood, I think the efforts of the District Officer may induce cultivators now in the District, chiefly Menangkabau men, to take up a somewhat increased area and bring over friends from Sumatra to take up land to a limited extent.

5. No considerable area of new land can be brought under cultivation, unless immigrants from Sumatra and Java can be induced to settle in considerable numbers, and to effect this it would be necessary to make advances amounting to a large sum.

6. Possibly, if it were considered advisable to make advances on a large scale, repayment might be insured by the adoption of a system analogous to the labour system of miners.

I have, &c.,

C. KEMP,
Acting District Officer,
Ulu Langat.

REPORT ON LAND AVAILABLE FOR PADI CULTIVATION IN KUALA SELANGOR DISTRICT, AND STEPS NECESSARY TO GET IT OPENED UP.

DISTRICT OFFICE,
Kuala Selangor, 18th January, 1892.

SIR,—I have the honour to report as to the available land for padi cultivation in this District, and as to the steps necessary to get it opened up.

2. There are in this District many thousands of acres highly suitable for padi cultivation; in the immediate neighbourhood of the existing roads there are about ten thousand acres on which padi could be grown if a complete system of irrigation were carried out.

3. This District has, ever since systematic meteorological observations have been taken, been proved to be the driest in the State, and it has been shewn to be impossible, under the present conditions, to plant padi with any reasonable prospect of success.

In 1889, 1,750 acres were planted, but a very poor harvest indeed was reaped this was indirectly due to a drought when the padi was half grown; in 1890 no padi was planted, because there was no rainfall to justify it; and in 1891 the rain came so late that only a few enthusiastic persons planted about 120 acres in all.

4. There is no population to justify the irrigation of large tracts of land, but I recommend that in each *mukim* a small piece of land at the side of the main road, from 100 to 800 acres according to the population, be thoroughly irrigated. The large drains at present existing at the sides of all the roads would materially assist this work, the detail of which I do not consider in this letter.

5. I feel confident that if this were done, with the present population of the District, about 3,000 acres of padi, sufficient in an average year to feed about 25,000 persons, would be yearly grown, and as most of the land is suitable for padi, nothing but careful husbanding of the water, and ordinary care in planting, &c. is required to produce large crops.

6. I do not believe that any good would be done by offering land free or at very low rates for padi cultivation, if it is desired to artificially encourage the planting of padi; a small bounty on padi reaped and properly saved would have the best effect.

7. If the Government desires to spend money on pushing the planting of padi, I do not think it could be better spent than in the irrigation of several small pieces of land in this District, where there is an adult Malay and Javanese population of about 3,500, the greater part of whom devote their time to agriculture.

I have, &c.,

J. R. O. ALDWORTH,
Acting District Officer, Kuala Selangor.

REPORT ON THE RICE CULTIVATION IN THE DISTRICT OF ULU SELANGOR.

1. It is noticeable in this District that the padi cultivation during the last four years has made no appreciable increase.

1. Ulu Bernam, under Haji MUSTAPHA, is perhaps the only *mukim* where an increase can be seen.
2. In Kerling, under Saiyid MASHOR, the planting has decreased, owing to many families having left the *mukim*.
3. In Ulu Yam, the cultivation is about the same as it has been for some years. This is the best valley for padi in the District, and there is any quantity of land lying idle that might be made use of, could I get more families to come in.

4. Serendah.—In this *mukim*, a considerable quantity of padi was cultivated about four years ago, but as nearly all the land was given out under leases for mining purposes, the people gradually stopped planting altogether. Serendah is essentially a mining district, and the padi has had to give way to the more valuable product.
5. In Rawang, the padi cultivation should be much larger than it is, as there is any quantity of land suitable for this purpose, with water easily accessible for irrigation purposes. Sungei Samah was a very excellent little valley of rice, but now I believe a good deal of the land has been given over for mining purposes.

II. In my opinion, the primary cause for the non-increase in padi cultivation in the District is that it has to give way to mining. When a good piece of land is cleared and the valley is planted up and looks thriving, the Chinese come in and bore for tin, which, if they find, they either get Government to allow them to work on this land, or compensate the people themselves and purchase it.

III. I think each *mukim* should have a certain portion or portions of land marked off for the sole purpose of padi-planting.

IV. The people of Ulu Yam have often asked me to try and get a rebate of the land rent for their first two years of occupation on padi land. I represented this to the Resident, but he did not see his way to do this. I would now again bring this matter up for the Resident's further consideration.

V. Again, I have had many applications, during my charge of Districts, for loans to enable the people to make water-races through the land for purposes of irrigation. In most instances these loans have been sanctioned and always with a good result.

VI. Of course if so much money was advanced per family, many more people than at present would take to planting padi.

VII. I think it would be well if the people were assured of the above-mentioned points, viz. :—

1. That certain portions of country would be put aside for padi-planters only, and that on no account could miners encroach on this land.
2. That occupiers of new land wishing to plant padi, would not be charged land rent for the first two years.
3. That Government would be willing to assist in loans, on security, for the purpose of making water-races, dams, or other necessities for irrigation of padi land.
4. That Government would be willing to purchase new and better seed from other countries should the planters want it.

VIII. Tanjong Malim, Kerling, Ulu Yam, Ulu Kali, Sungei Buluh, and Kuang are all large fields for the padi-planter, and, with the exception of Sungei Buluh and Kuang, have good communication for transport.

IX. I should be extremely glad to receive any new grains to distribute to my Penghulus to experiment with.

I add a few statistics which may be interesting:—

Place.	No. of Families.	No. of Acres.			Approximate amount of <i>gan-tangs</i> to the acre.	Approximate value for 100 <i>gan-tangs</i> .	Total approximate value.
		<i>a.</i>	<i>r.</i>	<i>p.</i>			
Tanjong Malim, ...	49	194	1	29	600	\$ 5	\$ 5,820
Galumpang, ...	16	38	3	18	500	6	1,140
Kerling, ...	8	25	3	32	350	10	875
Kuala Kubu, ...	10	28	2	34	400	12	1,344
Ulu Yam, ...	54	254	1	26	800	6	12,192
Batang Kali, ...	37	160	0	29	800	6	7,680
Rawang, ...	.	46	0	00	500	8	1,840

J. A. G. CAMPBELL,
District Officer, Ulu Selangor.

SUMMARY BY GOVERNMENT SECRETARY, SELANGOR.



Reports from all Districts are attached.

2. The results of enquiries are as follows:—

In the Kuala Lumpur District, 980 acres are under cultivation, 700 being in the Setepak valley. There are about 500 acres more available in the District, but the returns being small, and the tenure uncertain owing to the encroachment of miners, it is not thought that much can be done to encourage padi cultivation unless the land be reserved for it.

3. In the Klang District, it would appear that no padi is grown, but Mr. TURNEY estimates that there are 45,000 acres of *sawah* land available, if set apart for the purpose and proper irrigation channels made. He recommends remission of rent for three years and State aid to the extent of \$25 to each family. Also that seed from Java should be supplied free of cost by the Government.

4. The District Officer, Kuala Selangor, reports that, owing to the dry weather experienced of late years, padi cultivation has practically ceased in his District, only 120 acres being planted in 1891. He estimates that there are 10,000 acres of good land available, and recommends patches of land varying in extent from 100 to 800 acres in each *mukim* being set apart near the roads and systematically irrigated. He does not encourage the idea of State aid, or remission of quit rent.

5. In Kuala Langat, there appear to be about 1,200 acres of *ladang* grown in a lazy, thriftless fashion, which appears to have prevailed in Jugra from time immemorial. The District Officer considers that 150 square miles are available, and suggests the importation of Burmese or Siamese, who should have their passage paid and receive a free gift of \$10 to each family. The settlers would be given work for a certain number of days in each month on a road to be constructed between Jugra and Sepang, the remainder of their time being occupied in opening up their land for cultivation. The Government is further to assist them by supplying them with buffaloes, bullocks and ploughs, the cost being treated as a loan to be repaid when their crops come to maturity.

6. The District Officer, Ulu Selangor, furnishes statistics shewing that about 750 acres are under padi cultivation in his District, the average yield being fairly good. He says there is "any quantity" of land available, but gives no figures. He recommends reserves for padi-planting in each *mukim*, and a rebate of the land rent for the first two years, and loans for irrigation purposes; also a supply of better seed from other countries should the planters wish it.

7. The Report from Ulu Langat shows that about 7,000 acres of padi land are available there. No mention is made of that under cultivation at present, and presumably it is not extensive. The District Officer considers that if land in his District is to be cultivated, labour from Java or Sumatra must be introduced, large advances being made by the Government. He suggests that re-payment might possibly be insured by the adoption of a labour system analogous to the system which obtains amongst miners.

8. My own views are that little or nothing can be expected from any attempt to foster padi cultivation in Kuala Lumpur or the Ulu Districts. Tin-mining and rice-growing will not prosper side by side; the latter must inevitably go to the wall.

9. I am entirely opposed to State aid to any extent beyond paying the passage of immigrants, or to the remission of land rents. The course recommended by the District Officer, Kuala Langat, would involve the Government in liabilities to an enormous extent, and the cost of the proposed road to Sepang would probably be monumental.

10. The proposal of the District Officer, Kuala Selangor, is the most practical one, and should, I think, be tried on a small scale.

11. A proper system of irrigation is the main point to be insisted on, and the erection of water-gates wherever necessary to keep out the sea.

12. The services of a competent Engineer—preferably one who has been employed on irrigation works in India or Burma—might with advantage be secured to study and report upon the feasibility of adopting a large acreage of the low-lying country in the State to the cultivation of padi.

G. W. WELMAN,
Government Secretary,
Selangor.

REPORT BY THE BRITISH RESIDENT OF SUNGEI UJONG.

BRITISH RESIDENT'S OFFICE,
Sungei Ujong, April, 1892.

[No. $\frac{144}{92}$.]

SIR,—I have the honour to acknowledge the receipt of your letter No. 12,869 of the 18th December, 1891, regarding the extension of the cultivation of padi and other grains.

2. The information gained from personal enquiry and from the reports of the District Officers of Port Dickson and Jelebu affords little hope of extending the cultivation of padi with the present population. On the coast, the land available is practically unlimited. From Cape Rachado to Port Dickson there are large tracts well adapted for padi-fields. In some parts the land stretches right away to the neighbourhood of the Linggi Road at about the 15th mile. In the neighbourhood of the Lukut River, too, there are large tracts of suitable land, and also in the Linggi District, but the population is not large.

3. All the foreign inhabitants of the above-mentioned districts and most of the Malay population live upon imported rice, and where the country-grown rice is used the padi is prepared in such a careless way that even if more of it were grown it is doubtful whether it would have a market. An improvement might be made in this direction, if planters could be found, by the supply of first class seed by the Government. Padi-planting, however, could only be carried out on a large scale with a surplus or an imported population. The present population of the coast consists largely of immigrants from Malacca, who are planting coco-nuts and fruit trees, and especially gambier, for sale to the neighbouring Chinese pepper and gambier estates. The ryots do the same thing, and they all hire themselves out as day labourers to the Chinese and the Railway Company. So long as they can command from 30 to 50 cents a day, they will not plant padi which, on a small scale, is a difficult product to cultivate successfully. In Linggi, now that nearly all the road traffic has been attracted to the Railway, the people are again directing their attention to padi-planting, having neglected that industry for cart-driving hitherto. As, however, they have various occupations, such as boat-building, taking contracts for felling, etc., it is not probable that they will cultivate more than actually necessary; it is doubtful if they will produce enough for their own consumption.

4. In Seremban and its neighbourhood, there is more chance of success in encouraging padi-planting. Setul and Lenggeng are inhabited by Menangkabau planters, who grow sufficient for their own consumption and have generally sufficient to supply almost entirely the Chinese mining population in the neighbourhood, but whenever, in past years, I have tried to induce them to extend their cultivation, they have invariably asked for advances which, when given, I have had trouble in getting back, sometimes not being able to obtain repayment. Another drawback in this district is that it is also a rich mining district, and Malays are induced to sell the land they have leased for padi to Chinese and remain idle for a long time on the proceeds.

5. In Pantai, enough is planted for the consumption of the inhabitants, but as they are fairly well off and have plenty of buffaloes and extensive orchards, I have found it hopeless to attempt any improvement on their present system as they have ample to live upon.

6. In Jelebu, the natives of the country plant rice enough for their own consumption, and the crops are mostly good. They will, however, plant no more, and even if they did the sort they grow is not such as is consumed by the Chinese, who, as well as the floating Malay population, live upon imported rice.

7. The only way I can see is for the Government to assist immigration largely, both with land and capital. It is a question for consideration what sort of immigrant would pay best—whether Siamese, Tamils or Northern Indians. I understand that Tamil families assisted by the Government have taken root in Lower Perak, and the same system might be followed here. Easy terms might be given for re-payment of advances, and conditions could be made as to planting.

8. I propose at the next meeting of the State Council to have a date fixed for the simultaneous commencement of padi-planting at the next season, and to try if some of the planters can be induced to make use of a better sort of seed. Hitherto the Penghulu of each *mukim* has fixed the date of planting, but if the whole country commence at once it may have the effect of inducing the whole of the population to plant their padi-fields, and will certainly save the crops to a great extent from rats, etc.

I have, &c.,

W. F. B. PAUL,
British Resident.

REPORT ON THE PROMOTION OF THE CULTIVATION OF RICE AND
OTHER GRAIN SEEDS IN THE CONFEDERATED STATES OF
THE NEGRI SEMBILAN.

1. I attach the Report of the District Officer, Kuala Pilah, *in extenso*.
 2. The Acting District Officer, Tampin, after remarking on the various kinds of swamp rice seed in use in his District bearing local names and to which minor importance may be attached, states that in Rembau, a small and very populous State, there is not sufficient rice to supply the demand of the natives. Rembau is so thoroughly cultivated that there is, practically, no land lying fallow. He estimates that about 150 acres might, by assistance in the construction of dams, be brought under rice cultivation. I had already gone into this question, and I considered at the time that the cost would not, under ordinary circumstances, warrant the cultivation of so small an acreage. He reports another 100 acres as available, but considers that the land, which is situated on the Lubok China-Linggi Road, is so liable to heavy floods that any outlay there would not repay either the State or the cultivator.
 3. In Tampin, he reports about 150 acres available for rice cultivation, all other lands being already cultivated, and the population being small, it would be necessary to bring in cultivators from outside into this land.
 4. In Gemenchah, the Malay population is very small. There are extensive flats on the Gemenchah River that could be converted into rice-fields and would probably accommodate at least four hundred families.
 5. His report in reference to ragi is unfavourable. It is only eaten in India by the natives in the colder parts. It is a heating form of food and considered quite unfit for food for the native population of the Peninsula.
- Mr. CAZALAS mistrusts the possibility of producing dholi at a cheaper rate than it can be purchased. It is not in favour with the Malays, being very rich, and is eaten only as a curry or *sambal* to rice.
6. I will now give my remarks on these reports, and my general remarks on the question as existing in this State. The State possesses no sea-shore and no extensive alluvial flats at the estuaries of large rivers. All the available rice land lies in valleys between the hill ranges, and nearly all these valleys are in a high state of cultivation, so much so that in Rembau and in the Sri Menanti States proper of Ulu Muar, Jempol, Terachi and Gunong Pasir, the population, and consequent subdivision of land, is increasing so rapidly that by degrees land has to be found in other valleys for such surplus population to move to. This is being done and could be done the more so with a little assistance from Government. But I would point out that this is a question of mere local requirement. It is not that lands could be found and opened for the cultivation of rice for sale or export, but merely for the sustenance of the Malay population of over 35,000 in a State containing about 1,800 square miles, which population is increasing.

Such available lands as remain will undoubtedly gradually be opened up under the above conditions.

Some assistance may be required in the opening up of the two principal uncultivated Districts, viz., Gemenchah and Sereting, although both these rivers and their tributaries contain alluvial deposits of tin and gold. I have recently had a report on the upper portion of the Sereting, which is not encouraging, the chiefs of tribes here affirming that the soil is unsuitable, sand being near the surface, as in the case of nearly all alluvial lands in which such minerals as gold and tin exist. The lower reaches of the river towards Sebaling and Lubok Serampang, however, appear to afford rich lands suitable to rice cultivation. At Langkap and Greloi in Ulu Muar to the North-East of Gunong Berembun, some work has already been done both by Natives and foreign Malays towards opening up lands for rice. At Selaru in Johol, on the main cart-road some work has been done, and also at Kelébang on the Muar River. In Gemenchah, the Natives have, I believe, been principally deterred from the cultivation of wet rice by the floods that occur there nearly every year. This District I believe to be the one principal district remaining in this State in which a large number of families could be provided for. It would be probable, however, that dams and water-courses would require a considerable outlay.

It will be remarked that in the Kuala Pilah District the estimated extent of rice land under cultivation is 10,300 acres. In the Tampin District the acreage is from six to seven thousand acres; both these amounts are approximate. The production, however, is reliable and the average padi assessment shows for 1890, 3,600,000 *gantangs*, or 180,000 *pikuls* of padi, which, converted into rice, amounts to 108,000 *pikuls*; thus showing that the native population, on the average, should have just sufficient rice for its support. The amount per head of men, women and children would be three *pikuls* or five *gantangs* per month. The State cannot and can never be expected to supply swamp rice to its foreign population, as it possesses no lands on which rice could be produced for sale.

The high price of rice during the last six months happens to have been severely felt here, the crops last year having failed in most Districts of the State. It is hardly necessary to state that the planting of hill padi is altogether discouraged. There is, however, a valuable form of rice cultivation on the slightly undulating flats above Kuala Gemencheh on the Muar River, and also below Kuala Gemencheh at Awat, and I have never ceased impressing upon the people, where such undulating flats exist, the desirability of extending and opening up further acreages. These fields are called in Malay *padang tenggala* (ploughed fields), and are cultivated by Pahang Malays who have settled in the State. It is a very usual form of rice cultivation in Pahang, the ploughed fields in the neighbourhood of Pulau Tawar being, I remember, extensive. The system is roughly as follows:—Land being found to be suitable is felled and cleared. The land is ploughed and a particular variety of dry padi seed is planted, one crop is taken. The planter then prepares another adjoining field in the same way and plants his next year's crop on this land leaving the original field to fallow. The third year the same process is gone through of opening another field. Thus to each holding there are three fields, and these three fields are ploughed and planted permanently in rotation. It can be seen, however, that only rich lands on the banks of large rivers where there are considerable extents of slightly undulating dry lands can be cultivated in this way. Steep hills could not be worked with the buffalo plough. Buffaloes also are a *sine quâ non* to the cultivation, though this must be said also in regard to the successful cultivation of swamp rice.

I regret to say that, in the only case in which I was able to persuade a native of this State to open a ploughed field for rice on the above system, he obtained a very poor crop the first year, and refused to continue cultivation, falling back upon swamp rice instead. No doubt the system requires to be learnt especially in the experience of some years, though this applies to all planting.

In connection with this report, I propose, as soon as I have been able to re-visit Sereting, Rembau and Gemencheh, to report on some system of development and encouragement of rice cultivation after full discussion with the Chiefs and people.

I will now pass to dholl and ragi. The native population here plants a considerable amount of Indian corn, which they are very fond of. This they plant on the secondary growth attaching to their garden or *kampung* lands, and thus no virgin forest is destroyed. I do not think that they would adopt the cultivation of dholl in preference to Indian corn, and Mr. CAZALAS is right in saying that they do not like it as food. From what I have heard of ragi, I should say it would prove a most undesirable form of food here, being only suited to colder districts.

The District Officer, Kuala Pilah, draws attention to the encouragement in his District of planting Liberian coffee and pepper in the Malay garden lands. Arabian coffee exists in nearly every Malay garden here. The small amount of coffee that it bears is sold, as the leaves only are used by the Malays. They are scorched over a fire and dried, and an infusion is made as in the case of tea. The elevation is insufficient to expect good crops. I have already referred in previous reports to the cultivation of Liberian coffee, and already some plants have been distributed, and a large nursery is now being made at Kuala Pilah for the distribution of plants amongst the tribes. Only a few plants will be given to each household, in order to secure their careful cultivation. I should like to see encouragement extended in this direction, as also in the introduction of sheep and cattle. No doubt it would be most beneficial, and it has always been my wish, as soon as revenues allowed, to make some systematic proposals on this subject, especially for the introduction of sheep, which I have done myself successfully. It would not require a very large sum to introduce sufficient sheep here to make a mark in the immediate neighbourhood. As the numbers increased they would no doubt be purchased further afield. The map accompanying Mr. CHEVALLIER'S Report will assist considerably in referring to the places mentioned.

MARTIN LISTER,
British Resident.

REPORT ON THE IMPORTANCE OF PROMOTING THE CULTIVATION
OF PADI, &c., IN THE KUALA PILAH DISTRICT OF THE
NEGRI SEMBILAN.

1. The Kuala Pilah District of the Negri Sembilan (etched in green on attached sketch plan, page 6) is approximately 1,150 square miles in extent, and of this area about 38 square miles are planted with tapioca (etched in brown on plan) 16 square miles with padi (etched in blue on plan) and 12 square miles, with coco-nut trees, fruit trees, &c. The remaining area of 1,084 square miles, which is coloured light green on the plan, is mostly forest and is, therefore, available for agricultural and mining purposes.

2. The District, with the exception of certain valleys already under occupation and of which a list is given, is not suitable for grain cultivation, as the country is mostly very hilly, and there are, as far as can be ascertained, no large tracts of flat land left, the smaller valleys being reserved for mining purposes.

3. The valleys which, with ordinary crops, yield a sufficient supply of rice for the consumption of the natives of the country, can conveniently be divided as follows, and their directions may be seen from the attached plan on page 6:—

Name of Valley.	Length in Miles.	Area of Padi Land.	Area of Garden Land.
		Acres.	Acres.
Kuala Jempol to Bandul, ...	23	3,000	2,000
Sri Menanti to Gunong Pasir, Pilah, ...	9	1,000	800
Talang, ...	10	800	800
Juasseh, ...	5	600	400
Jempol, ...	5	400	400
Johol, Inas and branches, ...	20	2,000	2,000
	...	2,500	2,500
Total area of padi land, ...		10,300	
Total area of garden land, ...		...	8,900

or, as already stated, 16 square miles of padi land and 12 square miles of garden land.

4. Dry padi grows very well, and heavy crops from small areas of land on the banks of the Muar River and elsewhere have been obtained by Malays and Sakais, but it is not considered advisable to encourage this cultivation, as only one crop is obtainable, unless the land is manured and, therefore, the forest is destroyed and the ground rendered useless for several years.

5. In the Negri Sembilan, no efforts have been made by the Natives to obtain more than one crop of padi within the year. It would, doubtless, be difficult to irrigate some of the padi-fields, but in the Muar valley there is always a good supply of water, and a proper system of irrigation could easily be carried out by the Malays themselves with a little assistance from the Government. I think that some encouragement should be given to the people to attempt planting two crops, rewards being offered to the first successful planters, and small advances of money granted to persons willing to try the experiment.

6. In this country, even if the introduction of other grains such as dhol and ragi were possible, it would hardly be necessary, as in the event of a rice famine the natives would exist upon tapioca roots, sago (*rembiah*) and Indian corn, which they very often plant near their houses and use when short of rice. The Chinese population could obtain an abundant supply of sago from the large tapioca estates in Johol, also sweet potatoes and other vegetables which they cultivate to some extent.

7. I consider that, rather than introduce the cultivation of new grains, the natives should be encouraged to extend their padi-fields where possible, plant sago palms (*rembiah*) along the rivers and streams, and pay more attention to the cultivation of their garden lands, which might be improved. A little assistance from the Government in the above direction would greatly benefit the Malays, and I would recommend that each Lembaga be given a certain number of coffee and pepper plants for careful distribution among the people of his tribe.

8. It would also be well if the natives of the country could be persuaded to breed sheep and cattle in addition to goats and buffaloes, as there is excellent grazing land in the *kampongs* and adjoining grass lands. In Kelantan, sheep do very well, and the few that have been tried in Kuala Pilah have been a success, so there is no reason why they should not be introduced here. I believe that if the Government could obtain a certain number of sheep from Kelantan or Calcutta, the principal Malays of this country would be glad to buy them at cost price.

HARVEY CHEVALLIER,
District Officer,
Kwala Pilah.

REPORT BY THE BRITISH RESIDENT OF PAHANG.

BRITISH RESIDENCY,
Pahang, 26th April, 1892.

SIR,—With reference to your letter, ¹²⁸⁸⁶⁹₀₁ of the 18th of December last, I have the honour to enclose, for the information of His Excellency the Governor, the copy of a Report by the Superintendent of Ulu Pahang, with which I agree generally.

2. During the present disturbed condition of Pahang, it is practically impossible to take any effective steps to improve or extend the cultivation of rice and other cereals, but, as soon as these disturbances have been settled, I think that much might be done by a judicious expenditure of money, for purposes of irrigation and in purchasing new seed, as there are large areas of uncultivated padi land in every District of the State. Before formulating any scheme, however, I propose, with His Excellency's approval, to lay the whole matter before His Highness the Sultan in Council.

I have &c.,

J. P. RODGER,
British Resident, Pahang.

REPORT BY THE SUPERINTENDENT OF ULU PAHANG.

KWALA LIPIS,
25th February, 1892.

SIR,—I have the honour to make the following report, as instructed in Colonial Secretary ¹⁴⁸²₀₁.

2. With reference to land available for padi, I would point out that this District contains localities eminently suited for this form of cultivation. The whole of the Dong valley, nearly the whole of the valley of the upper Lipis, and the large triangular tract of country formed by the Semantan and Lipis rivers, is all flat land, for the most part consisting of grassy plains, and admirably adapted for irrigation. The water could be brought from the Dong, Gali, Semantan and Lipis rivers, and this, to a small extent, is now done by the Rawa Malays of the Dong and Lipis valleys. In former times this part of the country was very thickly populated, and the rice necessary for the food supply of the District was all grown on the spot. In the localities which I have mentioned, there must be at least 60,000 acres, and perhaps as much as 100,000 acres available, and in other parts of the District, notably in the upper Tembeling, and on the banks of the Pahang River, below Pedah, there are other tracts of land which present natural advantages for the padi-planter. At the same time, no part of Pahang which I have visited is as suitable for rice cultivation as the localities enumerated as forming part of the upper Lipis District.

3. The pernicious practice of using the crop obtained each year for seed at the next planting season, the still more ruinous habit of planting the same seed in the same ground year after year, and of never crossing the seed, or taking any precautions with a view to its improvement, has had a most disastrous effect on the rice crop of Pahang. It is not too much to say that fully one-fourth of the rice planted produces barren ears, and, latterly, owing to a long succession of droughts, floods and other vicissitudes, the crops obtained have, in numerous instances, not equalled the amount of the seed from which they sprung.

4. Another reason exists for the paucity of the rice supply in Pahang. The crops are often very insecurely fenced in, the natives often being satisfied with a *tangkal babi*, or charm, consisting of a line hung upon upright posts, under which it is fondly believed that no pigs will pass. Even if the fencing was more regularly attended to, and pigs and buffaloes kept from damaging the crops, there are a number of other animals which cause great damage. The principal enemies to the crop are rats, of which there are two kinds—the *tikus prah*, or ordinary field mouse, and the *tikus mondok*, a very large species of rat, not unlike the Australian bandicoot,—the *kelasan*, a large species of bat which devours the grain by night, and the *belalang gambar*, or green locust, of which, however, there has been no serious plague in Pahang during the last few years, though great damage was done to the crops by them in 1884-1885.

5. The modes of cultivation are, of course, rude in the extreme, and the mode of reaping with a small instrument, called a *tuei*, which consists of a small semi-circular blade, the other edge of which is sharpened, and against which each stalk is pressed one by one, the ear being held in the fingers, is peculiarly slow and painful. Five or six reapers with this instrument will only reap one *igu* of land in 15 days, (an *igu* is as much land as a single yoke of oxen can plough in a season), whereas with the *sabit*, a kind of reaping-hook, which, in some places, has been introduced by the natives of Sumatra, the same amount of work can be done by two men in three days. In some places the use of the *sabit* is being adopted by the natives of Ulu Pahang, but in most places the Malays, while confessing the superiority of the Rawa tool, are too true to their conservative instincts to be willing to accept the innovation.

6. The introduction of new seed is much desired by the natives in this District, and to a certain extent I believe that it would be possible for an active District Officer to even effect some changes in the tools and implements employed. I doubt very much, however, whether the indigenous population would undertake the cultivation of any but the products of the soil with which they are already familiar. A Malay always considers that he has done all he can do when he says that he is "not accustomed" to any new industry, and it seldom seems to occur to him that it is possible to make oneself accustomed to it. Even padi-planting, if it is to be extended to any appreciable extent, would have to be undertaken by some persons other than the people of the country, who have neither the desire nor the energy to make use of the natural advantages which they find ready to their hands. They are fully aware that these advantages exist, but they are, as a race, too supine to avail themselves of them.

7. The amount of land at present under cultivation is about sufficient to supply half the rice necessary for the food requirements of the District. I estimate that there is from 10,000 to 15,000 acres of land annually cultivated for all purposes by the people of this District—a District which in area is larger than the whole of the neighbouring State of Selangor.

8. In writing the above, I fear that I shall not have brought to your notice any matters with which you are not already familiar, but I have thought that it is possible that some of the trivial facts which I have given in this report, relating to Malay padi-planting in Pahang, may be useful to you as reference when considering this question with a view to improving the system now in use in this State.

I have, &c.,

HUGH CLIFFORD,
Superintendent, Ulu Pahang.

ENCOURAGEMENT OF RICE-CULTIVATION IN THE MALAY PENINSULA.

Minute by the Colonial Secretary.

1. The reports which have been furnished in compliance with the Circular issued by the orders of His Excellency the Governor in December, 1891, though containing much that is of interest are scarcely sufficient as a basis for a specific line of policy for the encouragement of rice-cultivation.

2. Though very detailed information was not actually called for, it would have been satisfactory had District Officers attempted, by careful calculations, to satisfy themselves and to prove to Government that the measures which they propose can be safely recommended on sound economical principles. The first condition of successful agriculture is of course that it must pay. No Government is likely to undertake or promote the cultivation of rice, as a rich proprietor in Europe may grow grapes or pine-apples, in order to have the produce, regardless of its cost. It is considered, I notice, by the Acting Resident of Perak (Mr. TREACHER) that the State may look to be indirectly compensated for a large expenditure on works of various kinds by :—

(a) An accession of population.

(b) The retention in the State of the large sums now spent on imported rice.

How far such an expectation may be justified must be a matter of conjecture.

3. Mr. TREACHER having expressed in general terms his concurrence with the recommendations of the District Officers in Perak, it will be desirable to summarise here what those recommendations are. For the most part they are only general and are unsupported by statistics or estimates of any kind, and it yet remains to have a complete scheme to be submitted for some particular district.

4. Special State expenditure is recommended in respect of :—

(a) Roads or bridle-paths. (Krian, Matang, Lower Perak.)

(b) Irrigation works. (Ulu Perak, Lower Perak, Kinta, Batang Padang, Kuala Kangsa.)

(c) Distribution of seed. (Krian.)

(d) Free passages or assisted passages to immigrants from foreign countries.

(e) Remission of land-rent for three years. (Lower Perak, Selama.)

(f) Maintenance of immigrants on guaranteed work for six months after arrival. (Lower Perak, Matang.)

(g) Drainage. (Matang, Lower Perak, Krian.)

(h) A State experiment of rice-farming on a large scale.

(i) Exemption of abandoned padi-land from rent for one year if taken up by "natives of the State."

(j) The erection of husking machinery by Government.

(k) The establishment of a Government model farm.

(l) The introduction of Chinese settlers of the farmer class, with their wives, at the expense of the State.

5. As to the manner in which the State is to be reimbursed for the expenditure upon all or any of these schemes, the reports are mostly silent. One gentleman, however, who has apparently not studied the subjects of population and labour, or the conditions under which rice is cultivated in other countries, is sanguine enough to declare, in somewhat general language, that "if sufficient land were planted, the State might not only become independent of foreign markets, but might also become one of the rice-supplying countries of the world, and derive a large revenue from paddy instead of paying away large sums of money for rice and being dependent on other and uncertain markets for the staple food of its people!" The importance of the question is, of course, here exaggerated. The Acting Resident's report shews that about 70,000 acres of land in Perak are under rice cultivation and that there is enough land available to produce 200,000 or 300,000 tons more rice than is grown at present. The total area of paddy land in Perak may thus be roughly estimated to be 300,000 acres. But the area of paddy land under cultivation in Lower Burma ten years ago was more than three million acres.

6. Much of what is here said about the Perak reports applies equally to those received from Selangor. There is a general consensus of opinion that the way to encourage rice-cultivation is to tempt the cultivator by State help. The extent to which this is recommended does not equal the Perak proposals, but the commercial aspect of the problem does not come in for examination.

7. The various proposals as to the State aid in Selangor include :—
- (a) Exemption from land-revenue for three years.
 - (b) The introduction of foreign settlers at Government expense, the State paying their passages, and supporting them for a probationary period, until farming pays.
 - (c) Loans for purchase of buffaloes, implement, seed, etc.
 - (d) Loans for irrigation works.
 - (e) Purchase of seed.

8. The Resident of Sungei Ujong sees no way open to Government, if it is desired to extend rice-cultivation in that State, but to "assist immigration largely, both with land and capital." Advances are to be recoverable on "easy terms."

9. The Resident of Negri Sembilan, an inland State, furnishes some statistics shewing that the State can feed its indigenous population, but that there is no prospect of the extension of cultivation so as to permit of export or local sale to the foreign population, miners, etc.

10. The Resident of Pahang, in forwarding a brief but interesting description of rice-cultivation in Pahang by Mr. CLIFFORD, speaks in favour of "a judicious expenditure of money for purposes of irrigation and in purchasing new seed."

11. Among the schemes submitted to Government, I must not omit to notice the recommendation of Mr. C. LEECH, Commissioner of Lands, Perak, that "the question of cultivation, classes of grain, etc. should be taken up by an expert," and the advice of Mr. G. W. WELMAN, Secretary to Government, Selangor, that "the services of a competent Engineer—preferably one who has been employed on irrigation works in India or Burma—might be secured to study and report upon the feasibility of

“adapting a large acreage of the low-lying country in the State to the “cultivation of paddy”—both proposals involving a considerable charge on public funds.

12. It may be accepted that in Perak, Selangor, Sungei Ujong and Pahang there exist large tracts of flat alluvial land bordering the sea coast, which are available for the cultivation of rice, and which are now lying undeveloped owing to want of population and other causes. The inland districts need not be taken into consideration. Up the country, rice-lands are only found here and there in valleys not far from the rivers, or in the depressions in undulating tracts. The areas so available for cultivation inland are comparatively insignificant (see however a description of an inland district in No. VIII of the Perak Reports), whereas on the coast they extend to tens of thousands of acres.

13. The problem is how to get this waste land turned into rice-producing districts, and before it can be hoped to solve this with the help of any of the suggestions made by the Residents of the Native States and their Officers, a great deal more statistical information is required. As far as I am aware no good description of Malay and Chinese agriculture in the Straits Settlements has been produced since 1836, when Colonel JAMES LOW of the Madras Army, then in charge of Province Wellesley as Superintendent, published a “Dissertation on the Soil and Agriculture of Penang and Province Wellesley.” Although his descriptions, written nearly sixty years ago, do not apply in all respects to the cultivation of to-day, and although the customs described are those of the Malays of Kedah, and the statistics are those of 1825-1833, still it has seemed to me that Colonel LOW’S book gives so much valuable information, that I subjoin extensive extracts from it.

14. When extensive emigration schemes are put forward without statements of the cost of the passage and temporary maintenance of emigrants, and irrigation schemes without plans and approximate estimates, and when exemption from land-revenue is advised though the recorded experience of competent land-revenue officers in the past is against it, the careful study and calculation upon which Colonel LOW’S remarks are based may well be recommended for imitation.

15. The next thirteen pages are from Colonel LOW’S work* :—

“Rice is the grain chiefly cultivated in the Straits of Malacca. On the Island of Penang, the field is confined, owing to the generally hilly nature of the surface; but Province Wellesley which is an alluvial district, offers a wider range, and to it, therefore, the following observations will principally apply. The area of this province has not yet been fully ascertained owing to the incorrectness of all the maps of it, these having been constructed when it was in a jungly state, and to the irregular line of its boundary. But judging from a series of triangles which have been taken, preparatory to a more correct plan, the area cannot well be less than one hundred and twenty square miles. How much of this superficies is well fitted for rice cultivation will be known perhaps in a very few years hence, when all the *sawah* land shall have been cleared of forest; until when it can only be generally asserted that several detached patches remain to be located, some of which consist of upwards of 500 *orlongs*. The Malays of this Peninsula are strongly attached to agriculture. The unmaritime Malay could not exist without his *bendang* or rice field—and to the preparation of it, every other passion, for a while, gives way. His enthusiasm in the work is such, that a positive and greater gain could hardly bribe him from it. With such a predisposition, the Malay is a useful subject, where the cultivation of grain and the obtaining of those supplies, which naturally arise out of or follow that cultivation, are desirable objects. Beyond this, Malayan agriculture is deficient in method, too often slovenly,

* The spelling of Malay words has been altered, and the foot-notes are new.

and always falls far short of the fullest productive point. But the Malay is not stubborn, although he is indolent and capricious. Example and prospects of gain, may in time, as they now partially do, stimulate his dormant faculties to useful efforts.

Malayan husbandry differs considerably from that practised by the ryots of India; the former is not subject to the village system so prevalent in the latter region. The British Malayan ryot or landholder, after having paid his rent or quit-rent, is quite independent, and his threshing-floor is never beset by those needy dependants, who take *custom* from that of the more enduring Hindoo; such as barbers, watchmen, astrologers, brahmins, fakirs, and washermen. He is a mussulman, but can rarely, if ever, be charged with bigotry, fanaticism or intolerance.

* * * * *

It would be well for the *orang Malayu* of this coast were he to imitate the thriftiness, perseverance and foresight of the Hindoo. If he finds it difficult to get money, he finds it much more so to keep it when obtained. His habits are all of a lavish or a thoughtless cast, and may fairly be traced to the insecurity caused by native despotism, and to the creed which locks up his money by forbidding him to take interest. Trade and buying of landed property, are the only means left to him of partially evading this law.

* * * * *

The population of Kedah and Patani—from which ours has chiefly been drained off—has a decidedly agricultural character, and is not more disposed to locomotion, betwixt harvest and harvest, than any other people so situated would be.

* * * * *

The Malays are not, however, the only rice cultivators either in Penang or Province Wellesley, although they are in the proportion of about 41 to 4 of the other classes.

* * * * *

The Chinese, with the exception of a few of those from Macao, look with contempt on paddy-planters. Yet what but lack of a paddy-field forced them from their country?

* * * * *

Data are wanting from which a very *precise* estimate might be formed of the quantity of rice grown on Penang. It is pretty certain that the quantity of *sawah*, or proper paddy land actually under cultivation, does not exceed 700 *orlongs*. No prospective estimate can ever be formed of the quantity of dry, or *uma* land likely to be used for light padi crops, since the Malay can never, if he can avoid it, cultivate such lands for two seasons successively. The quantity of jungle cleared for such cultivation for the ensuing season, may be rated at 200 *orlongs*.

Neither can the actual extent of rice land, cultivated in Province Wellesley, be yet ascertained, owing to the quantity of new land constantly coming under tillage, and as such is not surveyed until well cleared. But there are sufficient data for enabling us to rate it at not less than 15,000 *orlongs*, or twenty thousand acres, which is rather more than thrice the quantity which was under culture in 1825. At the latter period, Government was induced to advance cash to the cultivators and to give them rice lands at a rate of quit-rent almost nominal. This liberality was but ill repaid. Few of the Malays who received advances, cultivated the land allotted, or returned the loan; while the worst consequence was, that they began to think that their services could not be dispensed with, and thus a great incentive to exertion was removed. From the period that the ryots were thrown on their own resources, (1826) the competition for land, and as a sure consequence, its value, has rapidly increased. It is estimated that about 30,000 acres of land of every description are in cultivation within the Province.

The population of Penang and Province Wellesley combined, excluding troops and their followers—but including convicts—amounts to 84,500 souls, or very nearly so. The annual consumption of rice, by this number, will be presently estimated.

The average number of persons composing a family is assumed to be five, which, from actual observation, is pretty near the truth. The daily average consumption by each family is rated at $3\frac{1}{4}$ *chupahs* of rice.

* * * * *

The Burmese and Siamese are the grossest feeders and the greatest consumers

of rice. The Ava Government, during the late war with the British,* gave the following rations to each soldier:

Rice being nearly 34 <i>chupahs</i> by measure	...	...	64 lbs.
<i>Belachan</i>	...	...	3 $\frac{3}{8}$ "
Chillies	...	...	4 "
Salt	...	...	3 $\frac{5}{8}$ "
Salt-fish occasionally only	...	...	10 $\frac{7}{8}$ "

The Siamese require about a similar supply.

A common labouring Malay requires, monthly:

Rice, 30 <i>chupahs</i> or 56 lbs. (value in cents)	...	...	90
Salt, 1 $\frac{1}{2}$ <i>chupah</i>	...	...	2 $\frac{1}{4}$
Fish	...	...	30
Chilli and other condiments	...	...	15
Tobacco, <i>sirih</i> , areca, lime and gambir	...	...	60

Total, pice, or cents 197 $\frac{1}{4}$

The value of pice is fluctuating, and is now 106 per Spanish dollar.

For a family of five persons, an addition of ninety cents monthly will be required to the above items, and rice in proportion.

The expense of the year will therefore be 2,367 pice or cents, which at an average of 105 cents or pice per Spanish dollar will be Sp. dollars 22.57

Clothing & Housing.

A man:—

2 <i>sarongs</i>	...	...	...	cents 60
1 <i>baju</i> or jacket	...	...	...	" 30
1 pair pantaloons	...	...	...	" 30
1 head-dress or kerchief	...	...	...	" 20

1.45

A woman:—

4 <i>sarongs</i>	...	...	...	cents 120
2 <i>bajus</i>	...	...	...	" 70

190

Housing	...	...	...	1
Extra luxuries, such as <i>durians</i> , &c. &c.	...	...	...	2

Total, yearly expenses, Drs. 27.01

A substantial ryot lives much better and will wear out yearly 2 *sarongs*, two long sashes, called *kain panjang*, two *bajus* or jackets, 2 pairs of pantaloons, two kerchiefs, two handkerchiefs, besides keeping by him a complete festival suit of these clothes. It has been estimated by writers on India that the poorer ryot of Hindustan expends in living only fourteen rupees a year. The Chinese and the Malays consume nearly an equal quantity of rice, but the former use much more animal food than the latter and dress much better, in the lower classes.

Upon an average, it will be found that those Malayan householders *who have been several years settled*, and who occupy from two to five acres of land in perpetuity are possessed of personal property, to an amount varying from ten up to a hundred dollars. This property consists of, perchance, a koran, also brass kitchen utensils, cuspidors of brass, about a dozen China cups and plates, bedding and mosquito curtains of coarse muslin, and mats, water jars—often of Peguan manufacture—a chest, rice mortars and sieves, betel-box and apparatus of brass, fishing apparatus, grain and oil measures; a spear and *kris*, and knife or *parang*, baskets of rattan work, a boat when close to the sea or on the bank of a river;—massive gold earrings, for the women of the family, also gold and silver buttons and silver bracelets, chains and others ornaments;—silk and cotton dresses.

The worldly goods and chattels of a ryot of the poorest class who occupies an *orlong* of land, or perhaps who is merely a tenant for the year, may be of the average value of ten dollars. His house may be worth five or six.

* * * * *

* The first Burmese war 1824-1826.

Estimated yearly consumption of Rice.

PENANG.

By the fixed and fluctuating population, exclusive of troops	... <i>koyans</i>	3,500
By 200 horses, and by cattle &c.	... ..	280
		3,780

PROVINCE WELLESLEY.

By fixed and fluctuating population	... ..	3,378
Seed grain on Penang, $3\frac{1}{2}$ <i>koyans</i> paddy, or	... ..	$1\frac{3}{4}$
Do. in Province Wellesley or 75 <i>koyans</i> of paddy, being in rice	... ..	37 $\frac{1}{2}$
Loss	... ..	5

Total estimated consumption, *koyans*, 7,202 $\frac{1}{4}$

Rice land in Penang yields a return which may not be averaged higher than 75 fold—or nearly 300 *gantangs* of paddy for each *orlong*; but it has been considered advisable to rate it here at 60-fold only. The rice land, or *bendang*, of Province Wellesley gives an average return of 117 $\frac{1}{2}$ fold; the maximum degree of productiveness being six hundred *gantangs* of paddy for an *orlong* (or $1\frac{1}{3}$ acre) of well-flooded, alluvial land, or 150-fold; which number of *gantangs* are equal to 300 *gantangs* of rice, weighing nearly 4,520 English pounds. The present average produce has been very *moderately* estimated in this account at 470 *gantangs* the *orlong*, of paddy.* The quantity of seeds invariably allotted for an *orlong* of land is 4 *gantangs*. In the estimate of *future* produce as available for the support of the local population, 480 *gantangs* an *orlong* have been assumed as the *net* average produce, this increase being admissible on the score of the improving productiveness of the land. The average produce now derivable, as above specified, from one square mile of *bendang* land will be 248 $\frac{1}{3}$ *koyans* of paddy, or 142 $\frac{1}{6}$ *koyans* of rice, affording food sufficient for the support of 1,915 souls; so that were every *orlong* to have its complement, the population of this Province might be more than doubled without outrunning the means of subsistence. Prospectively viewed, the number which a square mile will be sufficient to support may be rated at 1,936 souls. In Siam, forty-fold is estimated a good average produce. † At Tavoy, on the Tenasserim Coast, the maximum rate of productiveness of the rice land was, in 1825—and is still believed to be—nearly the same as the *average* of Siam; while the *average* was only 20-fold, at which last rate the produce of a square mile would support about 1,000 souls. There the return for seed sown is not only thus small, compared with the return for the quantity sown here, but to obtain the above average of 20-fold, or 260 *gantangs* of paddy from one *orlong* of land, it would be requisite to sow thirteen *gantangs* of seed. The difference in favor of this local Malayan husbandry is therefore 219 *gantangs* of paddy for each *orlong* cultivated—besides the profit arising to the latter by the saving of labour. To obtain, on the Tavoy Coast, the clear return of 470 *gantangs* of paddy,—being the average above stated for Province Wellesley, including land newly cleared, and not yet become fully productive—it would be required to cultivate 1 & 4-6th *orlong* and to sow 23 $\frac{1}{2}$ *gantangs* of seed.

The total present population of the latter Province could be supported on the average quantity of rice raised on 24 square miles of superficies; while on the Coast alluded to, an area of about 43 square miles will be required to supply food to such a population.

The very superior fertility of the Province Wellesley soil depends on its alluvial composition, and on its being level and easily accessible to water—and in some localities, on its being comparatively new; but this last circumstance does not seem to operate as might be supposed: for some land, which has been longest under cultivation, or upwards of 20 years, yields the largest crops.

The soil of Mautama or Martaban Province, of which Moulmein formed a part, seemed to me, while travelling over its plains in 1825, to approach nearest to the

* In Burma, the average productiveness of the acre is rather more than 30 bushels of paddy.—*Report on Revenue Administration, British Burma, for 1881-82.* This is roughly 200 *gantangs* to the acre or 266 *gantangs* to the *orlong*.

† In BUCKLE'S "History of Civilization," ch. ii, there is a note to the following effect:—

In Egypt, according to SAVARY, rice "produces eighty bushels for one."—*Loudon's Encyclop. of Agriculture*, p. 173. In Tenasserim the yield is, from 80 to 100.—*Low's Hist. of Tenasserim in Journ. As. Soc.*, III, 29. In S. America 250 fold according to SPIX and MARTINS (*Travels in Brazil*, II, 79), or from 200 to 300 according to SOUTHEY (*History of Brazil*, III, pp. 658, 806). The lowest estimate given by M. MEYEN is forty fold, the highest which is marsh rice in the Philippine Islands 400 fold.—MEYEN'S *Geography of Plants*, 1846, p. 301.

standard of this coast. Pegu, however, being for the most part an extensive delta composed of alluvion, its soil perhaps takes the lead of ours. The productiveness of the soil of Malacca or of Singapore will scarcely, it is supposed, reach our standard: 30-fold is the estimated average at Malacca. Out of 42,667 *orlongs*, the quantity supposed to be available at Malacca for rice cultivation, only 3,297 *orlongs* were under tillage three years ago. According to the "Malayan Annals," and they are rendered credible by European contemporary accounts,—the population of the city of Malacca, when first attacked by the Portuguese, amounted, independent of the country or interior population, to 190,000 souls. If this number—or, say, 200,000 for the whole,—were supported by the grain produce of that country, it must have required an extent of $102\frac{1}{2}$ square miles or 49,602 *orlongs* to have been under rice cultivation, supposing the fertility to have equalled that of the Kedah coast as above given. Being a commercial state, however, it is probable that it received grain from other countries. It is only in those Malayan states where agriculture seems to have never been entirely subordinate to trade, that we now find a fixed agricultural population of any considerable magnitude. Java was one of these; Kedah, Perak, Patani and Trengganu, with Ligor, and Sanggora, were probably also in the list. Kedah, from its position and general features, must always have been a grain country. Its commerce, never extensive, was in the hands of its rajahs, and their favourites, and when that was all but annihilated by the drain caused by the new channels into which trade flowed consequent on the proximity of European settlements, the population sustained little comparative diminution: and continued to raise supplies of grain for its neighbours as well as itself, until, falling under foreign dominion, its energies were paralysed and its population dispersed.

The Imports and Exports of Rice for this Settlement are as follows:—

IMPORTS.

	<i>Koyans.</i>	<i>Bags.</i>	<i>Koyans.</i>	<i>Gantangs.</i>
For the year ending 30th September 1833	3,197 $\frac{3}{4}$	6,052		
For the $\frac{1}{2}$ -year ending 30th Sept. 1834	721	11,482		
			Total 4,357	80

EXPORTS.

	<i>Koyans.</i>	<i>Bags.</i>		
For the above 18 months	1,478	25		
			Total 1,478	500
<i>Excess of Imports over Exports,</i>			2,878	380
Total estimated consumption by the fixed population— <i>itinerants—cattle, &c. &c. &c. in Penang and Province Wellesley for 18 months—seed grain for the half-year excluded; consumption of troops also excluded</i>			10,740	600
Total excess of consumption over importation for 18 months as above			7,862	220

The produce to meet this is estimated as under:—

PENANG.

Fixed cultivation for 18 months	197
Fugitive crops	50
	— 247

being equal to nearly one month's consumption.

PROVINCE WELLESLEY.

Fixed cultivation for above period	6,604 $\frac{1}{2}$
Irregular and fugitive ditto	300
	— 6,904 $\frac{1}{2}$
	— 7,151
	400

Total deficiency unaccounted for, being excess of consumption over the balance remaining of Exports and Imports and amount of produce added thereto	710	820
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There is no reason to doubt the accuracy of the statement of exports and imports, yet it is highly probable that a good deal of rice has been imported in small quantities through numerous channels both into Penang and the opposite coast without being observed. The crops for the last two years in Province Wellesley were

very abundant, as the present promises to be, and perhaps the produce for these has exceeded the average assumed here. The produce of partially cleared lands too, may have been somewhat underrated. The grain-dealers may also have had a supply in hand at the beginning of 1833. Some of these causes must have been in operation. Besides the registered exports too, it is well-known that considerable quantities of rice have been exported occasionally from Province Wellesley to the borders of Kedah and Perak.

The grain season commences about the middle or end of July on Penang, and about the middle of August in Province Wellesley. In the latter, the ryots continue planting until the middle of October, being regulated by the degrees in which their fields are flooded. The grain is ripe within from 5 to 8 months after planting.

The rice produced here is of the same description as that raised in Kedah, and it ranks next to Bengal rice in the market.

The varieties of rice are very considerable and they are nicely discriminated by the Malays. At first, one might feel disposed to think these people fanciful, but on a narrow inspection, the different kinds of rice are observed to possess distinct features.

The following are those sorts best known, and they have been arranged as nearly as may be, according to their generally received value. The first five may be cut by the sickle and are termed *giyau*.

FOR SAWAH OR WET LAND CULTIVATION.

Sri raja, sri bumi, riyong, sri bangsa, sri menjadi, ripen in 7 months and are denoted as of the first class by the word *sri* (excellent) prefixed.

Mayang srai, white and short; *mayang tilor*, yellowish grain; *mayang buih*, white grain; *mayang pinang*, reddish grain; *mayang kudong*, white grain; *mayang tilui*, dark grain; *bujang besar*, white grain; *sisat*, white and long grain; *bemban, unak lebah*, reddish grain; *chak pauh*, dark grain. These ripen within 7 months.

Mayang sapangku, white, *sultan bersendayan, bodul*, ripen in 8 months.

Mayang kuning, mayang gading, bunga machang, bunga sena, sunting mam-pelai, bunga pandan, riyong kecil, unak ikan, borat, chanda ber-inai, ripen in 6 months.

Ekor, serip mas, jarum puak, rambut, sawa, taring pelandok, piring, bawang, ripen in 6 months.

Panget-so, lately introduced from China, ripens in 100 days.

The following are different kinds of the *oryza glutinosa*, or pulut rice:—

Pulut hitam, pulut galah, ripen in 5 months.

Pulut gaharu, pulut kilah, pulut santan, pulut salambar nibong, pulut kucing likat, pulut gading, pulut gantongalu, pulut naga bilai, pulut kajang, pulut sepat, pulut indan, pulut sikapal, ripen in 7 months.

Padi jagong. This species is said to be cultivated in Kedah, and to give two crops in one rainy season.

The following are varieties of the upland rice, or *padi uma*, which will not thrive on flooded land:—

Mayang jagong, biji trong, sabun, jarum perak, ripen in 4 months.

Tuma, Sungkal, Bruang, (the bear,) *kala*, (scorpion,) *anak murai, langsung*, ripen in 5 months.

Fintan, Febat, ripen in 6 months.*

The Malays here have not attempted double cropping as on the Continent of India. There are no tanks, and it is only at a very few spots that they could be made. Most of the Malayan wet land rice requires so long a period to reach maturity, that there would be a deficiency of water for a second crop were an attempt to be made to grow one. But the Malays are obstinate in asserting that, were water abundant, still the rice sown here will not fructify after the rainy season has passed. But the *jagong* rice before noticed seems an exception.

The Chinese, last year, introduced from China a species of rice termed by them *Panget-so*, which is short grained, of a reddish colour and goes to ear in 3 months and ten days after planting, and as it is a species which requires to be flooded it promises to be an acquisition, although a very light grain.

There are considerable tracts of land bordering the *bakau* or mangrove flats,

* The following list of various kinds of grain is taken from the catalogue of specimens sent home to the Imperial Institute (1892):—

Padi Nachin Kuning, from Malacca.

„ *Nachin Puteh*, do.

„ *Nachin Kerbau*, do.

„ *Nachin Sarotin*, from Negri Sembilan. This is a heavy paddy, boiling hard, one of the slowest growing kinds taking six months to ripen. Favourite paddy for horses.

„ *Nachin*. Hard-boiling rice, favourite with the lower classes. Negri Sembilan.

which at present lie waste. It is understood that there is a kind of rice cultivated in Chittagong which is not injured by brackish or salt water occasionally reaching it; were this also introduced, much benefit might accrue.

The Malays never manure their rice fields,* nor is there any occasion as yet for doing so, especially while the system continues of allowing the field to lie from 6 to 8 months fallow every year. The people of Bengal render rice capable of being preserved for a long time by dipping it in boiling water so as to destroy the germ. The Malays have not adopted this plan and therefore beat or grind out the rice from the husk just before it is to be used. The Burmese, the Siamese, and it is believed all the Indo-Chinese Governments, maintain large granaries. The object is political, with reference to their exposure to frequent warfare; yet it is of vast utility in times when the crops fail.

SEED TIME.

Four *gantangs* of paddy are sown upon a well-watered and cleared spot of land of the extent of about a sixteenth part of an *orlong*. In about 40 days the plants attain sufficient vigour to admit of their being removed to the *bendang*, or paddy field.

The task of transplanting is commonly performed by the women. Before the seed is sown in the nursery, it is twice measured, in order to ascertain that none has *escaped* preternaturally!

The *semai* or rice plants are pulled up by their roots in bunches of sufficient size to be easily grasped with one hand. The roots are rapidly cleaned with the other

Padi Linggi, from Malacca.	
„ Radin Siak, do.	
„ Radin, from Perak; Negri Sembilan. Sweet smelling rice like Padi Undan. Takes four months to ripen.	
„ Radin Bernam, from Perak.	
„ Radin Kelang, do.	
„ Radin Kuning, do.	
„ Jarum Mas, from Malacca.	
„ Anak Ikan, do.	
„ Merebau, do.	
„ Wangi, do.	
„ Larut, do.	
„ Undan, from Negri Sembilan. A soft-boiling rice, emitting a sweet odour. Rarely planted. Prized on account of its rarity. Takes four and a half months to ripen.	
„ Gangsa, from Negri Sembilan.	
„ Trong Buri, from Negri Sembilan. When cooked it becomes dry and nearly round and readily hardens. A favourite rice for feasts, and largely grown in Negri Sembilan, as a larger crop is obtained from it than from any other kind.	
„ Trong Dahun, from Negri Sembilan. Ordinary hard rice.	
„ Trong, from Perak.	
„ Santapan Raja, from Negri Sembilan. Boils soft and smells sweet. Favourite rice of the Malay. Yields a comparatively poor crop, but much prized for its distinct rich flavour.	
„ Pakang, from Negri Sembilan. Ordinary soft-boiling paddy. Takes four and a half to five and a half months to ripen.	
„ Sri Bumi, from Negri Sembilan. Boils soft and grows quickly. An expensive paddy to grow, as the yield is small.	
„ Sumbut Rumut, from Negri Sembilan. Soft paddy. Takes four or five months to ripen.	
„ Benang Acheh. The quickest growing paddy in Negri Sembilan; it takes only three months to ripen, and boils fairly hard. Much sought after.	
„ Tiga Jatampoh, or Padi Jemba Bawang, from Negri Sembilan. Hard-boiling rice, inferior in yield to Trong Buri.	
„ Sabangsa, from Negri Sembilan.	
„ Anak Kedah, from Perak.	
„ Ara, do.	
„ Bemban, do.	
„ Bodor, do.	
„ Bunga Machang, do.	
„ Bunga Machang Besar, do.	
„ Burong (<i>lit.</i> bird rice), do.	
„ Chantek (<i>lit.</i> pretty rice), do.	
„ Hitam (black rice), do.	
„ Jangka, do.	
„ Kuku balam, do.	
„ Lakun, do.	
„ Lembut, do.	
„ Lembut Jarang, do.	
„ Lembut Merah, do.	
„ Malok Soson, do.	
„ Machang, do.	
„ Machang Kuning, do.	
„ Machang Puteh, do.	
„ Mayang Che Ma, do.	
„ Mayang Minigorek, do.	
„ Mayang Mulut, do.	
„ Orang, do.	
„ Pasan Karang, do.	
„ Puchuk Beranak, do.	

* This statement is not now correct. The Malays of Malacca use buffalo bones (imported from Burma) as manure.

and the tops are cut off. A few of the whitest stalks are then selected and carried separately to the field. *Ayer bedak*, a fragrant cosmetic dissolved in water, is now sprinkled over the ground in order to propitiate the spirit of the paddy; the Malayan Ceres, for whom the Malays have no distinct appellative but express their meaning by the words, *Samangat Padi*,—the *Chaba Yendai* of the Burmese—which implies that the spirit of the paddy vanishes through terror when not conciliated.

* * * * *

The paddy-planter is provided with a short stick, with a fork at the end. Having inserted from five to nine stalks or plants into this fork, he pushes it down into the mud, to the depth of from 3 to 6 inches according to the nature of the soil. Superstition enjoins that decorum should be observed during that operation and that no one should speak during the planting of every seven bunches. These bunches are

Padi Puchuk Nipah,	Perak.
„ Puteh (white rice),	do.
„ Rami,	do.
„ Rantek,	do.
„ Riang,	do.
„ Sabunyi,	do.
„ Sakai,	do.
„ Sakapoi,	do.
„ Samajadi,	do.
„ Santap Bohong,	do.
„ Sarendah,	do.
„ Sarendah Krian,	do.
„ Serai,	do.
„ Serob,	do.
„ Si Anteh Puteh,	do.
„ Sibaris,	do.
„ Sri Menjadi,	do.
„ Sri Patani,	do.
„ Sungkai Padang,	do.
„ Telor Belalang <i>lit.</i> grasshopper eggs),	do.
„ Tongkat (<i>lit.</i> walking stick rice),	do.
„ Tongkat Jelapang,	do.
„ Ulat Batu Bahara,	do.
Pulut Bincha,	do.
„ Che' Besan,	Malacca.
„ Bintang (star rice),	Perak.
„ Bising Datang,	do.
„ Beruk,	Negri Sembilan.
„ Bunga Machang,	Perak.
„ Bunga Tebu,	do.
„ Darat Belut,	do.
„ Gading,	do.
„ Galah,	do.
„ Gendang,	do.
„ Hijau (green rice),	do.
„ Hitam (black rice),	do.
„ Hitam Penawar,	Malacca.
„ Hitam Kadudok,	Perak.
„ Jarum,	Negri Sembilan.
„ Janggut,	Perak.
„ Jawa, ing fast and well. The only from	Negri Sembilan. The best and sweetest smelling form, grow- “Pulut” made into <i>Limang</i> , a national dish.
„ Kapor,	Perak.
„ Katumbak,	do.
„ Kemenyan,	do.
„ Kuching Lekat,	do.
„ Lebai,	do.
„ Lilin,	do.
„ Lupa,	do.
„ Mengkawan,	do.
„ Merah,	Malacca.
„ Minyak,	Perak.
„ Rambutan,	Negri Sembilan.
„ Selangor,	Negri Sembilan and Malacca.
„ Tanjung,	Perak.
„ Pandan,	do.
„ Pipit,	do.
„ Pisang,	do.
„ Rendu,	do.
„ Samat,	do.
„ Santap Mahang,	do.
„ Selam Babi,	do.
„ Senotak Otak,	do.
„ Sepah Petri,	do.
„ Changgai Puteh,	Negri Sembilan.
„ Soh (Sauh),	Perak and Negri Sembilan.
„ Sutra,	Perak.
„ Telor,	do.
„ Tali,	Malacca.
„ Taring Pelandok,	do.
„ Wangi.	

set at distances, varying from half a foot to one and a half foot. In the richest soils even two feet might be allowed, as the bushes expand sufficiently to cover the intervals. The owner afterwards inspects his field occasionally, sees that it has the requisite quantity of water and destroys weeds and vermin. As the year begins to fill, he stretches ropes over the field and attaches scarecrows to them, and he erects a high covered perch in which one of his family constantly watches—at the imminent risk at night of being picked off by a tiger. Birds and rats, which occasionally appear in great numbers, contrive, notwithstanding, to take heavy custom out of the crops.

Newly occupied land near forest, is most subject to their inroads: several insects also infest the rice fields. It is almost incredible the swarms of rats which overran the plains and paddy-fields of Province Wellesley last year. They did much partial damage to the young grain, but the crop was nevertheless most abundant. It is probable that such an uncommon invasion was from the interior. These swarms disappeared nearly as sudden as they came; yet they are sufficiently numerous at all times to form one of the legitimate subjects for grumbling to the farmer. They are most destructive in rainy nights, such, say the ryots, protecting them from their enemies, the owl, snakes, &c. The Malays are obstinate in believing that they swam across from Penang because a great many had been observed floundering in the mud after the retreat of the tide; but the most current opinion with them is that these rats were produced in oyster or other shells!

As the year of the rice appears, the water is generally allowed gradually to drain off to hasten its filling, but it will fully ripen without this precaution. The ryots assist each other both in sowing and reaping. The grain is cut with the sickle * when it has been laid down by its own weight or by wind, or is otherwise in jeopardy. But as the straw is here of little or no value, grass being abundant throughout the year, and as the grain is often, from perhaps an intermixture of different sorts, not all ripe at once; and as the ryots do not readily walk out of the path which their forefathers followed, recourse is generally had to the most dilatory and expensive method of cutting by *renggam*, by which only enough of the stalk is left to admit of its being grasped by the hand and tied up in bunches.

Viewed with the eye of an economist, it is a beautiful object, a ripe waving paddy-field of ten miles or more in extent. The whole air is perfumed by the mellow aroma. The Malay then is in his glory, and all the old women and elderly matrons are seen with conical straw hats plucking the ears of corn; the married women and spinsters under a certain age are left at the distaff and loom and other household duties.

The Malays hold sacred the first three days of harvest, and the presiding spirit of the grain is again evoked and propitiated. These days are *pantang* or under an interdict; or tabooed, as the African would express himself; and until they are past, the cultivator is careful not to permit any thing to be removed from his house.

* * * * *

MODES AND EXPENSE OF CULTIVATION.

No uniform system of culture has yet been adopted, owing to the varying quality and condition of the land.

The most approved system is, of course, that which includes the free use of the plough. But some years must elapse before all of the land shall have been sufficiently cleared of stumps and roots of trees and other impediments to admit of its being generally employed. Even now many lands, fit for the plough, are cultivated in the less efficient manner employed by the Malays on new lands.

CULTIVATION.

BY THE PLOUGH ON 20 ORLONGS OF FOREST LAND.

<i>First Year.</i>		<i>Drs.</i>
Clearing ...	... @ 20 drs. per orlong,	... 400
5 Buffaloes ...	... @ 9 " each,	... 45
3 Plough ...	... @ 5 " "	... 15
2 Harrows ...	... @ $\frac{1}{2}$ " "	... 1
1 Roller ...	... $\frac{3}{4}$ " "	... 0.75
2 Ploughmen and one assistant for 80 days work;		
should the land be very stiff and not well flooded, the cost of this labor will be enhanced by $\frac{1}{4}$ th. The land is ploughed four times and harrowed thrice.		... 24
Preparing $\frac{1}{2}$ orlong as a nursery for rice plants		... 1.20
1 Cart (<i>light construction</i>) ...		... 15
80 <i>gantangs</i> seed paddy ...		... 3
Planting @ 60 cents per orlong ...		... 12

Carried forward,... 516.95

* *Penggiau* or *Sabit*.

	Drs.
Brought forward, ..	516.95
1 Watchman, who also cleans, weeds and looks to the supply of water &c. &c.	15
Reaping by the sickle or <i>penggiau</i> . If by <i>renggam</i> it would be 10 per cent.	8
15 days treading out the grain by buffaloes, and winnowing it, (the former operation is made at night,) and 4 labourers ...	6
Carrying home and housing ...	5
Granary ...	25
A granary costs, for this quantity of grain, about 25 drs. and will last 5 years only; being of light materials.	
Mats, baskets, bags (these cost about 2 drs. and last 3 years) ...	2
Loss by accidents ...	2
Total of 1st year, drs.	579.95

Second Year.

Expenses as before, only deducting for first clearing of land, for buffaloes, carts, ploughs, &c. &c. granary and bags. ...	76
Total expenses for two years, drs.	655.95

PRODUCE.

When the land is of good quality and well suited to the plough, then the net annual average produce of one *orlong* with another will hardly be less than 480 *gantangs* of paddy, or 240 of rice, in favorable seasons.

The crop for 20 *orlongs* will therefore be 12 *koyans* of paddy @ 35 drs. per *koyan*, drs. 420

For the 2 years, therefore, the case will stand thus:

Two years produce 24 <i>koyans</i> of paddy @ 35 drs. per <i>koyan</i>	840
Total expenses of cultivation for the period, or 2 crops	655.90
	Sp. drs. 184.10
Deduct interest, 84 dollars averaged @ 15 per annum and quit-rent, 30 drs.	114
Net profit, Sp. drs.	70.10

Were the paddy to be converted into rice, the profit would probably be sometimes diminished by about 15 Spanish dollars, as the cost of unhusking and winnowing the paddy would amount to 75 Spanish dollars, being $1\frac{1}{4}$ dollar the *kuncha*, and especially as paddy and rice do not always bear the same relative value in the market. The price of 35 dollars has been assumed as that which has, for very many years back, been deemed a fair average one. Whether it will continue to fall or rise, will depend on events which it is not easy to foresee. But the probability is rather in favor of enhanced prices in the *koyan*. At the end of the 2nd year, the clear profit by the above estimate is 70 Sp. dollars after the capital has been returned and interest and all charges have been deducted. For every subsequent year therefore we have

12 <i>koyans</i> of paddy @ 35 drs. per <i>koyan</i>	Drs. 420
Expense of cultivation,	76
	344
Quit-rent and interest,	15
Total profit, Sp. Drs.,...	329

This will be a profit of 16 dollars an *orlong* after deducting interest on the outlay. This will nearly correspond with the rent in kind received from the best land.

It will be borne in mind that the highest present rate of productiveness has been stated at 600 *gantangs* of paddy an *orlong*, which would admit of a net profit, on one *orlong*, of $20\frac{1}{2}$ Sp. dollars. It is probable that a failure of the crop may be looked for once in ten or twelve years; for in these regions there is evidently a cycle of seasons, although the cause is not apparent; and those of the intermediate years will fluctuate in quantity as is the case in most countries.

Having now shewn the return, which—on an average of soils with the most approved present practice, and with every natural obstacle to cultivation, surmountable by industry, removed—it is possible to obtain in favorable seasons; it remains to describe the modes of cultivation which, from want of capital, from local impediments increased by that want, and too frequently from indolence in the cultivator, are adopted by the majority of the ryots. The original cost of *clearing*, it will be held in mind, is always *presupposed*.

BY THE *TAJAK* OR *PARANG*.—20 *ORLONGS*.

	Drs.
<i>Seed time</i> .—Hire of coolies with <i>tajak</i> to cut bushes and destroy weeds	40
<i>Samai</i> or plants	10
Planting @ 60 cents an <i>orlong</i>	12
	62
<i>Harvest</i> .—4 men watching from seed time to harvest, ...	8
Reaping with the <i>renggam</i> @ 10 per cent. paid in kind on the spot,	42
Carrying home and housing @ 6 per cent.,	20
Cost of granary estimated @ 5 drs. a year,	5
	75
	Total Sp. drs., ... 137
Quit-rent averaged as before	15
Interest on outlay	8
	160
Produce averaged as before—value,	420
	260
Yearly net profit, after recovery of capital,	Drs., ... 260

PINJAK-AN OR *TIJAK KERBAU*.

In this method of cultivation, the ryot hires a herd of buffaloes and turns them into the flooded land. They are there driven about until all the weeds and grass are fairly trodden deeply under the mud. The hire of a herd of 50 buffaloes amounts to about $1\frac{1}{2}$ Sp. drs. a day, and they will prepare 2 *orlongs* daily. The expense is Sp. drs. 30 for the 20 *orlongs*.

The other expenses must be calculated as before. The saving in labor, compared with the *tajak* method, will not perhaps exceed 10 dollars, but the gain by a larger crop will perhaps be considerable. The expense of tending a herd of 50 buffaloes if kept for the above purpose, would be 75 Sp. drs. a year. But when carts come into more general use, as roads are extended, the combining of other employment for buffaloes with agriculture will no doubt be introduced more universally.

HUMA.

In this dry cultivation the jungle is cut down and burned, and holes being immediately made in the virgin soil with a sharp stake, four or five seeds of padi are dropped into each, but are not covered with earth. This cultivation is often mixed with that of Indian corn, sesame, cucumbers, melons and gourds and pulses. The cost of clearing and cultivating one *orlong* will be about 12 Sp. drs. the first year, and for the third year, (the second being unproductive) about 10 drs. The average produce for the first year is reckoned about the same as that of *semai* land. It falls off afterwards, as neither the plough or manure are applied.

The Malays cut with the *renggam* on lands where the sickle might be used. In addition to the reason before assigned for this expensive process, namely that the grain does not, from being mixed perhaps, ripen all together, they object to the sickle because a good deal of grain is lost by falling out while being cut. There may be some truth in the first objection and its cause might in time be removed. In regard to the second, the loss by shaking is a mere trifle, compared with the enhanced expense incurred by rejecting the sickle.

It appears, therefore, that by judicious management, capital expended is returned within the second year, the seasons being propitious; leaving a balance of profit in the cultivation of 20 *orlongs* of about 70 Spanish dollars. But it is obvious that were the bare capital to be recovered and no more, within such a short time, the speculation would be a very favorable one where capital had no other more advantageous outlet.

RENT.

Ample as the above-described profit may be considered, yet the money-rent of land is not always proportioned to it. We have been viewing the proprietor and ryot in one person. Disjoin the two and the state of the case is disproportionately altered.

The highest rate of money-rent as yet does not exceed 4 Spanish dollars an *orlong* ($1\frac{1}{3}$ of an acre) the average being about $2\frac{1}{2}$ dollars. But when the rent is paid in kind, its amount is frequently nearly doubled. Money-rent is almost invariably paid in advance, while rent in kind is paid after the harvest. In the latter instance, a poor tenant can give no other security than that of the expected crop, unless indeed he mortgages his land. To this subject I will revert hereafter. But a proprietor will best consult his own advantage by taking a far less usurious one.

A ryot's labor for six months, were he only to employ himself in his rice cultivation, would be about 13 Spanish dollars value. But he is not confined entirely to it, for his family can watch it while he is employed in other labour. In fact he hardly feels this part of the cultivation to be any expense. Should the proprietor of good land get one-third of the gross produce value as rent, then he would receive, under the ploughing system, 140 Spanish dollars for 20 *orlongs* of land, and his tenant would have 204 dollars after deducting the wages of labor. Under the *tajak* method his rent would be the same, while his tenant would get 143 dollars, assuming that the rate of productiveness is the same in both cases; the difference in profits arising from a saving of labor and not from increase of produce. In both cases the landlord would receive a disproportionate share of the produce of his land, while the tenant would have high profits.

Under such a rate of profits, arising too from a small outlay of capital on the part of the farmer, the landlord, it might be said, should have a far larger share in shape of rent. But although it is highly probable that his rents will rise, it is also pretty certain that the risks attending cultivation will cause that rise to be slow. Perhaps if prices of produce do not fall much, or labour becomes dear, he may hereafter be able to obtain a third of the gross produce as rent.

The foregoing remarks rest on ascertained data, but from the nature of the country and the population they may not always be invariably applicable.

If four dollars be taken as the average money-rent per *orlong* of good grain land the corresponding number of years' purchase would be, on an average, about six years. An average of prices will not determine this point; for they will depend on the capital which confined profits in other channels may compel the holders to invest in land. If this were to be the rule, then instances could be adduced of sales at ten years' purchase. The competition for fresh rice-land is now so great that the disposable quantity will most probably, within a very few years, have been given away. The Malays take the best land first if conveniently situated, but otherwise they take that which is most easily accessible, if it will yield a return for the labour to be bestowed on it. It will not perhaps be until all the remaining lands yet lying under jungle shall have been occupied and cultivated that the true value of grain cultivation to the several classes concerned, the landlord, tenant and labourer will be fully ascertained.

* * * * *

With few exceptions, the Malays decline to cultivate dry land permanently, unless it be conjoined with flooded rice-land. In the latter case, the dry land forms the *kampung* or garden with the owner's house in the centre, and in it he plants cocoanuts, plantains, and other fruit trees; sugar-cane, indigo, tobacco, pulses, and sweet potatoes. The proportions in which these two descriptions of land have been occupied may be about one of dry to ten of wet. It is the want of flooded rice-land which is now drawing away to Province Wellesley many of our Penang Malays, and probably the remaining quantity may serve to meet the demand for a moderate period. When all the wet land shall have been located, there will yet remain several tracts of dry land, unless more capital shall have been employed on it than hitherto for the raising of produce adapted to foreign consumption.

* * * * *

As a sort of general rule for present purposes, the quantity of 640 *gantangs* has been assumed as the highest rate which ryots allow, under ordinary circumstances may be obtained from one *orlong* of land. But no correct information can be got from either landlord or cultivators. Actual experiment has therefore been resorted to, or rather a minute investigation of the ripe crops, and the results have been so far satisfactory as to prove that double the above quantity at least, or about 5,424 $\frac{1}{3}$ lbs., could be raised on one *orlong*, provided the whole field could be made *equally productive with the portion submitted to test*, and this would, if only double, be equal to 187 $\frac{1}{2}$ bushels, or 139 $\frac{1}{4}$ bushels by measure, to the acre. It may be observed that the grain was not selected out of a field for examination, but was taken in the straw at random. But cultivation is subjected to so many accidents, that granting the possibility of such

a rate of produce, we yet require facts to shew that it can be extensively realized, or even a near approximation to it attained by judicious management. It has been before observed that a bunch of rice is raised from six or seven seed plants. Bunches may be seen at this moment in Province Wellesley containing forty or even fifty stalks with an ear to each, and from six to seven feet high; and the average number of rice grains to an ear has been found to be about 250; and 360 have been counted in a single ear.

* * * * *

The number of ears of grain, however, are not exact indexes of the produce. Thus, 113 ears of the rice called *Mayang Svati* gave one English quart and 13 ounces by measure, of paddy; while 193 ears of the sort called *Riyong* only gave 1 quart 4 ounces: again, 176 ears of *Pattet* rice gave 1 quart 4 ounces, while 196 ears of the kind named *Mayang Pinang* yielded 1 quart 4 ounces.

* * * * *

In fact, the present profits of ordinary husbandry here are, owing to the bounty of nature, chiefly resolvable into the price of labor engaged on the land; and at the rate at which a ryot can live, he can obtain, even from poor land, a return ample when compared with the labor bestowed on it. But as before remarked, this arises from his not being entirely dependant on rice cultivation.

* * * * *

Descending from the highest to the lowest description of rice land and assuming that the average rate of money-rent for the best land is 4 Spanish dollars an *orlong*, or about one-sixth of the gross produce value; and that in kind, two *kunchas*, or actually one-half of the produce; we shall have the following scale:—

1st

Land of the best Description;—Money-rent, &c.

	<i>Spanish Dollars.</i>
1. Owner's, or landlord's, share according to present custom in money, per <i>orlong</i> , including quit-rent,...	4
2. Tenant or cultivator, ...	12
3. Labour and stock, ...	8
	—
	Sp. Drs.,... 24

Rent in kind, &c.

	<i>Gantangs of Paddy.</i>
1. Owner's or landlord's share, at <i>pawah</i> , i.e., one-half the produce, that being the standing crop on the ground, which he has to cut and carry away, ...	320
2. Tenant's share, ...	107
3. Labour and stock, ...	213
	—
	<i>Gantangs</i> ,... 640

2nd

Land of Medium Quality;—Money-rent, &c.

	<i>Spanish Dollars.</i>
1. Owner's or landlord's share, and as above, ...	3
2. Tenant's share, ...	7
3. Labour and stock, ...	8
	—
	Sp. Drs.,... 18

Rent in kind, &c.

	<i>Gantangs of Paddy.</i>
1. Owner's or landlord's share, and as above, ...	240
2. Tenant's share, ...	27
3. Labour and stock, ...	213
	—
	<i>Gantangs</i> ,... 480

3rd

Third-rate Land;—Money-rent, &c.

	<i>Spanish Dollars.</i>
Owner's or landlord's share, or as above, ...	2
Tenant's share, ...	2
Labour and stock, ...	8
	—
	Spanish dollars,... 12

Rent in kind, &c.

			<i>Gantangs of Paddy.</i>
Owner's or landlord's share,	...	...	160
Tenant's share, none,	...	...	...
Labour and stock,	...	...	160
			—
			<i>Gantangs,...</i> 320
	4th		
	<i>Poor Land.</i>		
Labour at 10 pice per day and stock, &c.,		Dollars,...	8
			—
Return in produce,	...	<i>Gantangs,...</i>	200

Scarcely repaying the outlay.

But as before observed, poverty or other reasons will induce ryots to value their own labour at a much lower rate, when employed on their own account, than when sold to another, so that it might be difficult to fix the exact limit where cultivation would cease.

By the Malayan method on which the above scale is grounded, we have a rate of rent in kind, and profits combined, which it is believed no land can yield in England.

In some cases the landlord gives a *nali*, or the tenth part of a *kuncha*, about half a dollar's value, to the cultivator, who then clears and plants. The young crop is then marked out into two equal portions. Each party takes one, and each watches his own, cuts the crop and houses it.

By this method the landlord may perhaps obtain a little more than one-third of the gross produce value.

At other times the landlord gives an advance of four or five *gantangs* for seed to the cultivator on whom devolves all the charges of cultivation; when the crop becomes ripe it is equally divided while standing on the field, and each party cuts and carries away his own half.

* * * * *

In some parts of China the owner gets 60 per cent. of the produce, the rate of wages being about 8 cents of a dollar. Two crops are taken and each individual bunch of rice is manured during its growth. The labourer occasionally gets 50 *chee* or brass coins (1050 nearly to one Spanish dollar) and his food as daily wages. The Chinese assert that, in this way, an *orlong* would yield 1 *koyan* and 160 *gantangs* of padi.

In a previous part of this Paper it has been shewn that the population, altho' chiefly agricultural, is yet supplied with numerous other sources of gain than that derived from the soil. So long as these keep open, and increasing cultivation draws more largely on the labouring class to supply the new ranks of farmers, the price of labour will not fall below, but probably rise considerably for a while, above its present average rate.

Were these sources cut off, which is a very improbable supposition, the chances being in favor of an increase to them, the labor market would be so glutted as to reduce the price of labour to the lowest possible scale. For those who now live comfortably, and even for natives luxuriously, on the means derived from these sources, in addition to the produce of their land, would be thrown for subsistence entirely on that produce.

* * * * *

HARVEST, FOOD, &c.

Women are the principal reapers or rather pluckers of the grain-fields; but when the more expeditious way of reaping by the sickle is substituted, men will be most useful. At present, a very expert reaper can cut 50 *gemal* in a day. A *gemal* is as many of the upper parts of the rice stalk, with ears attached, as may be grasped by one hand. Of this quantity the reaper never receives less than 10 per cent. and often more. But at this rate he will get about 7½ *chupahs* of paddy or 3¼ of rice, the value of which will vary from 8 to 12 cents. A family of five persons, at an average of only 30 *gemal* each daily, can, by unremitting labor during the two harvest months, at the above percentage, obtain rice enough for six months' consumption, or ample food, by exchanging a part of this, of the usual descriptions, for three months, including rice. In this case, labour might be considered dear, and so it would be, had the poorer labourer the option of constant work.

A Malay is frugal in his diet. Fish is his chief animal food, and he seldom indulges in buffalo flesh, except on anniversaries, marriages, and other occasions of rejoicing. But he is, nevertheless, of an extravagant turn, and fond of dress.

* * * * *

Although the Malay is, on the whole, frugal in his diet, yet the grain, or farinaceous portion of it, is, of the best description, indigenous to the country he inhabits. Were he to be as easily satisfied as the African or native of South America, he might subsist on maize and plantains, here both abundant, and discard luxuries. Whatever might be the abundance of other grain, roots, and fruits, a scarcity of rice would be by him considered in the light of a famine.

* * * * *

A day-labourer in England is able to earn about a peck of wheat, in good times, daily. An American help can earn two pecks. A common Chinese labourer here can easily enough earn one peck of rice. The peck of wheat is about the average value here of 22 cents, and the peck of rice about $17\frac{3}{4}$ or 18 cents. A Malay can earn nearly half a peck of rice daily. In China, it is understood, the agricultural labourer cannot earn above $12\frac{1}{2}$ pecks of rice in a month, by daily and *uninterrupted* labour.

There can be no doubt that wheaten bread is a more nourishing substantial food than rice, and yet the latter is well adapted to the climate and people, and Europeans in the East often insensibly become greater consumers of rice than of wheat.

But wheat requires to be ground, and made into bread before it becomes fitted for general consumption, while rice is used immediately after being cleared from the husk.

A reference to Europe prices will shew that a peck of wheat there will probably always purchase one-third more of other commodities than a peck of rice will here.

Wheat being thus a much more substantial food than rice, it will exchange for much larger quantities of other commodities than rice will. But the difference betwixt the price of a peck of wheat and a peck of rice is about 4 cents only, and sometimes less, the dearness of wheat compared with rice lying in the cost of preparing it for food; while rice, after the separation from the husk, requires no grinding and baking to make it ready for use. A *kati* or one and a third lb. of fine flour costs 15 cents, of coarse flour 7 to 8 cents. The same weight of rice costs 2 cents or nearly so, and a *kati* weight of rice-flour 6 cents. The prices fluctuate a little. They are more or less than here stated.

* * * * *

16. Continuing the subject of the remarks which preceded the above extracts, it is necessary to consider the causes for the non-cultivation of the tracts of land available for rice growing on the coasts of the Peninsula.

17. The causes seem to be the following:—

(1)—**Want of population.**—If in the Peninsula the proportion of inhabitants to the square mile in any way approached that which is attained in British India, China or Java, the struggle for life would no doubt necessitate the cultivation of all the best land. But the population is sparse, and whole districts are uninhabited. Men can choose their occupations and are not forced into agriculture by competition.

(2)—**High rate of wages.**—Scarcity of labour, consequent on sparseness of population, results in the fixing of a high rate of remuneration for a day's work. To this the presence of the mining industry also contributes in no small degree. If the agriculturist can earn as a labourer twice as much as the cultivation of his fields will bring him, he will abandon agriculture and live on imported rice.

(3)—**Competition of more profitable employment.**—Independently of labour which is paid for by wages, there are sometimes fields of enterprise open to Malays which result in the loss to the State of whole communities of agriculturists. The gutta-percha industry is one of these. The Malay paddy-planters of Muar, Padang and Batu Pahat in Johor abandoned their lands two or three generations ago to collect gutta, and their descendants have grown up, in many cases, entirely ignorant of agriculture. They are now taking to it again, but much of the land formerly cultivated is still lying waste.

(4)—**High standard of comfort and luxury demanded by modern Malays.**—A purely agricultural life will not satisfy the modern Malay of the Straits Settlements and Native States, except in somewhat remote inland districts. It requires that the cultivator shall be satisfied with poor fare, and that altogether his style of living shall be simple, modest and

economical. As satisfying these conditions, the Malays of Negri Sembilan are an almost ideal peasantry. Their method of cultivation is excellent, they preserve their ancient habits and traditions, and they are satisfied with very little. In no Malay State that I know of could a more interesting and instructive statistical report upon Malay cultivation be drawn up.

In Malacca, where the Malays are good cultivators and much attached to their fields, cultivation is only one of a man's means of livelihood. The Malacca Malay is extravagant and accustomed to live well; he could, in few cases, afford to live as he does without earning money by fishing, trading, carting goods for hire, wood-cutting, day-labour for Chinese, &c. The same may be said of the Malays of Penang and Province Wellesley and of some places in the Protected Native States.

(5)—**Smallness of profits derivable from paddy planting as compared with other kinds of agriculture.**—While Chinese of the poorer class will embark energetically in market-gardening, gambier and pepper planting and other kinds of agriculture, they are hardly ever found, in the Straits Settlements, earning a livelihood by growing rice. That Chinese look on paddy-planters with contempt, as Colonel LOW declares, is no doubt true. They regard it as a poor sort of trade by which only the most frugal peasants can earn a living. A Chinese in Johor, asked why he did not grow rice, said that he would rather be a coolie on \$7 a month than make his living by cultivating a paddy-field. Chinese of the moneyed class are willing enough to trade in grain by making advances to Malay cultivators on condition of buying the crop, or a large proportion of it, at a cheap rate, but they seldom take up land for rice cultivation, and never embark in this kind of agriculture on a large scale. Were they accustomed to do so, the Malay paddy-planter would no doubt be gradually edged out of this, the only industry that remains to him, by the ever-encroaching Chinaman. It is to be noticed that only one instance of Chinese rice farming is mentioned in the reports received from the Native States. The District Officer, Kuala Kangsa (Mr. BUTLER), mentions an "experiment", on "a few acres", by one KONG LENG, whom he thinks "should be assisted by Government," if he carries out his intention of planting more extensively.

A well-known Mohammedan capitalist in Singapore (Saiyid MOHAMMED ALSAGOFF) made an experiment in rice-cultivation recently on a moderately large scale, at Kukub in Johor. He put three hundred Javanese on a piece of land (total area unknown) which had been previously partially cleared for tobacco planting and though the enterprise was not unsuccessful it was not considered to be sufficiently remunerative to be persisted in.

In the first year the crop was an entire failure, the seed, which had been obtained from the Madras Presidency, proving to be quite unsuitable. In the second year seed-corn procured from Malacca was used and a good crop was obtained. The following is the profit and loss account:—

Wages of 300 Javanese at \$5 a month each for 6 months,...	\$ 9,000.00
Seed-corn, 35 <i>pikuls</i> ,*	37.50
Felling and clearing at \$9.50 for each man employed, ...	2,850.00
	Total expenditure,...
	\$11,887.50
Receipts—211 <i>koyans</i> of paddy at \$60 per <i>koyan</i> , ...	\$12,660.00
	Net profit,...
	\$ 772.00

In the third year paddy cultivation was abandoned and the land planted with coco-nuts.

* Paddy is measured by the *gantang* ($1\frac{1}{4}$ gallon nearly), or the *parah* (10 *gantangs*), 800 *gantangs* making one *koyan* of 43 *pikuls* weight.

4 <i>chupahs</i>	= 1 <i>gantang</i>
16 <i>gantangs</i>	= 1 <i>nali</i>
10 <i>nalis</i> , or 160 <i>gantangs</i>	= 1 <i>kuncha</i>
5 <i>kunchas</i>	= 1 <i>koyan</i> .

One *koyan* of rice weighs about 6,033 lbs. avoirdupois and is nearly equal to 1,044 bushels.

(6)—**Cheapness of imported rice.**—This is so closely connected with the subject of *wages* (see (2) above) that it is difficult to treat the two subjects separately. When Colonel LOW wrote (about 1833) the price of a *koyan* of paddy was estimated to be worth \$35, and the retail price of rice was 3 cents a *chupah*.

The present price of a *koyan* of paddy (January, 1893) of the first quality is \$65, and the retail price of rice in Singapore is 5 cents a *chupah*.

But when Colonel LOW wrote the wages earned by field labourers were:—

Chinese, ... 9 sicca rupees = \$4.36
Tamils and Malays, 6 sicca rupees = \$2.90

The average wages at present in Singapore are:—

Chinese, ... \$7.12 per mensem.
Malays and Javanese, ... \$4.75 do.

The wages for Tamils (free labourers) in Penang are:—

Province Wellesley Estate coolies, about 18 cents a day,
say for 26 days = \$4.68 in the month.

It will appear from these figures that the price of paddy has risen 86 per cent., and that of rice 66 per cent., and that the wages of agricultural coolies have risen in the following proportion:—

Chinese = 63 per cent.
Malays = 64 per cent.
Tamils = 61 per cent.

The price of rice and the rate of wages would thus seem to have risen *pari passu*, and it seems to be obvious that an immigrant population in a new country, with the boundless food-supplies of Burma and Siam on either hand, can import rice almost more cheaply than they can grow it.

18. The measures proposed by British officers employed in the Native States, for the encouragement of the agricultural industry which is thus handicapped, may be considered under the heads:—

- (1) Exemption from land-revenue.
- (2) The development of rice districts by Government works.
- (3) Immigration schemes.
- (4) State experiments (mills and farms).
- (5) Distribution of seed, or loans for the purchase of seed, buffaloes, etc.

19. *Exemption from land revenue for a limited period.*—The best opinions are entirely opposed to this method of tempting settlers. There is nothing new in the proposal. Exemption of this nature for a period of from two to four years was allowed in Province Wellesley sixty years ago with the result that it was condemned by the Land Revenue officials of that day,* as abandonment, as soon as the rent-free period had expired, was common.

Mr. C. LEECH (Commissioner of Lands, Perak) is probably correct in the conclusion at which he arrives (*supra*, p. 17) that "granting land rent free for three years for encouraging paddy-cultivation is a mistake and tends to pauperise the grantees."

20. *The development of rice districts by Government works.*—Irrigation and drainage works might reasonably be undertaken in specially selected districts where the land-revenue system is sufficiently elastic to allow of a prospect of a sufficient return accruing to the State in consideration of the outlay. But Perak has unfortunately been saddled with the only system of tenure with which officers of this Colony were familiar ten years ago, namely, tenure by an English grant or lease with a small fixed quit-rent. I say "unfortunately" because the result in the Colony has been

* Their opinions will be found on p. 31 of *Correspondence relating to the Land Revenue System of the Straits Settlements, 1837-1844*, published in Singapore in 1883.

disastrous, an expenditure being involved for survey which is wholly incommensurate with the land revenue to be collected. An experience similar to that of the Colony is in store for those whose duty it will be to administer the State of Perak in the future, unless the system be altered. Already in that State the expenditure in the Land Department exceeds the receipts.

21. Private owners of land suitable for rice-cultivation in Penang have, to my knowledge, found it a paying speculation to fell the jungle and lay out the land in fields, providing necessary drainage, and then to let the land annually to Malay cultivators.

22. A development scheme which would bring into cultivation swampy land fit for paddy cultivation, but now under forest or secondary jungle (*e. g.* see para. 9 of Mr. C. LEECH'S report *supra*, p. 17) might well be undertaken by a Government, but it ought first to be clear that the revenue to be obtained from the cultivators who are put on to the land will justify the outlay.

23. In this last respect the customary tenure of Selangor and Malacca (which ought to be copied throughout the Protected Native States) is more likely to facilitate the successful accomplishment of such schemes than the leasehold tenure of Perak and Penang, and the permanent character of the land-rents in the latter, seems to me to remove one great incentive to State action, while the technical nature of the documents put into the hands of the peasantry is likely to provide material for difficulty in carrying out works on lands already opened (see for instance the "first consideration" on which Mr. KHO BU ANN properly insists (*supra*, p. 19)).

24. I believe that a district suitable for a development scheme on a large scale, where the conditions are such that a financial success is fairly probable, will be found at Kuala Selangor. The experiment recommended by Mr. DENISON (*supra*, p. 27E) in paras. 39-45 of his report of the 10th October, 1891, might also be tried, if the Malacca tenure is adopted in the district selected.

25. *Immigration schemes.*—With the sight constantly before him of a practically unlimited extent of forest and waste land undeveloped for want of population, the administrator of a Malay State or district is tempted to recommend almost any scheme which will encourage settlers to come in on any terms. There is considerable danger, therefore, that economical principles will not always be borne in mind. Immigration schemes may be considered as they affect Malays, Tamils and Chinese respectively.

26. *Malays.*—Writing to Government, as Commissioner of Lands Titles, on the 14th December, 1885, I said:—

"The Residents of Native States should set themselves to create a land-revenue. The mere importation into a district of a body of Malay settlers who, after the manner of Malays, may very possibly go somewhere else as soon as the term for which they enjoy exemption from taxation expires, does not afford much ground for exultation. On the contrary, the destruction of forest trees and the temporary cultivation of land will, if followed by abandonment, be productive of absolute damage without any return whatever. And even if cultivation be continuous, the presence of a population who, though contributing nothing, or an inadequate amount, to the State, require nevertheless police protection and in other ways add to the cost of the Government establishment, is a burden to the State rather than an advantage.

It is very important, in order to understand the full bearing of this question, to study the early history of the Colony. It will be a permanent disgrace to this generation of public officers if we repeat in the Native States the blunders which our predecessors committed in Penang and Province Wellesley in the early part of the century. As long ago as 1828, when much of the mischief had been done, it was considered by Governor FULLERTON that a general land-tax of $2\frac{1}{2}$ rupees (\$1.12 $\frac{1}{4}$) per acre (being a fair average equivalent of one-tenth of the grain produced on an acre of land) would not be an unfair impost. I do not consider this in any way an ex-

cessive estimate of the minimum rate which may be fixed for land-rent and district-cess (Municipal rates) combined.

* * * * *

I would call attention to the following extract from a minute by Governor FULLERTON, dated August 23rd, 1828, which seems to me to place the whole matter clearly and unanswerably:—

“That no Land Revenue can ever be raised in these Settlements is I am aware
“a received opinion, but it is the opinion of those who never saw a land revenue raised
“anywhere else, and who therefore do not understand the principle on which it must rest.
“All the lands of this Island (Penang) belonged of right to the Government and they
“were free to grant or withhold and to dictate the terms on which they were to be held.
“Had the Government preserved that right and only issued the land gradually or in
“due proportion to the growing capital and increased population and labour of the
“country, there is no question that they might have had a land revenue, small indeed
“at first but growing with the wealth and demand of the people, though probably never
“reaching the extent it has done on the Continent of India. But, instead of following
“this course, they issued gratuitously all the lands of the Island at once, everyone that
“asked had a grant, many who never meant to settle but took the land for *nothing* in
“the hopes of selling it for *something* hereafter. The whole of the lands of the
“Island were at once thrown on the market and of course to an extent greater than
“there was or has ever been capital and labour to cultivate it. Land became worth
“nothing and would pay no revenue, for nobody would pay 2½ rupees per acre for
“land where they could get it for nothing.

“The same cause would have produced the same effect, the same course would
“have produced the same result, anywhere else on the Continent of India or else-
“where. If the waste land of many villages in the territory of Madras were at once
“thrown open and gratuitously given away, the cultivated land assessed would be
“abandoned and there would be no such thing then as land-revenue, until capital
“so far increased as to take up the whole in the market.

* * * * *

“I am aware that it may be argued that the vast quantities of unoccupied pro-
“ductive lands under the neighbouring States might preclude the operation of the
“principles here laid down as the ground-work of land-revenue, but to this it may
“be answered that in no neighbouring States is land granted away free; from all
“I can learn the lands are liable to the exaction of the tenth of the produce, and in
“reality to whatever other exaction any Chief in power, or relation of a Chief,
“chooses to impose; the benefit of protection of person and property enjoyed under
“British rule is more than equivalent, I presume, to the payment of 2½ rupees per
“acre which is in fact the computed value of the tenth of one acre's produce in
“grain, the lowest species of cultivation. The aggregate assessment of the land in
“Kedah since the Siamese usurpation, I have heard computed at 40 per cent.
“of the produce. Province Wellesley has been peopled and cultivated by refugees
“from thence and although this Government have granted them lands at the old
“rate, 20 cents of a dollar per *orlong*, I doubt not they would willingly have agreed
“to pay their tenth as in other Malay countries, and we must not here forget the
“very large sums it has cost this Government to settle the inhabitants, to main-
“tain and support establishments for their protection, for the increase of which there
“is a constant call without any adequate recompense to Government.”

27. Holding these views, I confess that I have no faith in colonisation schemes which begin with bribing Malays by advances and loans to take up land and, at the end of a few years, leave a deficit which has to be written off, while the new Malay community, if any is permanently established, becomes a source of expense to the State, in respect of roads and police protection, without making any adequate contribution to the revenue. Mr. DENISON'S report on the expenditure on account of the introduction of Malay settlers in Lower Perak can hardly be considered satisfactory from a financial point of view. And the various references to the subject scattered through these reports shew, it is satisfactory to see, that the more thoughtful of the District Officers are alive to the impolicy of the artificial creation of Malay settlements by such means. Mr. BUTLER (*supra*, p. 12) says “so far as my experience goes, I have found that the advancing of
“money to Malay settlers does more harm than good, for they generally
“do no work so long as it lasts and, when it is all spent, try to get out of
“the place to avoid repayment.” This agrees with the description given

by Colonel LOW (*supra*, p. 47) of the result of an experiment made in Province Wellesley in 1825, "the Government was induced to advance cash to the cultivators and to give them rice lands at a rate of quit-rent almost nominal. This liberality was but ill-repaid. Few of the Malays who received advances cultivated the land allotted or returned the loan; while the worst consequence was that they began to think that their services could not be dispensed with and thus a great incentive to exertion was removed." The danger, too, that Malay settlers who have received advances and taken up land in one district may migrate to another, before the liabilities are cleared off, or their rent-free period is terminated, and may take up fresh land and get fresh advances from a second District Officer to whom they are strangers, must not be overlooked. Mr. DENISON has elsewhere reported that he has not found his settlers shifting to other States or districts, but something of the kind is alluded to (*supra*, p. 16).

28. *Tamils*.—Statistical information as to the cost of an experiment in colonisation from the Madras Presidency is altogether wanting. This detracts from the value of the suggestions made by the Resident of Perak in his Administration Report for 1890, para. 74,* and by Mr. T. H. HILL in his letter printed with these papers (*supra*, p. 18). The Roman Catholic Tamil colony at Bagan Serai reported by Mr. TREACHER to be "fairly prosperous" (see p. 10 of his report), does not seem to be financially successful (*supra*, pp. 14 and 56) and the statement of the Bishop of Malacca (*supra*, p. 26) that "it is cheaper for a Tamil to buy rice in the bazaar than to grow it" is not encouraging.

29. *Chinese*.—In his Administration Report for 1890 (para. 11), the Resident of Perak (Mr. SWETTENHAM) reported "it has been possible to make arrangements for the introduction of some Chinese agriculturists with their families and the Government will give every assistance and encouragement to increase the number of such settlers." From the report of Mr. TREACHER, however, (*supra*, p. 4, para. 9) it would appear that there can be little prospect of obtaining Chinese colonists in sufficient number for the extension of rice-cultivation in the Malay Peninsula. And unless they could be introduced on such terms as would shew that the experiment is economically sound, the gain to the State is not apparent. I consider it quite hopeless to expect Chinese to take up paddy-planting on a large scale in the Native States, and apparently no means of inducing them to do so can be devised by the Native States Officials (see para. 15 of Mr. C. LEECH'S report, *supra*, p. 18).

30. *State experiments (Mills, Farms, etc.)*—Mr. TREACHER is in favour of the erection of husking machinery by Government, but the estimated cost of such an experiment in any one district and the details of the scheme, which would involve somewhat complicated relations between the Government and the cultivators, are not given. Similarly, Mr. C. LEECH suggests (*supra*, p. 18) a "model farm," with a scientific expert at the head of it and an agricultural school attached to it, which "if properly managed" is after a time to be self-supporting. But here again details and figures are wanting. It is impossible to deal seriously here with suggestions of this kind.

31. *Distribution of seed, or loans for the purchase of seed, buffaloes, etc.*—I quite agree with those District Officers who think that assistance of this nature should be given to paddy-planters. But seed should be paid for by the cultivator at cost price, and the punctual repayment of loans (which should only be made on the security of a headman) should be exacted.

* "I am still decidedly in favour of introducing annually a number of Tamil labourers (men and women) to improve the labour supply and reduce the ruling rate of wages."

32. There is little information about the cultivation of *ragi* (*eleusina coracana*) in these reports, see, however, the concluding paragraph of the report of Mr. STEPHENS (*supra*, p. 15).

33. The conclusions which I submit for the consideration of His Excellency the Governor are the following:—

- (1) An experiment on a large scale under which a large area of paddy-land would be cleared, laid out and drained, and cultivators placed upon it, upon terms which would enable them in a few years to acquire a proprietary right, subject to assessment, might be tried both in Perak and Selangor. The Residents of those States might be asked to report what the preliminary cost would be, and to make recommendations as to locality and area, the number of years in which the cultivators would be allowed to acquire a proprietary right on gradual repayment of the initial cost, and the terms as to assessment.
- (2) State immigration schemes are, I fear, illusory as far as paddy cultivation is concerned. But it might be possible to induce men of some wealth and position, natives of India, China, Siam, Java, Ceylon or the Malay Peninsula, to colonise districts assigned to them upon the promise of, after proved success, high rank in the State and a substantial reward. I do not see why the Government of a Native State requiring population should not issue a notification offering an honorific title and a large payment to any influential native who will within a limited number of years colonise a new district (to be selected) with so many hundred families of his countrymen over whom he would be placed as headman with Magisterial powers. The initial expense must be borne by himself, but on proved success, a named money reward should be paid to him, and he should have a hereditary right to a percentage on the revenue collected in the district.
- (3) The Resident Councillor, Penang, in his capacity of British Consul for the Siamese States on the West Coast of the Peninsula, should be called on for a report upon the working of a system said to be in force in Kedah under which a Penang Chinese, who holds a concession for the sole right of erecting and working rice-mills in the State, makes advances to cultivators and receives the produce which is cleaned in Kedah and exported as rice. It is possible that some such system might with advantage be introduced in connection with the development scheme (1).
- (4) Exemption from land revenue for a term of years and bounties of all kinds to Malay settlers (who are migratory) should be prohibited.
- (5) Seed should be issued or loans granted subject to the conditions mentioned in para. 31.
- (6) The information contained in Colonel LOW's book might be usefully added to and brought up to date by the aid of full reports, by the Resident Councillors and Residents of Native States, on Malay agriculture.

W. E. MAXWELL,
Colonial Secretary.

Singapore, 28th January, 1893.

1893

SUPPLEMENT TO THE STRAITS SETTLEMENTS Government Gazette.

FRIDAY, 30th MARCH, 1894.

REPORT ON THE GARDENS AND FORESTS DEPARTMENT,
STRAITS SETTLEMENTS.

BOTANIC GARDENS, SINGAPORE.

Staff.

1. In the early part of the year, the Mandor, ANIFF, resigned his appointment, and T. C. PEREIRA replaced him. The coolies worked well throughout the year, but there was a good deal of sickness, mostly of a mild type, among them. There were two or three cases of injury from poisonous trees or fruits, the dangerous plants being *Melanorrhæa*, *Hippomane Mancinella* (the Manchineel), and *Kentia MacArthurii*; and one man was much hurt by a deer which attacked him while feeding it.

Visitors.

2. The number of visitors to the Gardens was as large as usual, and included many European botanists of note, on their way to Java to make botanical researches, several of whom expressed regret that there was no laboratory accommodation in the Botanic Gardens, as, in many respects, Singapore was better suited for the carrying on of research than Java.

The Regimental Band performed once or twice a month on Friday afternoons in the Gardens, and attracted many visitors.

Aviaries.

3. The zoological collection proved as attractive as in former years, and several interesting animals and birds were added to it. Among these were:—A mias (purchased); six common monkeys (presented by Mr. MACHADO); a golden cat (*Felis Temminckii*, presented by Mr. MOUSLEY); a black bear (female, purchased); an Australian dingo (presented by Captain PITTS); a black buck (presented by the 2nd Battalion of the Lincolnshire Regiment); one rusa (female, *Cervus equinus*); one American deer (presented by Captain DAVIES); two bamboo rats (*Rhizomys*, presented by Mr. GOODHART); two Raffles' squirrels (purchased); two common squirrels (caught); one emu (presented by Captain TALBOYS); one purple coot (presented by Mr. MACHADO); two Malacca swamp tortoises (*Cestudo Amboinensis*, captured); one monitor (*Hydrosaurus salvator*, presented). Two hamadryads (*Ophiophagus elaps*) and several other snakes were captured in the Gardens.

A common monkey was born in the aviary on the 27th of March. The teal on the lake also hatched out a brood of ten ducklings, which were unfortunately all destroyed by hawks or eagles.

New and Rare Plants.

The following plants, seldom or never before flowered in Singapore, flowered this year:—*Brassia caudata*; *Aspasia variegata*; *Cattleya Schroderæ*; *C. Bowringiana*; *Oncidium cebolleta*; *O. roraimense*; *O. luridum*; *Mormodes pardinum*; *Lycaste aromatica major*; *Miltonia spectabilis*; *Laelia harpophylla*; *Stanhopea grandiflora*; *S. eburnea*; *Catasetum tridentatum* (from South America and the West Indies); *Dendrobium sanguinolentum* and var. *cerinum* (from Kedah Peak); *D. antennatum* (New Guinea); *D. hymenopterum* (Kedah Peak); *Cymbidium lancifolium* (Malacca); *Sarcanthus castaneus* (Singapore); *Vanda*, Miss Joaquim (a hybrid between *V. teres* and *V. Hookeriana*); *Cleisostoma crassum* (Borneo); *Saccolabium calceolare* (Borneo); *Rhododendron Brookei* (Borneo); *Aristolochia gigas Sturtevantii* (Trinidad); *Didymocarpus citrinus* (Kedah Peak); *Sonerila*, a new species with tuberous rhizomes (Kedah Peak); and another large-branched species from Igeh, which was presented by Mr. A. MACHADO, together with a very fine flame-coloured *Didymocarpus*, a new genus of *Commelinaceæ*, near *Polia*, and *Codonacanthus* sp., all from the same locality; *Trevesia eminens* (Philippines); *Entada polystachya*; *Hedychium longicornutum* (Malacca); *Clerodendron minahassæ* (Celebes).

Among the ornamental foliage plants and ferns, the most remarkable species received were:—*Asplenium scandens* (Borneo, presented by Bishop HOSE); *A.* sp. (Perak); *Iecanopteris carnosa*, Bl. (Malacca); *Adiantum*, nsp. (Singapore); *Nephelaphyllum tenuiflorum* (Kedah); *Cyrtandra*, sp. (Borneo, presented by Mr. ST. V. B. DOWN.

During the year, a catalogue of the Garden plants was drawn up. It is hoped that it may be printed this year, as it will be useful as a reference list, and in arranging for exchanges with other Gardens. A bulletin, treating of the cultivation of indigo, patchouli, and fibre plants, was also published.

Artist.

The Artist, Mr. JAMES D'ALWIS, was employed during the year in making drawings of new and rare plants peculiar to the Malay Peninsula.

Experimental Garden.

The clearing of the ground formerly known as the Military Reserve, for the arboretum was continued, and the positions of the natural orders as far as *Urticaceæ* were marked out, labelled and planted up with such species as could be procured. The economic groups were also further developed, and many additional kinds planted. A piece of damp waste ground was devoted to a collection of screw-pines (*Pandani*), and a number were planted and labelled.

During the year, a number of plants of economic value were obtained, including several new strains of pineapples, viz., the black pine of the West Indies, the Abacaxi from Pernambuco, and English pines from Windsor Castle. A valuable cooking plantain was received from Jamaica, and a stock of the best native kinds received from Malacca. Some seeds of good strains of Florida oranges, presented by Admiral AMMEN of Washington, failed to germinate. A valuable yam from New Guinea was also presented to the Gardens, and is growing rapidly. A good stock of Cola nuts was received from Kew. This plant grows very well here, and has flowered, but has not yet borne fruit.

Among fibre plants, *Urera tenax* was received from Natal, and a stock of the wild plantain (*Pisang Karok*) from Malacca.

Inspection of Coco-nut Trees.

The inspection of trees, and destruction of dead or decaying trees, was carried on as in past years, and 279 notices were served on various persons during the year. Fourteen hundred and sixteen (1,416) dead trees and stumps were ordered to be destroyed, and twenty-six piles of rubbish, likely to act as breeding-places for beetles, were cleared away. In most cases, the notices were promptly complied with, as the Natives quite understand the damage which has been and is being caused by the insects, but in sixteen cases it was found necessary to prosecute. Fines to the amount of \$33 were inflicted on seven persons. Six others, immediately complying with the notices on receiving summonses, were dismissed on paying the cost of the summonses, and in three cases the owners could not be found and the summonses had to be withdrawn.

Much trouble has been caused by one or two cases in which the piles of sawdust and refuse tan-bark were so extensive that it was impossible to entirely destroy them. In these cases the owners are compelled to employ men to turn over the refuse, and destroy the grubs and beetles, which, as the insects are found to have some value for feeding ducks, they are not unwilling to do.

Experiments were made in destroying the larvæ, with gas-water and with London Purple. But it was found that the former had but little more effect on them than ordinary water, while grubs put into London Purple seemed quite unharmed.

During the year, one tannery was burnt down, and underneath and between the houses many larvæ were found to exist, nor had the fire made any great diminution in their numbers, as living grubs were found less than a foot below the ground where the houses had been burnt.

Expenditure.

Vote,	...	...	...	...	...	\$	c.
						700	00
						\$	c.
Salaries,	...	...	...	...	444	20	
Transport,	...	...	...	...	76	61	
Uniforms,	...	...	...	...	10	00	
Expenses in removing trees and stumps,	...	...	...	...	169	00	
					699	81	
Balance,	...	...	...	...	0	19	
						\$700	00

Herbarium and Museum.

During the year, a large number of specimens were added to the herbarium. In an expedition to Kedah Peak and its neighbourhood and, later, to the Perak Hills, I obtained 860 specimens; 259 plants were collected by Mr. FOX, and 175 by a native collector in Pahang; 196 specimens were sent from Penang by Mr. CURTIS, and 486 from Malacca sent by Mr. GOODENOUGH; Dr. KING presented 318 specimens

from Perak and India, and 64 specimens were sent from the almost unknown region of Legeh by Mr. A. MACHADO.

Dr. HAVILAND presented 454 specimens from Borneo, and Mr. A. EVERETT 83 specimens of mosses from Borneo and the Natuna Isles. Baron VON MUELLER presented 76 Australian plants.

Specimens were sent in exchange or for identification to the British Museum, Kew Gardens, Dr. KING, Baron Von MUELLER, Dr. COGNIAUX, Colonel BEDDOME, Dr. HACKEL, Dr. BROTHERUS, and Dr. BURCK.

A good series of named varieties of paddy was received from Manila; a series of named dammars was procured in Malacca, and a number of other economic products were collected, and the whole collection re-arranged and classified. Several large specimens of timber were also obtained and the hand specimens were arranged in a cabinet.

Library.

In addition to the usual periodicals and Garden Reports, the following works were received and added to the Library:—

Presented:—

- Dr. TRIMEN.—Handbook of the Flora of Ceylon, Vol. I.
 Dr. KING.—Materials for a Flora of the Malay Peninsula—part 4.
 C. MOORE.—Handbook of the Flora of New South Wales.
 F. SANDER.—Reichenbachia, Vol. II.
 Dr. MASTERS.—List of Conifers and Taxads cultivated in Britain.
 Do. —Conifer Conference 1891—Introductory Address.
 TRELEASE.—Missouri Botanic Garden—3rd and 4th Annual Reports.
 RENDLE, A. B.—Falling of Leaves.
 Do. —An Advance in our Knowledge of Seedlings.
 GRESHOFF, M.—Monographia de Plantis Venenatis et Sopiensibus ad pisces capiendis.
 HOOKER, Sir JOSEPH.—Flora of British India, Part XIX.
 MACMILLAN, CONWAY.—The Metaspermæ of the Minnesota Valley.
 RIDLEY, H. N.—Flora of the East Coast of the Malay Peninsula.
 BAILEY, VERNON.—The Prairie Ground Squirrels.
 A. K. FISHER.—Hawks and Owls of the United States.
 VEITCH, H. J.—Manual of Orchidaceous Plants—part IX.
 MACDONALD, A. C.—Ensilage (Capetown), presented by the Author.
 Bulletin van het Kolonial Museum te Haarlem, 1892-3.
 Acta Horti Petropolitani, Tom. XII, fasc. II, presented by the Director of the Botanic Gardens, St. Petersburg.

Presented by the Government of the United States:—

- Dr. G. VASEY.—The Agricultural Grasses and Forage Plants of the United States, 1889.
 Do. Monograph of the Grasses of the United States—Grasses of the South.
 Do. Report of an Investigation of the Grasses of the Arid Districts.
 Do. Illustrations of North American Grasses, Vol II.
 Do. Reports of the Botanist for 1889 to 1892.
 J. M. COULTER.—Manual of the Phanerogams and Pteridophytes of W. Texas, Vol II, Parts 1 and 2.
 J. N. ROSE.—List of Plants collected by Dr. EDWIN PALMER in 1890, in Mexico and Arizona, Vol. I, 4.
 Report of the Secretary of Agriculture, Washington, 1892.

Purchased:—

- MIQUEL.—Choix des Plantes Rares.
 MARTIUS.—Historia Naturalis Palmarum.
 CASTILLO.—Flore de la Polynesie Française.
 LOCK.—Coffee and its Culture.
 JACKSON, B. D.—Index Kewensis, Part I.
 SAGOT, P.—Manuel Pratique des Cultures Tropicales.
 SCORTECHINI.—Description of new Scitamineæ of Malay Peninsula.
 BECCARI, O.—Description of new Palms, New Guinea.

Exchanges.

The usual exchanges of plants and seeds with kindred institutions have been maintained; 1,247 plants and 508 packets of seeds were received from the undermentioned contributors, and 841 plants and 133 boxes and packages of seeds were sent out:—

Contributors:—

Royal Gardens, Kew.	J. d'Almeida, Esq., Singapore.
Botanic Gardens, Calcutta.	A. Cohen, Esq., Pernambuco.
Do., Ceylon.	Admiral Ammen, Washington, U. S. A.
Do., Durban.	Miss Ridley, England.
Do., Saigon.	J. P. Joaquim, Esq., Singapore.
Do., Hongkong.	R. Little, Esq., do.
Do., Bangalore.	W. Boxall, Esq., do.
Do., Buitenzorg.	W. Micholitz, Esq., do.
Do., British Guiana.	St. V. B. Down, Esq., do.
Do., Jamaica.	H. M. Becher, Esq., do.
Do., Adelaide.	A. D. Machado, Esq., Kelantan.
Do., Paris.	W. Nanson, Esq., Singapore.
Do., Trinidad.	Geo. Derrick, Esq., do.
Do., Port Darwin.	G. Pechè, Esq., Moulmain.
Messrs. F. Sander and Co., St. Albans.	J. R. Hilty, Esq., Singapore.
" Cannell and Sons, Kent.	The Right Revd. Bishop Hose.
" Dammann and Co., Italy.	A. Ericsson, Esq., Singapore.
" Boehmer, Yokohama.	T. Sarkies, Esq.
" Reasoner Bros., Florida.	Hon. Martin Lister, Negri Sembilan.
Baron von Mueller, Melbourne.	Dr. Ellis, Singapore.
Agri-Horticultural Society, Madras.	Seah Liang Seah, Esq., Singapore.
J. Ravensway, Singapore.	M. Myre de Vilers, Siam.
	R. W. Hullett, Esq., Singapore.

BOTANIC GARDENS, SINGAPORE:

Statement of Receipts and Expenditure for the Year 1893.

RECEIPTS.		EXPENDITURE.			
	\$ c.	<i>Salaries.</i>		\$ c.	\$ c.
By Balance in Bank, ...	455 85	Herbarium Keeper, ...	235	53	
" Government Grant,	8,500 00	Chief Mandor, ...	235	00	
" Sale of Plants and		Carpenters, ...	212	34	
Flowers, ...	821 59	Printers (Label), ...	120	00	
" Miscellaneous Re-		Peons, ...	167	50	
ceipts, ...	150 85	Aviary-keeper, ...	95	88	
" Interest, ...	27 10	Mason, ...	123	40	
		Police, ...	348	05	
		Coolies, ...	3,298	00	
		<i>Bills.</i>			4,835 70
		Manure and Cartage, ...	189	67	
		Food for Birds and Animals,	802	66	
		Purchase of Pots and Tubs,	322	66	
		Purchase of Seeds and Ani-			
		mals, ...	184	55	
		Purchase of Books and Her-			
		barium Paper, ...	658	53	
		Purchase of Tools and			
		Stores, ...	372	43	
		Purchase of Timber, Planks,			
		etc., ...	351	47	
		Purchase of Bricks, Lime,			
		etc., ...	214	81	
		Purchase of Laterite and			
		Gravel, ...	519	06	
		Repairs to Buildings, ...	333	06	
		Subscription to Telephone,	90	00	
		Director's Petty Expendi-			
		ture including Freight, ...	360	24	
		Assistant Superintendent's			
		Petty Expenditure, ...	112	10	
		Miscellaneous, ...	529	88	
					5,041 12
					9,876 82
		Balance, ...			78 57
					<u>\$9,955 39</u>
	<u>\$9,955 39</u>				<u>\$9,955 39</u>

FOREST DEPARTMENT, SINGAPORE.

Introduction.

The great reduction of the Forest Vote for this year has precluded any great progress being made in forestry, and the consequent reduction of the number of men employed has been followed by an increase in thefts of Government timber and in fires. Two small reserves have been practically abandoned, viz., Bedok, and Upper Tanglin, and it has been difficult to protect the other reserves or to keep the boundary-paths open and clean.

Staff.

The absence of Mr. DERRY on leave in June, entailed transferring Mr. GOODENOUGH to Malacca to take up the acting appointment, and his place was taken by the Coco-nut Trees Inspector, BAKER, for some months, when T. BAYLISS was appointed. From January to November, 19 forest watchmen were employed, but it was then found necessary to reduce them to 10.

Planting.

A considerable number of timber trees were planted during the year, chiefly Bilian (*Eusideroxylon Schwagerii*), of which, 2,270 young trees were planted on Bukit Timah, and 1,680 at Bukit Mandai, where also 970 trees of Balam and 370 Kuku Balan Utan were planted. The "Fire-guard" along the Bukit Mandai Road was cleaned of weeds. The trees have now attained a fair size, and have already shewn their use in resisting the advance of fire.

The India-rubber trees (*Hevea braziliensis*), male bamboos (*Dendrocalamus strictus*), and Rengas (*Gluta Renghas*), planted some years ago, have made rapid growth and seem to be doing very well. Many more young plants of Bilian and other timber trees sown in 1892, remain in the Nursery beds, but cannot be planted out on account of want of funds. Indeed, an extra grant of \$500 was found necessary in order to cover the expenses of planting out those which were ready for removal this year.

Licenses.

Owing to the working out of most of the mangrove swamp districts in the neighbourhood of Singapore, the application for firewood licenses has very much increased, and the demand can hardly be supplied, although the price of the licenses has again been raised. One hundred and thirty-six (136) passes for cutting firewood, fishing stakes, lalang, and rattans, in the reserves of Changi, Kranji, Seletar, Sungei Pandan and Toas were issued.

		\$	c.
The revenue derived from these passes and other sales amounted to		441	50
		\$	c.
Mangrove firewood,	...	356	50
Fishing stakes, rollers, etc.,	...	35	00
Rattan, ...	...	1	00
Lalang, ...	...	1	50
Sale of gutta-percha leaves,	...	12	00
Sale of an old hut, ...	...	2	00
Sale of an old boat, ...	...	4	00
S'marum timber, ...	...	2	00
Temporary occupation licenses, ...	...	2	50
		<hr/>	
		416	50
Farming of pepper encroachments,	...	18	00
" fruit trees, ...	...	7	00
		<hr/>	
		\$441	50
		<hr/>	

Fires.

Fourteen fires occurred in the reserves during the year, about 202 acres of lalang, and brushwood being destroyed. The largest outbreak was at Bukit Mandai reserve, where 152 acres of grass and secondary forest, and upwards of four hundred seedlings were burnt.

Prosecutions.

Nine persons were prosecuted for removing timber, etc., one of whom was cautioned and dismissed, the remainder were fined or imprisoned, the fines amounting to \$104, of which, \$66 were paid.

H. N. RIDLEY,
Director of Gardens and Forests.

GARDENS AND FORESTS DEPARTMENT, PENANG.

1. There has been no change in the staff during the year. MAHOMED HANIFF, who was Acting Overseer of the Waterfall Garden at the date of my last report, was confirmed in the post on the completion of his apprenticeship in June.

Maintenance of Forest Reserves.

2. Consequent on the reduction of the Government Grant from \$2,300 in 1892 to \$1,000 in 1893, the number of Guards had to be reduced to five, which is the least with which any effective protective work can be done in such small and scattered mountainous reserves as those in this Settlement.

With this staff, the boundaries, aggregating 65 miles in length, have been kept as clearly defined as circumstances would permit. Twelve persons were prosecuted for illicit timber cutting, and two for causing jungle fires. Two of these cases were dismissed, and the remainder fined in sums varying from \$2 to \$50, the total amount of fines inflicted amounting to \$174.

3. The Sergeant's quarters on Government Hill tumbled down during the year, and there being no money available for re-construction, he has been obliged to hire a house and live at an inconvenient distance from his work. The temporary station at Telok Bahang is also in an advanced state of decay and will soon be uninhabitable. These buildings have hitherto been maintained out of the annual grant, but on the reduced scale this is no longer possible, and additional provision for buildings is necessary.

4. The Revenue Survey, completed during the year, shows that the protected forest area is greater than was originally estimated, the actual extent being 15.75 square miles, or 10,057 acres, equal to about one-seventh of the whole island; and Pulau Jerejak 1.30 square miles, or 830 acres. These reserves are in eight blocks, mainly on the sides and crests of steep hills at from 1,000 to 2,750 feet elevation, and are for the greater part stocked with valuable kinds of timber. Owing, however, to their inaccessibility to timber-cutters, it is improbable that any considerable revenue will be derived from the greater portion, unless timber and charcoal become much more expensive than at present.

5. It must, however, be borne in mind that the value of these hill reserves is not represented by the probable amount of revenue to be derived from them, either now or in the future, as their purpose is mainly climatic, and it would be a great misfortune should they by any means be destroyed.

6. The most important, from a revenue-producing point of view, is the North-West reserve, a great portion of it being bounded by the sea. Licenses for cutting within this, and easily accessible parts of some of the other reserves, would, I believe, be willingly taken out at considerably higher rates than at present paid, but considering that no restriction had been put on timber-cutting up to 1885, and that all the best kinds of timber are of slow growth, strict supervision would be necessary. My opinion is that it would be better to wait a few years longer before issuing licenses for these reserves.

7. A good number of specimens of forest trees, &c. were collected during the year while on inspection duty in connection with forest reserves, &c., and about 720 of these were sent to Kew, Dr. KING, the British Museum, and Singapore. Early in the year, the whole of the *Dipterocarpaceæ* collected by myself in Penang and Langkawi were sent to Dr. KING, on loan, for use in connection with the working out of this order for "Materials for a Flora of the Malayan Peninsula." These he has since returned named, and a large proportion prove to be previously undescribed.

Waterfall Garden.

8. There has been no falling off either in the attraction, or appreciation by the public of this garden, and, as in previous years, by far the greater portion of my time has been devoted to it. Many additions and improvements have been effected, and a great number of new and interesting plants added to the collection.

9. Two thousand and five hundred (2,500) plants and 82 packets of seeds were distributed free to public institutions and by way of exchange, and about the same number of plants sold, the total amount received from this source amounting to \$500. Ornamental foliage and flowering plants are most in demand, but a good number of shrubs, fruit trees, shade trees, &c. are included in these figures. A list of the principal Contributors and Recipients is given in Appendix B annexed.

10. Among the more striking plants that flowered in this garden during the year (of which an abbreviated list is given in Appendix C) was a giant plant of *Grammatophyllum speciosum*, which bore about one thousand flowers. This plant was photographed by local photographers both amateur and professional. Another was *Aristolochia gigas* var. *Sturtevantii*, with enormous flowers over twenty inches across. This plant was, by the kindness of the Kew authorities, carefully packed and sent on board the steamer the morning I left London for Penang, and, although a rather weak plant, reached here alive. It is now nearly always in flower, and several plants have been propagated from the original, some of which have already flowered in the other Settlements. It is a truly remarkable plant, its great drawback being its abominable smell.

11. Some new beds have been made near the office and planted with annuals, flowering shrubs, &c., and also a circular clump of palms that had outgrown their tubs. Many trees of various kinds, principally indigenous, such as *Styrax serrulata*, *Pentace Curtisii*, &c., have been planted in various parts of the grounds. Cannas have, as in 1892, the first year the finer hybrid forms were introduced, been a striking feature. Messrs. JAS. VEITCH & SONS kindly presented a set of a dozen varieties of the best new ones that have been distributed since 1890. Several new hybrids have also been raised in the garden here from crosses made by myself, one of which is superior to any of those received from England, and by the permission of His Excellency Sir CECIL CLEMENTI SMITH, the late Governor, bears his name.

12. A new shed for ferns and begonias has been erected, mainly with material that had been used for the Agricultural and Horticultural Show, and the plants have made excellent progress since being placed in it. It will, however, like all soft wood structures in this climate, last only a comparatively short time.

The octagonal plant shed, which contains many of the more valuable plants in the garden, has been entirely renewed with well seasoned *chengal* timber and *bertam* chick roof for shade, so that it will not require any further attention for at least three years.

13. Two new water tanks have been built, one for ferns and the other for orchids, and connected with the water supply from the swimming bath, so that now there is scarcely a botanical garden in the Tropics so well provided with water, which, in a country subject to spells of dry weather of from two to three months' duration, is a most important matter.

14. Re-metalling of the main road leading to the reservoir was done in the months of January and February, with material supplied by the Municipal Commissioners, when we were under the impression that all heavy cartage in connection with the new reservoir was finished, but as that proved to be an error, and it is not finished yet, this will have to be done over again when the leak in the reservoir has been stopped. The expense of this will not, however, I hope, fall on the gardens but on the Commissioners. Until the work at the reservoir is finished, a great portion of the garden cannot be kept in decent order.

15. Unusually heavy rains in June did much damage to roads and paths, and caused some considerable slips along the river banks, which necessitated re-sloping and turfing.

White ants having proved very troublesome in the office, especially on account of their depredations among herbarium specimens. The whole surface below the arches was cemented, and there has since been no trouble. This was done by the Public Works Department, but all the other works by the garden coolies.

16. The total expenditure in connection with this garden amounts to \$4,499.52, and the revenue derived from sale of plants and use of Swimming Bath to \$568.50, as shown in Appendix A annexed.

Government Hill Gardens.

17. Work in the Experimental Nursery has been principally confined to keeping the ground clean and manuring the fruit trees. The orange trees obtained from Malta by the late Sir J. DICKSON produced a few fruits of fairly good quality, but the prospect of a paying crop is not promising. The expenses of carrying up manure is too great to allow of the cultivation of many things that could otherwise be profitably cultivated in this nursery.

18. In Government Bungalow Gardens, the work has been of the usual routine order, consisting of keeping the grounds in order and maintaining, as far as possible, a regular supply of vegetables and flowers for occupants of the bungalow and the Resident Councillor. The Overseer in charge, in addition to his garden work, attends to the Post and Telegraph Office, which takes up the greater portion of his time.

Coco-nut Tree Preservation.

19. As in previous years the Inspector has divided his time equally between Penang Island and Province Wellesley. Two hundred and six (206) Notices were served on owners requiring them to destroy dead trees or material which serve as breeding places for the beetle. Of this number, 43 were summoned for non-compliance with the order in accordance with the Ordinance, and fines inflicted amounting to \$42.25.

Altogether 1,704 dead and diseased trees were destroyed, and 58 heaps of rubbish, 75 diseased trees growing on Crown land were also cut down and destroyed. The total expenditure in connection with this work is \$692.50.

General.

20. A short trip for the purpose of collecting new and interesting plants for cultivation and exchange was made to the Siamese West Coast, about 200 miles North of Penang, in February, and the result was most satisfactory. Leaving Penang by one of the local Chinese steamers, I arrived at Tongkah, also known as the Island of Junk Ceylon, after a passage of 24 hours. After spending four days in this island, the Siamese Chief Commissioner kindly lent me a boat and furnished me with a letter of introduction to the Raja of Pangah, whose residence is about 40 miles from Tongkah. On the way we touched at several small islands, generally adding something to the collection at each place. A striking feature of this part of the Peninsula is the abrupt manner in which the islands rise from the sea, so much so that landing on some of them is impossible. The same character marks the rocks and small hills for some miles inland, so that looking land-ward from some distance out at sea, there is no means of distinguishing between the rocky islands inshore and similar rocks among the mangrove forest. It is evident that a great silting up has taken place here in recent times. The town and the Raja's residence are situated some miles up the river, which in places flows between the high rocks that are seen from the sea. The whole valley in which the town is situated is surrounded by hills of the same character, except at the upper and lower ends. It is an ideal place for a botanist, and should be visited at the beginning or end of the rains, when many interesting plants that were quite dried up at the time of my visit will be discovered. In one place I saw an immense mass of *Vanda gigantea* with at least fifty spikes of fully expanded flowers, and near this several plants of *Cypripedium nivicum*. Among the interesting plants obtained here was a lovely blue *Didymocarpus*, and a species of *Tetraphyllum* with rosy pink flowers. A few plants of *Dendrobium aggregatum*, and *D. Farmerii* were collected, but they are extremely rare here and it is apparently their extreme Southern limit. The Siamese Chief Commissioner, Tongkah, kindly sent a steam launch to tow my boat from near the mouth of the Pangah River to Ghirbee River, and when I had spent a day there back to Tongkah, whence I returned to Penang. I cannot sufficiently express my thanks to the Siamese Commissioner at Tongkah, and the Raja of Pangah, for the assistance they rendered during my fourteen days' stay.

21. An Agricultural and Horticultural Show was held on the Race Course during the first three days in June and proved a great success. Temporary sheds were erected for plants, fruits, vegetables, poultry and cattle, while the existing buildings were used for produce &c. Malacca and the Native States sent many exhibits, and perhaps the most noteworthy exhibits of the whole Show were the Liberian coffee and pepper plants in tubs, covered with fruits, from Selangor. The prizes offered for native medicinal plants, coco-nuts, betel-nuts, paddy and other products in which natives are mainly interested, brought hundreds of samples, so that judging in these classes was a matter of extreme difficulty. It is to be hoped that this kind of exhibition will be repeated at no distant time.

C. CURTIS,
Assistant Superintendent of Forests.

APPENDIX A.

Revenue and Expenditure—Gardens and Forest Department, Penang, 1893.

REVENUE.	EXPENDITURE.	
		\$ c.
Grant—Maintenance of Forest Reserves, ... \$1,000.00	Salaries of Forest Guards, ...	503 46
	House Rent for Assistant Superintendent, ...	360 00
	House Rent of Sergeant of Forest Guards, ...	18 00
	Transport and Field Allowances, ...	45 55
	Uniform, ...	33 00
	Materials for Herbarium, ...	18 00
	Oil for Stations, ...	5 40
	Miscellaneous, ...	12 92
		996 33
	Balance, ...	3 67
	1,000 00	
Grant—Maintenance of Waterfall Garden, ... \$4,500.00	Salaries, ...	3,231 68
	Tools and Material, General Repairs, &c., ...	292 38
	Pots and Plant Tubs, ...	144 90
	Material for new Ferns Shed, ...	80 34
	Material for renewing Plant Sheds, ...	214 30
	Planks for Plant Cases, &c., ...	84 93
	Seeds and Plants, ...	89 23
	Freight on Plant Cases, ...	18 00
	Manure, ...	56 40
	Cartage, ...	42 20
	Furniture for Bungalow, ...	15 50
	Articles for Swimming Bath, ...	6 84
	Periodicals, ...	14 00
	Advertising, ...	5 90
	Field Allowances, ...	17 56
	Paper for Herbarium, ...	34 60
	Miscellaneous and Petty Expenses, ...	150 76
	4,499 52	
Balance, ...	0 48	
	4,500 00	
Grant—Maintenance of Grounds of Government Hill Bungalow and Experimental Nursery, ... \$600.00	Salaries, ...	571 48
	Purchase of Seeds, ...	6 75
	Purchase of Tools, ...	19 05
	Miscellaneous, ...	2 28
	599 56	
Balance, ...	0 44	
	600 00	
Grant—Expenses of carrying out Provisions of Coco-nut Trees Preservation Ordinance, ... \$700.00	Salaries, ...	552 00
	Fixed Allowance, ...	120 00
	Uniforms, ...	5 50
	Cutting down dead Coco-nut Trees on Crown Land, ...	15 00
		692 50
Balance, ...	7 50	
	700 00	

APPENDIX A,—Continued.

Revenue and Expenditure—Gardens and Forest Department,
Penang, 1893,—Continued.

REVENUE.	EXPENDITURE.	
		\$ c.
Travelling and Personal Allowances, ... \$700.00	{ Pony Allowance,	432 00
	{ Botanical Tours,	159 73
	{ Journey to Singapore,	87 70
	{ Field Allowances,	6 00
	{ Balance,	685 43
		14 57
		700 00
Plant Sales, \$500 00		
Receipts from Swimming Bath, ... 68 50		
Rents, 7 00		
Total, ... \$575 50		

APPENDIX B.

Principal Contributors and Recipients of Plants and Seeds, 1893.

CONTRIBUTORS.	RECIPIENTS.
Director, Royal Garden, Kew.	Director, Royal Gardens, Kew,
Do. do., do., Calcutta.	Do., do. do., Calcutta,
Superintendent of Botanic Gardens, Hongkong.	Do., Botanic Gardens, Java.
Superintendent of Botanic Gardens, Bangalore.	Do., do. do., Singapore.
Messrs. Jas. Veitch & Sons, London,	Superintendent Botanic Gardens, Hongkong.
„ F. Sander & Co., St. Albans.	Messrs. J. Veitch & Sons, London.
Agri-Horticultural Society, Rangoon.	„ F. Sander & Co., St. Albans.
Do. do., Calcutta.	Agri-Horticultural Society, Calcutta.
Mrs. S. Apcar, Calcutta.	Do., Do. Rangoon.
„ Mower, Rangoon.	Mrs. Mower, Rangoon.
Mr. G. Pechè, Moulmain.	Mr. W. H. Frizell, Penang.
„ J. C. van Ravensway, Singapore.	„ G. Pechè, Moulmain.
„ O. Bartels, Brisbane.	„ S. T. Apcar, Calcutta.
„ Pereira, Singapore.	„ O. Bartels, Brisbane.
„ F. G. A. Goedhart, Sumatra.	„ A. T. Bryant, Dindings.
„ D. Logan, Penang.	„ W. Egerton, Sungei Ujong.
„ C. Goldham, Tongkah.	„ C. Maries, Gwalior.
„ C. Maries, Gwalior.	„ G. Baldwin, Perak.
„ T. A. Wooldridge, Penang.	„ D. Logan, Penang.
„ D. Blaze, Penang.	„ T. A. Wooldridge, Penang.
„ G. Baldwin, Perak.	„ J. K. Birch, Penang.
Dr. Franceschi, California.	„ G. F. Adamson, Penang.
Mr. A. T. Bryant, Dindings.	Colonel Frowd Walker, Perak.
	Public Gardens, Taiping.

APPENDIX C.

A List of a few of the interesting Plants flowered in the Waterfall Garden, Penang, 1893.

NAME.	Date of Flowering.	Native Country.
Anthurium Andreanum, ...	Always in flower.	Columbia.
„ Dechardii, ...		S. America.
„ ferrierense, ...		Garden Hybrid.
Angrecum citratum, ...	May.	Madagascar.
„ articulatum, ...	March.	Do.
„ Sanderianum, ...	April.	Do.
„ Scottianum, ...	Oct.-Nov.	Comoro.
„ sesquipedale, ...	Oct.-Dec.	Madagascar.
Ærides multiflorum, ...	May-June.	Burma.
„ odoratum, ...	July.	India.
„ virens, ...	July-Aug.	Malaya.
Æschynanthus Wallichii, ...	Nearly always in flower.	Dindings.
„ marmorata, ...		Penang.
Aristolochia elegans, ...	...	Brazil.
„ gigas var. Sturtevantii, ...	...	Do.
Bulbophyllum radiatum, ...	Aug.-Dec.	Panga, Siam.
Cattleya Bowringiana, ...	June.	C. America.
„ amethystoglossa, ...	February.	Brazil.
„ aurea, ...	May.	Costa Rica.
„ gigas, ...	May.	S. America.
„ Mossiæ, ...	Dec.-Feb.	La Guayra.
„ Mendelii, ...	March.	Brazil.
„ labiata, ...	July.	Do.
„ Percivaliana, ...	Sept.-Dec.	Colombia.
„ Schroderæ, ...	June.	Brazil.
„ Sanderiana, ...	May.	New Grenada.
„ trianaë, ...	February.	Brazil.
Calanthe curculigoides, ...	September.	Malaya.
„ limatodes, ...	Sept.-Dec.	Burma.
„ rubens, ...	Nov.-Jan.	Longkawi.
„ Regnerii, ...	Oct.-Nov.	Siam.
„ vestita, ...	Sept.-Dec.	Burma.
„ veratrifolia, ...	Jan.-Dec.	Malaya.
„ sp., ...	...	Perak.
Cirrhopetalum medusæ, ...	Sept.-Oct.	Penang.
„ longissimum, nsp., ...	Sept.-Oct.	Panga, Siam.
„ sp., ...	Sept.-Oct.	Do.
Cypripedium barbatum, ...	Nov.-Dec.	Penang.
„ Lowii, ...	April.	Borneo.
„ Haynaldianum, ...	Nov.-Dec.	Phillipinës.
„ insigne exul, ...	December.	Panga, Siam.
„ niveum, ...	August.	Langkawi.
„ bellatulum, ...	March.	Siam.
„ Spicerianum, ...	August.	Assam.
„ Sedenii, ...	April.	Garden Hybrid.
Cælogyne Cumingii, ...	April-May.	Penang and Perak.
„ asperata, ...	Feb.-July.	Perak and Borneo.
„ tomentosa, ...	July.	Perak and Penang.
„ Parishii, ...	March.	Burma.
„ pandurata, ...	March.	Perak.
„ Dayana, ...	November.	Borneo.
Crinum Mooreii, ...	April.	Natal.
„ pedunculatum, ...	December.	New Guinea.
Cycnoches chlorochilum, ...	February.	Demerara.
Dendrobium Buissonii, ...	February.	Burma.
„ Dalhousianum, ...	Dec.-Mar.	Do.
„ densiflorum, ...	Dec.-Mar.	Do.
„ formosum, ...	August.	Do.

APPENDIX C,—Continued.

A List of a few of the interesting Plants flowered in the Waterfall Garden, Penang, 1893,—Continued.

NAME.	Date of Flowering.	Native Country.
Dendrobium Dearii, ...	Jan.-Dec.,	Philippines.
" Farmerii, ...	February.	Mergui.
" taurinum, ...	September.	Phillipines.
" Jenkinsii, ...	May.	Burma.
" Wardianum, ...	Feb.-March.	Do.
" phalænopsis, ...	December.	New Guinea.
" Pierardii, ...	March.	Burma.
" Veitchii, ...	Dec.-Jan.	Java.
" sp., several of botanical interest only, ...	...	...
Didymocarpus sp., fl. blue, ...	April-Dec.	Panga, Siam.
" sp., fl. yellow, ...	Nov.-Dec.	Kedah.
Eria albido-tomentosa, ...	July.	Langkawi.
" ornata, ...	July-Aug.	Do.
" sp., several from Perak and Langkawi. ...	...	...
Epidendrum atropurpureum, ...	August.	Mexico.
" var. album, ...	August.	Do.
Eucharis candida, ...	...	New Grenada.
Galeandra sp. (Sander), ...	June.	...
Grammatophyllum speciosum, ...	July.	Malaya.
Habenaria carnea, ...	July-Nov.	Langkawi.
" " white var. ...	July-Nov.	Do.
Hæmanthus Kalbreyeri, ...	June.	Guinea.
Impatiens Sultani, ...	...	Zanzibar.
" Hawkerii, ...	...	Pacific Islands.
" sp., ...	...	...
" mirabilis, ...	...	...
Lycaste aromatica, ...	May.	Langkawi.
" Skinnerii, ...	Jan.-Feb.	Mexico.
Leptotes bicolor, ...	August.	Guatemala.
Lælia harpophylla, ...	February.	Brazil.
" Dayana, ...	Aug.-Oct.	Do.
" anceps, ...	August.	Do.
Miltonia spectabilis, ...	August.	Mexico.
" Roeslii alba, ...	July.	Peru.
" Morelliana, ...	June.	Do.
" Warscewiczii, ...	August.	Do.
Oncidium barbatum, ...	November.	Brazil.
" ampliatum majus, ...	February.	Guatemala.
" ornithorynchum, ...	Dec.-Mar.	C. America.
" sp. (Sander), ...	...	Mexico.
" phymatochilum, ...	March.	...
Phajus alba, ...	September.	Brazil.
" Blumii, ...	June.	Burma.
Peristeria elata, ...	June.	Perak.
Phalænopsis tetraspis, ...	July.	Panama.
" amabile, ...	Nov.-Dec.	Andamans.
" esmeralda, ...	...	Borneo and Java.
" cornu-cervi, ...	...	Langkawi and Siam.
" violacea, ...	...	Malaya.
" sumatrana, ...	...	Perak and Borneo.
Saccolabium sp., ...	...	Perak.
" curvifolium, ...	May-June.	Tongkah.
Vanda cærulea, ...	May-June.	Langkawi.
" insignis, ...	July.	India.
" teres, ...	April.	Timor.
" Hookerii, ...	April.	India.
" tricolor, ...	...	Perak.
Zygopetalum Mackayii, ...	September.	Java.
	Sept.-March.	Brazil.

C. CURTIS,

Assistant Superintendent of Gardens and Forests.

REPORT ON THE GARDENS AND FORESTS, MALACCA.

1. Mr. J. S. GOODENOUGH took charge of the Department in June, on Mr. DERRY'S proceeding to Europe on leave.

2. With the reduced staff consisting of only four coolies and a mandor, nothing but the usual nursery garden work could be attempted: The beds adjoining the proposed lake were kept in good order, and about 6,366 plants of various kinds were propagated, of which 2,207, chiefly fruit-trees, were sold to various private persons, and 73 various trees were supplied to Government grounds.

3. A line of palms were planted along the main drive during the year, and they have grown well and already are a noticeable feature in the garden.

The Plant-sheds.

4. The plant-sheds, of which there are two, have been well looked after, and the plants contained therein are doing well.

5. One shed is situated a little way above the nursery. It is a span-roofed shed, of rumbia attaps, measuring 51 feet long by 14 feet wide, principally given to orchids, lilies and ornamental plants and shrubs.

6. The other one, 41 feet long by 18 feet wide, and situated next to the cross entrance, is also a span-roofed structure covered with rumbia attaps; the side tables, made of rough red iron-stones, are one foot high on which are placed ferns (some very fine ones), begonias (both native and foreign) and creeping aroids; and it is also used to shelter the more delicate native plants brought in from distant jungles.

Experimental Cultivation.

7. The clove trees, which were planted in 1888, have flowered twice during the year, and I hope to be able to get some data as to the probable yield of cloves per tree and of the market value.

8. Some of the young plants planted in the upper portion of the gardens in 1891 have not thriven as the soil was too hard. They have been removed to a more suitable spot, which has been more beneficial to them.

9. *Nutmegs.*—It would seem that dry, clayey soil does not suit these. A few trees planted for experiment in a dry spot dwindled away till they had a starved and stunted appearance, while trees planted in the lower part of the gardens where the soil is richer and less dry, have thriven and are all that can be desired.

10. *Tea* (Hybrid Assam) and *Liberian coffee* are growing well, and endeavours will be taken to keep a good stock supply, especially of the latter, for which there is an increasing demand in the Settlement.

11. *Farming.*—The fruit crop of the gardens was let for \$33.99 during the year.

12. *Exchanges.*—A large number of fruit trees and other economic plants were transmitted to Singapore and Penang, for shipment to other parts of the world.

13. *Herbarium.*—An extensive series of specimens was collected during the year, a set of which was sent to the Singapore Herbarium. The collection has now become so large that additional accommodation was found essential. Two new cabinets were, therefore, purchased at a cost of \$35.

14. *Forest Reserves.*—The total area of reserved forests in the Malacca Settlement is now 49,210 acres. The boundaries of all the reserves have been kept clear of weeds and grass, as well as possible with the reduced staff, except in the cases of the Brisu and Merlimau reserves, which had to be much neglected.

15. *Staff.*—The Forest Police, having been reduced by 12 men, now consists of only two Corporals, 3 Lance-Corporals and 7 Watchmen. All worked well, with the exception of one Corporal, who was found to be neglecting his work, and was dismissed.

16. *Licenses.*—Passes for timber-cutting, collecting dammar and wood-oil, cutting rattan, collecting palm-toddy and fibre were given out, for various reserves, viz., Sungei Udang, Bukit Bruang, Bukit Panchor, Merlimau, Bukit Sadanen, Jus and Batu Tiga, and brought in a revenue of \$593.10. The fruit-trees were farmed in the Panchor reserve and produced \$85.23.

17. *Fires.*—One large fire occurred at Ayer Kurau, which burnt down grass and brushwood to the extent of about forty acres. The cause was undiscovered.

18. *Prosecutions.*—There was but one prosecution during the year, for timber cutting at Batang Malaka. The defendant was fined \$20, which was paid.

19.

EXPENDITURE.

Total Revenue and Expenditure.

<i>Revenue.</i>		<i>Expenditure.</i>	
Gardens and Forests,	\$1,022.67	Gardens and Forests,	\$,2499.64

Detail of Expenditure.

	Vote,	...	\$2,500 00
		\$	c.
Salaries of Forest Guards,	1,272	96
" " Gardens,	491	99
Pony Allowance,	432	00
Field "	145	00
Freight and Shipping,	8	35
Maintenance of Bullock and Cart,	12	30
Purchase of Plants and Seeds,	0	35
Incidental,	30	89
Office and Herbarium,	46	40
Transport,	59	40
Balance,	0	36
		<hr/>	
Total, ...		\$2,500	00

Detail of Revenue, Gardens and Forests

<i>Gardens.</i>			<i>Forests.</i>	
	\$	c.	\$	c.
Sale of Fruit-trees, ...	106	91	Tenths on Dammar, ...	87 25
" Shade trees, ...	5	00	Wood-oil, ...	36 00
" Clove trees, ...	109	72	Sale of Timber, ...	284 35
" Nutmeg trees, ...	24	72	Water Supply to Sago Factory, ...	20 00
" Ornamental trees, ...	19	94	Sale of Rattans, ...	18 65
" Coffee trees, ...	6	00	" Kabong Palm-toddy and	
" Orchids, ...	4	15	Fibre, ...	19 05
Fruit crop and Plantain, ...	33	99	" Fruits, ...	85 23
Sale of Mangkuang leaves, ...	1	00	" Charcoal, ...	23 00
" Rumbia leaves, ...	1	20	" Gutta, ...	3 66
Packing and Cart-hire, ...	24	41		
	<hr/>			
Total, ...	337	04	Total, ...	577 19
Plants supplied for Government			Timber supplied for Government	
use, ...	7	30	use, Public Works Department, ...	92 52
	<hr/>		Timber supplied to Penghulu	
Grand Total, ...	\$344	34	for a Mosque, ...	8 62
			Grand Total, ...	\$678 33

J. S. GOODENOUGH,
Acting Assistant Superintendent of
Gardens and Forests.

STRAITS SETTLEMENTS.

Paper to be laid before the Legislative Council by Command of
His Excellency the Governor.

REPORT ON THE GARDENS AND FORESTS DEPARTMENT, STRAITS SETTLEMENTS, FOR THE YEAR 1894.

Botanic Gardens, Singapore.

Staff.

Several changes in the staff took place during the year. Mandor T. C. PEREIRA was replaced by AHMAT; Chief Mandor P. C. COORAY resigned; and the Inspector of Coco-nut Trees was dismissed. The frequency of these changes is to be deplored, but I can see no help for them without paying much larger salaries than we do. The Artist, Mr. D'ALWIS, who had previous to this year been paid from a special vote, was in January transferred to the Gardens vote. He too resigned his appointment on account of the smallness of his pay: this is particularly to be regretted, as it stops altogether, or at least considerably delays, the figuring of the new and characteristic plants of Malaya, with which it is intended to illustrate a written Flora. The Director, Mr. H. N. RIDLEY, went on leave to England in September; and Mr. DERRY, the Assistant Superintendent of Forests, Malacca, returned from England also in September, and was detailed for duty at Head Quarters pending the result of the recommendations of the Retrenchment Committee, who had recommended that his office should be abolished.

Visitors.

3. There is a steady increase in the number of visitors. I am glad to report a less number of thefts than usual; one resident, however, was caught stealing orchid-flowers, was prosecuted, and fined \$30. The Regimental Band played frequently in the Gardens on Friday afternoons, and on several occasions by moonlight, the latter performances attracting enormous crowds.

Aviaries.

4. The aviaries, which form such an attraction to visitors, have absorbed a considerable amount of labour and money, as they have been entirely reconstructed during the year. The old structures, which were made of wood and shingle roofs, had become absolutely dilapidated, and it was resolved to rebuild them in a more permanent manner. The enclosures have been made by brick walls, and the roofs of corrugated iron, and better accommodation has been given to the animals. Several additions have been made to the collections, amongst them being a mynah from Java, presented by His Grace the Duke of NEWCASTLE; two crowned partridges (*Rollulus cristatus*), presented by Dr. JOHNSTON of Pahang; three pelicans (*Pelicanus manillensis*), presented by Messrs. MACHADO and CUMMING; one emu (*Dromæus novæ-hollandæ*) and two jabirus (*Mycteria australis*), presented by Captain VINCENT, Singapore; two Brahminy kites (*Haliastur indus*) and one Malayan palm civet (*Paradoxurus hermaphroditus*), presented by Mr. C. P. DERRICK, Singapore; and one female bear (*Ursus malayanus*), presented by Miss AYLESBURY, Perak. The following were purchased:—Three bandycoots (*Parameles* sp.) from New Guinea, and two young mias (*Simia satyrus*). I regret to report the death of the large Malay bear from inflammation of the stomach; he had been in the Gardens nearly five years. The large mias purchased last year died from general debility; and the black buck, which was presented by the 2nd Battalion The Lincolnshire Regiment, was killed by a deer, which

broke through the partition of the next compartment. A common monkey was born in the aviary on the 2nd of September; the mother having previously given birth to two others in the same place in 1892 and 1893, respectively. A young deer was also born in the Gardens on the 30th March. Two young tiger cubs from Pahang were deposited by His Excellency the Governor pending arrangements for their transfer to the Zoological Gardens, London.

Plant Houses.

5. Extensive repairs were carried out in the large plant house and orchid house adjoining. Many of the cross beams and their upright supports have been renewed: these ballow wood beams had stood since the house was erected some twelve years ago. The other plant sheds have been repaired where necessary.

6. Most of the plants mentioned in last year's Report have again flowered, as well as several new introductions. Among the latter is a new genus (named by the Director "Machadoa") after its discoverer, who found it in Tringganu; it belongs to the natural order *Commelinaceæ*, and is a pretty little plant. A new *Trichoglottis* flowered and was named *T. zebrina*—a very handsome purple-leaved grass. *Pennisetum* was introduced from New Guinea, and proved on flowering to be *P. macrostachyum*. Other new introductions are:—*Bougainvillea Sanderiana*, *Dracæna Sanderiana*, *Tradescantia decora*, new hybrid *Begonias*, *Cypripedium Charlesworthii*, *Collabium nebulosum*, *Selaginella usta*, *Selaginella grandis*, *Aristolochia saccata*, *Medinilla Teysmannii*, &c. Especial mention should be made of several important collections from Kew, including a complete set of *Phyllocacti*, a mixed collection of valuable economic plants, and 632 seeds of the cola nut. Messrs. SANDER & CO. have also contributed some valuable South American orchids, and mixed plants of a decorative character.

7. An attempt has been made to improve the cultivation of roses, and several consignments have been received from Bangalore, Calcutta and Saharanpur. It is hoped that by inarching the better kinds on the stock of one of the common strong growing local varieties, the flowers will be kept from degenerating as they do when left to grow on their own roots.

Lawn and Flower Beds.

8. Greater attention has been paid to the cultivation of flowering plants such as annuals, and the beds have been kept gay with a succession of such plants as *Gaillardias*, *Zinnias*, *Petunias*, &c. The most serviceable plants in this direction, however, have unquestionably been the *Cannas*, obtained chiefly from Mr. CURTIS in Penang, who has been so successful in introducing and growing most of the best varieties.

Lakes.

9. The lakes have received the usual attention in clearing the weeds (*Utricularia*) which grow with such astonishing rapidity, and about a hundred cart-loads of silt were removed from the top end of the big lake. The *Nymphaeas* were manured from time to time. I am glad to be able to report the re-introduction of the Victoria Regia lily after repeated failures. Our only plant died in 1891, and since then no pains have been spared to re-introduce it by seeds and young plants. Seeds were received from British Guiana and Kew, and a young plant obtained from Penang, but in spite of every care, the latter died, and the former failed to germinate. In September last, our efforts were rewarded with success, several plants germinated from seeds kindly supplied by Dr. TREUB from the famous Gardens at Buitenzorg, the largest plant is now well established in the small lake near the nursery.

Roads and Walks.

10. No extensive re-metalling has been done, but repairs have been made where necessary, and all the small walks around the Band-stand coated with a fresh layer of gravel. The bridge on the new lake has been removed, the planking being rotten, and, on the recommendation of the Superintendent of Works and Surveys, the culvert has been replaced by cast iron pipes 2' 6" in diameter obtained from the Municipality. The erection of granite posts and chains along both sides of the dam has yet to be done.

Economic Garden and Arboretum.

11. The arboretum may now be said to be practically complete, so far as allotting the space to the various natural orders is concerned. The space for the remaining natural orders from *Urticaceæ* were marked out and planted during the year. A good deal of time was taken up in turfing the ground between the trees to prevent the washing away of the surface soil by heavy rains, and it is found the trees grow

very much better when the ground is under grass. This part of the Garden, although not much visited now, will, it is hoped, be more frequently visited as the trees grow up and become more interesting.

12. Some experiments were made in making paper from various fibres, such as lalang, ginger plant stems, the sheaths of various palms, &c., with a fair amount of success. As these and some other experiments have been detailed more fully in Bulletin No. 4, I need not further allude to them here.

Inspection of Coco-nut Trees.

13. Two hundred and fifty-eight (258) notices calling upon occupiers to destroy 1,800 trees and stumps were served during the year, and in two cases only was it found necessary to prosecute, small fines being inflicted in both cases. In August last, the Inspector was dismissed by order of the Government for misconduct; and as in the opinion of the Government it was not considered necessary to keep up the post, the inspection of plantations and the working of the Ordinance is now carried on by one man only, which hardly needs pointing out is quite inadequate to do the work properly. In support of this, I may quote some figures taken from a letter sent me by Mr. ALLINSON, who was lately in charge of the Grove Coco-nut Estate, Tanjong Katong. He says:—"Three beetle-men are constantly employed on the estate, whose duty it is to search for and destroy the beetles found in the trees. The crop of beetles averages about 25 per diem. In addition to the searching of the trees, just described, a regular examination of stumps has been initiated with startling results, the figures are given in the Appendix.

"APPENDIX.

"Result of Daily Searches for Beetles.

	<i>"Black.</i>	<i>Red.</i>	<i>Trees cut down.</i>
" April, ...	526	1	30
" May, ...	637	2	16
" June, ...	521	5	14
" July, ...	612	...	...
" August, ...	584	...	...
" September, ...	680	4	...
" October, ...	759	20	28
" November, ...	700	9	15
" December, ...	515	3	11
	<u>5,534</u>	<u>44</u>	<u>114</u>

"Inspection of Stumps.

	<i>"Black.</i>	<i>Red.</i>	<i>Larvæ.</i>
" November,	724	5	5,000
" December,	228	2	2,000
	<u>952</u>	<u>7</u>	<u>7,000</u>

14. The above figures bear eloquent testimony to the fertility of the beetles, in spite of the greatest efforts to keep them in check, for if such numbers are to be found on one of our very best and most highly cultivated estates, what are we to expect from the less cultivated ones, to say nothing of the countless numbers of small holdings which carry a few coco-nut trees? There can be no doubt that, if we are to combat the scourge successfully, greater efforts will have to be made to carry out the Ordinance more effectively, and this can only be done by an increased staff working under an intelligent Inspector. (This will, however, form the subject of a separate report to Government.)

EXPENDITURE.

Vote,	...	...	...	...	\$700.00
	Salaries,	...	...	...	\$320.52
	Expenses, removing trees and stumps,	...	...	...	286.00
	Transport,	...	...	...	39.42
	Uniforms,	...	...	...	7.00
					<hr/>
					\$652.94
			Balance,...		47.06
					<hr/>
					\$700.00
					<hr/>

Herbarium and Museum.

15. No botanical tours outside Singapore were taken during the year, nevertheless a considerable number of Singapore species were added, collected mainly by the Director in the outlying parts of the island. Four hundred and seventy-seven (477) specimens were received from Dr. KING, Calcutta; 36 from Dr. HAVILAND, Borneo; 272 from Malacca; 97 from Baron VON MUELLER, Australia; 88 specimens were collected in Java by Mr. HULLETT, and 30 from various sources. Many plants, chiefly orchids, were sent in to be named by local cultivators.

16. The following specimens were distributed (many of them for identification by various specialists):—One thousand four hundred and sixteen (1,416) to Dr. KING, Calcutta; 1,862 to the British Museum; 452 to the Royal Gardens, Kew; 101 palms to Professor O. BECCARI, Naples; 25 *Melastomaceæ* to Professor COGNIAUX, France; 96 species of mosses to Professor BROTHERUS, Russia; 33 species to Dr. HAVILAND; 29 ferns to Colonel BEDDOME, England; 13 ferns to Bishop HOSE; 28 *Gramineæ* to United States Department of Agriculture and Professor HACKEL, St. Polten. Our herbarium of Malayan bamboos was loaned to Mr. GAMBLE of the India Forest Department, who was engaged on a monograph of the Indian species. After critical examination, several of ours prove to be new.

17. The Museum was enriched by a very complete set of Johor timbers to the number of 614, and while some of these, no doubt, will prove to be duplicates, it is nevertheless the most complete set ever got together: they have been cut to a uniform size, and will be placed in cabinets for reference.

18. A series of saprophytes were preserved in spirits, one of them proving new, and has been named *Thismia fumida*. Some plants used by the aborigines of the Peninsula for making their arrow poison, were presented by Professor VAUGHAN STEVENS. A series of various natural history specimens were sent to the British Museum and to Mr. HOLMES of the Pharmaceutical Society.

Miscellaneous.

19. A successful Flower Show was held in June, under the auspices of the Gardens Committee, the main feature of which was the very good display of orchids.

A Bulletin on Sago was prepared during the year, but the press of work at the Government Printing Office prevented its being published within the year, the same cause preventing the publication of the Garden Catalogue, drawn up some time ago. I hope these will be taken in hand in 1895.

Library.

20. In addition to the usual Periodicals and Garden Reports, the following works were received and added to the Library:—

Presented:—

Dr. TREUB.—Verslag omtrent den Staat van Stands Plantentium to Buitenzorg, 1892 and 1893.

Dr. TREUB.—Annales du Jardin Botanique de Buitenzorg, Vol. XII, Part I.

DUTHIE, J. F.—Records of the Botanical Survey of India, Vol. I, No. 1—Report on a Botanical Tour in Kashmir.

GAMMIE, G. A.—Report on a Botanical Tour in Sikkim.

Dr. PRAIN.—Memoirs and Memoranda, 1894.

Dr. CROMBIE.—British Lichens.

Dr. WATT.—Agricultural Ledgers, No. 1-4 1892, Nos. 1-20 1893, Nos. 1-6 1894.

Under-Secretary for Agriculture, Brisbane.—Agricultural Bulletins.

United States Department of Agriculture.—Experiment Stations Records.

MOLL, J. W.—Een toestel on Planten voor het herbarium Te Drogen.

Do., —Rapport sur quelques Cultures de Papaveracies.

Dr. BORSMA.—Bulletin No. 13.

Purchased :—

Index Kewensis, Fasc. II and III.

VASQUE.—Monographiæ Phanerogarum Guttiferæ, Vol. VIII.

Dr. TRIMEN.—Handbook of the Flora of Ceylon, Part II with Atlas.

Exchanges.

21. The usual exchanges of plants and seeds with kindred institutions outside the Colony have been maintained. Twelve hundred and fifty-four plants and three hundred and sixty-nine packets of seeds were received from the under-mentioned contributors, and three hundred and thirty-four plants and one hundred and four boxes and packages of seeds were sent out :—

Contributors :—

Royal Gardens, Kew.
 Do., Calcutta.
 Botanic Gardens, Ceylon.
 Do., Bangalore.
 Do., Saigon.
 Do., St. Petersburg.
 Do., Buitenzorg.
 Do., Trinidad.
 Do., Hongkong.
 Do., Durban.
 Do., British Guiana.
 Do., Mauritius.
 Do., Rockhampton.
 Do., Saharanpur.
 Do., Apia, Samoa.
 Agri-Horticultural Society, Calcutta.
 Baron von Mueller, Melbourne.
 Prof. Max. Cornu, Paris.
 Messrs. Sander & Co., St. Albans, London.
 „ Bull, London.
 „ Cannell & Son, England.
 „ Dammann & Co., Italy.
 „ Stanley Prise & Co., India.
 Revd. Schlechter, South Africa.
 Conservator of Forests, Dehra Dun.
 J. O'Brien, Esq., England.
 Geo. Peché, Esq., Maulmain.
 F. Gilmour, Esq., Missouri, U. S. A.
 Admiral Amme 1, Washington, U. S. A.
 Rt. Rev. Bishop Hose, Borneo.
 W. Scott, Esq., Perak.
 Dr. Johnston, Pahang.
 Dr. Braddon, Sungei Ujong.
 Major-General Berkeley, England.
 Messrs. Pereira & Co., Florists, etc., Singapore.
 R. Cundall, Esq., Manila.
 W. Boxall, Esq., Singapore.
 A. Ericsson, Esq., Singapore.
 W. Micholitz, Esq., Singapore.
 M. Langlasse, Singapore.
 Mrs. A. S. Murray, Singapore.

BOTANIC GARDENS, SINGAPORE.

Statement of Receipts and Expenditure, for the Year 1894.

RECEIPTS.		EXPENDITURE.			
	\$ c.		\$ c.	\$ c.	
By Balance in Bank, ...	78 57	<i>Salaries.</i>			
" Government Grant,	8,500 00	Artist, ...	250 00		
" Sale of Plants and		Herbarium Keeper, ...	239 02		
Flowers, ...	864 51	Mandor, ...	217 59		
" Interest, ...	49 48	Carpenters, ...	281 81		
		Mason, ...	98 25		
		Plant Collector, ...	100 00		
		Printer (Label), ...	165 48		
		Peon, ...	96 00		
		Aviary Keeper, ...	96 00		
		Police, ...	348 00		
		Coolies, ...	2,963 29		
				4,855 44	
		<i>Bills.</i>			
		Manure and Cartage, ...	205 39		
		Food for Birds and Animals,	824 55		
		Purchase of Pots and Tubs,	158 06		
		Purchase of Plants & Seeds,	194 32		
		Purchase of Books, ...	19 95		
		Purchase of Tools and			
		Stores, ...	614 62		
		Purchase of Timber, Planks,			
		etc., ...	303 97		
		Purchase of Bricks, Lime,	318 45		
		Freight on Plant Cases, etc.,	232 35		
		Director's Petty Expendi-			
		ture, ...	217 31		
		Assistant Superintendent's			
		Petty Expenditure, ...	115 24		
		Subscription to Telephone,	97 50		
		Miscellaneous, ...	304 02		
				\$3,605 73	
				\$8,461 17	
		Balance, ...	...	\$1,031 39
				\$9,492 56	
	\$9,492 56				

WALTER FOX,

Assistant Superintendent of Gardens and Forests, in Charge

Forest Department, Singapore.

22. A further reduction of the vote precluded very much being done, except protection and planting the remaining bilian plants that were not big enough to plant out in 1893. About a thousand plants were planted at Bukit Timah and Bukit Mandai. The young trees planted in former years were attended to as regards clearing of weeds, &c. The boundary paths and fire guards have been kept in order. A considerable portion of the time of the forest guards was taken up patrolling those coast and river reserves in which licenses were issued for cutting timber, &c., the amount of revenue obtained from this source being more than sufficient to pay the forest guards during the year.

Licenses.

23. A still further increase in the number of applications to cut mangrove fire-wood, fishing stakes, rollers, tan bark, &c. was made during the year, indeed some had to be rejected, as more applications were made than we could with prudence grant. Three hundred and thirty-five (335) permits were granted, as against 136 last year, yielding a revenue of \$982.75, as against \$416 in 1893.

24. Fifteen fires occurred during the year in the various reserves. Very little damage was done in any case, except the one that took place at Sungei Jurong and Pandan during the very dry weather that prevailed in February. On this occasion the fire swept over nearly 150 acres, and destroyed some good forest, and young plants. In every case it was found impossible to find out how they had originated. In one case some Chinese squatters were prosecuted on good circumstantial evidence, but the Magistrate did not think the case proved, and acquitted the prisoners.

Prosecution.

25. Three cases of illicit timber cutting were prosecuted, and fines inflicted in each case, amounting in all to \$30.

26. Since Mr. DERRY'S return in September, the Department has been without the services of an Inspector of Forests. Mr. GOODENOUGH who had been acting for Mr. DERRY reverted to the salary of his own appointment, and as there was no provision for the Acting Overseer, he was discharged. This explains the reason of a balance appearing on the vote at the close of the year.

General.

27. In accordance with the recommendations of the Retrenchment Committee, the forests were handed over from the 1st of January, 1895, to the charge of the Collectors of Land Revenue in Singapore and Penang, and the Collector of Land Revenue and District Officers in Malacca. As this is probably the last Report which this Department will make on them, it would be advisable that this opportunity should be taken of putting on record the present state of the Forest Department, and reviewing briefly its work since its initiation and comparing it with what existed before its creation. It will be remembered that it was in 1884 that the Governor Sir F. A. WELD commissioned the then Superintendent, the late Mr. CANTLEY, to prepare a Report on the Crown Forests of the Colony, and to make recommendations for the creation of a Department for their preservation. Mr. CANTLEY was eminently fitted for the task entrusted to him, no more by having just relinquished charge of the Gardens and Forests in Mauritius, than for his admirable powers of organization: and he threw himself into the work with his characteristic energy, the result was a most elaborate and valuable Report, in which he discussed the subject in a masterly and complete manner, he shewed the urgent necessity for stopping the ravages of the wholesale destruction of the forests which had been going on ever since the foundation of the Colony, and made no less valuable suggestions for the creation of a Department which would check those ravages, and carry out those principles of Forestry which have been shewn necessary in every country to be absolutely essential to its well-being. Unfortunately death prevented him from carrying out the task he had sketched out, nevertheless the thoroughness with which he laid the foundation have enabled his followers to bring the Department to the comparative state of efficiency it is in at present.

28. During the last few years, however, the votes have been so reduced as to prevent any work except almost that of protection, nor is this policy altogether to be regretted, for the comparative big votes of the first few years, necessitated by surveys and demarcations, were no longer required, as owing to the limited area of the forests in Singapore and Penang, their utility as a source of revenue, was subordinated

to their climatic and hygienic uses. This has not prevented, however, steady perseverance at re-forestation which has been going on, brought about by protection, and assisted by artificial planting as far as funds allowed, thus building up a valuable source of revenue for the future, and especially so in Malacca, where the area of Crown Forests is considerable.

29. Mr. CANTLEY'S recommendations did not only apply to the Colony, but equally with all their force to the forests of the Peninsula, which, if carried out, in time would at all events prevent their indiscriminate destruction. But it is more to what has actually been accomplished in the Colony that I would beg leave to point out. What was the state of things before 1884? As has been said, indiscriminate felling had been going on since the early days of the Settlement, the Crown Forests, such as were left of them, were the prey of the illicit tree-feller, who from want of any one to prevent him, helped himself to whatever he pleased; encroachments again went on unchecked, because seldom or never found out; fires were numerous; and most important of all the very sources of our water supply were being endangered both from destruction of forests, and the introduction of squatters with their pigs and other pollutions. All this has been stopped, and various parts of the island have been reserved, surveyed, and properly demarcated with boundary paths and fire guards, and an endeavour, so far as funds have permitted, to reforest these reserves with young plants of the more valuable timbers which had become extinct on the island, and were getting scarce in accessible positions elsewhere.

30. The total area of Forest Reserve in Singapore amounts to 12,965 acres, divided into 13 reserves. A description of their contents will be found in the Annual Report for 1889.

[The area of Forest Reserves in Penang and Pulau Jerejak amount to 11,226 acres, and in Malacca to 42,000 acres.]

FOREST DEPARTMENT.

Expenditure for 1894.

Vote, ...	...	...	...		\$1,400.00
Salaries, ...	...	...	...	\$999.00	
Cartage, ...	...	...	...	33.00	
Seeds, ...	...	...	...	24.50	
Miscellaneous, ...	...	...	...	54.58	
				\$1,111.08	
			Balance,...	\$288.92	
				\$1,400.00	

WALTER FOX,
*Assistant Superintendent of Gardens
and Forests, in Charge.*

Gardens and Forests Department, Penang.

Waterfall Botanic Garden.

Numerous improvements to grounds, plant-sheds, &c. have been effected and no pains spared to make this Garden attractive to the general public. One great drawback to high class cultivation of difficult subjects is the lack of intelligent labour. All the gardeners and coolies employed are immigrants from Southern India and it almost invariably happens that by the time a man begins to be useful, he either returns to his native country, or obtains employment elsewhere at a higher rate of pay. In spite of this, we have established a more than local reputation for the cultivation of orchids and other choice plants, but this is only maintained by constant personal supervision and hard work.

2. A considerable increase in revenue from the sale of plants is shown in the Statement of Revenue and Expenditure annexed, the total amount being \$948.24, as against \$500 in 1893. I am doubtful whether this can be maintained in 1895, especially as the vote for travelling has been reduced to a point that allows of very little in the way of botanical collecting being undertaken for the purpose of obtaining new and rare plants for sale and exchange.

3. The usual interchange of plants and seeds has been carried on, with the result of adding a great number of interesting plants to our collection. A list of the principal contributors and recipients is given in Appendix B.

4. Many interesting orchids and other plants, some of them new and undescribed, flowered during the year, but none, I think, attracted more attention than a plant of *Congea tomentosa*, trained against the end of the fern-shed. This plant was collected by me two years ago, and herbarium specimens distributed under the name *Sphenodesma* sp. It is deserving of a place in every tropical garden, for as a decorative plant it must be classed with *Bougainwillæa* and *Petræa volubilis*, but of an entirely different colour to either. It may be already in cultivation, but I do not remember seeing it.

5. Several new beds have been formed and planted, and old ones re-planted from time to time so as to keep up, as far as possible, a show of flowering and coloured leaved plants. Roses, which are generally considered difficult to grow in the plains, have done remarkably well, but the choice of varieties suitable to this climate is limited. Maréchal Neil and Gloire de Dijon are superior to all others that have been tried so far. By grafting on a strong-growing stock found growing semi-wild in a garden in Penang, of which I do not know the name having never seen it in flower, greater success has been obtained than by using *Rosa gigantea*, the one generally used in India. During the dry season, from November to March, Dianthus made a grand display and deserve to be more generally grown than at present. Flowering plants are much less generally grown in Penang than foliage plants.

6. The principal orchid-shed, which was in a bad state of repair, has been reconstructed with hardwood timber. This shed is 58 x 40 feet. One of the sheds in the nursery, 50 x 18 feet, has been renewed with 3" and 4" iron supports and old boiler tubes from the sugar estates, and this is, I hope, the beginning of a new era in plant-shed construction. In this climate iron is not only the most suitable, but in the end the cheapest material, but the initial expense has hitherto prevented its use in this Garden. A portion of the material necessary for renewing another shed in 1895 has been purchased and paid for out of 1894 vote.

7. A new pond for the cultivation of the Victoria Regia lily in a more conspicuous place than that in which it was formerly grown, has been made by throwing a stone-work dam across the hollow a few yards above the Office on the opposite side of the road. This was finished, and three young self-sown plants from the old pond planted in June, and by the 1st September, they completely covered the whole area. The depth of water is from 3 to 4 feet, and the material in which they were planted leaf-mould and cow manure, a cart-load of which has been added every two months.

8. For the cultivation of annuals, and other flowering plants requiring sun, a raised octagonal bed of rough stone-work has been made opposite No. 1 plant-shed and been kept bright with a succession of flowering plants during the whole year. Want of full exposure to direct sunlight is the principal cause of failure in growing the majority of flowering plants, especially annuals.

9. This year has seen the completion of the Reservoir at the top of the Garden, and has enabled us to complete the formation and metalling of the new road to it, as well as re-metalling the road over which all material for constructing the Reservoir

has been carted. Altogether 1,525 lineal yards of carriage road have been re-metalled. In doing this, the Municipal Commissioners assisted both with labour and material.

10. A catalogue of flowering plants and ferns found growing wild in Penang has been compiled by me and printed by the Royal Asiatic Society, Straits Branch; about 50 copies of which have been distributed to various Botanists and Forest Officers. This list contains 1,971 species belonging to 793 genera, and 129 natural orders. It will require revision when the more recent collections have been critically examined by competent authorities, as many additional plants have been collected since this paper was printed.

11. In the beginning of the year, I was absent on two months' leave and visited Rangoon, Mandalay, Bhamo and the Mergui Archipelago. During this trip I obtained many interesting plants for the Garden, and made the acquaintance of several gentlemen interested in Botany, Horticulture, and Forestry, who not only did all in their power to assist me while on the spot, but have since contributed additional plants and seeds, and will, I hope, continue to do so in the future.

12. In July, a hurried visit was made to Taiping, my absence from Penang only extending over three clear days. One of these days was spent in judging at the Taiping Agricultural and Horticultural Show, and the other two in collecting plants of *Lecanopteris carnosa*, and other plants, a portion of which were sent to the Royal Gardens, Kew, at the request of the Director of that establishment, and it is gratifying to find that the majority arrived alive.

13. In October, I obtained permission to visit Perak for ten days for the purpose of obtaining plants for cultivation and exchange. A report on this trip was submitted, for the information of His Excellency the Governor, on my return, a copy of which is attached (Appendix C).

14. A visit was also made to the Dindings in connection with the planting of cloves and nutmegs in that Settlement.

Government Hill Gardens.

15. A fairly good and regular display of flowering plants, both in beds and pots, has been maintained in the grounds of the Government Bungalow. Among the more striking and easily grown plants for beds at this altitude (2,500 feet) may be noted cannas, roses, dahlias, dianthus, begonias and corn-flowers. As a pot plant nothing surpasses in brilliancy at this altitude *Impatiens Hawkerii*, which is grown in great numbers. The whole stock in this part of the world has been propagated by cutting from the original plant I brought from Kew in December, 1891. All attempts to induce this plant to produce seed has been abortive.

16. The old plant-shed on Gun Hill has been taken down and removed to a less exposed position below the Governor's Bungalow, and the original site planted with grass.

17. Vegetables have been regularly supplied to the Governor's Bungalow when occupied, and twice a week to the Residency throughout the year. Only a limited number of European kinds can be profitably grown, the easiest and most satisfactory being carrots, beet, leeks, lettuce, khol rabi, radish, peas, and, in the dry season, tomatos. "Collections" of both vegetable and flower seeds put up by the trade, either in Europe or India, always contain at least 50 per cent. of varieties quite unsuitable for this climate, and it is, therefore, cheaper and better in ordering seeds to specify the kind and quantity required. Several of these "collections" were sent me during the year by residents in Penang and Sumatra for an opinion as to suitability and instructions for cultivation, with permission to take a portion for the Gardens. I am afraid in most cases the result to the purchaser was disappointment.

18. In the experimental nursery the most important event of the year is the heavy crop of fruit borne by three trees of Avocada pear (*Persia gratissima*), the introduction of which is a decided success, and the cultivation of which will be largely extended this season from the seed obtained. A few of the orange trees produced some fruit, but not so abundantly as could be wished. Lichee, loquat, and olives look promising, and we shall see in a year or two more whether these are deserving of extended cultivation. The great drawback to cultivation in these hill gardens is the excessive cost of carrying up manure.

Preservation of Coco-nut Trees.

19. Notices were served on 661 persons having on their premises dead trees or material suitable for breeding places for the beetles. Of this number, 23 were prosecuted for non-compliance with the orders, and fines inflicted amounting to \$30.50.

There is a general feeling, I believe, that the working of this Ordinance is for the public good, but its good effect can be insured only by frequent inspection and insistence on the orders being complied with.

Maintenance of Forest Reserves.

20. No addition has been made to the Forest Reserves, and the work of the year has been mainly protective. The total area under protection is the same as last year, viz., 10,887 acres in nine separate blocks with boundaries aggregating 65 miles.

21. The cost of protecting small acres from fire and the inroads of illicit timber cutters must necessarily be comparatively much more expensive than larger ones, and the amount expended on this work (\$966.62 as shown in Statement of Expenditure annexed) is the least with which efficiency can be expected, and any reduction of the present number of guards renders efficient protection impossible.

22. Twenty-seven persons have been prosecuted during the year for cutting timber and causing damage by fire, and fines inflicted amounting to \$215.

23. In accordance with the recommendation of the Retrenchment Committee, it has been decided to transfer from 1st January, 1895, the management of all Crown forests in the Settlement to the Officers in charge of the Land and District Offices, and as this is the last Annual Report it will fall to my lot to write on these forests, it is desirable to point out the present position.

24. From a direct revenue-producing point of view, there is no great scope for forest operations in a small and mountainous island like Penang, but at the same time the importance of preserving, and, as far as possible, especially by natural reproduction, improving the existing forest cannot be overestimated.

25. Previous to my arrival in the Settlement, in July, 1884, a general report on the condition of the forests of the Colony, and forest conservancy generally, had been laid before the Legislative Council by the late Mr. N. CANTLEY, then Superintendent of Botanic Gardens, Singapore, but no active measures had been taken to carry his suggestions into effect.

26. After consultation with Mr. CANTLEY and a preliminary inspection of the area and contents of Crown forests in Penang, it was decided to demarcate certain areas, with a view to future revenue, within which no further cutting should be allowed for a number of years in order that the better class of timber-trees which were fast disappearing might have a chance of re-establishing themselves by means of natural reproduction. It was intended, if necessary, to artificially re-stock, where necessary, land within these reserves with high class timber, but this has not been done, except on a small scale, partly on account of the expense, but mainly because there is every reason to believe that efficient protection during a sufficiently long period is all that is necessary to effect the same purpose.

27. Considerable improvement has already taken place in the character of young trees springing up within the reserved areas, but ten years is a very short period in the life of the best hardwood trees found in this Settlement, many of which require at least from 80 to 100 years to reach a serviceable size and condition. Really good seed-bearing seasons occur only at intervals of several years. The best since I have been in the Settlement was in 1887, and I can now point to thousands of young trees of the very best kinds such as Damarlaut, and Meranti (*Shorea* and *Hopea* sp.) as the result of that year's seed crop.

28. The greater portion of the reserves are, however, on the crest and slopes of steep hill-sides, and their value, from a revenue-producing point of view, is not likely to be considerable, so long as timber is obtainable in much more easily accessible localities, but their maintenance for climatic purposes is most important. Whatever difference of opinion may exist as to the effect of forests on rainfall, there can be none as to their use in storing and regulating the water supply.

29. At the time these hill reserves were demarcated, cultivation had already, in places, crept up beyond the limit at which, had there been any choice, the boundary line would have been carried, but it was decided from the beginning to interfere as little as possible with cultivation, which consists mainly of cloves and nutmegs, and consequently the boundary line was opened above these Gardens. I point this out now so that in case of these Gardens at an altitude of much above 1,000 feet being abandoned, as has already happened in two or three cases, the boundary should be altered so as to include these lots within the hill reserves.

30. That protection from encroachment and illicit timber cutting by means of Forest Guards is necessary, is proved by the fact that from 1889 to 1894, 256 prosecutions were instituted by this Department for forest offences, mainly under these two headings, and I am satisfied that a very great number of cases escaped detection.

31. Acting on the principle laid down in paragraph 26, no licenses for cutting timber within the reserved areas have yet been issued, although many applications have been received, and a rate much higher than that now paid for timber growing on Crown land outside the reserves would willingly be paid. All revenue collected from Crown forests outside the reserves has been credited to the Land Department, so that without violating one of the first principles laid down at the beginning of the work, it has not been possible for the Forest Department to show a revenue. This, of course, makes no difference to the actual revenue of the Colony, but it is not in accordance with the general rules of forest conservancy.

APPENDIX A.

Revenue and Expenditure—Gardens and Forest Department, Penang, 1894.

REVENUE.	EXPENDITURE.	AMOUNT.
		\$ c.
	{ Salaries,	3,171 29
	{ Purchase of Plants and Seeds, ...	201 70
	{ Pots and Plant Tubs,	166 66
	{ Cartage and Manure,	84 63
	{ Planks for Plant Cases, & Repairs, ..	61 47
	{ Tools and Materials, for Current Re-	
	{ pairs,	243 56
	{ Material for renewing Plant Sheds,...	330 30
Grant—Maintenance of Wa-	{ Freight on Plant Cases,...	24 60
terfall Garden, ... \$4,500.00	{ Paper and Cabinet for Herbarium, ...	59 50
	{ Road Metal,	29 60
	{ Periodicals,	7 75
	{ Advertisement,	7 20
	{ Miscellaneous Petty Expenses, ...	107 37
		\$4,495 63
	{ Balance,	4 37
		\$4,500 00
	{ Salaries,	\$477 50
Grant—Maintenance of	{ Purchase of Seeds,	10 79
Grounds of Government Hill	{ Purchase of Manure,	72 52
Bungalow and Experimental	{ Purchase of Tools, &c.,...	38 86
Nursery, \$600.00		
	{ Balance,	\$599 67
		0 33
		\$600 00
Grant—Expenses of carrying	{ Salaries,	\$464 00
out Provisions of Coco-nut	{ Fixed Allowance,	120 00
Trees Preservation Ord i-	{ Cutting down dead Trees,	39 00
nance, \$700.00		
	{ Balance,	\$623 00
		77 00
		\$700 00

APPENDIX A,—Continued.

Revenue and Expenditure—Gardens and Forest Department,
Penang, 1894,—Continued.

REVENUE.	EXPENDITURE.	AMOUNT.
		\$ c.
	Salaries of Forest Guards, ...	421 37
	Transport and Field Allowances, ...	93 80
	House Rent for Assistant Superintendent, ...	360 00
	House Rent of Sergeant of Forest Guards, ...	36 00
Grant—Maintenance of Forest Reserves, ... \$1,000.00	Coolies clearing Boundaries, &c., ...	37 00
	Oil for Stations, ...	9 70
	Tools, ...	6 25
	Miscellaneous, ...	2 50
		\$966 62
	Balance, ...	33 38
		\$1,000 00
	Pony Allowance, ...	\$432 00
Grant—Travelling and Personal Allowances, ... \$550.00	Travelling and Personal Allowances, ...	117 74
		\$549 74
	Balance, ...	0 26
		\$550 00
Plant Sales, ... \$948 24		
Bath Receipts, ... 65 85		
Rents, ... 12 25		
Total Revenue, ... \$1,026 34	Total Expenditure, ...	\$7,234 66

C. CURTIS,
Assistant Superintendent of Forests.

APPENDIX B.

Principal Contributors and Recipients of Plants and Seeds, 1894.

CONTRIBUTORS.	RECIPIENTS.
The Director Royal Gardens, Kew.	The Director Royal Gardens, Kew.
The Director Botanic Gardens, Java.	The Director Botanic Gardens, Java.
The Supt. Botanic Gardens, Calcutta.	The Supt. Botanic Gardens, Calcutta.
The Supt. Botanic Gardens, Hongkong.	The Supt. Botanic Gardens, Hongkong.
Agri-Horti. Society, Rangoon.	Agri-Horti. Society, Rangoon.
Agri-Horti. Society, Calcutta.	Agri-Horti. Society, Calcutta.
Messrs. F. Sander & Co., St. Albans.	Messrs. F. Sander & Co., St. Albans.
Messrs. J. Veitch & Sons, London.	Messrs. J. Veitch & Sons, London.
Messrs. S. P. Chatterjee & Co., Calcutta.	Messrs. Damman & Co., Naples.
Messrs. Stanley Price & Co., Calcutta.	Messrs. S. P. Chatterjee & Co., Calcutta.
C. H. Swindon, Esq., Calcutta.	O. Bartels, Esq., Brisbane.
C. Marries, Esq., Gwalior.	Chief Commissioner, Tongkah.
E. Versman, Esq., Langkat.	C. H. Swindon, Esq., Calcutta.
Luang Narison, Tongkah.	W. D. Barnes, Esq., Ipoh.
W. Scott, Esq., Taiping.	Public Gardens, Taiping.
D. Blaze, Esq., Penang.	District Officer, Butterworth.
Dr. Legg, Perak.	District Officer, Balik Pulau.
G. Peche, Esq., Moulmain.	Col. Walker, Taiping.
J. D'A. Pereira, Esq., Singapore.	J. D'A. Pereira, Esq., Singapore.
Miss Mackintyre, Penang.	Municipal Commissioners, Penang.
Hon. L. Surowongsee, Penang.	G. Peche, Esq., Moulmain.
J. W. Hodge, Esq., Penang.	Capt. Davis, Rangoon.
T. A. Wooldridge, Esq., Penang.	Capt. Winter, Rangoon.
J. F. MacFarlane, Esq., Penang.	T. A. Wooldridge, Esq., Penang.
Mrs. Baldwin, Tapah.	J. F. MacFarlane, Esq., Penang.
Mrs. Woodgate, Tapah.	J. W. Hodge, Esq., Penang.
Capt. Winter, Rangoon.	Mrs. Baldwin, Tapah.
Capt. Davis, Rangoon.	C. Maries, Esq., Gwalior.

APPENDIX C.

BOTANIC GARDENS,
Penang, 30th October, 1894.

To

The Hon'ble the Resident Councillor.

SIR,—In accordance with instructions in Circular Departmental No. 19, dated 1st August, 1894, I have the honour to submit, for the information of His Excellency the Governor, the following Report on a recent trip to Perak for the purpose of collecting botanical specimens for the Herbarium, for cultivation in the Garden, and for exchange.

2. Left Penang by the s.s. *Taw Tong*, at 3 P.M. on the 15th instant, and arrived at Telok Anson at 6 A.M. the following morning; at 2 P.M. proceeded to Tapah Road Station by rail, and arrived there at 3 P.M. From Tapah Road Station to Tapah is an hour's drive by gharry, but, owing to detention, it was 5 P.M. when I reached the Town.

3. The following morning, October 17th, commenced work by collecting along a bridle-path in the direction of a place called Kalindi for a distance of about four or five miles. The afternoon, and in fact all the afternoons during my stay, turned out very wet, and little collecting could be done. There are many interesting plants in this locality, especially palms, of which I procured seeds of several species. It is also a good agricultural country, suitable for many tropical products, particularly Liberian coffee, of which there are promising plantations in the neighbourhood of Tapah.

4. On the 18th, worked up the left bank of the Batang Padang River, and collected a number of ferns, orchids, &c. Many well known plants of interest were observed, one of the most noticeable being a gigantic specimen of a large fern *Angiopteris evecta*. Rain came on about noon, and nothing more could be done until 5 P.M., when it cleared up, and I managed to collect several specimens of a fine orchid—*Cælogyne pandurata*.

5. On the morning of the 19th, left Tapah for Kuala Dipang, distant about 18 miles. This is a limestone region of which I had heard much, and was the object I had in view on leaving Penang. I did not proceed direct, but stopped first at about 1½ miles from Tapah to see a Liberian Coffee Estate of which about 100 acres has been planted. The two-year old coffee is very fine and promises to be a good investment. At six miles from Tapah I halted again to examine the trees that had been felled for a new road. Here I collected some fine specimens of *Cælogyne Lowii*, a plant named after the late Resident of Perak, and originally collected by him in Borneo. About noon, I reached Kampar, a large mining village containing probably 10,000 Chinese. Remained here until 2 P.M., and then went on to Kuala Dipang in pouring rain. The distance from Tapah to Kuala Dipang is about 18 miles.

6. *October 20th.*—The village of Kuala Dipang is at the foot of Gunung Bujang Malaka, and near the junction of the Kampar and Dipang streams. One side of the valley is limestone, and the opposite granite. The flora of the limestone, to which I mainly confined my attention during the limited time at my disposal, is, as I expected to find, quite different to anything I had previously seen in Perak. The general features is much nearer that of the Langkawi Islands and Panga on the mainland, but the same families and genera are here represented by different species. Begonias, balsams, alocacias and gesneriaceæ are numerous in individuals, but not one species, so far as I saw, is identical with those found in Langkawi and Panga. Here at the foot of the hills are patches of deep rich reddish soil, not of sufficient area for a large estate, but excellent for small cultivators requiring say 40 or 50 acres in a patch. In places there occurs in considerable numbers a species of *Laportea* which the Malays call "Jelatang Gajah." I was warned to avoid this plant, and for some time did so, but in a moment of forgetfulness I brushed one lightly with the back of my hand. The stinging sensation is exceedingly painful and continued in my case for about thirty-six hours. Cold water appears to increase the pain. Natives say that if any considerable portion of the body comes in contact with this plant, diarrhœa and vomiting is caused, and the pain continues four or five days.

7. On the 21st, I again worked the limestone range, beginning at a place called Sungei Siput, about 2 miles from the Rest House. Mining operations are going on here at about 500 feet up the face of the cliff, and the material is sent down on rotan slides stretched from the working out into the valley, their total length being about 700 feet. In the hope of finding new plants, I was induced to go up the ladder to this working, but I must say, I was by no means comfortable until I found myself safely down again. Several interesting plants were collected in the neighbourhood of these mines.

8. On the 22nd, time being limited, I hired a gharry and drove to the foot of Gunung Mesa, distant from Kuala Dipang Rest House about 5 miles. This is an isolated limestone hill, on the top of which there is a trigonometrical station. From this point there is a very fine view of the surrounding country, but the flora is poor compared to the hills I had been on the two previous days. On another little isolated hill I collected a new begonia and a balsam. On my return to the Rest House at noon, I met an Englishman who has a mine on Bujong Malaka at 3,000 feet elevation. He invited me to accompany him there, which I should gladly have done had time permitted. Having packed up the plants collected, I commenced the return journey at 4 P.M., and slept in the Rest House at Kampar.

9. *October 23rd.*—Raining heavily all night, and no sign of clearing at day-break. Waded about for an hour in a swamp to collect plants of *Vanda Hookerii*. At 10.30 left for Tapah, but stopped half-way and struck into the jungle for three hours to hunt up a plant I once received from this locality, but did not find many.

10. *October 24th.*—Packed up plants collected at Tapah before leaving, and those that had been collected by a gentleman, who rendered me great assistance, during my absence. Dispatched these in a bullock-cart to Tapa Road Station, and followed in a gharry at 9.30. Train left at 11 A.M., and reached Telok Anson at noon. Went straight on board the s.s. *Flying Dragon*, and arrived in Penang at 6 A.M. on the 25th.

11. The result of this trip is, in spite of the unfavourable weather, very satisfactory. A number of orchids and other ornamental plants, about 500 in all, have been added to the Garden, some of which are undoubtedly new and undescribed. Others are well known, but in demand for the purpose of exchange. I also made the acquaintance of several gentlemen who will from time to time contribute to the Gardens plants that strike them as being of interest, and to whom in return we shall be able to give assistance in the matter of seeds and plant of economic value. One gentleman, who had some experience in growing vanilla in the Seychelles, asked for plants to try in Perak, which will be sent him. I was also able to be of some assistance to another gentleman in pointing out the first appearance of "Green Bug" on coffee, an insect with which they are apparently and fortunately unacquainted in Tapah, and advising as to means of checking it at once.

12. This is, I believe, the first time that any member of the Gardens and Forest Department of this Settlement has visited Batu Padang or Kinta for the purpose of collecting plants. What is known of the flora is mainly through the collections of dried plants made by Mr. WRAY and Dr. KING'S Collector. As neither of these gentlemen collected living plants to any extent, I confined my attention principally to this. The area explored by me is, of course, very trifling, and it is to be hoped that some day an opportunity may occur of extending our knowledge of this region.

I have, &c.,

C. CURTIS,
*Assistant Superintendent of
Gardens and Forests.*

Report on the Gardens and Forests, Malacca.

1. MR. GOODENOUGH was in charge during the year. Nothing could be done beyond ordinary upkeep for want of funds.

Experimental Nursery.

2. About 30,000 young clove trees were raised and distributed among the Chinese tapioca planters, together with 300 nutmeg trees and a few other mixed fruit trees.

Forest Reserves.

3. The boundaries have been regularly patrolled and kept open. I regret that the inspection paths have had to be abandoned, and nothing could be done to the Brisu or Merlimau Reserves. The area of the Forest Reserves in Malacca is 42,000 acres.

Licenses.

4. The permits issued for collecting damar, wood-oil, fibre, toddy, etc. brought in a revenue of \$625.72, and the fruit trees at Panchor were farmed out for \$105.50.

Fires.

5. Three fires occurred during the year, but fortunately did no particular damage, being confined to lalang and brushwood. The origin was unknown in each case.

6. There were no prosecutions during the year.

General.

7. In accordance with the recommendations of the Retrenchment Committee, the Forest Department has been handed over to the charge of the Collector of Land Revenue and District Officers stationed at Alor Gajah and Jasin, respectively. For this purpose, I visited Malacca in November, and made the necessary arrangements for the transfer.

W. FOX,

Assistant Superintendent, in Charge.

Revenue and Expenditure, Forest Department, Malacca, 1894.

REVENUE.		EXPENDITURE. (VOTE \$2,000.)	
	\$ c.		\$ c.
Sale of Timber, ...	296 51	Salaries of Forest Guards, ...	881 41
" Fruit (Forests), ...	147 96	" at Experimental	
" Clove Trees, ...	97 00	Gardens, ...	426 86
Tenths on Damar, ...	70 50	Pony Allowance, ...	432 00
Ornamental Plants, ...	54 31	Field Allowance, ...	117 00
Kabong Toddy and Fibre, ...	39 00	Transport, ...	84 00
Wood Oil, ...	33 00	Miscellaneous, ...	58 63
Fruit crop (Garden), ...	37 39	Balance, ...	00 10
Plants supplied to Government,	97 66		
Timber " " "	137 50		
Miscellaneous Receipts, ...	62 10		
Total, ...	\$1,072 93	Total, ...	\$2,000 00

J. S. GOODENOUGH,

Acting Assistant Superintendent of Forests.

W. FOX,

Assistant Superintendent, in Charge.



STRAITS SETTLEMENTS

ANNUAL REPORT

ON THE

BOTANIC GARDENS

AND

FOREST DEPARTMENT

FOR THE YEAR

1895

BY

H. N. RIDLEY, Esq.

Director



PUBLISHED BY AUTHORITY

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1896

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ANNUAL REPORT OF THE BOTANIC DEPARTMENT, SINGAPORE.

1. During my absence on leave till July 2nd, Mr. FOX took sole control of the Botanic Gardens, and on my return he applied for a year's leave and left in July. Mr. J. GOODENOUGH who, in accordance with the retrenchment scheme, had been discharged from the Department, was taken on temporarily in November as Assistant.

The Herbarium Keeper, TASSIM DAUD, was discharged in September, and AHMAT KASSIM was taken on in his place. The Mandor of the Economic Garden, XAVIER, broke down in health, and left at the end of the year.

Visitors.

2. The number of visitors to the Gardens was as large as usual, and the Regimental Band played once or twice a month for a portion of the year, and proved very attractive.

There were a few cases of theft of flowers, but they were of no great importance, and there were no prosecutions.

Aviaries.

3. The improvements made in the aviaries last year have produced satisfactory results; the animals being more thriving and looking better.

Among the additions to the collection of animals were:—

One tigress (*Felis tigris*), presented by Mr. D. H. WISE, Acting Resident, Pahang; three jackals (*Canis aureus*), presented by Captain BROWNE; three orang utans (*Simia satyrus*), purchased; one honey-bear (*Ursus malayanus*), presented; one Borneo red monkey (*Semnopithecus* sp.), purchased; one Indian mungoose (*Herpestes griseus*), purchased; three black Celebes monkey (*Macacus niger*), purchased; two kijangs (*Cervulus muntjac*), purchased; one sparrow hawk (*Accipiter* sp.), presented; one Afghan partridge (*Caccabis chukar*), presented. A deer (*Cervus equinus*) was born in the Gardens, and a hybrid monkey, by a kra (*Macacus sinicus*) out of a beruk (*Macacus nemestrinus*) was bred—a very rare occurrence, if indeed it has ever happened before. The little animal is growing well and strong.

The pair of herons (*Ardea sumatrana*), which have been so long in the Gardens, laid three eggs, as did a box tortoise (*Cistudo amboinensis*). A large python (*Python reticulatus*) laid a large number of eggs, apparently unfertile.

The old deer-sheds being very unsatisfactory and in a state of decay, were pulled down and a new and stronger enclosure is being built. The constant rain at the close of the year prevented the work being finished.

Plant-houses.

4. The large plant-house needed very extensive repair, as much of the wood-work was rotten, and a number of beams were replaced. As in the case of the new deer-sheds, the rain caused much delay in executing the work, to which was added some difficulty in obtaining good timber, as Balau, the best timber now procurable at a reasonable rate, is getting scarce.

The orchid-house fell down shortly before my return; the upper part has been replaced by an iron structure, and the stages are being replaced with banks of coral-stone and earth. Most of the old houses and stages have now been reconstructed in this manner, which in many respects is immensely superior to the old plan of planks supported on posts or brickwork pillars. The centre of the stage consists of earth, which is enclosed by walls of coral rock cut into blocks, and the top is covered with cement.

Lawns and Flower-beds.

5. These have been kept up to their usual standard during the year, and a large number of plants have been planted out where necessary.

Among the more interesting plants which flowered for the first time or which have seldom flowered here were *Gongora maculata*, *Vanda hastifera*, *Renanthera storiei*, *Costus igneus*, *Alpinia involucrata*, *Nicolaia elatior*, *Loxococcus rupicola*, *Anisoptera glabra*, *Allamanda Williamsi*, *Garcinia Hanburyi*, *Tricholæna teneriffæ* (a newly introduced fodder grass), *Lespedeza Sieboldi* (also a fodder plant), *Clerodendron myrmecophila*, *Aristolochia unguifolia*.

A superb plant of *Todea barbara*, stated to be over a hundred years old, was presented to the Gardens by Baron VON MUELLER, and two plants of the rare *Asplenium subaquatile* from Borneo, were also received. A large tuber of *Amorphophallus titanum* was presented by Mrs. WILLIS SMITH.

Both the Vanillas which produce the commercial Vanilloes, viz., *V. planifolia* and *V. pompona*, flowered and fruited this year.

Herbarium.

6. During my absence no collections of herbarium specimens were made. The most important additions were 1,503 specimens from the collections of WALLICH, and HANCE selected by myself from the duplicates of the British Museum Herbarium, and presented by the Trustees of that institution.

Five hundred and thirty-eight (538) specimens from the Peninsula and India, presented by Dr. KING.

Sixty-six (66) specimens of grasses and ferns of North America, received in exchange.

Two hundred and forty-three (243) specimens from Bonthain Peak, Celebes, presented by Mr. A. H. EVERETT, and a small collection made in Province Wellesley and Penang, by myself in December. A small number of specimens of various kinds were sent to the Royal Gardens, Kew, and to Dr. KING.

The cabinets for wood specimens being too small to contain the collection, some more have been added, and the old ones repaired and varnished.

Bulletin.

7. An Agricultural Bulletin dealing with sago and its cultivation and with soils, was published early in the year.

Forestry.

8. In December, in accordance with instructions, I visited Penang and Province Wellesley to look into the remaining forests with a view of taking steps for their better preservation, and a report was duly forwarded to the Hon'ble the Colonial Secretary on the subject.

Library.

9. The following works were added to the Library in addition to the usual journals, bulletins and reports. :—

Greshoff.—*Nutzige Indische Pflanzen*, Part I, presented by Colonial Museum, Amsterdam.

Schlich.—*Manual of Forestry*, presented by Author.

Trimen.—*Flora of Ceylon*, Vol. III, presented by Ceylon Government.

Ridley.—*Flora of the East Coast of the Malay Peninsula*, presented by Author.

Ridley.—*New species of Thismia*, presented by Author.

Wallich's Catalogue, presented by the Trustees of British Museum.

Beddome.—*Ferns of Southern India*, presented by the Trustees of British Museum.

Dunal.—*Monograph des Anonacees*, presented by the Trustees of British Museum.

Dunal.—*Histoire des Solanacees*, presented by the Trustees of British Museum.

Mohl.—*Vernieschte Schriften*, presented by the Trustees of British Museum.

Mohl.—*Über des Winterliche Farbung*, presented by the Trustees of British Museum.

Mohl.—*Bau des Vegetabilischen Zellmembran*, presented by the Trustees of British Museum.

Radlkofer.—*Serjania*, presented by the Trustees of British Museum.

Bureau.—*Loganiaceæ and Bignoniaceæ*, presented by the Trustees of British Museum.

Soubeiran.—*Acclimatation des Cinchonas*, presented by the Trustees of British Museum.

Chevreul.—*Absorption de l'Azote*, presented by the Trustees of British Museum.

Sprengel.—*Introduction to the study of Cryptogams*, presented by the Trustees of British Museum.

Sprengel.—*Tentamen Supplementi ad syst. vegetat. Linnæi*, presented by the Trustees of British Museum.

Victorian Exhibition.—*Indigenous Vegetable Substances*, presented by the Trustees of British Museum.

Wight's Catalogue, presented by the Trustees of British Museum.

Taylor, T.—*Arbores Mirabiles*, presented by the Trustees of British Museum.

Ægineta.—*Pharmacæa Simplicia*, presented by the Trustees of British Museum.

Salm Dyck.—*Cactææ*, presented by the Trustees of British Museum.

- Turpin.—Organographie Vegetale, presented by the Trustees of British Museum.
- Jessen.—Lebensdauer der Gewächse, presented by the Trustees of British Museum.
- Gris.—Recherches Microscopiques sur Chlorophyll, presented by the Trustees of British Museum.
- Richard, A.—Elements de Histoire Naturelle Medicale Bot. II, III, presented by the Trustees of British Museum.
- Kunze, G.—Index Filicum, presented by the Trustees of British Museum.
- Baker, J. G.—Synopsis of Selaginellas, presented by the Trustees of British Museum.
- Baker, J. G.—Rhizocarpeæ, presented by the Trustees of British Museum.
- New Commercial Drugs.—No. 11, presented by the Trustees of British Museum.
- Prain.—Vegetation of Coco Group, presented by the Trustees of British Museum.
- Cooke, M. C.—Index fungorum Britannicæ, presented by the Trustees of British Museum.
- Preiss.—Enumeratio Plantarum Australiæ, presented by the Trustees of British Museum.
- Trelease.—Structures which favour Cross-fertilization, presented by the Trustees of British Museum.
- Nordlinger.—Der Holz-ring, presented by the Trustees of British Museum.
- Brandel, V.—Insect-fressende Pflanzen, presented by the Trustees of British Museum.
- Trelease.—A yellow Opium-mould, presented by the Trustees of British Museum.
- Mercklin.—Prothallium des Farnes, presented by the Trustees of British Museum.
- Klinge.—Graminaceæ et Cyperaceæ Wurzeln, presented by the Trustees of British Museum.
- Gaudichaud.—Recherches des Vegetaux, presented by the Trustees of British Museum.
- Bucé.—Clove Tree in Dominica, presented by the Trustees of British Museum.
- Decaisne.—Maladie des Pommes de Terre, presented by the Trustees of British Museum.
- Hasskarl.—Plantæ Javanicæ rariores, presented by the Trustees of British Museum.
- Munter.—Krankheiten der Kartoffeln, presented by the Trustees of British Museum.
- Roemer and Schultes.—Mantissa, 1827, presented by the Trustees of British Museum.
- Catalogue of Plants in Hort. Bog. cult, 1866, presented by the Trustees of British Museum.
- De Vries.—Protrepticus, presented by the Trustees of British Museum.
- Dickie.—Contributions to the Physiology of Fecundation, presented by the Trustees of British Museum.
- Todaro.—Cultivated Plants in Palermo Gardens, presented by the Trustees of British Museum.
- Trimen.—Herman's Ceylon Herbarium, presented by the Trustees of British Museum.
- Von Mueller.—New Papuan Dilleniaceæ, presented by the Trustees of British Museum.
- Von Mueller.—New Melastomaceæ, presented by the Trustees of British Museum.
- Von Mueller.—New Goodeniaceæ, presented by the Trustees of British Museum.
- Von Mueller.—Leguminous Trees, presented by the Trustees of British Museum.
- Von Mueller.—Descriptions and Notes on Papuan Plants, No. VIII, presented by the Trustees of British Museum.
- Martens.—Algæ of Burma, etc., presented by the Trustees of British Museum.
- Milde.—Index Botrychiorum, presented by the Trustees of British Museum.
- Fries.—Symbolæ ad Floram Daliæ, presented by the Trustees of British Museum.
- Wallich.—Hedychium, presented by the Trustees of British Museum.
- Prain.—Notes on Lokas, a new Chinese dye, presented by the Trustees of British Museum.
- Ferguson.—All about Spices, purchased.
- Index Kewensis, Vol. 5, purchased.

BOTANIC GARDENS, SINGAPORE.

Statement of Receipts and Expenditure, for the year 1895.

RECEIPTS.		EXPENDITURE.			
	\$ c.	<i>Salaries.</i>		\$ c.	\$ c.
By Balance in Bank, ...	1,031 39	Herbarium Keeper, ...	215 48		
„ Government Grant,	8,500 00	Mandor, ...	191 00		
„ Sale of Plants and		Carpenter, ...	304 00		
Flowers, ...	497 47	Plant Collector, ...	100 00		
„ Interest, ...	30 23	Printer, ...	120 00		
		Office Peon, ...	95 74		
		Aviary Keeper, ...	95 86		
		Mason, ...	135 26		
		Garden Police, ...	347 26		
		Garden Coolies, ...	2,907 53		
					4,512 13
		<i>Bills.</i>			
		Manure and Cartage, ...	204 47		
		Food for Birds and Animals,	701 57		
		Purchase of Animals, ...	60 00		
		Purchase of Pots and Tubs,	153 79		
		Purchase of Plants & Seeds,	240 33		
		Purchase of Tools and			
		Stores, ...	534 28		
		Purchase of Timber, Planks,			
		etc., ...	440 13		
		Purchase of Lime, Bricks,			
		Sand, &c., ...	361 10		
		Freight on Plant Cases, etc.,	80 51		
		Director's Petty Expendi-			
		ture, ...	86 80		
		Assistant Superintendent's			
		Petty Expenditure, ...	86 24		
		Repairing Coolie Lines, ...	35 00		
		Repairing Orchid House, ...	663 00		
		Garden Police Uniforms,			
		etc., ...	52 00		
		Transferring Plants from			
		Malacca Garden, ...	15 15		
		Miscellaneous, ...	321 83		
					3,145 16
					8,623 33
		Balance, ...	...		1,435 76
					\$10,059 09
	\$10,059 09				\$10,059 09

Economic Garden.

10. Considerable improvements have been made in the Economic Gardens. In the lower half the ground was turfed so as to prevent the damage caused by rain wash, which has had a good effect on the trees. Many half dead trees have been removed and a number of new ones planted, especially in the arboretum.

The top of the hill has been partially cleared and planted with cloves, nutmegs, Sisal hemp, tea, coffee and cola-nuts.

Among these is a small lot of the new coffee (*Coffea stenophylla*) a plant spoken very highly of. It is growing steadily and well, and at present does not appear to be affected at all by disease. Plants have been distributed to coffee planters in different parts of the Peninsula for experiment and observation.

There is still a great deal of land lying fallow in this garden, the smallness of the vote hitherto being insufficient to allow of clearing and planting, but as the vote has been increased for 1896 to \$1,500, it is hoped to clear and plant a great deal more of this land. This is all the more necessary now on account of the rapid development of agriculture in the Peninsula and its neighbourhood. Rami, indigo, Para rubber, coca, spices, as well as fruit trees, are in great demand and hitherto the gardens have been unable to supply a sufficient quantity of these and other economics.

The expenditure is as follows:—

	\$	c.
Mandor's Salary, ...	144	00
Coolies' Salary, ...	714	71
Tools and Stores, ...	19	44
Bricks, Cement, etc., ...	43	70
Manure, ...	66	50
Balance, ...	11	65
Total, ...	\$1,000	00

Revenue.

	\$	c.
Fruit crop, ...	13	00
Grass, ...	15	00
Total, ...	\$28	00

Inspection of Coco-nut Trees.

11. As the staff of this department was reduced to a single coolie, the amount of work that could be done was not very great, especially as during most of the year there was no assistant to the Officer in charge of the Gardens, so that it was impossible for him to visit the plantations and supervise the work of the coolie.

One hundred and forty-nine (149) notices to destroy trees and stumps were served, and 448 trees and 8 stumps were removed. There were no prosecutions.

The refuse tan bark at Rochor is still being burnt, and in some places the old accumulations have been built on so effectively as to prevent any lodging of the black beetle there. But the red beetle seems to have increased in numbers again in some places, especially in Gélang, and strong measures must be taken to reduce them.

The vote for the year was \$350.

Expenditure:—

	\$	c.
Salary of Coolie, ...	96	00
Transport, ...	27	35
Balance, ...	226	65
Total, ...	\$350	00

Government House Domain.

12. The Government House grounds were handed over to the charge of the Botanic Gardens in January, after a lapse of 8 years, previous to which they were under the control of the Superintendent of Gardens. They were found to be in a very neglected state, and a great deal of work had to be done in cleaning and planting. The Mandor, MATHIAS, resigned in March, and was replaced by JAMES. The tennis lawn in front of the House was raised, levelled and re-turfed, at a cost of \$52.92, and a piece of ground near the stables was planted with fruit trees and vegetables.

The grass on the grounds was let out for five dollars a month, during the latter half of the year.

Vote, ...	...	\$2,360.00
Expenditure :—		
Mandor's Salary, ...	\$	180.00
Coolies' Salary, ...		1,959.65
Re-making Tennis Lawn, ...		52.92
Materials and Tools, ...		62.91
Manure, ...		18.25
Miscellaneous Expenses, ...		15.45
Balance, ...		70.82
Total, ...		\$2,360.00

Revenue from grass cutting, ... \$25.00

H. N. RIDLEY,
Director.

Botanic Gardens Department, Penang.

The Assistant Superintendent of Forests was absent on leave in England for six months during the year, and in his absence, there being no European Officer of the Department available, the work was carried on by the Overseers of the Government Hill Garden and the Waterfall Garden.

2. In accordance with the retrenchment scheme, the supervision of Forest Reserves in this Settlement was transferred to the Land Office Department on the 1st January, 1895, and a report on their condition and progress will, no doubt, be made by the Collector of Land Revenue.

Waterfall Botanic Garden.

3. This Garden continues to increase in interest and popularity, and the number of visitors from passing steamers, as well as residents, is considerable. It is, in fact, the one place to which strangers are nearly always taken if they have friends in the Island, or are directed to go if they have none.

4. Further progress has been made with sloping and turfing the banks of the stream in places where slips have occurred, or were imminent, and this has absorbed a large proportion of the amount of labour available after the ordinary routine works, such as mowing, weeding, maintenance of roads, watering, &c. had been provided for.

5. A new masonry dam fifty-nine feet wide and eight feet high has been constructed a short distance above the second bridge, and in addition to raising the level of the stream and preventing slips, forms an effective cascade, especially during the rains.

6. One thousand five hundred and seventy (1,570) lineal feet of rough masonry drains have been constructed alongside the steeper portion of the carriage roads where the wash is most destructive.

7. Preparation for re-constructing No. 2 plant-shed with light angle iron was commenced in December by lifting the more valuable plants and removing them to a temporary shed. Material for this purpose, to the amount of \$490, was purchased out of the balance of 1895 vote, and the remainder, or at least as much as can be spared after payment of other liabilities, will be paid out of the current year's vote. This is a rather big undertaking to provide for out of the ordinary Maintenance Vote, but it has to be faced, for until these old wooden plant sheds are replaced by iron, we shall have constant expenses in the matter of repairs.

8. A great number and variety of trees and shrubs have been planted out in beds and clumps, and the general appearance of the grounds and plant-sheds made as attractive as possible.

9. During the early part of the year, there was a good show of orchids in the sheds and of annuals in pots and beds. At the beginning of the rains when the annuals had finished flowering, the beds were filled with Coleus, Dracænas, and other bright coloured foliage plants.

10. The usual interchange of plants and seeds with various correspondents has been continued, but owing to the absence on leave of the Assistant Superintendent, the numbers distributed by this department were less than they should have been.

11. Plant sales realised \$939.92, which, as in previous years, was paid in to revenue account. These sales represent upwards of four thousand plants, mostly in pots. Ornamental plants are most in demand, but fruit trees and trees for shade form a fair proportion. These plants are sold at low rates, as it is desirable to encourage their cultivation, but the result is that the more plants are sold the less money and labour there is available for the general up-keep of the garden, for pots cost money, and plants cannot be propagated without labour.

12. A large number of interesting and valuable plants has been added during the year, the greater proportion having been selected by the Assistant Superintendent from Botanic Gardens and nurseries while on leave in England, and brought out by him on his return. This selection, which filled eighteen cases and measured over ten tons, was attended to and watered, when necessary, during the voyage, and there is no doubt that this is the surest way of introducing certain plants that travel badly.

13. The thanks of this department are specially due to the Director, Royal Gardens, Kew; to Messrs. F. SANDER & Co., St. Albans; Messrs. JAS. VEITCH & SONS, Chelsea; and Messrs. HUGH LOW & Co., Clapton, for the greater portion of this fine collection.

14. A short trip to the Kinta District of Perak was made during the last ten days of the year for the purpose of collecting living plants and botanical specimens for the herbarium, with satisfactory results. On my return, I submitted a short report on the journey, a copy of which I annex to this report (Appendix B).

15. More room for the accommodation of the herbarium specimens is much needed; for, although the collection is mainly Penang plants, and altogether Malayan, the present Office is much too small for the herbarium as well as Office work.

16. The total expenditure for maintenance of this garden is \$4,484.43 as shown in statement annexed (Appendix A), but if from this is deducted the amount of revenue collected amounting to \$973.32, the actual cost is only \$3,511.11.

Government Hill Gardens.

17. Nothing new of importance has been done in these gardens, the amount of money available for labour being barely sufficient to keep the grounds of Government Bungalow in order and maintain a supply of flowers and vegetables.

18. The grounds of Belle Vue Bungalow badly require attention, but with the present labour staff it is impossible to do this work justice.

19. The Experimental Nursery has been kept clean, and many of the fruit trees look well, though in want of manure. If ever the long-talked of tramway to the top of the hill becomes an accomplished fact, none will derive more benefit than those engaged in gardening pursuits. At present the cost of carrying up any considerable quantity of manure is prohibitive.

Preservation of Coco-nut Trees.

20. The Inspector with the assistance of one Notice Server and one Climber, has been employed alternate months in Penang and Province Wellesley.

21. One thousand four hundred and twenty-five (1,425) notices have been served on persons having on their premises trees, stumps, or rubbish, suitable breeding places for the beetle; and as the result, 3,608 dead trees, 3,856 stumps, and 209 heaps of rubbish have been destroyed.

22. Seventy-nine (79) persons were prosecuted for non-compliance with the notices served on them, and fines inflicted amounting to \$170.

C. CURTIS,

Assistant Superintendent of Forests.

Penang, 18th January, 1896.

APPENDIX A.

Revenue and Expenditure—Botanic Gardens Department, Penang, 1895.

REVENUE.	EXPENDITURE.	AMOUNT.
		\$ c.
	Salaries,	3,135 42
	Purchase of Plants and Seeds, ...	126 50
	Purchase of Pots and Tubs, ...	101 47
	Purchase of Tools and Materials, ...	236 61
	Purchase of Lime and Manure, ...	65 70
	Purchase of Planks for Plant Cases, &c.,	86 36
Grant—Maintenance of Waterfall Garden, ... \$4,500.00	Purchase of Iron for Plant Shed, ...	490 00
	Cartage,	45 90
	Freights,	81 40
	Periodicals and Books, ...	40 53
	Miscellaneous and Petty Expenses, ...	74 54
	Balance,	\$4,484 43
		15 57
		\$4,500 00
Grant—Expenses of carrying out Provisions of Coco-nut Trees Preservation Ordinance, ... \$700.00	Salaries,	\$641 80
	Balance,	58 20
		\$700 00
Grant—Maintenance of Experimental Nursery, ... \$200.00	Salaries,	\$158 70
	Manure,	21 00
	Tools,	15 94
	Balance,	\$195 64
		4 36
		\$200 00
Grant—Travelling and Personal Allowances, ... \$330.00	Pony Allowance (6 months), ...	108 00
	Expenses in connection with collecting Plants in Perak, ...	87 96
	Balance,	\$195 96
		134 04
		\$330 00
Plant Sales, ... \$939.92		
Bath Receipts, ... 26.40		
Rents, ... 7.00		
		\$973 32

C. CURTIS,
Assistant Superintendent of Forests.

APPENDIX B.

BOTANIC GARDENS,
Penang, 7th January, 1896.

To

The Hon'ble the Resident Councillor.

SIR,—I have the honour to report that, in accordance with your permission, I proceeded to Perak on the 21st December last, for the purpose of collecting plants for exchange and cultivation in the Botanic Gardens, also botanical specimens for the herbarium and distribution. I arrived at Ipoh, Kinta, at noon on the 22nd, and at once commenced exploring the hills in the vicinity. By the aid of two European residents, who knew the exact localities, I was enabled in a short time to get collected about 2,000 plants of what is locally known as "Kinta Weed" (*Vanda Hookerii*), and a good number of "Tapah Weed" (*Arundina bambusæfolia*); the greater portion of which I purpose sending to England in exchange for plants received and brought out by me on my return from leave in September last.

Near some hot springs between Ipoh and Tanjung Rambutan I obtained several interesting ferns and other plants suitable for pot culture. Also three plants of *Arisæma fimbriata*, a plant not hitherto recorded from the Peninsula, but abundant in the islands to the North of Penang. The water at these springs is so hot in places that it is painful to keep one's hand in it. It is very clear, but without the strong sulphur smell noticeable in some of the hot springs in North Celebes.

On the morning of the 26th, I left Ipoh for Kuala Dipang, leaving the Malay man I took with me from Penang to complete the drying out of the botanical specimens, to pack the living plants and bring the whole direct to Telok Anson by rail to meet me on the 29th, which he did.

On the way from Ipoh to Kuala Dipang I examined the limestone hills at three or four different places, having different aspects, and found several new plants. One of these is a new balsam, the second species I have discovered in this district.

On the 28th December, being the last day of my stay at Kuala Dipang, I went some distance up Gunong Bujong Malacca, to a Sakai clearing, and got one of the men as guide for the day. We did not get very far up the mountain—probably not more than 1,500 feet—for we struck a ravine so exceedingly rich in interesting plants that the two men I had with me were loaded in a couple of hours.

Many of the plants collected were not in flower, but they are of great interest, and undoubtedly new to Gardens if not to botanists.

One of the most interesting is a very distinct begonia with narrow almost lanceolate leaves quite unlike any other species of this genus with which I am acquainted. It is found growing on huge water-worn boulders in damp shady places.

Small graceful palms suitable for pot culture are abundant, both in species and individuals, especially on the dry ridges, but unfortunately only a few seeds were obtainable. This is, I believe, owing to the fact that the monkeys eat them as fast as they ripen. It is very desirable that a more extended examination of the flora of this mountain should be made at the season when the greater number of plants are in flower, if one could ascertain when that is. In Penang, May and June are the best months and probably it is the same on this mountain.

There are Chinese miners working much higher up than the point I reached and, I believe, there is a survey hut on the very top, so that there would be no difficulty in obtaining shelter for a few nights.

I left Kuala Dipang to catch the train at Kampar on the morning of the 29th, intending to return to Penang the same evening, but on arrival at Telok Anson found there was no boat until the following day. This was unfortunate, as had I known in time it would have given me another day in the jungle.

From an agricultural point of view, Kinta is the best district I have seen in Perak, and from what I hear, will before long be a large coffee-growing district. Many other products would do equally well in such rich soil, but the present tendency is all in favour of coffee. Ipoh is a large and flourishing town, very hot in the day time and badly in want of shade trees.

I have, &c.,

C. CURTIS,
Assistant Superintendent of Forests.

STRAITS SETTLEMENTS

ANNUAL REPORT

ON THE

BOTANIC GARDENS

FOR THE YEAR

1896

BY

H. N. RIDLEY, ESQ.

Director



PUBLISHED BY AUTHORITY

SINGAPORE:

PRINTED AT THE GOVERNMENT PRINTING OFFICE

1897

ANNUAL REPORT OF THE BOTANIC DEPARTMENT, SINGAPORE.

1. During the greater part of the year, Mr. FOX was absent, returning on November 17th. I visited Penang and the Dindings in March, returning on April 9th, and was away also, in Selangor, from May 9th to June 11th, being engaged in reporting on the forests. During these periods, Mr. J. GOODENOUGH acted for me, and remained as Assistant till July 7th, when he was engaged as Mining Surveyor in Selangor. He was replaced by Mr. MELVILLE, who remained till Mr. FOX's return.

2. The Herbarium-keeper, AHMAT KASSIM, was discharged in August, and J. S. ISAAC took his place. The Upper Garden Mandore, YUSUF, replaced XAVIER as Mandore of the Economic Gardens, and a man named JUMAT was employed in his stead. He proved unsatisfactory and was replaced by one NATHANIEL, who was also quite unsuitable, and on October 15th, ANIFF, who had formerly been employed here, returned from Ceylon and resumed the post. Owing to the demand for coolies for the Native States, it was very difficult to obtain a sufficient supply for the Gardens in the early part of the year, and the high price of provisions and the fact that private employers and other establishments had raised the price of wages, in some cases very considerably, caused much discontent. There was a serious outbreak of beri-beri also in the lines in the spring, but, I am glad to say, only one death.

Not only was the supply of coolies deficient during part of the year, but the class of coolies and mandores obtainable now is very inferior to what it was in previous years, and wages, on the whole, are a little higher. The Javanese watchmen, having proved unsatisfactory this year, were discharged, and Sikhs were taken on in their place, and prove more suitable.

There were a number of petty thefts and a few more serious ones, due chiefly to the action of the Javanese watchmen in collusion with some of the coolies. The worst case was a charge against five soldiers of stealing plants and assaulting the Sikh watchman; one soldier was convicted and sentenced to a term of imprisonment.

Visitors.

3. The number of visitors was quite up to the mark, and the Regimental Band played once or twice a month for part of the year, and was much appreciated.

Aviaries.

4. Some of the houses in the aviaries were repaired or re-constructed. The sheds in the deer-paddocks were closed in with planks, so as to darken them. This was found to relieve the animals very much from the annoyance caused by the flies.

Among the additions to the collections were five common deer, presented by Mr. J. F. CRAIG; one Axis deer, presented by Mr. KIEL; one mias, presented by Mr. G. P. OWEN; three common monkeys, presented by Mr. JELLEY and Mr. E. SCHULTZE; one Wawa (*Hylobates var.*), purchased; two slow Loris, presented by Mr. TRUMMER; one squirrel (*Sciurus bicolor*), presented by His Excellency the Governor; one grey squirrel from Siam, purchased; one wild cat (*Felis planiceps*), purchased; four whistling teal, presented by Mr. A. MAXWELL; two Mandarin ducks (*Aix sponsa*), presented by Mr. HANCOCK; one large python, presented by Mr. ZAVITZ; one monitor, presented by Mr. DENNARD; one large tortoise (*Emys sp.*), captured in the Dindings.

Some common monkeys were born, and another hybrid between *Macacus nemestrinus* and *M. sinicus*, but it died at birth. The black Celebes monkey (*Cynopithecus niger*) was crossed with a male Beruk (*M. Nemestrinus*) but, unfortunately, died in parturition. The female jackal (*Canis aureus*) produced four pups. Three of which grew well and strong, the fourth crept through a drain into the adjacent tiger's cage and was destroyed. The Sumatran heron continued to lay eggs, but none hatched. Among the deaths may be registered an eagle which had been in the Gardens for at

least twenty years, and a mouse deer (*Tragulus Kanchil*) which had been five years in captivity and was evidently very old. Both the remaining black swans on the lake were devoured by a large python, over sixteen feet long, which was eventually killed on the island in the lake.

Plant-houses.

5. The large plant-house underwent considerable repairs and one side, the roof was covered with attaps in place of the laths which were rotten. The orchid-house was finished and proved very successful, and the small fern-house was re-constructed, the tables being built of coral, and the roof made of split bamboo, which seems a very suitable covering for these plants.

Lawns and Beds.

A large portion of the hill near the new lake was cleared of fern, and turfed. New beds for the seedling palms were made at the foot of it, and many palms from the old beds removed there, the old beds being turfed over. The upper part of the new lake was excavated, and the banks raised and strengthened. This work was done by contract, and was rather laborious on account of the large masses of timber found in excavating. The road between the two parts of the lake was also raised. An addition of thirty-five yards was made to the fern rockery, and it was planted with ferns and other plants, and a small enclosure was made for growing roses in tubs. The avenue of Sabal Palmetto near the large lake was badly attacked by palm-weevils, and a number of the trees destroyed.

Among the more interesting plants which flowered here for the first time or have rarely flowered were *Galphimia glauca* (an ornamental shrub), *Citrus decumana* var. (the Bali pumelo), *Acalypha Sanderiana* (New Guinea), *Desmodium tortuosum* (the North American beggar-weed, a fodder plant), *Liparis pectinifera* (a new species from the Dindings), *Thunia Marshalliana* (Burma), *Dendrobium cinnabarinum* (Borneo), *D. inauditum* (Amboina), *Cælogyne Rumphii* (Amboina), *Habenaria Susannæ* (Timor), *Thaumatococcus Daniellii* (West Africa), *Alpinia vittata* (New Guinea), *Zingiber spectabile* (Selangor), *Amorphophallus Rex* (Sumatra), *Pennisetum macrostachyum* (New Ireland).

Herbarium.

During the year, a considerable number of specimens were added to the herbarium. An extensive collection of plants from the interior of Selangor was made by the plant-collector during my stay there in the early part of the year, and a small number from the same district was sent by Mr. GOODENOUGH. Eighty specimens were received from Mr. CURTIS at Penang, 505 plants from Perak and India, presented by Dr. KING, and a specimen of the wild pumelo from Pahang, presented by Mr. MACHADO.

From Borneo were received a valuable collection of 223 ferns and 17 other plants from the Right Reverend Bishop HOSE, and a number of specimens from Sarawak by Dr. HAVILAND. From Java twenty-four specimens of *Zingiberaceæ*, presented by Dr. TREUB. A collection of mosses from Bonthain Peak, Celebes, was received from Mr. A. EVERETT. A small series of plant from New Guinea and Tenimber from Mr. PEREIRA. A specimen of the bastard teak from Christmas Island from Mr. KEYSER, and *Saccoglottis amazonica* from Mr. HART of Trinidad, and a collection of mixed plants, including Indian grasses named by Sir JOSEPH HOOKER, was received from Kew. A small collection was made by the Director in the Carimon Islands.

The wood specimens were re-arranged, and a number of local species added, together with a specimen of an unknown Sandal wood from the interior of Pahang, presented by Mr. MACHADO, and a remarkable scented wood from Christmas Island, presented by Mr. KEYSER.

The Guttas and India-rubbers were cleaned and re-arranged, and specimens of these and other economic products added to the collection.

The following specimens were sent in exchange to various botanists:—Over fifteen hundred to Dr. KING, Calcutta; 1,290 to the Royal Gardens, Kew; a named collection to Dr. TREUB, Buitenzorg; a small collection to the British Museum; and specimens of medicinal plants to the Pharmaceutical Society. A series of specimens of barks of chestnuts (*Castanopsis*) and mangroves, was sent to Dr. TRIMBLE of Philadelphia, who is experimenting on the tanning properties of these barks.

Library.

The following works have been added to the Library :—

Hand-list of Ferns, presented by the Royal Gardens, Kew.

Hand-list of Orchids, presented by the Royal Gardens, Kew.

Hasskarl.—*Retzia*, presented by the Royal Gardens, Kew.

Taubert.—*Gattung Stenomeris*, presented by the Royal Gardens, Kew.

Von Mueller.—New species of *Pycnarrhena*, presented by the Royal Gardens, Kew.

Von Mueller.—*Rhododendron Carringtoniæ*, presented by the Royal Gardens, Kew.

Baillon.—*Bulletin Mensuelle de la Société Linneene de Paris*, presented by the Royal Gardens, Kew.

Pierre.—*Flore Forestiere de la Cochinchine*, five parts, presented by the Royal Gardens, Kew and Calcutta.

India Museum Notes, presented by the Royal Gardens, Calcutta.

Annals of Calcutta Gardens, V, VI, VII, presented by the Royal Gardens, Calcutta.

Duthie.—*Field and Garden Crops*, presented by the Royal Gardens, Calcutta.

Duthie.—*Indigenous Fodder Grasses*, presented by the Royal Gardens, Calcutta.

Duthie.—*Fodder Grasses of Northern India*, presented by the Royal Gardens, Calcutta.

Agricultural Ledger, presented by the Royal Gardens, Calcutta.

Schlich.—*Manual of Forestry*, Vol. V. presented by the Secretary of State for the Colonies.

Annals de Jardin Botanique de Buitenzorg, presented by Dr. TREUB.

Koorders and Valetton.—*Boomsorten van Java*, Vol. IV, presented by Dr. TREUB.

Trimble.—*Tannins*, Vols. I, II, presented by the author.

Also, Gardens Report and Bulletins from the Gardens of Lagos (complete set), Jamaica, Barbados, Cape Colony, Madras, Ceylon, Michigan Botanic Department, State Agricultural College, U. S. A., Kolonial Museum Haarlem, St. Petersburg; Forest Reports, Punjab and Madras, Kew Bulletin and *Icones Plantarum*, from Kew Gardens.

Purchased :—

Vidal.—*Sinopsis de familias lenosas Filipinas*.

Decandolle.—*Prodromus*, Vol. IX.

Lodeman.—*Spraying of Plants*.

Beccari.—*Illustrationes de nuove e rare species Piantas*.

Cesati.—*Mycetum Borneense*.

Beddome.—*Supplement to Ferns of India*.

L. Wray.—*Practical Sugar Planter*.

Papers respecting the Culture of Sugar, East India Company—1822.

Reinwardt, Blume and Nees.—*Hepaticæ Javanicæ*.

Von Mueller.—Sir W. Macgregor's Highland Plants of New Guinea.

A. M. Ferguson.—*All about Aloe and Ramie*.

Do., *All about India-rubber and Getah Percha*.

Dr. Watts.—*Index to Dictionary of Economic Products*.

Hooker, Sir J.—*Flora of British India*, last two parts.

Bulletins.

During my stay in Penang, I investigated the cause of the nutmeg disease which was so destructive in 1860 and which was said to have re-appeared. I found it to be due to a small Scolytid beetle, and an account of the disease and others incident to the nutmeg and clove trees was published as a bulletin. Two more bulletins dealing with the cultivation of spices and with Ramie, Para rubber and diseases of coffee, together with an article by Mr. CURTIS on the cultivation of pot plants were prepared, and are in the hands of the printers.

Camphor.

During my stay in Selangor, I visited the camphor woods of Rawang, and obtained specimens of timber, leaves, etc. in order to experiment with them with a view of extracting the camphor, which commands an exceedingly high price. The material I brought being insufficient, the Resident sent down a beam of the wood, on which experiments are still being made at the Laboratory of the Government Analyst. The camphor oil, Borneol, is easily extracted by distillation, but the solid camphor resists, at present, any methods of extraction.

Exchanges.

The following exchanges of plants and seeds have taken place during the year. Five hundred and seventy-seven plants and four hundred and twenty-seven packets of seed. The former comprises a set of the new and beautiful begonias of the Rex type, selected by Mr. FOX and presented by Messrs. SANDER & CO. The same firm also presented a series of new caladiums and seven plants of that most beautiful African genus *Streptocarpus*. It is hoped that by hybridization between this genus and our own, nearly allied, one of *Didymocarpus*, we shall succeed in imparting a vigour to the latter which will enable it to be grown freely on the plains.

Two hundred and fifty-three plants and forty-one packages of seeds were sent out to various Botanic Gardens.

The following contributed to the Gardens :—

	The Director,	Royal Gardens,	Kew.
	Do.,	Botanic Gardens,	Calcutta.
	Do.,	Do.,	Ceylon.
	Do.,	Do.,	Buitenzorg.
	Do.,	Do.,	Mauritius.
	Do.,	Do.,	Saigon.
	Superintendent,	Do.,	Brisbane.
	Do.,	Do.,	Japan.
	Do.,	Do.,	Port Darwin.
	Do.,	Do.,	Madras.
	Do.,	Do.,	Grenada.
	Do.,	Do.,	Saharanpur.
	Do.,	Do.,	Trinidad.
	Do.,	Do.,	Lagos.
	Do.,	Do.,	Jamaica.
	Do.,	Do.,	Adelaide.
	Do.,	Do.,	Washington.
	Do.,	Horticultural Gardens,	Nagpur.
	Messrs. Sander & Co.,	St. Albans.	
	„	Carter & CO :—	
	M. Cornu,	Paris.	
	Mr. O. Bartels,	Brisbane.	
	Rt. Rev. Bishop Hose,	Sarawak,	
	Mr. Pereira,	Singapore.	
	„	Grosman.	
	„	Micholitz.	
	„	H. Walker,	Sandakan.
	„	Dumas.	
	„	McBain.	

BOTANIC GARDENS, SINGAPORE.

Statement of Receipts and Expenditure, for the year 1896.

RECEIPTS.		EXPENDITURE.			
	\$	c.		\$	c.
By Balance in Bank, ...	1,435	76	<i>Salaries.</i>		
„ Government Grant,	8,500	00	Herbarium-keeper, ...	187	99
„ Sale of Plants and Flowers, ...	1,601	68	Mandore, ...	149	20
„ Interest, ...	32	58	Carpenters, ...	305	97
			Masons, ...	175	56
			Printer, (Label), ...	120	00
			Plant Collector, ...	120	00
			Office Peon, ...	96	00
			Aviary-keeper, ...	96	50
			Garden Police, ...	361	73
			Garden Coolies, ...	2,890	91
					4,503 86
			<i>Bills.</i>		
			Tools & Stores, ...	544	48
			Timber, ...	856	90
			Lime, Bricks, etc., ...	603	27
			Pots and Tubs, ...	314	12
			Birds' & Animals' Food, ...	1,039	53
			Manure & Cartage, ...	226	30
			Plants & Seeds, ...	261	71
			Wardian Cases, ...	146	66
			Books, Papers, etc., ...	191	65
			Uniforms for Police and Peon, ...	116	30
			Freight on Plants, ...	39	58
			Repairs to Buildings, ...	65	00
			Subscription to Telephone, Laterite, ...	97	50
			Petty Expenses, ...	312	04
			Excavating Lower Lake and raising Road, ...	600	00
			Miscellaneous, ...	240	78
					5,691 22
			Balance, ...		10,195 06
					1,374 96
					\$11,570 02
					\$11,570 02

Economic Garden.

An additional vote of \$500 enabled much more work to be done here than in previous years. A large amount of ground was cleared of fern and dug over, and partly turfed, especially on the hill facing Dalvey Road where a number of trees were planted chiefly belonging to the orders *Bignoniaceæ*, *Laurinæ*, *Proteaceæ*, *Myristicaceæ* and *Euphorbiaceæ*.

On the top of the main-hill, which was turfed, a collection of *Coniferæ* was planted, and further patches of land were cleared and planted with *Guttiferæ* and *Anacardiaceæ*. In the lower part of the Garden, the ground was cleared, and beds made for different kinds of bananas, vanilla, male bamboo, coca, vegetables, ramie, and Mauritius hemp, for all of which there have been considerable demands, but the year will be always remarkable for the enormous demand for ramie plants, of which a very large number have been supplied to the Native States, Borneo and Sumatra, and, in a less degree, to Singapore. The propagation of this plant occupied a very large share of the labour, as the original stock in the Garden was by no means large, it being a plant seldom asked for till this year. Next to ramie, Para rubber attracted planters, and a very large amount of seed (2,810) and plants were purchased.

A number of planters and others interested in cultivation of economic plants visited the Garden to study the methods of propagation and culture.

Vote, ...			... \$1,500
Expenditure:—			_____
		\$ c.	
Mandore, ...	...	180	00
Coolies, ...	...	909	66
Manure, ...	...	101	50
Materials and Tools, ...	...	132	46
Laterite, ...	...	39	50
Lime and Bricks, ...	...	40	98
Balance in Bank, ...	...	95	90

	Total,...		\$1,500.00

Inspection of Coco-nut Trees.

As mentioned in last year's Report, the red beetle increased enormously, owing to the reduction of the staff to one coolie, so that it was imperative to add an Inspector, and in May, AHMAT BIN HAJI OMAR was appointed.

Three hundred and sixty-six notices were served on persons who had dead or dying trees or rubbish, likely to serve as breeding grounds for beetles. One thousand two hundred and sixty trees, and two thousand two hundred and ninety stumps, and twenty-five piles of rubbish and cow dung destroyed. There were thirty-two prosecutions for non-compliance with the notices, and fines amounting to \$95 were inflicted.

The vote for the year was, ...			\$350.00
Expenditure:—			_____
Salaries, ...	...	\$189.29	
Transport, ...	...	71.23	
Removing trees, ...	...	39.55	
Miscellaneous—Uniform etc., ...	...	9.20	
Balance, ...	...	40.73	

			\$350.00

Government House Domain.

During the year, twenty-six coolies and the mandore JAMES were employed on the Domain. One of the lawns was dug up and entirely re-turfed with Dôub-grass (*Cynodon*). The plant-houses were entirely re-roofed and brick pillars built to support the staging. One hundred and fifty new tubs and pots were purchased, and most of the plants re-potted. An additional piece of ground was prepared and planted with vegetables. The great extent of grass which constantly requires cutting takes up most of the coolies' time, sixteen men being usually employed on this work.

Vote,	\$2,360
Expenditure :—	
Mandore's Salary, ...	180 00
Coolies, ...	1,896 66
Re-making Tennis Lawn, ...	63 90
Materials and Tools, ...	147 75
Manure, ...	60 11
Miscellaneous, ...	3 20
	<hr/>
	\$2,351 62
Balance, ...	8 38
	<hr/>
	\$2,360 00
	<hr/>
Revenue :—	
Sale of grass, ...	\$ 50 00
	<hr/>

H. N. RIDLEY,
Director.

Botanic Gardens Department, Penang.

The only change of Officers during the year was the promotion of Mr. D'SILVA, Inspector of Coco-nut Trees, to the post of Forest Ranger in the Dindings. Mr. K. BALHETCHET succeeded Mr. D'SILVA in the month of August.

Waterfall Garden.

2. The most important work of the year has been the erection of a new iron plant-shed, 84 feet long by 60 feet broad and 16 feet 6 inches high in the centre, on the site of the old No. 2 shed. A portion of the material for this work was purchased in 1895, as mentioned in my Report for that year, and the remainder has been paid in 1896; the work of erection being done entirely by the Garden Carpenter and Coolies. The supports are steel rails set in 3 feet of concrete, and the roof of bent-angle iron in 2 spans of 30 feet each, covered with bertam chicks. The interior is entirely of rock-work planted up largely with local plants, tree ferns being an important feature. Much interest is shown in this shed, and the question as to the cost often asked by residents in the Colony with a view to copying it on a smaller scale. Altogether the material cost \$910, and I calculate that, to erect a similar shed and construct the rock-work, in or near town, the cost would be almost equal to that of the material. All the stone required here was obtained in the Garden, and cartage cost very little. This attraction and permanent addition to the Garden has been made without any increase to the grant for maintenance, but necessarily some other works have had to remain in abeyance.

3. The fernery, which was in a bad state of repair, having originally been constructed of material that was used for the Agricultural Show, had to be temporarily renewed, partly with wood, as funds would not admit of it being done in iron this year. In doing this, however, we used old, but substantial iron water pipes for the supports and set them firmly in concrete so that on the next occasion light T iron can easily be substituted for the present wood-work without interfering with the beds, and without involving much labour or expense.

4. Minor repairs were done to the other plant-sheds, and this must continue to be an annually recurrent item of expenditure, involving a good deal of labour and damage to plants so long as wood structures are used in this climate.

5. In the palm shed, the front stage, 129 feet long, has been built of rough stonework in lieu of the old wooden one, and this about terminates the use of wood stages for pot plants in this Garden.

6. The longest bridge across the main stream at the top of the grounds, 48 feet long, built in 1888, is in need of renewal. Some new timbers have been put in so as to keep it open to traffic for another year, if possible, but it is important that provision be made for this work in the Estimates for 1898, as it is a matter that cannot be done out of the ordinary maintenance vote. I hope that, as in the case of the two smaller bridges, already done, lower down the stream, it will be re-constructed of iron this time.

7. A great deal of work has been done at odd times, as labour could be spared, towards filling in and raising the ground in the pot plant nursery, and thus increasing the area which is much too restricted for the increased work, as there is no other suitable site available.

8. A further portion of the river bank has been sloped and turfed, roads repaired, trees and shrubs planted, lawns mowed, &c. as found necessary.

9. Plants and seeds in considerable numbers have been exchanged with various Botanical and Horticultural establishments, and with private individuals. Plants to the value of \$792.75 were sold and the amount paid into revenue account.

10. A matter of some interest to the planting community is the raising of a pretty large batch of Borneo sugar canes from seed. The seeds were sown early in November and germinated in five days. They were pricked off when from a month to six weeks old in a mixture of leaf-mould and sand in equal parts, and many of them are now (January 14th) over 6 inches high. There are in all over 3,000 plants. Subsequent sowings of other varieties under exactly the same conditions proved a failure, probably because the seeds had not been collected at the right stage, but I do not despair of succeeding with the others as well. Cane seeds would appear to retain their vitality only a very short time, for a second sowing of Borneo cane from the same lot of seeds as the first which came up so well, after an interval of only a fortnight, did not produce a single plant.

11. Ramie, to which considerable attention is being directed at present, has been distributed in small numbers, and a stock is being worked up with a view to meeting the demand which is almost certain to spring up within the next few months. Unfortunately the area of land at my disposal, suitable for this work, is very limited, being confined to the small Nursery at the Chitty Temple. In the Waterfall Garden there is hardly a square yard of level land and the soil is besides unsuitable for nursery work.

12. At the request of the Director, and to meet the growing demand for information by amateurs in the Settlement, a paper on the cultivation of plants in pots has been prepared which will be published in the Agricultural Bulletin of the Malay Peninsula.

13. Two short botanical excursions for the purpose of collecting both living plants and herbarium specimens were undertaken during the year, one to the Langkawi Islands in the month of April, and the other to the Siamese Malay State of Kasum in November. During these trips, I was enabled to add considerably to the number of plants cultivated in the Garden, and to the botanical knowledge of the regions visited.

A short account of the latter trip was furnished to the Hon'ble Resident Councillor on my return, a copy of which is annexed (Appendix B).

14. The total expenditure in connection with the Waterfall Garden amount to \$4,485.87, and the revenue collected from sale of plants, &c. to \$839.95, as shown in Appendix A annexed.

Government Hill Gardens.

15. 1896 proved an exceptionally wet year, the rainfall on Government Hill being a little over 150 inches, consequently a large amount of labour was expended in repairs to paths in the grounds of Government Bungalow. A number of roses, grafted in the Waterfall Garden, were planted out to replace the old ones that were worn out, and are growing vigorously.

A pretty regular supply of vegetables has been kept up, but it is a matter of some difficulty to grow much during the wet weather. From November to March is the best season for growing vegetables, but the cost of transport of manure, and the limited area of ground available, prevents cultivation on any considerable scale. Potatoes planted in October ripened a fair crop in seventy days, but several were diseased.

Table maize, which is deserving of much more attention than it gets in this country, as it grows in the plain just as well as on the hill, was ready for use in 60 days. Indian saved seed proved better than American.

16. Levelling and turfing the site for the tennis court at the new Convalescent Bungalow has been completed, but much requires to be done to these grounds in the way of planting, &c. when there is money available for carrying up manure.

17. The experimental nursery has been kept clean and some of the more important fruit trees manured, but beyond this, little could be done on the money available.

Preservation of Coco-nut Trees.

18. The Inspector of Coco-nut Trees was employed half the year in Penang and the other half in Province Wellesley under the direction of the District Officers. Two thousand and twenty-one (2,021) notices were served on persons having on their premises dead trees or heaps of rubbish likely to prove suitable breeding places for beetles, calling on them to destroy the same within a specified time. Sixty-four (64) of these persons were summoned for failing to comply, and of this number, 57 were fined in small amounts aggregating \$99.

General.

19. I must again refer to the need of more office space, or a separate building for herbarium specimens. The present two rooms are too small for both purposes.

C. CURTIS,
Assistant Superintendent of Botanic Gardens.

APPENDIX A.

Revenue and Expenditure—Botanic Gardens Department, Penang, 1896.

REVENUE.	EXPENDITURE.	AMOUNT.
		\$ c.
	Salaries of Gardeners and Coolies,...	3,182 62
	Purchase of Plants and Seeds, ...	80 96
	Do. Pots and Tubs, ...	62 69
	Do. Tools and Materials, ...	302 80
	Do. Lime and Bricks, ...	26 79
	Do. Planks for Cases &c., ...	48 29
	Do. Material to complete Iron Plant Shed, ...	420 13
Grant—Maintenance of Wa- terfall Garden, ... \$4,500.00	Do. Material to renew Fer- nery, ...	66 14
	Do. Material to repair Bridges,	96 79
	Do. Periodicals, ...	9 25
	Cartage and Manure, ...	58 19
	Miscellaneous Petty Expenses, ...	88 79
	Freight on Plant Cases, ...	42 43
		4,485 87
	Balance, ...	14 43
		\$4,500 00
	Salaries, ...	165 37
Grant—Maintenance of Ex- perimental Nursery, ... \$200.00	Purchase of Seeds and Manure, ...	31 68
		197 05
	Balance, ...	2 95
		\$200 00
Grant—Expenses of carrying out Provisions of Coco-nut Trees Preservation Ordina- nance, ... \$700.00	Salaries, ...	647 29
	Balance, ...	52 71
		\$700 00
Grant—Travelling and Per- sonal Allowances, ... \$330.00	Pony Allowance, ...	216 00
	Expenses in connection with Botani- cal Tours, ...	112 40
		328 40
	Balance, ...	1 60
		\$330 00
Plant Sales, ... \$792.75		
Bath Receipts, ... 47.20		
Total Revenue, ... \$839.95	Total Expenditure,	\$5,658.61

C. CURTIS,
Assistant Superintendent of Botanic Gardens.

APPENDIX B.

BOTANIC GARDENS,
Penang, 7th December, 1896.

To

The Hon'ble the Resident Councillor.

SIR,—Regarding the botanical tour recently made in the Siamese Malay States, on which I promised to report as soon as I had potted up the plants and attended to other matters requiring immediate attention, I have the honour to submit the following:—

I left Penang in the S.S. *Petrel*, which is at present the only steamer trading between this port and Tongkah, on the afternoon of the 9th November, and arrived there the following day, the voyage occupying about 23 hours. There was very heavy rain during the night on the way up, and I began to fear that I had undertaken the trip too early in the season, but fortunately my fears proved to be groundless for I had fairly dry weather all the fortnight I was away. On arrival in Tongkah, I called on Prah NANISON, the Acting Chief Commissioner, expecting to get the use of the steam-launch to go to Kasum, but unfortunately the launch, like pretty well everything else in all the places I visited, is sadly out of repair and cannot be used. He, however, kindly offered me the loan of a boat, and promised to have it ready the following morning, and also furnished me with letters to the Governors of Kasum and Pongah. At this season the wind is unfavourable for getting from Tongkah to the places I wished to visit, and unfortunately the mast of the Commissioner's best boat snapped at the foot before we had been an hour under sail, so that we had a long row into Pulau Sirih for repairs, where we remained all night.

On the second day we tacked about without making much progress until 5 P.M. when we landed on Pulau Panjang to do some cooking, and while this was being done I collected a few plants. *Cirrhopetalum medusæ* appeared to be abundant on rocks in this island. At 6.30 P.M. started again with a fresh breeze standing straight across for the picturesque islands near the entrance to the Kasum River under shelter of one of which, Pulau Prabat, we anchored until 5 A.M., when we got under way again. At 7 A.M. landed on a small island to cook and collect plants; the most interesting kinds found here being two species of begonia and two of pogonia, the native name of one of the latter being "elephant ear." From this place we proceeded slowly against wind and tide to Kasum which was reached between 3 and 4 P.M., so that I had actually been about 49 hours from Tongkah.

The scenery among the islands before entering the Kasum River is magnificent. Scores of islands of the most fantastic forms rising abruptly from the sea to a height of several hundred feet. Similar scenery may be seen in Langkawi, but on a much reduced scale. On arrival in Kasum I sent my letters of introduction to the Governor with a request for an empty house if possible. In a short time I received a message that the Governor was suffering from fever and would not be able to see me for two or three days, but a house was being prepared for me. This was the one decent looking house in the village originally intended, I was told, for a Post Office, but as soon as the men commenced clearing it out it was found to be unsafe, so I had to go into a Chinese attap house in the main and only street. For a place of its size, and it is a village of about 100 houses, and perhaps 700-800 inhabitants, Kasum is the most miserable looking place I ever set eyes on. The main street is overgrown with weeds and in places knee deep in mud. On either side are tall bamboo leaning at all angles with the remnants of banners dangling in the breeze, the remains of the decorations of some religious festival long past. The houses are of plank and attaps with very sharply pitched roof and a sort of covered five-foot way in front, but it is only in places that one can cross from one side of the street to the other without sticking in the mud. A few days' residence in this place has a most depressing effect. The morning after arrival, I collected orchids, &c. along a road that was commenced 3 or 4 years ago and cut for a distance of about 4 miles to a place called Wattam where there is a Bhuddist Temple in a cave in the limestone rock with numerous figures rapidly going to decay. One of the figures in a reclining position is about 45 feet long. I spent some time in botanizing on this hill and collected several interesting plants. One of the priests showed me a plant of *Dendrobium Farmerii* fastened on a block of wood which he assured me was very rare, and, so far as my experience goes, it is so, for I only collected two plants of it during the time I was there.

When the road to this place was commenced it was intended to carry it on to Pongah and fine hard-wood beams were brought in for bridging the streams and posts for telegraph wires. The wires were never put up and the beams are lying alongside the streams rotting.

On the second day, the Governor sent me a man who spoke Malay to accompany me anywhere I wished to go and to assist me generally. Two days I went down the river to the limestone hills, and on another day walked across to Pongah and slept there, returning by another route the following day. The distance I estimate to be about 10 or 12 miles. Pongah is not so nice a place as it was in the old Raja's time, things are fast going to decay. The road from the landing which he planted up with shade trees and kept in good order is now almost impassable in places, and the building in which I stayed on a previous visit and was most hospitably entertained leaks like a sieve, and as it rained the night I was there it was difficult to find a dry spot. It is interesting to note that several natives have a few orchids growing around their houses and one has quite an interesting little collection and this, they told me, was the result of my previous visit. *Dendrobium Farmerii* is evidently the kind they prize most, and shows good taste on their part, but it is scarce, and they set a value on them that prevented me from buying. This is abundant in Mergui, and Pongah is apparently about its southern limit. One very interesting *dendrobium* I saw in a garden which I was most anxious to get, but the owner would not part; he, however, gave some flowers to dry which will, I hope, be sufficient for determination, but I have little doubt it is an undescribed species. On the limestone islands I collected a great number of interesting and some, I believe, perfectly new plants, among the latter being a ginger, balsam, and arum.

Many plants were observed that it was quite impossible to get at, but, on the whole, I made a very satisfactory collection. The ginger which I believe to be new and of which I only saw a single flower, although it had been flowering freely not long previously grows in the chinks of the hardest rocks where it is impossible to get at the roots without blasting them out. I saw hundreds but only succeeded in getting about half-a-dozen, three of which I have sent to Kew. Of the balsam I dried a good series of specimens, and collected a nice lot of seeds, and of the arum tubers.

In one place I saw enormous clumps of *cypripedium*, but quite out of reach, and also a small growing *xerides* (*Aerides affine*). For miles round Kasum the virgin forest have all been destroyed by the paddy planters, and the present vegetation is composed largely of bamboos, of which, three or four species are so abundant that they may be said to be the prevailing feature of the vegetation on all the low hills. In spite of this great destruction of forest, only sufficient rice for local consumption is produced, and the present price is about the same as in Penang. Fowls are abundant and cheap costing only 6 or 7 cents each; but then these do not require much labour to raise.

A lazier lot of men it would be difficult to find, and the only thing that really livens them up is a cock-fight, then the village turns up like one man. Before going across to Pongah, I asked the Governor of Kasum to lend me a boat to return to Tongkah, but he said he had no suitable boat and that he always went in one of the Chinese tongkangs that come for fire-wood. He promised to arrange for me to go back in the same way, but when the time for starting came, the Chinaman said he had not enough wood yet, but perhaps he might go to-morrow or next day. To remain another day meant probably missing the *Petrel* and having to remain a week in Tongkah, so I begged them to find me a *prauh* of some sort, which they eventually did, and we got away on the ebb tide about 2 P.M. At about 7 P.M. we stopped at one of the islands for the men to eat, and they were inclined to stay there all night, but we got them on board and hoisted sail to a fair wind; one of the two men I took from Penang steering, and the other looking after the sail. None of the three men I got from Kasum were boatmen, and they did not understand sailing a boat. By 3 A.M. we had rounded Pulau Sirih, and were in sight of the Tongkah light; so that in returning with a fair wind, we did in 13 hours what it took 49 to do in going.

It was fortunate it did not rain either in going or returning, for we had no cover, not even a *kajang*. I had a whole day to spare in Tongkah, but there is not much to collect there unless one had time to go back to the wooded hills. There is no more sign of advancement here than in any of the other places. Everyone says that the population is diminishing rapidly. For every Chinaman that goes into Tongkah three or four come away.

I have, &c.,

C. CURTIS,

Assistant Superintendent of Botanic Gardens.

STRAITS SETTLEMENTS.

Paper to be laid before the Legislative Council by Command of
His Excellency the Governor.

REPORT ON THE FOREST RESERVES, SINGAPORE, FOR THE YEAR 1895.

1. The Forest Reserves in the Island of Singapore were, from the 1st January, 1895, handed over from the charge of the Forest Department to the Land Office. The vote for the maintenance of the Reserves was reduced from \$1,400 to \$1,000, so that nothing beyond the protection of the existing reserves and the keeping open of their boundaries could be attempted. Indeed this is all that has been done during the last few years (*vide* paragraph 28 of the Forest Department Report for 1894), nor does it seem that, in view of the poor soil of Singapore Island and its limited area, any considerable outlay would be attended with satisfactory results. I have been struck with the difference in the fertility of the soil in Singapore and Malacca. In the latter Settlement, the *lalang* that is left upon the land after the abandonment of a gambier or tapioca plantation rapidly gives way to brush-wood, and often in the space of five or six years disappears entirely. In Singapore, this absorption takes place much more gradually, and many large stretches of *lalang* have remained unchanged for more than ten years.

2. Everything possible has been done during the year to protect the Reserves, and I have reason to believe that the prosecutions that were instituted in the Police Courts had a most wholesome effect.

3. During the year, there were six cases of cutting timber in the Reserves or taking Government property therefrom, in which fines were inflicted. The fines amounted to \$76.50, as against \$30 in 1894 for three cases.

4. Several petty offences of this nature were dealt with, in some cases after summonses had been issued, by allowing the offenders to take out passes at double the ordinary rates. These payments have not been classed as fines.

5. The Revenue derived from the Reserves by passes amounted to \$462, as against \$982 in 1894. I found that holders of passes to cut *bakau* were cutting the young trees in the swamps in a most extravagant fashion, and as cautions had very little effect, I stopped the issue of passes for several months. This has, I believe, had a salutary effect, as most of the Malays who are engaged in the fire-wood business were obliged, on the closing of the Singapore Reserves, to resort to Johore. Passes are now freely issued, and such precautions as are within the power of the limited staff of the Department are taken to obviate the evil referred to.

6. During the year there were two large fires at Jurong and West Bukit Timah, by which about 300 acres of *lalang* and small brush-wood were burnt. There were small fires in the Changi and North Selitar Reserves, but in these cases no serious damage was done.

J. R. INNES,
Acting Collector of Land Revenue.

LAND OFFICE,
Singapore, 25th February, 1896.

STATE OF NEW YORK

IN SENATE

January 10, 1907

STRAITS SETTLEMENTS.

Paper to be laid before the Legislative Council by Command of His Excellency the Officer Administering the Government.

ANNUAL REPORT OF THE BOTANICAL GARDENS, SINGAPORE.

The only changes in the staff during the year were the replacement of YUSUF, the Mandore of the Economic Gardens, by a man named JOSEPH, on account of the illness of the former; and the resignation of the Plant-collector MAT, who had been employed in the Gardens and Forests Departments for nine years.

2. The coolies worked well, and a sufficient supply was easily obtainable. There were a few cases of petty thefts, and four prosecutions, fines amounting to \$36 being inflicted.

3. One new plant-house was built on the site of the old seed-house. It is a span-roofed house, of three spans, partly covered with glass and partly with split bamboo. It is sixty feet in length and thirty-six wide. This house has proved remarkably successful, being very suitable for begonias, aroids and ferns, and specially so for raising ferns from spores. The large plant-house, in which a great deal of the wood-work is rotten, has been partly renewed. In two of the aisles the wood-work has been replaced by iron rods and arches, which will be covered with chinks. The remaining aisles will be done in 1898. To put the whole building in a proper state of repair will be a very expensive business, for which the Garden funds are not sufficient, so that it will have to be done piecemeal. The alcove of arches covered with creepers leading from the bandstand hill towards the plant-sheds was removed, and the sides of the walk lined with rock work, which was planted with various ornamental plants.

Flower-show.

4. A flower-show was held at the Town Hall in May, which was well attended, and the plants exhibited were on the whole up to the standard.

Bulletins.

5. Two bulletins were published this year. One dealing with spices, and the other with Para rubber, coffee diseases, pot-plants and other subjects.

6. Among the more interesting plants which flowered in the Gardens for the first time were:—*Capparis frondosa*, *Garcinia Hanburyi*, *Zizyphus xylophyllus*, *Erythroxylon ovatum*, *Bauhinia strychnoidea*, *Bertholletia excelsa* (the Brazil nut), *Derris sinuata*, *Eugenia* (new species from the West Indies), *Mezoneuron sumatranum*, *Didymocarpus cyaneus* (n. sp.), *Saintpaulia ionantha*, *Strophanthus hispidus*, *Landolphia Heudelotii*, *Dichopsis gutta* (Gutta percha), *Balanostreblus ilicifolius*, *Coccoloba uvifera*, *Bougainvillea Sanderiana*, *Ficus maculata*, *Alpinia comosa*, n. sp. from Kedah, *Zingiber citrinum* (n. sp. Selangor), *Phrynium jagorianum*, *Tainia plicata*, *Zeuxine clandestina*, and *Pancreatium tortuosum*; and *Pandanus Houlettianus* produced fruit, which was previously unknown.

The most noteworthy ornamental foliage plants introduced this year include a very fine series of begonias from SANDERS, *Elatostemma vittatum*, and other ornamental species from Buitenzorg, *Kæmpferia calophylla*, a new species from Selangor, and *Colocasia gigantea* (Selangor.)

Aviaries.

7. The aviaries were entirely reconstructed, the old wood-work wherever possible being replaced in iron. Among the additions to the collections were two wild pigs (*Sus cristatus*) presented by Mr. FERNANDEZ; one brush-tailed porcupine (*Atherura macrura*) presented by the Director; one wild cat (*Felis bengalensis*) presented by Mr. GOEDHARDT; two grey squirrels (*Sciurus* sp.) purchased; one phalanger presented by Mr. HALL; one bear (*Helarctos malayanus*), from Borneo, presented by Mr. E. MAXWELL; a kanchil (*Tragulus kanchil*) presented by Mr. MORTON; one peacock (*Pavo muticus*) presented; four Chinese coots (*Porphyrio* sp.); 2 hornbills (*Buceros* sp.) purchased; four Borneo Argus pheasants presented by Mr. Bruderer; one black swan presented; two large pythons (*Python reticulatus*), about 20 feet long, presented by the Sultan of Johore; two black and yellow snakes (*Dipsadomorphus*) captured; two crocodiles purchased; one terrapin (*Cyclemys platynota*) presented by Mr. S. FLOWER. One hybrid monkey between *M. nemestrinus* and *M. cynomolgus*, and one kijang (*Cervulus muntjac*) were born in the Gardens.

Exchanges.

8. The following were the exchanges of plants and seeds during the year. Five hundred plants and one hundred and nineteen packets of seeds were sent to various cultivators and Botanic Gardens, and eight hundred and sixty-six plants and three hundred and eight packets of seeds were received.

The following contributed to the Gardens:—

Mr. Burckhardt.	Dr. Ellis.
„ Micholitz.	Mr. St. V. B. Down.
„ R. Little.	Messrs. Sanders & Co.
„ Grossmann.	Botanic Gardens, Kew.
„ Goedhardt.	Do., Calcutta.
„ E. M. Holmes.	Do., Buitenzorg.
„ A. D. Machado.	Do., Saigon.
„ Damman & Co.	Do., Tokio.
Dr. Smit.	Do., Nagpur.
„ Dohrn.	Do., British Guiana.
Mr. Pereira.	Do., Sydney.
Bishop Hose.	Do., Brisbane.
Lieut Kelsall.	Do., Durban.
Mr. R. Schlechter.	Do., Jamaica.
„ J. H. Osmond.	Do., Trinidad.
Mrs. Pennefather.	Do., Barbadoes.
Mr. Choa Kim Keat.	

Herbarium.

9. A small collection of plants was obtained in the Langkawi Islands in the dry season, and while on leave I obtained a number of plants in Selangor near the Batu Caves and along the Pahang track, and also in Sumatra on the Mandau River near Siak, and in Borneo at Labuan, Kudat, Sandakan and Labuk Bay. One hundred and ten plants from the Malay Peninsula were sent by Dr. KING. Forty-seven specimens of Scitamineæ of the Malay Islands were presented by Dr. KOORDERS. A number of specimens from Borneo were sent by Dr. DENNYS. Specimens of plants and timbers from Christmas Island were presented by Mr. LEACH; and specimens of dried plants from Java by Lieut. HARVEY, R. E. A collection of European plants was received in exchange from M. RICHTER.

Five hundred and thirty-three specimens of Malay plants were sent to Dr. KING and a small collection of orchid specimens to Mr. SCHLECHTER of Cape Town. Specimens were also sent to the Pharmaceutical Society and the Natural History Museum and to the Royal Gardens, Kew.

A number of wood specimens, chiefly from Singapore, were added to the wood collection, and a new cabinet made for their reception.

Library.

10. During the year, a catalogue of the library was printed, and a new book-case was purchased.

The following are the additions to the library:—

Catalogue of Welwitsch's Angolan Plants, presented by Director, Natural History Museum.

Jenman.—Minor Agricultural Industries of British Guiana, presented by the Author.

Dyer.—Notes on Mycorrhiza, presented by the Author.

Mathieu.—Estimate of the Cost, etc. of a Ramie Plantation, presented by the Author.

Wildeman.—Prodrome de la Flore Algologique, presented by the Author.

Mercklin.—Beobachtung an den Prothallium, presented by the Author.

Harms.—Die Nomenclatur bewegung, presented by the Author.

Coville.—Notes on the Plants used by the Klamath Indians, presented by U. S. A. Department of Agriculture.

Webber.—The Water Hyacinth, presented by U. S. A. Department of Agriculture.

Dodge.—Descriptive List of Fibre Plants, presented by U. S. A. Department of Agriculture.

- Dodge.—Report on the Culture of Jute and Hemp, presented by the Author.
 King.—Materials for the Flora of the Malay Peninsula, Parts 8 and 9, presented by the Author.
 „ New Indian Trees, presented by the Author.
 „ Indian Species of Vitis, presented by the Author.
 King and Pantling.—New Orchids from Sikkim, presented by the Authors.
 New Hand-list of Tender Monocotyledons, presented by the Director, Kew.
 Masee.—Monograph of Geoglosseæ, presented by the Author.
 Christy.—New Commercial Drugs, presented by the Author.
 Boorsma—Mededeeling, Part XVIII, presented by the Author.
 Bijlert.—Onderzoek eenige Groondsorfen van Deli, presented by the Author.

Also the Reports of the United States Department of Agriculture, India Museum Reports, Record of the Botanical Survey of India, India Museum Notes, Agricultural Ledger, Annals of the Botanic Gardens, Buitenzorg; and Bulletins and Annual Reports from the Botanic Gardens of Kew, Ceylon, Lagos, Trinidad, Jamaica, Cape of Good Hope, Natal, Brisbane, Guiana, Sierra Leone, West Australia, Mysore, Madras, Queensland, Barbadoes, St. Lucia; and the Koloniaal Museum, Haarlem.

The following works were purchased:—

- Currey.—Fungi of Pegu.
 Mitten.—Musci Indiæ Orientalis.
 Clarke.—Indian Begonias.
 Hanbury.—Cassia moschata.
 Hooker.—Balanophoreæ.
 Miers.—Barringtoniaceæ.
 Eeden.—Hoot-sorten.
 Stapf.—Flora of Mount Kinabalu.
 Hart.—Cacao.
 Collins.—On the Collection of India-rubber.
 Seeligmann.—Le Caoutchouc.
 Notaris.—Epatiche de Borneo (2 papers).
 La Coste.—Musci Archipelagi Indici.
 „ Synopsis Hepaticarum Javanicarum.
 Hampe.—Musci Frondosi of Ceylon and Borneo.
 Dozy and Molkenboer.—Musci Archipelagi Indici.
 Baker.—Handbook of Amaryllideæ.
 Sawyer.—Odorographia.
 Ward, H. M.—Timber and some of its Diseases.
 Warburg.—Die Muskat Nuss.
 Tubeuf.—Diseases of Plants.

BOTANIC GARDENS, SINGAPORE.

Statement of Receipts and Expenditure, for, the year 1897.

RECEIPTS.		EXPENDITURE.			
	\$ c.		\$ c.	\$ c.	
By Balance in Bank, ...	1,374 96	<i>Salaries.</i>			
„ Government Grant,	8,500 00	Herbarium-keeper, ...	187 50		
„ Sale of Plants, Seeds and Flowers, ...	2,901 95	Mandore, ...	229 00		
„ Interest, ...	27 29	Carpenters (two), ...	311 50		
		Mason, ...	140 82		
		Plant-collector, ...	110 00		
		Printer (Label), ...	120 00		
		Peon, ...	96 00		
		Aviary-keeper, ...	94 34		
		Police, ...	346 99		
		Coolies, ...	3,634 01		
					5,270 16
		<i>Bills.</i>			
		Tools and Stores, ...	557 93		
		Laterite, Sand, etc., ...	200 00		
		Timber, Lime, Bricks, etc., ...	925 58		
		Pots and Tubs, ...	251 73		
		Birds' and Animals' Food, ...	1,236 53		
		Manure and Cartage, ...	157 12		
		Buildings (Aviary and Plant- house), ...	1,221 71		
		Freight on Plants, ...	155 26		
		Books, Papers, etc., ...	578 92		
		Garden Seats, ...	150 00		
		Plants and Seeds, ...	270 49		
		Subscription to Telephone, ...	97 50		
		Wardian Cases, etc., ...	163 60		
		Petty Expenses, ...	308 47		
		Miscellaneous, ...	437 71		
		Rice Allowance, ...	116 50		
					6,829 05
		Balance, ...			12,099 21
					704 99
					<u>\$12,804 20</u>
	<u>\$12,804 20</u>				<u>\$12,804 20</u>

Economic Garden.

A considerable part of the hill in this Garden was cleared, dug and planted with grass, and some fresh land was opened in the swampy portion near the ramie beds, but the greatest amount of labour was expended in clearing the scrub around the Para rubber trees. This had grown up so high as to make it impossible to find the seeds of the trees, which fell among it.

The demand for plants and seeds of Para rubber was greatly in excess of the supply, but 21,035 plants and 10,875 seeds were supplied to planters in Singapore, Selangor, Malacca, Pahang, British Borneo and elsewhere. Various experiments were made as to methods of propagation, tapping and yield of rubber, the results of which have been published in a Bulletin on the subject. A large number of planters and others interested in the cultivation of this plant from different parts of the Peninsula, Java, Sumatra and Borneo visited the Garden to see the rubber trees and the various methods of cultivation and preparation of the rubber.

The demand for ramie, which was very large last year and at the beginning of this, fell off considerably, as rubber came into favour. This is partly at least due to the low price offered by manufacturers for the ribbons. Nearly four thousand plants and a few boxes of seed were disposed of.

Experiments were made also with *Curculigo recurvata*, the "Lumbah" of the Malays. It is a well known ornamental plant belonging to the order *Hypoxidæ*, and supplies from its leaves a fibre of considerable value used by the Dyaks. The plant grows easily, but it remains to be seen whether the yield of fibre per acre will be enough to recommend its cultivation.

Over a hundred plants of gutta-percha from Sumatra were planted out for experiment. Among the economic plants of importance introduced this year, *Kickxia Africana*, the African tree rubber, occupies the first place. It had been received on one or two previous occasions, but always dead: the plants received this time were in grand condition. From the same establishment came also *Landolphia senegalensis*, one of the African rubber vines. It appears that the *Landolphias* are stouter growing plants than our *Willughbeias* and *Melodinus*, and will probably be more satisfactory to cultivate, so that an additional species is welcome.

Pentadesma butyracea (*Guttiferæ*), the butter and tallow tree of Sierra Leone, was also obtained from Kew. It produces a valuable oil.

The new green aloe, *Furcroya macrophylla*, a good fibre plant, was received from Barbados, and *Lahia kutėjensis*, the Borneo durian, which is stated to possess the full flavour of *Durio zibethinus* without its odour, was received from the Botanic Gardens, Buitenzorg.

Upkeep of Economic Garden.

Vote,	\$1,500.00
Salaries of Mandore and Coolies, \$1,330.83	
Attaps, Baskets, &c.,	43.74
Tools, &c.,	67.96
Flower-pots,	35.00
Manure,	17.50
Balance in Treasury,	4.97
	<hr/>
Total,	\$1,500.00
	<hr/>

Inspection of Coco-nut Trees.

Three hundred notices were served on persons who had dead or dying trees or piles of rubbish. One thousand five hundred and seventy-five dead trees and two hundred and sixty-nine stumps and thirty heaps of rubbish and cow-dung were destroyed. There were only nine prosecutions, and fines amounting to \$21 were inflicted.

The vote for the year was \$350.00

Expenditure:—

Salaries,	\$240.00
Transport,	92.74
Uniforms, &c.,	5.05
Balance,	12.21
	<hr/>

Total, \$350.00

Government House Domain.

The Mandore JAMES left in the early part of the year, and ANIFF, Mandore of the Botanic Gardens, took his place till a man named SAMUEL was employed. The Javanese coolies behaved very ill in the first part of the year, and finally ran away. Two were summoned and fined, the others could not be found. After this, Klings were employed for grass-cutting, and Javanese for pots and house work. A lawn in front of the house was re-made entirely, being raised and re-turfed. Some beds for Vandas and Renantheras were made, and the whole of the East side and part of the West side of the park was fenced in.

Vote,	\$2,360.00
Expenditure:—	
Salaries, ...	\$2,005.19
Tools, ...	182.85
Attaps, Rollers, etc.,	32.63
Planks, etc., ...	24.62
Manure, ...	47.48
Flower-pots, ...	25.82
Tubs, ...	24.00
Balance, ...	17.41
Total, ...	<u>\$2,360.00</u>

H. N. RIDLEY,
Director.

Singapore, 25th January, 1898.

Botanic Gardens Department, Penang, 1897.

Visitors to the Waterfall Garden have been more numerous than in any previous year, particularly those with an especial interest in matters horticultural and botanical. Among the number was His Majesty the King of Siam, who was very pleased with the Garden, and selected a number of plants for cultivation in Bangkok. The Director and Curator of the Buitenzorg Gardens, the Superintendent of the Hongkong Gardens, and the Curator of the Calcutta Gardens were also among the strangers that visited us, and made selections of plants.

Personal visits and letters from gentlemen interested in planting matters, requesting information, mainly respecting rubbers and ramie, have been numerous, and much time has been taken up with purchasers of plants.

2. An interesting addition to the Garden is a glass case at the West end of the Fernery, with soft granite boulders inside, on which are planted a collection of filmy ferns (*Trichomanes* and *Hymenophyllum*). During the Jubilee holidays, which I spent on the Perak hills, several species which do not occur in Penang were collected and brought back in good condition, and, although coming from an altitude of 3,000-4,000 feet, they are all, with the exception of *Trichomanes maxima*, making satisfactory growth. Among the rocks on which these are growing are planted *Bertolonias*, *Sonerilas*, and other small-growing *Melastomaceæ*, which can only be grown to perfection in the moist atmosphere of a glass case.

3. The octagonal plant-shed, in which there is a good collection of specimen foliage plants in pots and tubs, has been re-covered with nibong laths instead of chinks; and the potting-shed, which was in a bad state of repairs has been roofed with corrugated iron. Minor repairs were also done to the wood-work and coverings of the other plant-sheds.

4. One thousand and eight lineal feet of carriage road have been re-metalled with stones obtained in the course of cutting down a bank to raise the ground in the pot-plant nursery.

5. Considerable improvements in the grounds have been effected by continuing the sloping and turfing the banks of the stream near the entrance gate, and also just below the second bridge. Eight new beds have also been formed, and planted with cannas, roses, and flowering shrubs; and a number of large palms and other things that had outgrown the space available in the plant-sheds have been planted in various parts of the Garden.

6. Owing to the unusually heavy rainfall (175 inches), the maintenance of roads and paths has been an important labour item, and for the same reason it has also been an unfavourable season for a great number of flowering plants. Cannas, which are grown in large masses, have, however, been very fine during the whole year. Their principal requirements being an abundance of water and manure, the past season has suited them admirably.

7. The area of land in connection with this Garden available for experimental agricultural work is too limited to admit of work being done on a sufficiently large scale.

8. The seedling sugar-canes mentioned in my last annual report have made satisfactory progress, but, owing to want of suitable ground in which to plant them, the greater number, when about a foot high, were handed over to the Managers of the Caledonia and Prye Sugar Estates. Unfortunately the weather set in dry soon after those at Prye were planted, and a great many died.

Of those planted out in the Nursery here—about 600 plants in all—there were very few losses, and the growth has been rapid.

The first lot of 300 plants were planted out on the 15th February, that is, when just three months and ten days old.

In August, 2,000 canes, from ten to fourteen feet high, were cut from this lot for further trial on the estates to which the seedlings were sent. About fifty stools of those judged to be the most promising and showing the greatest amount of variation were allowed to remain for the purpose of obtaining seed, but up to the present, and they are now almost a year planted, there are no signs of flowers. The seeds were all from a purple cane, known here as the "Borneo," but the progeny are of various colours, a good number being green ones. Scarcely one is exactly typical "Borneo," although, as regards foliage, all bear more or less evidence of their parentage. Fuller details are given in a paper which will appear in the next Agricultural Bulletin.

9. In order to test practically the time required to grow a crop of ramie from seed, a sowing was made on the 12th February, on a carefully prepared bed of light soil with protection from sun and rain. The seeds were covered very lightly, and, considering the quantity sown did not germinate freely. On the 2nd March the young plants were from four to six inches high, and at the end of that month they were planted out in beds two feet apart. The first cutting was made in the middle of August, or just exactly six months from the time the seeds were sown. Two months later they were ready to be cut again, and with an adequate supply of manure and water this may be taken as the average time (*i. e.*, every two months) at which cuttings may be made.

We have in cultivation three very distinct varieties, but none of them produce in our soil clean long stems, unless liberally manured. The conclusion I have come to is that ramie will have to be cultivated as highly as sugar-cane, and that the idea that it can be grown as a paying crop on poor land unsuited for anything else is entirely wrong. Selection of the right variety is also a point to which intending planters should pay particular attention.

10. The soil of this Garden is by no means the kind that I should choose for planting Para rubber, as it is dry and gravelly, but there are a few trees here that were planted in 1886. The largest of these has a girth of about thirty-six inches at three feet from the ground, and as many inquiries were received respecting the quantity of rubber to be obtained from a tree, &c., this one was tapped as an experiment in June. The first day's collection yielded only half an ounce, but by renewing the cuts on seven subsequent occasions, one pound of dry rubber was obtained, being an average of two ounces for each time. This is very poor, compared with the results obtained in Singapore and in Perak, but, as I have already mentioned, the tree is growing in unsuitable soil, and the weather was at the time very wet. The climate appears to suit this tree, and the only important item of expenditure after a plantation is once established is the cost of collecting.

Many applications for seeds were received, but our whole crop consisted of about six hundred seeds only.

Seeds should be planted as soon as ripe, as they retain their vitality for only about a fortnight. If planted as soon as ripe, they germinate in about 12-14 days. An attempt to propagate this tree from cutting was not a success.

11. Plants and seeds in about the same proportion and numbers as in previous years have been exchanged with the various Botanic Gardens and Societies with which we are in correspondence, but the number of pot-plants sold is greater than in any previous year, the total receipts from this source being \$916.96, which has been paid into Revenue account.

12. Provision having been made in the Estimates 1898 for an additional room for keeping herbarium specimens, a large number, that had been accumulating for years, have been mounted, and as soon as the room is ready will be systematically arranged so as to be readily available for reference.

13. A short botanical tour of three days' duration^a for the purpose of collecting living plants was made in the company of the Director to the Langkawi Islands in February; and in May I attended the Singapore Flower Show and obtained a good many desirable additions to the collection already in cultivation.

14. The total expenditure in connection with the maintenance of the Waterfall Garden, as shown in statement annexed, is \$4,498.11, and the receipts from sale of plants and use of swimming bath to \$974.76, showing an actual cost of \$3,523.35.

Hill Experimental Nursery.

15. Nothing of importance has been done in the Experimental Nursery, and it is not intended in future to spend much on it beyond keeping the fruit trees, &c. clean. None of the European fruits introduced are likely to be of any commercial value in this country, unless the olive should do so, which is still doubtful. Peaches, apples, and figs have been produced, but not in sufficient numbers to warrant any further expenditure in this direction. The terracing of every foot of land required, and the cost of carrying up manure renders it undesirable to plant anything here that can be grown equally well elsewhere.

Two men are employed here during four days in the week, the remainder of their time being employed in keeping in order the grounds of Convalescent Bungalow.

Government Hill Bungalow.

16. The unusually heavy rainfall on the hill of 175.85 inches, which is, I believe, an unique record for Penang, was, during a great portion of the year, unfavourable for the cultivation of both vegetables and flowering plants. Some difficulty was also experienced in the matter of labour, four out of six men accustomed to garden work having left at one time to take up employment on the railway in the Native States, on higher pay.

17. A small but fairly constant supply of vegetables was kept up during the whole year, a few native kinds being grown during the heavier rains. The European kinds planted were:—Beet, lettuce, cabbage, carrot, turnip, Khol rabi, leek, parsley, endive, cucumber, onion, peas, beans and celery. Some of these were of little account from July to October, but cabbage grown from cuttings did well in all weathers. A paper on the cultivation of vegetables in Penang has been written for the next Agricultural Bulletin.

18. Annuals and other flowering plants have been grown in variety in both pots and beds, but the show of flowers has not been so good as in drier seasons. Dahlias, salvias, begonias and coreopsis made a bright show in beds, and both *Lilium longiflorum*, and carnation marguerite promise to make a good show later on.

19. A number of young roses have been put in as the old stock was getting worn out. Tea and China roses are the only ones that are really satisfactory in this climate.

20. Orchids, of which considerable numbers do not grow satisfactorily in the Waterfall Garden, have been sent up and planted on the *Dacrydium* trees bordering the paths in the bungalow gardens at an altitude of 2,500 feet. Several species that cannot be got to exist for more than a few months on the plains have taken a firm hold of the trees and in some cases have already flowered.

About a dozen plants of *Vanda cœrulea* flowered in August and September, and one plant of *Vanda kimballiana*, a species that does not grow well on the plains. *Vanda tricolor* is growing well, and as the climatic conditions are very similar to those under which they are found growing in Java, I have hopes that they will eventually spread themselves over the hills.

Dendrobuim aureum, *D. Jamesianum*, and *D. Cambridgeanum* have been most floriferous, all from growths made since they were fastened to the trees. Others, such as *D. nobile*, and *D. densiflorum*, of which there are several dozens of plants, will probably flower later on if we get a spell of dry weather. This season I shall add a good number of *D. Devonianum*, *D. Wardianum* *D. crassinode* and others obtained during a recent trip to Burma, and which are now flowering in the Waterfall Garden, to the collection on the hill.

Through the kindness of correspondents in Burma, I have obtained a considerable number of Shan States and other orchids, and although most of them are small plants, not quite good enough for sending to Europe, they do very well for the purpose of finding out their suitability to the climate.

21. The plant-shed in which palms, ferns and foliage plants generally have for some time been grown for decorating the corridor, &c., has been removed to a spot alongside the Overseer's Quarters, where it will be more constantly under his eye, and also nearer a water supply in dry weather.

Preservation of Coco-nut Trees.

22. The Inspector of Coco-nut Trees has been employed during alternate months in Penang and Province Wellesley. Two thousand six hundred and forty-eight notices were served on persons having on their premises dead trees, manure, or other material in which beetles breed, calling on them to destroy the same within a specified time. For non-compliance, fifty-two were summoned and fined in small amounts, aggregating \$134.

When in Province Wellesley, this Officer works under the direction of the Senior District Officer, who directs his attention to the localities most needing attention, and signs the notices.

C. CURTIS,

Assistant Superintendent of Botanic Gardens.

APPENDIX A.

Revenue and Expenditure of the Botanic Gardens Department, Penang, 1897.

REVENUE.	EXPENDITURE.	AMOUNT.
		\$ c.
	Salaries of Gardeners and Coolies,...	3,373 44
	Purchase of Plants and Seeds, ...	93 22
	Do. Pots and Tubs, ...	105 35
	Do. Tools and Materials for current repairs, ...	494 03
	Do. Materials for re-roofing Potting Shed, ...	137 67
	Do. Material for Herbarium,	53 00
	Do. New Hand Cart, ...	16 50
	Do. Manure and Cartage, ...	100 39
	Freight on Plant Cases, ...	10 00
	Subscriptions and Periodicals, ...	14 79
	Miscellaneous and Petty Expenses,...	79 92
	Road Metal, ...	19 80
	Balance, ...	4,498 11 1 89
		<u>\$4,500 00</u>
	Salaries, ...	159 16
	Manure, ...	15 16
	Miscellaneous, ...	24 30
	Balance, ...	198 62 1 38
		<u>\$200 00</u>
	Salaries, ...	662 00
	Balance, ...	38 00
		<u>\$700 00</u>
	Pony Allowance, ...	222 00
	Personal Allowances, ...	64 46
	Passage Money, ...	30 00
	Balance, ...	316 46 13 54
		<u>\$330 00</u>
Plant Sales, ...		\$916.96
Bath Receipts, ...		57.80
Total Revenue, ...	Total Expenditure,	<u>\$974.76</u> <u>\$5,675 19</u>

C. CURTIS,

Assistant Superintendent of Botanic Gardens.

STRAITS SETTLEMENTS.

Paper to be laid before the Legislative Council by Command of
His Honour the Officer Administering the Government.

REPORT ON FOREST RESERVES, SINGAPORE, FOR THE YEAR 1897.

1. As I have only been in charge of the Land Office and, therefore, of the Forest Reserves, temporarily for about two months in 1897, I feel it is a matter of some difficulty to write a report on the Forest Reserves.

I have not had time to visit all of them or to go thoroughly through any of them, and my report, therefore, must necessarily be based, to a large extent, on information derived from the Forest Rangers.

2. The total extent of the Forest Reserves in Singapore Island is 12,491 acres 1 rood 24 poles, and they are looked after by Forest Guards, who are under the surveillance of the Forest Ranger for the Division of the Island in which they are situated, who again are under the control of the Collector of Land Revenue.

(a) In the Western Division there are 8,491 acres 1 rood 6 poles of Reserve looked after by six Forest Guards under Forest Ranger NONIS.

(b) In the Eastern Division there are 1,393 acres of Reserve looked after by two Forest Guards under Forest Ranger RAPPA.

(c) In the Northern Division there are 2,607 acres 18 poles of Reserve looked after by two Forest Guards under Forest Ranger RODRIGUES.

3. I attach tabulated statements giving various particulars about the Reserves in each of these Divisions:—

A.—Western Division.

No.	Reserve.	Nature of Jungle.	Area.	No. of Inspections made by Forest Ranger during the year 1897.	No. of Bakau Passes issued during the year 1897.	No. of Passes for Wood issued during the year 1897.	No. of Arrests made during the year 1897.
1	Bukit Timah Forest Reserve, ...	Mostly big jungle,	a. r. p. 847 0 00	10	...	...	4
2	Jurong Forest Reserve,	Little jungle, mostly swamp & lalang, ...	412 0 16	17	17	...	...
3	Pandan do., ...	Mostly small jungle, rest bakau, swamp & lalang,	2,140 3 06	22	11	...	...
4	Ulu Pandan do., ...	Jungle on hill top,	4 3 09	10	...	...	...
5	Bukit Panjang Forest Reserve, ...	Nearly all lalang,	117 2 16	1	...	...	...
6	10th mile post Bukit Timah Road (right),	Jungle on hill top,	13 0 28	2	...	...	...
7	Chan Chu Kang Forest Reserve, ...	Swampy jungle,	49 0 00	4	...	...	...
8	Toas Forest Reserve,	Bakau & jungle,	1,601 3 32	10	...	1	6
9	Morai do., ...	Do., ...	314 1 05	3	...	...	...
10	S. Buloh do., ...	Do., ...	770 2 16	17	...	...	...
11	Kranji, do., ...	Do., ...	756 0 32	17	8	13	...
12	Sembawang do., ...	Jungle & lalang,	1,046 3 38	9	...	2	...
13	Mandai do., ...	Do., ...	407 0 32	6	...	...	...
14	13th mile post Kranji Road (right), ...	Big jungle, ...	9 2 16	17	...	...	...
		Total, ...	8,491 1 06	145	36	16	10

Remarks on (a).—Total area :—3,584 acres 1 rood 35 poles.

Three (3) men in charge. Headquarters at Bukit Timah Road, 6 $\frac{3}{4}$ mile post, right side from town (behind Bukit Timah Police Station). One sampan panjang, in good order, with sails, &c. complete kept at Jurong River, Kampong Ayer Terjoon.

Remarks on (b).—Total area :—4,906 acres 3 roods 11 poles.

Three (3) men in charge. Headquarters at Kranji, 14th mile post, left side of road. One sampan panjang (very old) with sails, &c., complete, kept near Kranji Police Station.

Revenue derived from Forest Reserves (Western Division) during 1897.

36 Bakau Passes, ...	...	...	...	\$144.00
Fees for 850 Kelong Rollers, ...	...	...	\$42.50	} ... 116.20
Fees for 165 Nibong, ...	...	...	16.50	
Sale of 71 trees, 1' to 3' in diameter, ...	...	...	57.20	
Ten (10) arrests were made for wood cutting.			Fines inflicted	.
\$115. Fines paid \$90, ...	...	...	...	90.00

Total amount realized, \$350.20

Passes to cut wood (bakau) in the Forest Reserves at S. Pandan, Jurong, Toas, Blukang, Tengeh, Morai and Kranji were discontinued from February, 1897, by order of Mr. BLAND, then Collector of Land Revenue. The few that were issued, were only to those Malays that live along the river.

There was only one case of fire during the year 1897, and this was in March, at the Bukit Timah Forest Reserve. The person suspected was arrested, but owing to insufficiency of evidence, the case was dismissed. About 10 acres of brushwood and lalang land were burnt.

B.—Eastern Division.

No.	Reserve.	Nature of Jungle.	Area.	No. of Inspections made by Forest Ranger during the year 1897.	No. of Bakau Passes issued during the year 1897.	No. of Passes for Wood issued during the year 1897.	No. of Arrests made during the year 1897.
1	Changi Reserve, ...	Part big jungle, part bakau, rest brushwood, ...	a. r. p. 1,393 0 00	28	8	20	2

Remarks.—Forest Station on the 12th mile Changi Road.

Two men in charge.

One boat for inspection of rivers and mangrove.

Revenue derived from Forest Reserves (Eastern Division) during 1897.

Eight Bakau Licences, ...	...	...	...	\$ 32 00
Fees for 1,903 Kelong Rollers, ...	...	...	...	95 15
Fees for 100 Rollers for house building, ...	...	...	...	1 00
Fees for 100 Nibong, ...	...	...	...	10 00
Sale of 30 trees from 10" to 2' in diameter, ...	...	...	...	12 90
Two cases (1 warned and discharged, one fined \$5 not paid), ...	...	...	...	...
				<u>\$151 05</u>

There was no case of fire during the year.

C.—Northern Division.

No.	Reserve.	Nature of Jungle.	Area.	No. of Inspections made by Forest Ranger during the year 1897.	No. of Bakau Passes issued during the year 1897.	No. of Passes for Wood issued during the year 1897.	No. of Arrests made during the year 1897.
1	North Seletar Reserve,	Jungle, lalang and bakau,	a. r. p. 1,492 1 08	5	21	5	1
2	Chan Chu Kang Reserve, ...	Jungle, ...	813 3 08	5	...	2	...
3	Ang Mo Kio Reserve,	Brushwood and lalang, ...	296 0 02	4	...	...	1
4	Sempang Reserve, ...	Jungle, ...	5 0 00	3	...	...	...
		Total,...	2,607 0 18	17	21	7	1

Remarks.—Two men in charge. Quarters at 8½ mile post, Thomson Road.

A boat with sail, etc. kept at Sungei Seletar. There was a fire in July at old nursery in Chan Chu Kang Reserve when 350 small rengas trees and 100 glam trees were burnt. They were of no value, as they had never been transplanted and were consequently stunted. The cause of this fire was never discovered. The extension of North Seletar Forest Reserve was gazetted at the end of 1896, but, owing to press of work in the Survey Office, it has not yet been surveyed and demarcated. This should be done at once so that it can be duly guarded.

Revenue derived from Forest Reserves (Northern Division) during 1897.

Twenty-one Bakau Passes, ...	...	...	\$ 84 00
Fees for 920 Kelong Rollers,...	...	...	20 50
Sale of 8 trees, 3' in diameter,	...	...	18 20
One arrest case for wood-cutting, fine inflicted \$15.00 (not paid), ...	...	...	...

Total, ... \$122 70

4. I do not understand the principle on which a good many of these Reserves have been kept, and the irregularity of their boundaries greatly increases the trouble of guarding them.

Bukit Timah and Changi, with small portions of Kranji and Seletar, are practically the only Reserves containing big jungle; and these, with the bakau swamps, are, therefore, the only Reserves of value.

The rest are composed of brushwood swamp and lalang, and I am doubtful if they are worth reserving.

5. The Forest Guards have been constantly engaged during the year in keeping up the paths marking the boundaries of the Reserves, making and repairing bridges, and going on rounds. During the year, all the Reserves were marked out near the roads and at other places by tin labels with "Forest Reserve" painted on them, affixed to posts or trees, in place of the old boards which had become rotten and decayed.

No attempt at re-forestation has been made, and I very much question, with the poor soil of Singapore, whether it would be worth trying, except on a very extensive scale.

W. C. MICHELL,
Acting Collector of Land Revenue.

REPORTS ON THE FOREST RESERVES IN THE SETTLEMENT OF
PENANG, FOR THE YEAR 1897.

North-East District, Penang.

LAND OFFICE,
Penang, 18th February, 1898.

1. An account of the area and position of the Penang Forest Reserves may be seen in Gardens 3,089/96 (C. S. 2,010/96) of 13th April, 1896.

2. During the year under review, those Reserves that are under this Office have been under the charge, as regards detection of illicit cutting, of two Guards. The clearing of the boundaries has been the work of these Guards and two coolies. They are all under the supervision of the Land Office Forest Ranger, who takes his orders from the Collector of Land Revenue.

3. I have recently walked round the Reserves and found that, though in some places the boundary paths were quite clear, in other places they were almost impassable. This was chiefly in the more inaccessible places, and I am of opinion that the only way of keeping these paths open is to employ a special gang of coolies for a few days to thoroughly open them once a year. The four men who are regularly employed cannot, I think, keep the whole lines open without outside assistance.

4. I do not recommend any increase to the vote for Maintenance of the Reserves beyond (a) a sum sufficient to cover the wages of the gang of coolies referred to above, and (b) an increase of \$2 a month to the pay of the elder of the two Guards. This man, who has been about 10 years in Government Service, receives only \$8 a month. He has consequently been regarded as a mere coolie, and all the responsibility for the maintenance of the paths falls upon the Forest Ranger, whose duties are multifarious. I think this man should receive a wage of \$10 a month and the title of Head Forest Guard. He lives upon the hill and can patrol the more inaccessible parts of the Reserves without difficulty. I recommend that he be given this increase of pay upon the understanding that he will lose his employment if the Collector's next report upon the state of the paths after inspection is not favourable. The Forest Ranger should of course continue to go round the Reserves and report the result of his inspection to the Collector of Land Revenue, but he has not been able, since the introduction of Ordinance V of 1895, which requires demarcation by him of every portion of a lot in the District that is transferred or mortgaged, to give sufficient time to the Reserves. The unsatisfactory state of some of the boundary paths is due to the fact that neither the Collector of Land Revenue (who was engaged in Magisterial work in addition to his own duties during the greater part of the year) nor the Forest Ranger has been able to give enough attention to the work. It is unlikely that this will be the case again. Moreover, a few extra coolies working for a short time would put the paths in a proper state, and if my recommendation as to the Head Forest Guard is carried out, the paths will doubtless be kept sufficiently open. Further expenditure than this would, in my opinion, not be justifiable.

5. During the year, 21 prosecutions for illicit cuttings took place, resulting in 19 convictions. There have been no encroachments on the Reserves. Any encroachment would be easily discoverable, and the land and timber upon it would not be of sufficient value to induce any one to run the risks resulting from such a proceeding. In connection with the subject of the removal of timber, I may be allowed to advert to what seems to me to be a popular error as regards the former state of the Penang Reserves. It is frequently stated that the paucity of large hard-wood trees, on the higher slopes of Penang Hills, is due to the fact that they were gradually weeded out surreptitiously years ago when there was no sufficient supervision of the Forests.

I am inclined to believe myself that they did not exist in any quantity. How could huge trees or planks from them have been taken down the precipitous slopes of the Penang Hills from a height of 2,000 feet when there were no roads such as those that now exist? The labour involved in such a process would have been immense, while sea-borne timber from other places would be easily obtainable. Indeed to any one who has walked about the hills away from the regular paths such a theory must appear untenable. Is it not rather the case that such trees, many of which Mr. CURTIS in his 1894 report says "require at least from 80 to 100 years to reach a serviceable size and condition" have never grown in large quantities on the rocky soil of the Penang Hills? They are to be still found in large quantities in Malacca, where 50 years ago they might probably have been cut by any one who pleased.

6. I attach a statement shewing how the vote for the Maintenance of the Reserves was spent during the year.

J. R. INNES,
Collector of Land Revenue.

Statement shewing Amount expended from Vote "Maintenance of Forest Reserves," during 1897.

Estimate, \$750.*

Expenditure.

4 Forest Guards at \$8 each,	...	\$384.00	{ 2 for N. E. 2 for S. W.
4 Coolies at \$7 each,	...	329.10	
4 Suits of Khaki clothing,	...	10.72	
Kerosine oil supplied,	...	7.00	
Transport to Pulau Jerejak,	...	1.00	
		Total authorized, ...	
		\$731.82	
		Balance, ...	
		18.18	
		Total, ...	
		\$750.00	

South-West District, Penang.

1. There are 5 Forest Reserves in South-West District as shewn in the following list:—

No.	Mukim.	Lot No.	Area.		
			a.	r.	p.
A.	Pantai Acheh,	132	3,208	0	08
B.	Telok Bahang,	174	465	2	30
C.	Do.,	181	380	1	36
G.	Ginting Hills,	247	21	2	14
H.	Pasir Panjang Hills and Bukit Gemuroh,	27 } 190 }	201	2	04

Of these, the most important in point of area, value of timber, and altitude, is that known as Forest Reserve A, which comprises practically all the land West of a line drawn from Telok Bahang to Pantai Acheh. Owing to its position in the immediate neighbourhood of the two fishing villages of Telok Bahang and Pantai Acheh, it is more exposed to trespass than are the others. It is true that the majority of passes for cutting wood in Crown land (as distinct from Forest Reserves) is taken out by the Klings and Jawi Pekans living at Telok Bahang, but a great deal of stealing goes on as well, while the inhabitants of the village site of Pantai Acheh, all of whom are engaged in fishing, seldom if ever apply for passes, though there is never any lack of timber in the village. There are on the Southern side of the Reserve in question, the boundary of which is within a stone's throw of the village site, various paths into the Reserve, which have undoubtedly been made by wood-stealers.

* Half of this amount is now under supervision of the District Officer, Balik Pulau, who pays the wages of coolies employed in his District.

2. The other four Reserves, being in less accessible positions, are less exposed to trespass of this nature, and the amount of illicit timber-cutting which takes place in them is practically insignificant. There are at any rate no such traces of wholesale theft as are to be met with occasionally in Forest Reserve A. They are all, with the exception of Forest Reserve G, of a similar nature, containing very much the same kind of timber as Forest Reserve A, the amount of good timber varying of course in proportion to their areas. I attach a rough list showing the various kinds of woods to be found in each of the Reserves.

3. Forest Reserve G is so small in area, and contains such comparatively worthless timber that, as I suggested in my Report for 1897, it would, in my opinion, be as well to abolish it as a Reserve, dealing with it simply as Crown jungle on the hill top, and preserving it merely in the same way as all such Crown land is now reserved. The trees in it are only secondary jungle, the majority of them being climbers and worthless undergrowth, and I think that it is a waste of the time of the Forest Staff to make them clear and guard so insignificant a tract of jungle. In my Report I mentioned also Forest Reserve H as being comparatively unimportant, but a subsequent inspection of this Reserve and the timber contained in it, has caused me to change my opinion. Though small in area, it contains a great deal of big timber and is practically the only tract of such jungle left in the South of the Island.

4. If it is considered inadvisable to lessen the number of Forest Reserves in this District, I would still recommend the abolition of Forest Reserve G, and I would suggest that the hill-tops forming the range of hills running South from Bukit Penara to the Ginting Hills, and dividing the Relau and Balik Pulau Plains, should be declared Forest Reserve in place of the present Forest Reserve G. There remain here about 130 acres of good timber (in the Mukims of Balik Pulau Hills and Pondok Upeh), and I believe that there is about as much more in the Town Mukim of Ayer Itam, only theoretically divided from that in this District by the Mukim boundary. I do not know why Forest Reserve G was established, but I can see no reason for its continuance. The hill on which it is, is a low one, its area is absurdly small, the hill-tops on each side of it are cleared and planted right up to its boundary, it contains only a very poor class of secondary jungle, and it seems therefore to have no claims on account of its intrinsic value. There is also no stream in the valley below it, so that it seems to serve no good purpose. The Pondok Upeh jungle, on the other hand, contains a variety of good timber, runs some distance along the hill-top, is of far larger area, and has a fair sized stream running down the valley below it. On these grounds I think that the change I recommend, if feasible, would be a good one.

5. The "Forest Operations" during the year have consisted solely in patrolling the Reserves to prevent illicit timber-cutting, and in clearing the Forest Reserve paths. Eleven persons were prosecuted during the year for cutting timber in the Reserves, and fines to the extent of \$220 were imposed. Of these \$160 were paid. Two men from Pantai Aceh who were habitual wood-stealers and had previous convictions, were sentenced to 3 months' rigorous imprisonment. One of the prosecutions was for cutting timber in Forest Reserve H, but all the remainder were for the same offence in Forest Reserve A, the defendants being all Chinamen living in the Pantai Aceh Village Site.

6. The Forest Staff comprises 1 Forest Ranger, 2 Forest Guards and 2 coolies. During the latter half of 1897, the Forest Ranger was put in charge of the Forest Staff, who were formerly under the control of the Collector of Land Revenue, Penang. The 2 Forest Guards and their coolies have been chiefly occupied throughout the year in clearing the paths round the Reserves—a continuous work, as no sooner has a path been finished than the portion first cleared again requires attention. The work is thus necessarily slow, and the other calls on the time of the Forest Guards, and the scattered positions of the Reserves, all of which have to be guarded and patrolled, make it difficult to keep pace with the rapid overgrowth. I hope, now that the paths have been thoroughly cleared and opened out—a work which was only rendered possible by the engagement of 2 coolies at the end of 1896 to assist the Forest Guards—that less attention will suffice to keep them open, and that thus the Guards will have more time for their work of patrolling the various Reserves. If their time is to be occupied every year as it was in 1897, I consider the staff hardly sufficient for successful conservation.

7. Apparently no steps have ever been taken here to plant in the Reserves trees which are becoming scarce, or to do anything more than prevent, as far as pos-

sible, any trespass into the tracts of jungle reserved. If this is all that is meant by Forest Operations, I do not consider that anything is to be gained by an increase of the staff, but if it were possible I would suggest that steps might be taken from time to time to plant trees which are becoming scarce, or which might be valuable in the future, and thus to make the Reserves something more than a tangle of ordinary jungle trees. If this were done, however, the staff would have to be increased. Under the present conditions, this does not seem worth while. It is true that the scattered positions of the Reserves renders it easy to steal wood from one of them while the Guards are engaged at another; but, excepting always such systematic thieving as that carried on near Pantai Aceh, the amount of timber lost in this way is so comparatively insignificant that its preservation would not repay Government for any increased expenditure upon the staff. Considering the nature of the work on which they are engaged, the number of men employed is practically sufficient for all present purposes.

8. The Reserves in the North-West of the Island being the more important ones, the Guards are permanently stationed at Telok Bahang, and now that the heavier work of clearing the paths has been completed, there should be little difficulty in protecting the Pantai Aceh Reserve from trespassers. For the other Reserves, occasional surprise visits are sufficient.

S. MCARTHUR,
Acting District Officer.

Balik Pulau, 23rd February, 1898.

FOREST RESERVE A, PANTAI ACHEH.

Names of Trees.

Merbau.
Tempenis.
Damarlaut.
Passir Linga.
Hamba Raja.
Mutupus.
Jati.
Hampastubu.
Gula.
Sorosoh.
Tumpul Bliong.
Klat.
Kranji.
Resak Merah.
Tembusu.
Medang Kuning.
Rengas Daun Kechil.

Meranti Merah.
Meranti Puteh.
Halbau.
Jangkang.
Miniah Daun Kechil.
Miniah Daun Besar.
Seraya.
Pinang Baik.
Rengas Daun Besar.
Mangkoyan.
Palas Tikus.
Krian Batu.
Resak Puteh.
Mintangor Batu.
Mintangor Bunga.
Langkap.
Tampang Burong.

Tampang.
Kurau.
Kledang Tandok.
Mepoh.
Merapoh.
Jelutong.
Damar Hitam.
Mahang.
Mata Kuching.
Temponit.
Pala Bukit.
Drom.
Kledang.
Tempoya.
Masekam.
Damar.
Badara.

Medang.
Ekor.
Ekor Batu.
Glam Tikus.
Nipis Kulit.
Trap.
Rambai Bukit.
Randa.
Kandek Hitam.
Kandek Burong.
Remuyu Bukit.
Barangan Kampong.
Barangan Babi.
Nibong.
Bertam.

FOREST RESERVE B, BUKIT LAKSAMANA.

Names of Trees.

Merbau.
Tempenis.
Damarlaut.
Passir Linga.
Hamba Raja.
Mutupus.
Jati.
Hampastubu.
Gula.
Sorosoh.
Tumpul Bliong.
Klat.
Kranji.
Resak Merah.
Tembusu.
Medang Kuning.
Rengas Daun Kechil.

Rengas Daun Besar.
Meranti Merah.
Meranti Puteh.
Halbau.
Jangkang.
Miniah Daun Kechil.
Miniah Daun Besar.
Seraya.
Pinang Baik.
Mengkoyan.
Palas Tikus.
Krian Batu.
Resak Puteh.
Mintangor Batu.
Mintangor Bunga.
Tampang Burong.
Tampang.

Kurau.
Kledang Tandok.
Mepoh.
Merapoh.
Jelutong.
Damar Hitam.
Mahang.
Mata Kuching.
Temponis.
Pala Bukit.
Drom.
Kledang.
Tempoya.
Masekam.
Damar.
Badara.
Medang.

Ekor Batu.
Ekor.
Glam Tikus.
Nipis Kulit.
Trap.
Rambai Bukit.
Randa.
Kandek Hitam.
Kandek Burong.
Remuyu Bukit.
Barangan Kampong.
Barangan Babi.
Nibong.
Bertam.
Langkap.

FOREST RESERVE C, TELOK BAHANG.

Names of Trees.

Tempenis.	Meranti Merah.	Kurau.	Glam Tikus.
Damarlaut.	Meranti Puteh.	Mepoh.	Nipis Kulit.
Passir Linga.	Halbau.	Merapoh.	Trap.
Hamba Raja.	Jangkang.	Jelutong.	Rambai Bukit.
Mutopus.	Miniah Daun Kechil.	Damar Hitam.	Randa.
Jati.	Miniah Daun Besar.	Mahang.	Kandek Hitam.
Hampastubu.	Seraya.	Mata Kuching.	Kandek Burong.
Gula.	Pinang Baik.	Temponis.	Rumuyu Bukit.
Sorosoh.	Mengkoyan.	Tala Bukit.	Barangan Kampong.
Tumpul Bliong.	Palas Tikus.	Drom.	Barangan Babi.
Klat.	Krian Batu.	Masekam.	Bertam.
Kranji.	Resak Puteh.	Damar.	Langkap.
Resak Merah.	Mintangor Batu.	Badara.	Nibong.
Tembusu.	Mintangor Bunga.	Medang.	Medang Tandok.
Medang Kuning.	Tampang Burong.	Ekor.	
Rengas Daun Besar.	Tampang.	Ekor Batu.	

FOREST RESERVE G, GINTING.

Names of Trees.

Rengas.	Medang.	Langkap.	Barangan Babi.
Sorosoh.	Klat.	Nibong.	Mengkoyan.
Urat Rusah.	Mintangor.	Barangan Kampong.	

FOREST RESERVE H, BUKIT GEMUROH.

Names of Trees.

Gading.	Kranji.	Miniah Daun Besar.	Drom.
Rengas Daun Kechil.	Resak Merah.	Seraya.	Nipis Kulit.
Rengas Daun Besar.	Medang Kuning.	Pinang Baik.	Rumenia.
Sorosoh.	Meranti Merah.	Mengkoyan.	Rumuyu Bukit.
Passir Linga.	Tempenis.	Mint gor Batu.	Barangan Babi.
Damar Hitam.	Damarlaut.	Jelutong.	Barangan Kampong.
Mutopus.	Halbau.	Mata Kuching.	Langkap.
Hampastubu.	Miniah Daun Kechil.	Temponis.	Nibong.
Klat.			

Northern District, P. W.

SENIOR DISTRICT OFFICE,
Butterworth, P. W., 8th January, 1898.

SIR,—With reference to your letter of 4th October, I have the honour to report on the Forest Operations in the Northern District of Province Wellesley.

2. I enclose tracings 1 and 2 * showing the Ara Kuda (Mukim 13) and Tassek Glugor (Mukim 12) Frost Reserves.

The area of the first is 563 acres; of the second 3,055 acres.

The ground in both is low-lying and in parts swampy.

3. Two Watchmen, Malays on salaries of \$144 and \$96, are employed solely in constantly going round, and through, these Reserves. Tassek Glugor is visited by them on an average 14 days in the month; Ara Kuda 9 days in each month. Forest Ranger XAVIER visits each Reserve on the average once a week. The Senior District Officer has visited Tassek Glugor twice and Ara Kuda once since April last.

4. Paths are open and clear from A to B on map 1 (Ara Kuda) and from A to B on map 2 (Tassek Glugor). There is no path at present along the Kedah Frontier Reserve, but it is to be hoped that part of the vote on the 1898 Estimates (\$350) for clearing the Frontier Reserve will be used for this purpose.

5. Notices are being served on all owners of cultivated land bordering on the Reserves to open out their boundaries with Crown land (section 16 Ordinance II of 1886). Many of the lots bordering on the Reserves have been abandoned and will in due course be resumed under Ordinance X of 1883.

* Not printed.

6. Fires are reported to have burnt upwards of 300 acres of lalang and brush-wood in the Tassek Glugor Reserve (2) in 1897, and 120 in the Ara Kuda Reserve (1). No large timber was destroyed by fire.

7. The Tassek Glugor Reserve (2) is reported to contain a few valuable Merbau trees (25). The Ara Kuda Reserve (1) a lesser number of Merbau trees (say 10). Neither Reserve contains other timber of special value.

8. No planting operations have been undertaken in the absence of funds. A considerable expenditure would be required for the planting of young trees, and their protection from fire, and it is to be doubted whether such expenditure would be justified in view of the facility of getting timber along the coast.

9. The Tassek Glugor Reserve is particularly inaccessible as a source of timber supply. It consists of a wide area of lalang land with clumps of trees scattered over it. I should be disposed to sell the land to coco-nut planters if any demand for it should be forthcoming.

10. There have been no applications for timber during the year from the Reserves. Two Malays were convicted and fined for taking timber without authority, for repairs to the Muda Bund.

R. N. BLAND,
Acting Senior District Officer.

Area of each Forest Reserve in Mukims XII and XIII.

Mukim No.	Lot No.	Area.	Remarks.	
XII	565II	<i>a. r. p.</i> 3,055 0 24	Tasek Glugor Reserve.	
XIII	421	13 3 01		
"	420	3 0 06		
"	419	4 1 01		
"	418	2 1 29		
"	416	8 0 37		
"	403	20 1 27		
"	402	2 2 16		
"	401	12 1 23		
"	399	2 3 12		
"	400	10 1 15		
"	397	14 0 16		
"	396	13 3 24		
"	393	2 3 29		<i>a. r. p.</i> 562 3 22 Ara Kuda Reserve.
"	392	4 3 24		
"	390	2 1 35		
"	380	269 2 13		
"	388	2 1 18		
"	387	1 1 20		
"	386	7 2 36		
"	385	2 1 38		
"	384	4 0 17		
"	383	4 2 09		
"	382	1 1 16		
"	381	7 3 18		
"	256	107 0 29		
"	257	12 0 12		
"	258	21 3 12		
"	379	1 3 09		
		3,618 0 06		

Central District, P. W.

DISTRICT OFFICE,
Bukit Mertajam, 17th February, 1898.

SIR,—I have the honour to submit my report on the Forest Reserves of the Central District, Province Wellesley, called for in C. S. 5022/97.

2. The Reserves consist entirely of hill-tops, and are 5 in number, viz. :—

	a.	r.	p.
1. Juru Hill, Lots 454 and 542, Mukim XII, ...	525	0	10
2. Bukit Seraya, Lots 679 and 680, Mukim XVII, ...	112	0	04
3. Bukit Mertajam, Lot 815, Mukim XVII, ...	162	2	01
4. Bukit Langkap, Lot 435, Mukim XIX, ...	189	2	10
5. Bukit Goa Ipoh, Lot 410, Mukim XX, ...	341	0	02

3. There is no special Forest Guard to look after these Reserves. They are visited by the Forest Ranger and Assistant Forest Ranger at intervals when an opportunity occurs, once or twice a month. The boundaries are kept clear by the owners of the adjoining lands.

4. The Reserves being on the hill-tops are not very well situated for timber cutting. They contain valuable timber trees such as Meranti, Merbau, Tambusu, Tampinis, Medang, and other commoner woods. There was one prosecution for illicit timber-cutting, and one pass for timber was issued in the Juru Reserve. There was also one prosecution, also in Juru, for encroachment on the Reserve.

5. There have been no other operations in the Reserves. A number of applications for land in the Reserves were made, but were not entertained.

F. J. HALLIFAX,
District Officer.

Southern District, P. W.

DISTRICT OFFICE,
Nibong Tebal, 18th February, 1898.

SIR,—I have the honour to report on the Forest Operations in Southern District Province Wellesley.

2. There is one Forest Reserve, the area of which is 1,553 acres.

The Reserve is situated on Bukit Panchor in the South-East corner of the district and is almost entirely of a hilly nature.

3. One Forest Guard on a salary of \$144 is employed solely in watching this Reserve, which is visited by him at least 20 days in each month.

The Forest Ranger, CHEEBIN MAHMOOD, is in the habit of inspecting the Reserve five times in each month.

The District Officer has visited the Reserve four times since March.

4. The path round the Reserve is open for the whole circumference.

5. There have been no fires during the year.

6. The Reserve is entirely jungle, and contains about 40 Merbau, 20 Tembusu, 20 Tampenis, 50 Patatai, 200 Mentalin, 20 Mantangor.

7. No planting operations have been undertaken, the land being well wooded.

8. One application for timber was received during the year. This was for the purpose of building a trap for a tiger. The application was granted, the quantity required being small and of no value. No cases of cutting timber without a licence were reported.

R. J. FARRER,
District Officer.

The Dindings.

The demarcation of Forest Reserves in the Dindings commenced in July, 1896, and was completed on 30th April, 1897. The work was carried out by a special staff of coolies acting under the instructions of the Forest Inspector, and on its completion a Forest Staff consisting of the Forest Inspector and 7 Malay Guards was organized, their salaries being as follows:—

Forest Inspector,	...	\$40	per month.
3 Guards, ...	...	9	do.
4 Do., ...	...	8	do.

2. The Reserves are six in number, and the total area of reserved land amounts approximately to 3,700 acres. I attach a sketch plan shewing the position of the reservations, lettered *A* to *F*.

3. *A.—Lumut Reserve.*—Area 500 acres, of which about 400 acres is hill-land and 100 acres low and swampy. This Reserve contains valuable timber, such as Damar Laut, Ebony, Kranji, Rasak, Rengas and Meranti.

B.—Pangkor Reserve.—Area 1,100 acres, viz., 900 acres hilly, 200 acres swamp. This Reserve includes the whole of Pangkor Island with the exception of the villages and adjoining kampongs, which extend along the East shore, and certain holdings across the centre of the Island towards the South. The timber found here is similar to that in *A*.

C.—Tanjong Hantu Reserve.—A small but valuable Reserve comprising the one steep hill from which the promontory takes its name. Area about 300 acres. Timber includes Rasak, Rengas, Chengai, Halbau, etc., but the trees are mostly of small size at present, many of the larger ones having been cut down some ten years ago by a Chinese timber merchant whose *kongsi* was afterwards abandoned owing to extraordinary mortality among his coolies.

D.—Gunong Tunggal Reserve.—Includes only high-land, viz., the Gunong Tunggal range of hills. Area about 400 acres. This is the finest of the six Reserves and contains some most valuable timber, being especially rich in Damar Laut, Pataling and Meranti Merah.

E.—Bukit Segari Reserve.—Area about 1,100 acres. A fine Reserve containing some 900 acres of very hilly land and 200 acres of swamp. Bukit Segari is the highest hill in the Dindings, its summit being more than 1,800 feet above sea-level. The timber found is similar to that in Reserves *A* and *B*, while various kinds of *Getah* are also to be had in the low-lying parts.

F.—Tanjong Burong Reserve.—Area, 300 acres. This Reserve is entirely mangrove swamp, and it is not clear to me why it was thought advisable to demarcate it. It contains an abundance of timber which is excellent for firewood or for piles, but for nothing else. For some time previous to May, 1897, the right of cutting firewood at Tanjong Burong was farmed out to a Chinaman, but the lease was then determined owing to the Farmer persisting in cutting trees of a less diameter than was authorized by the District Officer. The farm has, however, been renewed again this year to another syndicate under strict conditions and a large cash guarantee for the protection of the smaller timber.

4. Only one case of fire occurred in the Reserves during 1897, and this—which was of a trivial character—was apparently accidental. No encroachments on Reserve land were reported.

5. Twenty-nine cases of illicit timber cutting were dealt with during the year, the prosecutions resulting as follows:—20 Convicted; Withdrawn 1; 8 Acquitted.

The amount of fines inflicted was \$229, of which \$116 was realized. The timber cut in these cases was almost exclusively mangrove wood, and not a single case occurred where large or valuable timber was unlawfully felled. Indeed since the organization of the Forest Staff it may be said that the illicit cutting of large timber has been practically made impossible.

6. The head-quarters of the Forest Ranger and Forest Inspector are, of course, at Lumut, and the Guards were, originally, distributed as follows:—3 at Lumut; 2 at Beting Luas; 2 at Pengkalan Bharu (Bruas).

In consequence, however, of the constant thefts of bakau wood in the Sungei Panchor district, the culprits being chiefly the Chinese fishermen from Bagan, a village on the Perak bank of the river, I transferred one of the Lumut Guards to

Bruas at the close of the year. The arrest of these thieves is a matter of great difficulty, owing to the nature of the country in that district and to the remarkable line followed by the Perak frontier, which renders it an easy task for the offenders to slip back beyond Colonial jurisdiction on the approach of our Guards. A glance at the sketch plan which accompanies this will explain the position, and, as I have already drawn attention to the matter both in my Annual Report and in separate correspondence, it is needless to go further into details here. I trust that my suggestion for the erection of a hut for the Forest Guards at Sungei Panchor, and the building of a sampan for their use, will be sanctioned with as little delay as possible.

7. A hut was constructed during the year on the Eastern boundary line for the use of the Guards, and has been utilized periodically by them when patrolling in the neighbourhood.

8. At the beginning of the year, there were 16 timber *kongsis* working in the district, of which 9 were "plank" *kongsis*, where the felled timber was squared and sawn before export, and 6 were simple firewood-splitting houses, one charcoal factory completing the total. In October, however, immediately after the introduction of the new licence fees on sawyers and wood-cutters, one of the largest of the "plank" *kongsis*, viz., WONG AH TIP'S, at Bruas, ceased to work, and the same employer has also recently closed his second and smaller business at Telok Semangin. The Tanjong Burong firewood (Farm) *kongsi* was also closed during the year, as stated.

The positions of the different *kongsis* are indicated on the plan.

9. The total Revenue accruing from Timber Royalty during 1897 realized \$9,824.67, as compared with \$7,179.52 in 1896.

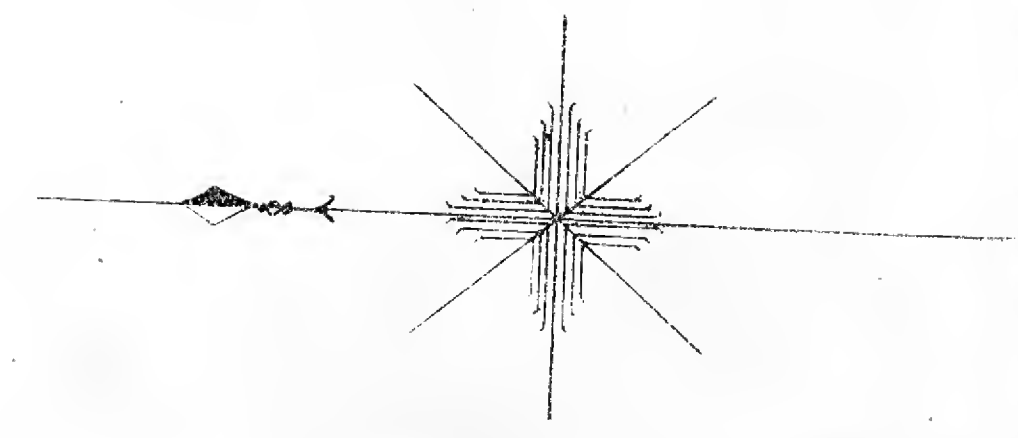
10. The *kongsis* throughout the District have been visited at frequent intervals during the year by the Forest Ranger, the Forest Inspector, and the Guards, and surprise visits of inspection have been paid from time to time by the District Officer.

R. P. GIBBES,
Acting District Officer, Dindings.

Lumut, 29th March, 1898.

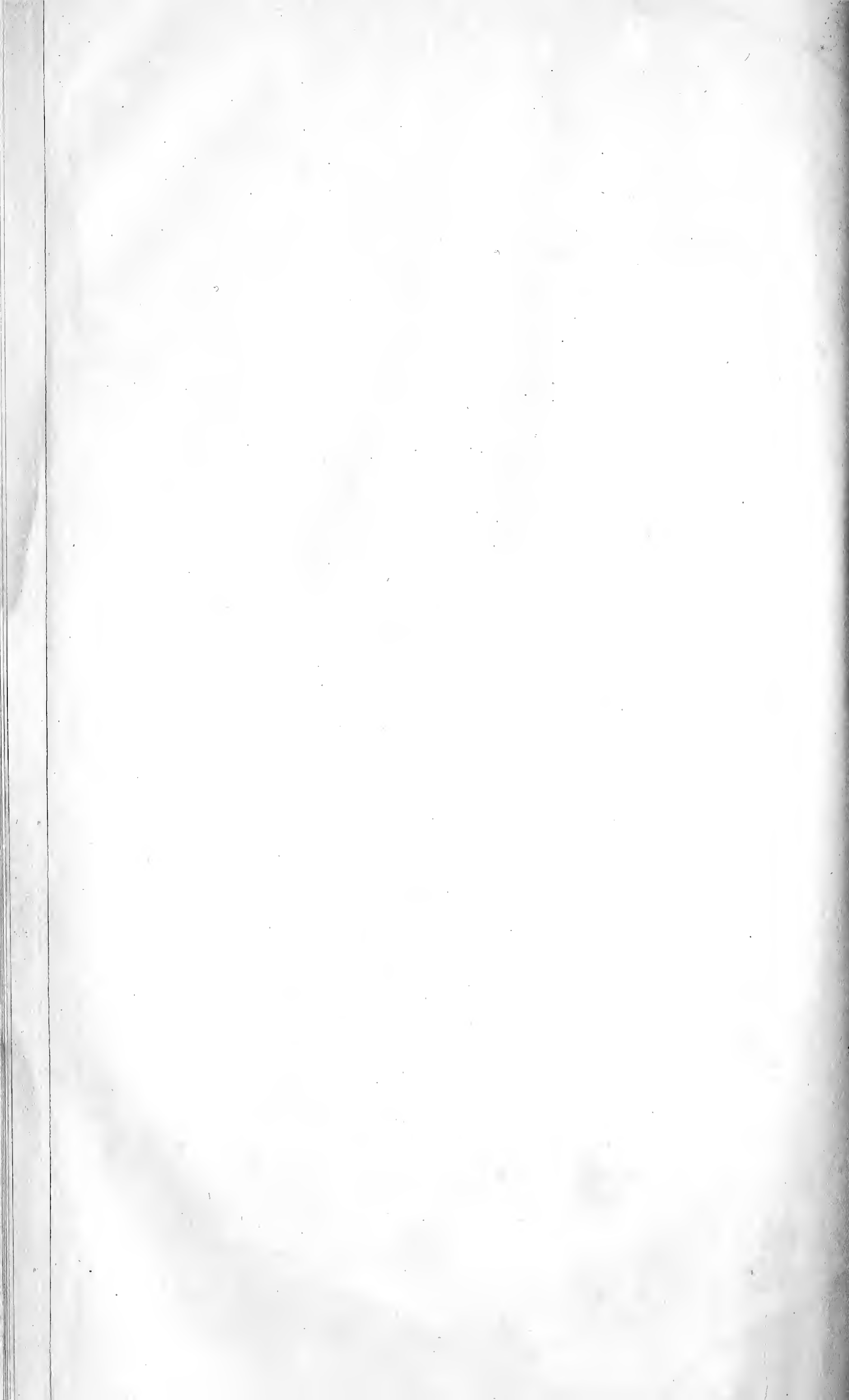
DINDINGS TERRITORY

- * = Firewood cutting Kongsi House
- ⊕ = Charcoal burning Kongsi House



Boundaries of Crown Reserves in red ink





**REPORT ON THE FOREST RESERVES IN THE SETTLEMENT
OF MALACCA, FOR THE YEAR 1897.**

1. The Forest Reserves in Malacca are 8 in number, as shown in the following table:—

District.	Locality.	Area.		
		<i>a.</i>	<i>r.</i>	<i>p.</i>
Central, ...	Bukit Bruang, ...	3,458	3	13
Alor Gajah, ...	Brisu-Sungei Siput, ...	5,268	2	08
Do., ...	Bukit Panchur, ...	3,356	3	29
Do., ...	Sungei Udang, * ...	4,392	0	35
Jasin, ...	Ayer Panas, ...	3,242	1	35
Do., ...	Merlimau, ...	6,217	0	00
Do., ...	Bukit Senggeh, ...	9,429	3	25
Do., ...	Bukit Sadánan, † ...	11,355	0	33
The total area is		46,721	0	18

* A small portion of this Reserve is in the Central District.

† 4,529 acres 2 roods 17 poles of this Reserve are in the Alor Gajah District.

2. The number of Guards employed in 1897 in protecting the Reserves was as follows:—

	Area of Reserves.			No. of Guards.	No. of Acres per Man.
	<i>a.</i>	<i>r.</i>	<i>p.</i>		
Central, ...	3,458	3	13	2	1,729
Alor Gajah, ...	13,017	2	32	4	3,254
Jasin, ...	30,244	2	13	5	6,048

It is obvious that, with this small staff, the amount of "protection" that can be given to the Reserves is very small: in fact the Merlimau and Brisu-Sungei Siput Reserves were not even nominally protected, the whole time of the Forest Guards in the Alor Gajah and Jasin Districts being given to the other Reserves.

3. The following table shows the revenue and expenditure for the year:—

	Revenue.		Expenditure.	
	\$	<i>c.</i>	\$	<i>c.</i>
Central District, ...	...	...	198	45
Alor Gajah District, ...	53	10	388	00
Jasin District, ...	200	00	491	77
Total, ...	\$253	10	\$1,078	22

The revenue from the Jasin District is only approximate, as no separate account has been kept of tenths paid for jungle produce taken from the Reserves. This will be done in future.

4. In 1894, the year before the Forest Department was retrenched, the revenue derived from the Reserves was \$1,207.69, and there had been a steady increase for some years before that in the amount collected on jungle produce. Had the Department not been abolished, the revenue might, in time, have nearly balanced the expenditure.

Central District.

5. The Acting Collector of Land Revenue (Mr. BROADRICK) reports that the boundaries of the Bukit Bruang Reserve have been patrolled and kept clear by the two Forest Guards. Of the 294 young gëtah trees planted in 1895, 257 are still living and doing fairly well. The remainder have died. There were no prosecutions for illegal cutting, &c. during the year.

Alor Gajah District.

6. The Acting District Officer (Mr. MARRIOTT), who has only recently taken up his appointment, reports that the boundaries of the Bukit Panchur Reserve are, on the whole, well kept, though overgrown in places with lalang where the Reserve abuts on abandoned tapioca land. In the Brisu-Sungei Siput Reserve no clearing was done, and unless they are cleared soon, the boundaries will be entirely obliterated. Steps will be taken to have this done during the current year.

7. At the time of writing his report, Mr. MARRIOTT had not been able to visit the Sungei Udang Reserve, owing to press of other work, but there have been two Forest Guards in charge of the Reserve during the year, and the boundaries have, I believe, been kept clear. The other two Guards are stationed at Bukit Panchur, and there are none in charge of the Brisu-Sungei Siput Reserve. There were no prosecutions for illegal cutting, &c. during the year.

Jasin District.

The Acting District Officer (Mr. SCOTT) reports that a Corporal and 2 Guards are stationed at Selandar, and do their best to look after the Bukit Sadánan and Bukit Senggeh Reserves, the aggregate area of which is 20,785 acres 18 poles, but the number of Guards is, of course, totally inadequate to the duties they are supposed to perform. The boundaries were, however, kept clear.

9. The Ayer Panas Reserve, the area of which is about one-sixth of the Bukit Sadánan and Bukit Senggeh Reserves, has been in charge of two men; the boundaries have been kept clear, and the Reserve has been regularly patrolled.

10. This Reserve contains very little, if any, "forest" (*i. e.*, primary forest) and hardly any timber of any value. It consists chiefly of "blukar" (secondary growth) from 25 to 40 years old, which has grown up over the former tin-workings, and its value as a Reserve is, in my opinion, nil. About 30 years ago the whole of the land comprised in the Reserve was worked for tin by Chinese miners, and a very considerable quantity of tin was obtained: but their methods were primitive, they only took the ore where it was most accessible, and they were unable to go to any depth because they were unable to get rid of the water which filled the workings.

11. There are several places in the Settlement, as mentioned by Mr. HERVEY in paragraph 6 of his Administration Report for 1892, where tin ore of good quality is found, of which those in the neighbourhood of Ayer Panas and Kesang are probably the best, and there is no doubt that much of the land in the Ayer Panas Reserve would pay well if worked with improved methods. During 1897, leases for 240 acres 3 roods 39 poles of the Reserve were issued, on my recommendation, to a Chinese syndicate, who have been getting very good ore from one place. The first consignment sent to the Straits Trading Co.'s Works at Pulau Brani gave 75% of tin, and if other miners take up land, there will probably be a considerable revenue from tin. I regret to say, however, that it has been decided not to grant any more land in the Reserve for tin-mining, an application for a lease of 25 acres, which was sent in shortly after the issue of the leases mentioned above, having been refused.

12. The Reserve brings in no revenue to the Government, and, as stated above, there is little or no timber of any value in it. I am, therefore, strongly of opinion that, if any further applications for mining leases are received, the Reserve should be abandoned. Should tin-mining succeed, as I hope it will, and it is considered desirable to form another Reserve in another place, the revenue derived from tin would enable the Government to establish a Reserve which might, at some future time, be of some value.

13. The Merlimau Reserve (area 6,217 acres), a much more valuable one than that at Ayer Panas, has been entirely neglected for several years. Provision has been made in the Estimates for 1898 for 3 more Guards in the Jasin District, and it is proposed to place two of these in charge of the Merlimau Reserve, but they will be able to do little beyond keeping the boundaries clear.

14. The order recently issued by the Government that the Forest Guards are to be under the Forest Rangers attached to the Land and District Offices, who are to give as much attention as they can to the Reserves, makes it absolutely necessary that an Assistant Forest Ranger should be given to the Jasin Office. The one Forest Ranger has more work than he can do already in reporting on applications for land and other Land Office work, and if he is to give any attention to the Reserves he must have some one to relieve him of some of his other work. Both the Land Office and the District Office, Alor Gajah, have Assistant Forest Rangers, and the Jasin Office should be placed on the same footing.

15. There was one prosecution during the year for illicit cutting.

General Remarks.

16. From the above reports it will be seen that "forest operations" in Malacca in 1897 have been confined to keeping open the boundary lines of 6 out of 8 Reserves and guarding those Reserves to a very limited extent. The fact that there has been only one prosecution for illicit cutting during the year speaks volumes for the measure of supervision that the Forest Guards are able to exercise. To assume that there were no other cases of illicit cutting would, I am afraid, be crediting the people with a respect for Government property that they do not possess.

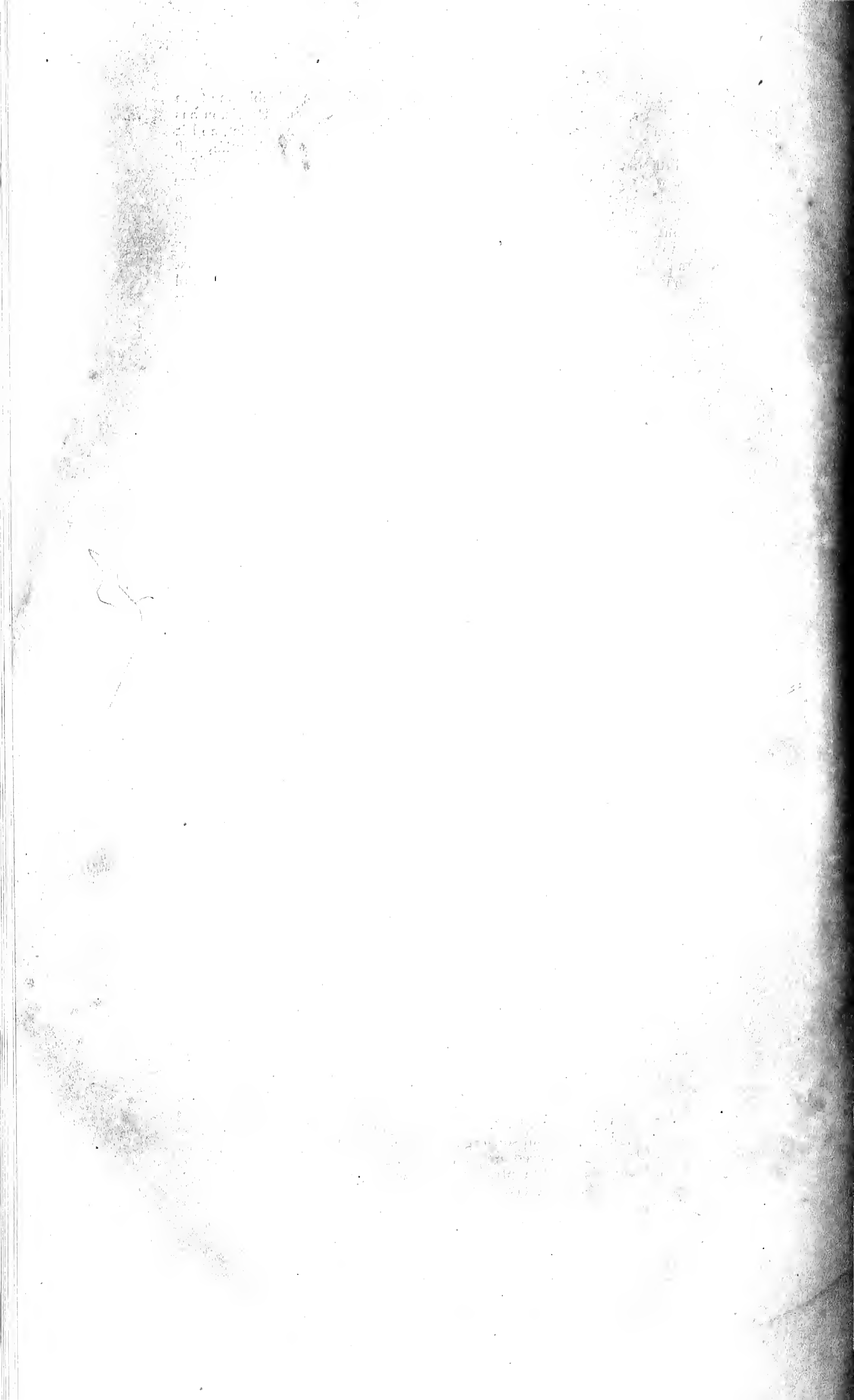
17. The revenue derived from the Reserves was practically nil, and, under the present system of management, it is difficult to see of what value they are to the Government. They are described on p. 23 of the Report of the Retrenchment Committee as being "insignificant in area and value," and I think that that description is a tolerably correct one. They are not large enough to have any appreciable influence on the rainfall, which, as a rule, is abundant, and is sometimes more than is required. They yield no revenue from timber, because no timber is allowed to be cut—except a small quantity used by the Public Works Department, for which nothing is paid—and the question is whether they can ever be made to yield any considerable amount of revenue except at a cost out of all proportion to the results.

18. If anything is to be done, I think that the experiment should again be tried of placing the Reserves in the charge of an Officer who could give his whole time to them, as the Collector of Land Revenue and the District Officers have their time very fully occupied with their other duties. Plans should be made of the different Reserves, and the places where there is good timber should be marked. A certain quantity might be cut every year under the supervision of the Officer in charge, who might also devote his attention to planting timber trees of the better kinds to provide a supply of timber for the future. The experiment might be tried for a certain number of years, and if it proved a failure it could be abandoned without any very serious loss to the Government.

19. Unless the Government is prepared to try some such experiment as that suggested above, I think it would be better to abandon the Reserves altogether, and to parcel them out systematically in blocks of say 500 acres to tapioca planters, who would gladly take them up, arranging that the portions first cleared should have time to become covered with secondary growth before the whole of the Reserve is cleared. By the opening of fresh tapioca plantations, a considerable amount of revenue, direct and indirect, would accrue to the Government.

E. M. MEREWETHER,
Acting Resident Councillor.

Malacca, 31st January, 1898.



STRAITS SETTLEMENTS.

Paper to be laid before the Legislative Council by Command of
His Excellency the Governor.

ANNUAL REPORT OF THE BOTANICAL GARDENS, SINGAPORE.

Staff.

1. The only changes in the staff were the employment of a new Plant-collector named TALKA, in place of MAT resigned. The coco-nut trees inspection coolie was at first tried for this post, but proved unsatisfactory. A young Tamil lad SAHIB was taken on as apprentice to learn gardening work, and has proved very useful, and a boy, SIMON, was also employed as apprentice in the office. The coolies worked well, but there were some cases of mild beri-beri in the lines, and it will be advisable now to rebuild their quarters in another spot.

Visitors.

2. The number of visitors was as large as in past years. Many planters and others interested in cultivation visited the Economic gardens to inspect the various official plants. A considerable number of scientific botanists, passing through to Java, Ceylon or Japan, also visited the gardens. The Regimental band performed regularly once a month on moonlight nights, and was much appreciated.

Prosecutions.

3. There were a number of cases of petty theft, chiefly by mail passengers, but few of any importance. Three Chinese and one Malay boy were charged with taking flowers. One was discharged, and one escaped, the others were fined or imprisoned. One Chinaman was fined three dollars for cutting sago palms, and one Indian was fined for injuring a python by striking it with a stick.

Flower show.

4. A very successful exhibition of flowers and flowering shrubs was held in the Town Hall in March. It was remarkable for the exceptionally good show of orchids. Large foliage plants and fruits and vegetables were excluded, and the exhibition was especially one of flowers.

Bulletin.

5. A bulletin dealing with vegetables, shade trees, poisonous plants, Sugar cane, seedlings, and other subjects was published.

Aviaries.

6. The following animals were added to the collection :—One *Semnopithecus* sp. purchased; one other (*Aonyx leptonyx*) caught in Singapore, purchased; two Kijangs (*Cervulus muntjac*) were born, one in April, the other in September; the latter, however, died next day. One hybrid ape was born. Three Thalaugers (*Trichosurus Vulpecula*) one of which produced a young one, presented by Mr. HALL; one kangaroo rat presented; four black swans presented by Mr. LE SOUEF. Two whistling teal presented by Mr. DARE; one *Neops malayanus* presented by Capt. H. TALBOY; one seagull presented by Capt. H. TALBOY; one Australian parrot presented by Mrs. HUNTER; two black storks *Xenorhyncus asiaticus* from Pahang purchased; one horsfield's eagle purchased; six flamingos, 8 ducks and 2 gulls presented by Mr. DIXON of Cairo. The flamingos did not thrive and three were killed by large water tortoises, (*Trionyx*). The other water-fowl hardly survived the journey except one gull. Two pelicans, deposited; one cobra and some green vipers (*Lachesis wagleri*) were captured and one of the latter produced nine living young. A rare tortoise *Daimonia subtrijuga* from Siam presented by Mr. FLOWER; two large water tortoises (*Trionyx cartilagineus*) were caught in the lake in a trap.

Upkeep.

7. The borders and beds in the garden were all gone over, thoroughly trenched and renewed, and planted with fresh shrubs and plants. The flowerbeds round the band stand have been exceptionally bright this year owing to the introduction of a large number of novelties received chiefly from Mr. DAMMANN of Naples, who sent a very large collection of various seeds, in exchange for those of palms; among these new-bedding plants, were several kinds of *Salvia* of different colors, *Solanums*, *Rivinas*, the sweet scented Basils (*ocimum*), *Nicotianas*, *Cacalia*, and a good series of the Orchid flowered *Cannas*. Among the more interesting new introductions were, the following, *Lepinia taitensis*, (Southsea islands) *Ceropegia perforatum* (New Guinea) *Lonchocarpus cyaneus*, two new species of Coffee from Africa, *Tupistra* new-species, *Typhonium* new species from Perak. *Cinnamomum* sp, a wild clove bark from Ulu Lipis, *Begonia decora*, *Didymocarpus* n. sp. and *Renanthera angustifolia* (Perak), and a fine series of araucarias was received from Brisbane.

8. The following plants flowered for the first time, *Baphia nitida*, the camwood. *Carapa Guianensis*, (craboil tree) *Commelina Sellowiana*, *Streptocarpus hybrids*, *Cacalia coccinea*, *C. aurea*, *Mucuna pruriens var. utilis* *Sarcochilus bisserratus* n. sp. (Perak) *Bromheadia schoenoides* n. sp. *Amomum micranthum*, *Hornstedtia Maingayi*. *Phrynium* n. sp. *Neyrandia Madagascariensis*, *Heptapleurum Hullettii*, and *H. Ridleyi* *Dendrobium anceps* (Burmah) *Büttneria* sp. (Pahang), *Garcinia Morella* (Ceylon.)

Nepenthes House.

9. A new glass-roofed house was built chiefly for pitcher plants, (*Nepenthes*) but it has also been used with great success for newly imported orchids and other delicate plants. Among the nepenthes are, *N. ampullacea*, *N. Rafflesiana*. and several varieties, *N. gracilis* *N. Reinwardtii*, *N. sanguinea* and *N. albomarginata*.

The large plant-house has undergone large and expensive alterations. The whole of the central portion has been removed, the wood work being completely rotten. The walls are covered with bertam-chicks made specially in Penang, supported on an arched-iron frame work carried on iron tubing pillars, and the central staging was covered with a circular roof of chicks carried on iron tubing and bars, from a brick pillar in the centre.

10. The following were the Exchanges of plants during the year, two hundred and thirty nine plants, and one hundred and ninety five packets were sent out to kindred institutions and Botanic Gardens and eight hundred and twenty four plants and four hundred and fourteen packets of seeds were received.

The following contributed to the Gardens :—

Mr. Micholitz.	Royal Botanic Gardens, Kew.
„ Pereira.	Do., Calcutta.
„ W. Nanson.	Do., Ceylon.
„ St. V. B. Down.	Do., Buitenzorg.
„ J. Goodenough.	Do., Hongkong.
„ A. Loher.	Do., Sydney.
„ Lease.	Do., Trinidad.
„ W. W. Bailey.	Do., British Guiana.
„ E. V. Carey.	Do., Brisbane.
„ Williams.	Do., Tokio, Japan.
„ Owen.	Do., Lagos.
„ Gerald Watson.	
Messers Dammann & Co., Italy.	
„ Behn Meyer & Co.	
„ Sander & Co.	
Mrs. Pennefather.	

Herbarium.

11. During the year no departmental botanical excursions could be made, but while on leave in July I visited the Kinta valley in Perak, ascending the hills of Bujong Malacca, and Gunong Keledang, and taking the plant collector, made large collections in the district. Although several botanists have visited this valley, a considerable number of novelties of interest were found, including a remarkable new species of *Tupistra*, the first of this Indo-Chinese genus discovered in the peninsula and a very fine *Bulbophyllum* with probably the largest flowers in the genus, a new

Typhonium, several new *Didymocarpi*, a *Zippelia*, and other striking plants. Later in the year I visited, on leave, the Negri Sembilan, botanically an almost unknown district, where among other plants a new *Shorea*, and a curious new *Phrynium* were obtained, and thence I visited Mount Ophir where many plants were collected. During my annual visit to Penang, Province Wellesley and the Dindings, I also collected a number of specimens. Plants from Singapore and Johore were also obtained during the year.

A continuation of the series of dried plants collected by Scortechini, Wray, and Kunstler, was contributed to the herbarium by Dr. PRAIN of the Calcutta Gardens, and specimens from the Papuan region, including the new palm *Livistona Woodfordi* Ridl; were presented by Mr. MICHOLITZ. Mr. CURTIS sent 104 specimens from Penang and Perak.

Forestry.

12. I visited Penang in June and inspected the forests on Government Hill, especially along the track of the proposed railway to the top from Ayer Hitam, and found that it would not in any way injure the forest. And also visited Balik Pulau to report on the proposed new reserve at Pondok Upik, a hill slope of about 300 acres, containing a quantity of good ordinary timber, but for reservation purposes of more value climatically to check denudation into the valleys at the base of the hills. A few days were also spent in the Dindings inspecting the forest conservation at Lumut, and the new boundary paths and timber factory at Gunong Tungul. All seemed in a satisfactory state and reports were sent in to Government on the state of affairs. India rubber (*Ficus elastica*) was noticed growing remarkably well in Lumut, and might well be propagated and planted out. And para rubber was sent to Lumut and Balik Pulau for planting in the forest reserves.

13. Duplicate specimens for naming or exchange were sent to the gardens at Calcutta and Kew, and ferns were sent to Dr CHRIST of Basle; Mosses to Mr. MITTEN, Algæ to Mr. WEST, and Fungi to Mr MASSEE of Kew, who reports that several of the latter were new to science. A number of specimens of timber were added to the wood-collection, including the Katinga wood of Siam, a very ornamental wood resembling Calamander wood, but produced by a wild citron apparently a variety of *Citrus Medica*. This was presented with a specimen of the leaves and fruits, by Hon'ble F. G. PENNEY. A small drying and preparing room was built on to the office for the work of the plant collector.

Library.

14. The following books have been added to the Library:—

- Ferguson.—All about coco-nut planting (new edition) presented by the Author.
 Obach E.—Gutta percha (Cantor Lectures) presented by the Author.
 Raciborski.—Flora von Buitenzorg presented by the Author.
 Penzig.—Die Myxomyceten der flora von Buitenzorg.
 J. G. Kramers.—Een Reis in de Koffie.
 Ianse Dr. J. M.—Noot-Muskaat Culteuer in Minahassa.
 Bijlert Dr. A. V.—Onderzoek van eenige grond soorten in Deli (cont.)
 Greshoff M.—Onderzoek naar de Plantstoffen (part ii).
 Konigsberger.—Schadelijke en Nuttige Insecten van Java.
 Zimmerman Dr. A.—Die Nematoden der Koffie Wortels.
 „ Enchytraeden in die Koffie Wortels.
 De Haan.—Regen val en Reboisatie in Deli.
 Coville F. V.—Notes on Mushroom poisoning, presented by U. S. A. Department of Agriculture.
 Nash V.—American Ginseng.
 Farlow.—Edible and Poisonous Fungi.
 Chesnut V. K.—Principal poisonous plants of North America.
 Jeffrey E. C.—Gametophytes of Botrychium Virginianum.
 Swingle and Webber.—Hybrids and their utilization.
 Smith E. F.—Black Rot of Cabbage.
 Dodge C. R.—Report on Flax culture.
 Swingle W.—Grain smuts.
 Walpers.—Repertorium 6 vols. presented, Royal Gardens, Kew.
 „ Annals 6 vols presented, Royal Gardens, Kew.
 Pierre Flore Forestiere de Cochin Chine, 2 parts, presented by Royal Gardens, Kew.

- Morris D.—Commercial Fibres.
 „ Commercial India rubber.
 Dyer.—Flora of Tropical Africa, vol. vii, part 2.
 Hiern.—Catalogue of Welwitsch's plants presented by Trustees of British Museum.
 Engler.—Systematik Pflanzengeschichte.
 Soltwedel F.—Forms of Sugar cane, presented by Hon'ble J. B. Vermont.
 Medley Wood J.—Natal Indigenous plants.
 Koorders F.—Flora van Celebes.
 Maiden.—Flora of Mt. Kosciusko, presented by Author.
 Port Jackson plants, presented by Author.
 Sterculia lurida, presented by Author.
 Vegetation of Lord Howes Island.
 Hallier H.—Monographie des Convolvulacées, presented by Author.
 Neue Pflauzen ausdem Malaischarchipel.
 Zwei Convolvulaceen.
 Indonesischen *Æschynanthus* arten.
 Birdwood, Sir J.—Memorandum on purchase of Carrot seed.
 King and Pantling Orchids of Sikkhim Himalaya, presented Calcutta.
 Christ Filices Sarrasinianæ presented by Author.
 Filices Novæ
 Ridley H. N.—New species of Entada, presented by Author.
 New Malayan Orchids.
 Sanders F.—Reichenbachia, Vol. II, presented by Author.
 Rhea Fibre Company.—Rhea Treatment by Gomess process.
 Niederlein.—Republic of Guatemala.
 Some copies of Boxburgh's drawings of Indian Alpinias were presented by Dr. Prain of Calcutta.

And the following periodical publications :—

Kew Bulletin. Icones Plantarum (Royal Gardens Kew) Agricultural Ledger, Botanical Survey of India Reports, Forest Administration of India by Ribbentrop, (Government of India) Journal of Agriculture (Queensland) Berlin Notizblatt Haarlem Kolonial Museum reports and extracted bulletins by Greshoff; St. Petersburg Acta Hortae petropolitani, Madras Forest Reports, and Agrihorticultural Society report, Garden Reports of Mysore, and Saharunpore, Queensland, British Guiana, Trinidad, Barbadoes, Jamaica, Lagos, Old Calabar, New South Wales, Trinidad, and Jamaica bulletins, Ceylon circulars, Buitenzorg Annual Report, Annales, and Icones Bogorienses, Zanzibar Annual Report, Cape of Good Hope, Agricultural Journal, Smithsonian Annual Report; Year book U. S. A. Experimental Station records, Missouri Annual Report, Merck's Annual Report, (Darmstadt) Planting opinion of Madras, Perak Museum Notes, Warburg's Tropenpflanzen Chemist and Druggist.

The following works were purchased :—

- Betzins.—Observationes.
 Somerwell, W.—Timbers and how to know them.
 Tschirch, A.—Indische Heil and Nutzpflanzen.
 Kurz.—Burmese Palms.
 „ Indian Plants.
 „ Burmese Plants.
 Schneider.—Book of Choice Ferns.
 Schiffuer, V.—Conspectus Hepaticarum Archipelagi Indici.
 Warburg.—Papuanische Flora.
 Coguiaux and Goossens.—Dictionnaire Iconographique des Orchidees, Gardeners Chronicle, Botanical Magazine, Tropical Agriculturist.

BOTANIC GARDENS, SINGAPORE.

Statement of Receipts and Expenditure, for the year 1898.

RECEIPTS.		EXPENDITURE.			
	\$ c.		\$ c.	\$ c.	
By Balance in Bank, ...	704 99	<i>Salaries.</i>			
Government Grant,	8,500 00	Clerk, ...	207 19		
" Sale of Plants, Seeds		Mandore, ...	229 99		
and Flowers, ...	2,867 60	Carpenters (two), ...	310 91		
" Interest, ...	26 37	Mason, ...	139 81		
		Plant-collector, ...	101 03		
		Printer (Label), ...	120 00		
		Peon, ...	107 00		
		Aviary-keeper, ...	94 86		
		Police, ...	338 75		
		Coolies, ...	3,393 67		
		Rice Allowance, ...	663 56		
				5,706 77	
		<i>Bills.</i>			
		Tools and Stores, ...	688 56		
		Laterite, Gravel, Sand, etc., ...	225 80		
		Timber, Bricks, Lime, etc., ...	890 41		
		Pots and Tubs, ...	148 00		
		Birds' and Animals' Food, ...	1,355 67		
		Manure and Cartage, ...	122 27		
		Buildings and Repairs, ...	470 92		
		Freight on Plants, ...	117 04		
		Books, Papers, etc., ...	377 80		
		Plants and Seeds, ...	86 00		
		Subscription to Telephone, ...	82 50		
		Wardian Cases, etc., ...	85 00		
		Petty Expenses, ...	335 24		
		Miscellaneous, ...	152 29		
				5,137 50	
		Balance, ...	...	10,844 27
				1,254 69	
				\$12,098 96	
	\$12,098 96			\$12,098 96	

Economic Gardens.

15. A large block of land some acres in extent on the East side of the gardens, and running to the boundary stream was opened up, cleared of fern and bushes, and planted up with Ramie for which there was a large demand, Citronella, Lemon grass, and Cuscus, Earthnuts, Bananas and other plants. Para-rubber trees were planted in a row on each side, and plants of Balata gum. *Mimusops globosa*, *Kickxia africana* and *Castilloa elastica* were planted in various spots. The soil at this spot is very good and though the ground is very wet, water being met with at a depth of from a foot to two feet, it seems to suit certain plants very well.

Another patch of ground above the Dalvey Road entrance by the order Urticaceæ was cleared of weeds and useless trees dug and levelled. There are a number of Para-rubber trees at this point. A good number of additions were made to the Arboretum.

Para-rubber is still in great demand, and fortunately this year's crop of seed was a very fair one as compared with that of the previous year, 98,650 seeds being obtained as against 83,000 in 1897.

These seeds were distributed to planters and to Government plantations, together with 10,650 plants, in the following proportions:—

Selangor 76,700 plants and seeds. Johore 21,300, Borneo 5,500, Pahang 3,550, Penang 1,400, Dindings 400, Negri Sembilan 600, Madras 500.

Still this by no means covers the demand for this plant, which is enormous. The greater number as will be seen are required for Selangor where the plant appears to thrive remarkably well. Complaints have however been received thence as to destruction of seedlings by rats, which bite the tops off, as well as by mouse deer, and other animals. At the suggestion of Mr. BAILEY the dried bark and leaves of a small tree were sent to England for Analysis to see if much rubber was lost in drying; no report of the results has yet been received. Samples of bark and soil from the ground on which the plants are cultivated were also sent to Mr. PARKIN, at present investigating the physiology of the Para-rubber tree in Ceylon, and some experiments and calculations were made for him.

Measurements of average and large trees growing in the gardens were made. Of the oldest trees planted in 1884, the girth at 5 feet from the ground was 4 foot 2 inches in the smallest and 6 feet in the largest. Of the trees planted in 1888 a number were measured and gave an average of 4 foot 3 inches, the biggest being 5 feet the smallest 3 foot 8 inches. Mr. WICKHAM, a gentleman, who has spent many years in the Amazonas district and was the first to introduce the plant to the East, visited the gardens, and explained an improved form of tapping the tree by punctures, obviating the necessity of making the usual V shaped incisions. The advantage of this is that the bark is less injured and heals sooner and remains smooth instead of becoming rough as it does under the grooving system.

Of Ramie.

16. Fifty-one thousand (51,000) cuttings and four boxes of seed were sent to planters. Chiefly in Muar, Sumatra and Borneo. It is found very easy to raise this plant from seed, and in wet weather the seeds often germinate on the plant. Of the different strains grown in the gardens, one is very superior in its tall growth before flowering, this is being more extensively propagated than the other varieties.

Coca seed, (*Erythroxylon Coca*) was also in some demand, and 12,000 seeds and some plants were supplied to the Native States. The recent rise in the price of the drug has called planters attention to it.

Other plants in request were Vanilla (700 plants), Patchouli (550), fruit trees (550), *Coffea stenophylla*, *Willughbeia firma*, Chocolate, Rattans, Cola, and Citronella grass.

Plant Diseases.

17. A number of insect and fungus pests were reported from various plantations in the Native States and specimens sent for identification. Among these were samples of destruction of coffee, fruit-trees, ferns and other plants by the coffee locust, specimens of which sent to the Natural History Museum, in London, were identified as *Cyrtacanthacris nigroviridis* walk; curiously a very rare-insect in Entomological collections in Europe. It lays its eggs in slits in the bark of the trees causing the death of the branches. Destruction of the adult by children with sticks and clearing the adjacent land of grass was recommended. Towards the end of the year great damage was reported in the coffee by the Beehawk moth (*Cephonodes Hylas*) the

larva of which devours the leaves, and what was apparently the pupa of a sawfly was also sent from Selangor with samples of badly injured leaves.

The borer-caterpillar was still doing considerable damage, and still more harm was being produced by the red smut fungus. Indeed the state of some fields was very serious. The constant planting of sugar on the same fields was beginning to show effects of degeneration of the cane, which was not to be wondered at, considering the long period during which the fields had been cultivated without change or rest. Specimens of the borer moth sent to the natural history museum were stated to be a species of *Chilo* distinct from the *Chilo saccharalis* of the West Indies.

The seedling canes supplied by Mr. CURTIS were examined. They were growing well and steadily but naturally not as rapidly as from cuttings.

Enquiries as to the use of the mungoose in destroying the rats which formerly were so destructive to the canes elicited the fact, that the rats were practically exterminated by the mungoose, which bred and appeared to thrive very well.

Cloves.

During my stay at Balik Pulau I examined the clove plantations and noted that the borer which was very bad formerly here had almost disappeared but I observed a distinct disease near the same spot which I had never met with before. The boughs of the trees, almost always on the side away from the hill slope died and fell off, the tree eventually perishing. Investigation showed that the bark at the junction of the bough with the trunk was thickened and corky and broken up, especially at the spot where during rain the water ran from the branches down the trunk. The disease was evidently produced by a fungus between bark and wood and was similar to the injury caused by *Irpex* on Coffee trees. I could find no developed fungus on the trees, and though I sought on rotten timber lying around, the few fungi I found were too rotten to identify. I expect it will prove to be *Irpex* which apparently does not confine its parasitism to Coffee, for I found in Province Wellesley an Orange tree entirely broken up by it. The clove disease was very local, occurring in patches, all the trees in one spot being attacked. The cause of the disease was explained to the Chinese owners and the remedy, destruction by burning of all decayed wood on the ground urged on them.

Sugar.

18. At the request of the planters in Province Wellesley I visited two of the larger estates where the Sugar Rhinoceros beetle *Xylotrupes Gideon* was found to be doing much damage, I had previously found this beetle in the cane fields, but it seemed to be inflicting but little injury. Lately however it had taken to feeding upon the roots of the cane, being attracted by the decaying part of the cutting after planting, instead of confining its attention to decaying vegetable matter, its normal food. The larvae were very abundant in some fields, and were being destroyed by digging and searching for them. The large jungle crows were also at work, following the diggers and seeking the grubs. It was said that the pest had been exterminated in some fields by flooding. In other places however they were found living in the wet mud of the canal banks apparently unharmed. It was pointed out that patches of wood left in and near the cane fields were of the greatest importance to the planters as affording shelter for the crows and other insectivorous birds. A matter often overlooked as one wooded hill in the centre of the cane district had been let to a Chinaman to grow tapioca, the wood being mostly felled and the birds driven away.

Camphor oil.

19. Samples of Camphor oil from the *Dryobalanops* of Rawang were forwarded from Selangor by the overseer of Forests and transmitted to the Royal Gardens Kew and a report from Mr. J. C. UMNEY was received which stated that "the oil consists in all probability of the more volatile portions only, almost solely by Terpenes." So far as I know therefore it would have no medicinal virtue nor any commercial value over ordinary turpentine oil. It differs very considerably from Camphor (*Laurus Camphora*) oil imported into this country containing large quantities of Saffral.

Specific gravity at 15° C. = .856.

Optical rotation in a tube of 100 mm + 29°.

It completely distils between 156°—160° C.

Upkeep of Economic Garden.

Vote for the year 1898 was, ...	...	\$1,500.00
Expenditure :—		
Salaries of Mandore and Coolies,	\$1,346.00	
Tools and Stores, ...	70.65	
Baskets, &c., ...	16.08	
Manure, ...	37.50	
Flower-pots, ...	23.00	
Balance in Treasury, ...	6.77	
		<u>\$1,500.00</u>

Upkeep of Grounds at Government House and Domain.

Vote for the year 1898, ...	...	\$2,360.00
Expenditure :—		
Salaries of Mandore and Coolies,	\$2,075.32	
Tools and Stores, ...	136.31	
One Iron Label for the tree planted by Prince Henry of Prussia, ...	35.00	
Cartage and Manure, ...	18.00	
Flower-pots, ...	2.50	
Buildings and Repairs (Plant house re-constructed), ...	70.00	
Timber and Planks, ...	9.06	
Shovel and Rubbish baskets, ...	13.08	
Balance in Treasury, ...	00.73	
		<u>\$2,360.00</u>

Government House Grounds.

20. The Mandor SAMUEL having been dismissed a man of the name of ROGERS was employed and gave great satisfaction. The coolies worked well, and the grounds were kept in an excellent condition. The plant-houses were put in thorough repair, and a number of small trees were planted in spots where it was considered advisable to block out houses, or unsightly spots. During his visit to Singapore, PRINCE HENRY of Prussia planted a palm (*Oreodoxa oleracea*) on the lawn in front of the house.

H. N. RIDLEY,
Director.

Singapore, 10th February, 1899.

Botanic Gardens Department, Penang, 1898.*Waterfall Garden.*

In addition to the usual routine work of maintaining a public Garden in good order, considerable progress has been made in extending the area and developing the natural features of the grounds.

2. Outside the plant nursery a steep bank has been sloped, turfed, and the upper portion planted with ornamental flowering shrubs; and a further portion of the banks of the stream which intersects the garden has also been sloped and turfed.

3. Above the Office a new clearing has been made, one hundred and eighty feet broad, and extending up the hillside for a distance of two hundred and fifty feet, the whole sloped and turfed. On this land the best of the original trees have been left and where necessary others of an ornamental nature planted.

4. A carriage road seventeen feet wide has been made, and metalled, around the Band Stand where there was previously only a five foot path. It is not often the band plays in this garden as it is considered to be too far from town, but whenever it has done so some inconvenience has been experienced for want of room in which to draw up carriages. This has now been remedied.

5. In the vicinity of the Band Stand, nine new circular beds, twelve feet in diameter, have been made and planted with new orchid-flowering Cannas, one variety in each bed. The result of this massing of colour is very effective. Cannas do well here and an important feature is made of them. Planted out in heavily manured soil and liberally watered they are in full flower in two months and go on flowering for an indefinite period, but to grow them to perfection they require lifting and replanting after six or eight months.

6. Under the Diospyros discolor tree, opposite the Fernery and Orchid houses, rockwork has been constructed and the pockets filled with various kinds of ornamental plants in pots so that they can be changed or renewed at will. Permanent planting of rockeries under trees is never satisfactory, as the roots of the trees impoverish the soil to such an extent as to render impossible the cultivation, for any length of time, any but the most robust species of plants.

7. Outside the entrance to the garden, at the spot where building material for the hill Bungalows was formerly landed, and chair coolies congregated, a number of Crotons have been planted and fenced which when they grow up will be a decided improvement.

8. From this point to the Office, a distance of five hundred and twenty-five feet, the main entrance road has been remetalled and consolidated with the steam roller.

9. Three hundred and eighty-three lineal feet of side drains have been built with stones and Cement, and two cross drains on the main road bridged with Granite Slabs in place of wood which was becoming unsafe.

10. At the top of the grounds the old wooden bridge that spanned the main stream has been replaced by a substantial granite arch that is in keeping with the surroundings and will last for ever.

11. An additional room for herbarium specimens has been added to the office and the soil from the hillside that had to be cut away to make room for this building utilised in raising the ground in front. Sufficient material had been accumulated during previous years to fill this room at once. The arrangement is not yet complete but is sufficiently so to be useful for reference.

12. With the exception of the construction of stone bridge and herbarium which were budget items and carried out by the Public Works Department, all other expenses were paid out of the Vote for Maintenance of Waterfall Garden, and executed by the Garden Staff, the total expenditure being \$4,498.50 as shown in statement annexed (Appendix A.) Ironwork costing \$249.62 for re-roofing the Fernery was purchased and the work will be carried out this year. The Revenue from sale of plants and receipts from Swimming Bath amount to \$745.50 which has been paid in to Treasury account.

13. As great interest is being taken in Para Rubber and considerable capital invested in its cultivation, I have again tapped the best tree in the garden from which 11b. of rubber was taken during the rainy season in June, 1897. A sample of this was subsequently sent to Kew and through the kindness of the Director, submitted to Messrs HECHT LEWIS and KHAN for valuation who reported it as "beautiful rubber very well cured worth to-day (31. 8. 98) 3/3 per lb". This had simply been dried in the sun and kept in the office for about a year.

Being planted on dry gravelly soil this tree grows less rapidly here than those that are planted in moister and more suitable soil in Perak and elsewhere. At two-and-a-half feet from the ground it forks and the main stem measured at three feet from the ground in June, 1897, had a girth of 36 inches. Measured again in December, 1898, after an interval of eighteen months, it had increased five inches in girth and the cuts had quite healed up.

This tree is thirteen years old.

This time the tapping was commenced on the 16th November which is generally about the end of the heavy rains, but there is here no season that can be counted on as absolutely dry as in Burmah and India, and in fact rain fell frequently while the operation was carried on which was spread over a period of thirty-four days. Oblique cuts leading to perpendicular channels, was made in six places (subsequently increased to seven) at the bases of which were affixed by means of a lump of clay and a nail small tins to receive the latex. An ordinary carpenter's chisel was used for making and renewing the cuts, but both this and the tins can be improved on when the work has to be taken in hand by the practical planter. Earthenware glazed cups with a hole near the bottom so that the latex can be drawn off without removing them will effect a great saving in labour as much time is taken up in fixing the tins securely when removed every day, and some rubber is also lost in doing this. A better

cutting tool than an ordinary Chisel can also be devised for the work. At the beginning the milk comes slowly and at no time continues running for long. With two exceptions the cuts were renewed between 7 and 8 A. M. and the tins brought in at 11 A. M.; but the flow had always ceased before that time. The two exceptions were when the operation was performed in the evening, but as there is always a danger of rain during the night, and a very slight shower causes water to flow into the tins as nearly all the water trickling down the stem of the tree falls into the oblique cuts and is thence led directly to the tins the work is best done in this climate in the morning. Generally the latex had coagulated by the following morning, that is after standing about twenty hours, but on two occasions only partially so. In these cases, and also when rain water had got in the tins, a pinch of powdered alum was added which caused perfect coagulation in a short time. If the addition of alum does not affect the value of the rubber (and on this point I hope to be able to report later as samples have been sent to the Director of the Royal Gardens Kew with a view to ascertaining this) it facilitates working operations in wet weather, for a little water getting mixed with the latex does not matter provided the vessels do not overflow. All the rubber can be recovered by the addition of alum.

On the morning the incisions were first made only $\frac{1}{4}$ oz. of wet rubber was obtained, but by taking a thin shaving off the lower surface of the oblique cuts on fourteen subsequent occasions the following quantities were obtained at each operation in ounces:— $\frac{3}{4}$, $1\frac{3}{4}$, $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{1}{4}$, 6, 9, $6\frac{1}{2}$, $8\frac{1}{2}$, 6, $6\frac{1}{2}$, 10, $8\frac{1}{2}$, 8. Total 5 $\frac{1}{2}$ lb $1\frac{1}{2}$ oz of wet rubber which weighed when dry exactly 3 $\frac{1}{2}$ lb. As will be seen from this the last three tappings gave a better result than any previous three and operations were only suspended as it was not advisable to make the cuts any wider. The time occupied in affixing the tins and renewing the cuts averaged half-an-hour on each occasion, or seven-and-a-half hours in all. It may therefore be taken that a man at say 30 cts. per day could attend to at least fifteen trees per day and that the cost of collecting will not exceed 10 cents. per lb. With larger trees and better appliances it will be probably much less. I have lately visited Bertam Estate in Province Wellesley where Mr. D. LOGAN planted about 2,000 young trees nine months ago and the growth is very satisfactory. From planters in Selangor I hear that the prospect is most encouraging the trees making very rapid growth. It is evident however that the land selected should be sufficiently drained to prevent the young plants being submerged for in one spot where this has happened at Bertam many have died, and those that are alive do not look nearly so well as others on slightly higher land.

14. Six plants of *Castilloa elastica*, kindly contributed by Mr. GERALD WATSON of Selangor, were planted on the 1st October and at the end of December had made shoots 1-2 ft. long. Previous to this there was no plant of this in the garden and it is too soon to form an opinion as to its suitability for cultivation here.

15. Seedling sugar canes, raised here, which were distributed last year, do not in the opinion of the planters promise to be of exceptional merit. A further distribution has been made this year, two cart loads going to Batu Kawan, of which we have not as yet received any report. I had hoped that some of the best seedlings growing in the Nursery would have flowered this season so that seeds of a second generation could be tried but not one has done so.

16. Of interesting new plants that flowered during the year *Bœa paniculata*, Ridl. deserves the first place on account of the long time it continues to bloom. The flowers are of a good size about $1\frac{3}{4} \times 1\frac{1}{4}$ in. of a pleasing mauve-blue colour, borne on a panicle 3 ft. high. The first flower opened on the 26th June and it has been in continuous flower ever since and has at the present time (7th January '99) twenty open flowers and about forty buds. Individual flowers last 5-6 days and for three months the daily number of fully expanded flowers was from forty to fifty. On the 19th October before commencing to gather seed 1,160 capsules, open flowers, and buds were counted, but no account was kept after. This plant, the only one that has yet flowered out of a dozen, I found growing abundantly on the face of a limestone cliff, but in places difficult of access, in the Kinta District of Perak in 1894. I think it does not flower until at least four or five years old and that after doing so it dies.

17. *Didymocarpus cyanea*, Ridl; mss- of which a large batch from seeds have been flowering freely and attracting the attention of visitors is a new species from iKasoom, a place in Siamese territory about two hundred miles North of Penang. It is one of the most easily grown and striking of the genus. Several other new species of this order have flowered during the year, of which drawings have been made, among them two new *Didissandras* from Perak.

18. Among Orchids some novelties have been flowered as well as a great number of better known kinds from various tropical countries. Of those collected locally

I think the most interesting was a plant of *Tainia Maingayü*, H. K. F. which though previously described from dried specimens had not been, so far as I am aware, in cultivation. It has a scape 2-3 ft. high with 10-14 flowers 5-6 inches across, of a reddish brown colour, and lasts in flower five weeks. This is said to have been collected by Maingay in Penang but I have got it only in Perak and there in only one locality. *Liparis venosa* Ridl. is another charming little plant that flowered in the garden.

19. During a short trip to Perak in August a great number of living plants and seeds were collected, as well as specimens for the herbarium and distribution. A report on this trip was furnished the Hon'ble Resident Councillor on my return, a copy of which is annexed (Appendix B),

20. A successful Flower Show was held in the Town Hall in February, the gardens being considered too far off for the convenience of exhibitors, followed by a Promenade Concert on the evening of the second day.

21. Plants and seeds have been exchanged to about the same extent as in previous years and there has been the usual amount of correspondence on horticultural, botanical, and planting matters. Rubber is the subject in which a good number are interested and to as many as I have had an opportunity I have recommended the Kew Bulletin of October last containing information up to date on Para Rubber. All interested in the subject should get it. Seeds of this tree are in great demand and any quantity could be disposed of here at a good price.

Government Hill Gardens.

22. The Governor's Hill Bungalow garden has been maintained in fairly good order but Mr. O'KEEFE, the Overseer in charge, reports that frequent changes among the Tamil Coolies and the irregular attendance, especially immediately after pay day, causes much trouble and inconvenience.

23. From January to June the Garden was at its best both as regards flowering plants and vegetables, of which a pretty regular supply has been kept up. From July to the end of November but little can be done with flowering annuals and only a very limited number of kinds of Vegetables can be grown, on account of the heavy rains.

24. At the Flower Show held in the Town Hall in February, a nice collection of Vegetables from this garden was exhibited, the Leeks and Beet being specially noticeable and somewhat of a surprise to most of the visitors.

25. Burmese and other Orchids planted on the trees have flowered freely. *Vanda Cœrulea*, which flowers during the rains, had on one of my visits in August over thirty flower spikes. Plants of *Azalea indica* obtained from Japan flowered well and deserve to be more extensively cultivated in the hill gardens.

26. Repairs to paths, rendered necessary by the heavy wash, is a constantly recurring demand on labour, and the slipping of banks during rains is by no means infrequent. Carrying water a long distance whenever there is a spell of dry weather is also a matter of great importance as regards labour. Taking these and other matters into consideration a larger staff is required, in proportion to the area of the grounds than in the Waterfall Garden.

Experimental Nursery.

27. During the past two years little has been done to the Experimental Nursery beyond keeping it clean. Two men only have been kept here and a portion of their time has been devoted to keeping clean the paths round the Convalescent Bungalow so that the actual expense is not much, but small as it is, it is scarcely worth keeping up.

28. It is conclusively proved, I think, that fruits &c. from temperate climes for which this Nursery was originally intended require greater elevation than is obtainable in Penang and the steepness of the site and nature of the soil render it unsuitable for the experimental cultivation of most kinds of plants.

29. A piece of level, or moderately level, land within easy distance of the Waterfall Garden for the introduction and trial of plants likely to be of commercial value would be a useful acquisition, but I know of no Crown Land available and the cost of purchase would be a considerable item. There is plenty of land within the limits of the present garden but it is all too steep for this purpose.

C. CURTIS,

Assistant Superintendent of Botanic Gardens.

APPENDIX A.

Revenue and Expenditure of the Botanic Gardens Department, Penang, 1898.

REVENUE.		EXPENDITURE.	
	\$ c.		\$ c.
Government Grant— Maintenance of Water- fall Garden, ...	4,500 00	Wages of Gardeners and Coolies,	3,304 24
		Tools and Material, ...	171 63
		Plant Tubs and Pots, ...	171 13
		Planks for Plant Cases &c., ...	89 98
		Attaps and Chicks, ...	40 98
		Plants, ...	34 73
		Manure and Cartage, ...	75 70
		Freight on Plants, ...	11 20
		Road Metal, ...	77 30
		Furniture for Office, ...	37 00
		Do. Herbarium, ...	77 30
		Iron for re-roofing Fernery, ...	249 62
		Periodicals and Book Binding, ...	48 00
		Miscellaneous Petty Expenses,	109 69
		Balance, ...	4,498 50 1 50
	4,500 00		
Government Grant— Upkeep of Grounds of Governor's Hill Bungalow,	1,000 00	Wages of Gardeners and Coolies,	696 60
		Manure, ...	150 30
		Plants and Seeds, ...	49 29
		Pots and Tubs, ...	34 30
		Tools, ...	61 74
		Attaps, ...	7 40
Balance, ...	999 63 37		
	1,000 00		
Government Grant— Expenses of carrying out Provisions of Coco-nut Trees Preservation Or- dinance, ...	700 00	Salaries, ...	552 00
		Inspectors Transport Allowance,	120 00
		Petty Expenses, ...	2 12
Balance, ...	674 12 25 88		
	700 00		
Maintenance of Experi- mental Nursery, ...	200 00	Wages, ...	161 50
		Plants and Seeds, ...	20 46
		Tools, ...	17 31
Balance, ...	199 27 73		
	200 00		
Travelling and Per- sonal Allowances, ...	330 00	Pony Allowance, ...	240 00
		Expenses of Botanical Tour, ...	88 75
		Balance, ...	328 75 1 25
	330 00		
Plant Sales, ...	695 40		
Bath Receipts, ...	50 10		
Total, ...	745 50		

C. CURTIS,

Assistant Superintendent of Botanic Gardens.

APPENDIX B.

Notes on a Botanical Tour in Perak by the Assistant Superintendent of Forests, Penang.

Leaving Penang at 6 P.M., on the 29th July, I arrived at Teluk Anson the following morning at 8 A.M., just 5 minutes too late to catch the train for Ipoh where I proposed making my base for a few days.

As the next suitable train did not leave until 2.25 I drove out with Mr. L. HAWKINS to see the Coffee and Rubber plantation under his charge. The Coffee looks well although there had been an unusually long drought at the time of my visit. Given suitable soil the success of this cultivation in Perak is assured, but the present low price must be a great disappointment to those who invested heavily two or three years ago.

Para Rubber, with which a commencement has been made, and for which the soil appears to be adapted, look well, but a new enemy, supposed to be Mouse Deer, has taken a fancy to this tree and eats the tops off. All the plants so eaten sprout again still the check is considerable and if constantly repeated must eventually kill them. This is a factor that has not hitherto been taken into account in connection with this tree and shows that it will be necessary to keep the "lalang" and jungle growth clear, so that there be no harbour for these animals, until the tops of the trees are high enough to be out of their reach, or else to fence in the area to be planted.

The journey by train from Teluk Anson to Ipoh occupies about three hours and can hardly be called pleasant during the hottest part of the day. At Ipoh I took up my residence in the Rest House and the following morning started out to explore the neighbouring limestone or marble Hills. Quite close to the railway a Singapore Company have commenced quarrying marble and three Italians I was told, have been recently imported from Europe for this work. Many interesting plants were collected during the morning but the most interesting thing to me was the finding of several trees of "Gutta Rambong" (*Ficus Elastica*) in a truly wild state. Every one interested in the subject knows that "Gutta Rambong" is collected by Sakhis and brought in for sale, and the tree has long been recorded in botanical books as a native of Perak but curiously enough neither Mr. RIDLEY nor myself had ever collected this tree in the Peninsula. All that I had seen hitherto had undoubtedly been planted but these trees were growing high up on the rocks and had sent their aerial roots down the face of the cliffs.

Every tree I saw had been tapped, and in some cases tapped to death. I obtained leaf specimens only as none of the trees were in fruit. Another interesting plant from a botanical point of view, very abundant here, is *Lowia*, a genus named after Sir HUGH LOW, a former resident of Perak and a keen botanist.

On the 1st August I spent the morning in visiting some private gardens in Ipoh but gardening is not greatly to the fore in this town. Shade trees are badly wanted all over the place for walking or driving on those intensely white and hot roads during the heat of the day is killing. A half-hearted attempt at planting has been made in places but the fencing has not been sufficient to protect the trees from the ravages of goats &c. By the 9 A.M. train I went to Batu Gajah in hopes of seeing the District Magistrate and obtaining from him information as to getting men for going up Gunong Bujong Malacca &c., but being a public holiday he had gone to Ipoh. I took the liberty of inspecting his plant house and its contents, especially the plants brought down from Bujong Malacca. The European residences at Batu Gajah are beautifully situated commanding a fine view of the surrounding country.

In the hospital grounds I noticed the largest tree of *Jacaranda mimosifolia* I have yet seen. No doubt it is the same age as the oldest of those planted in Penang but it is much larger than any here. All the trees of this kind in this part of the world are I believe from seeds or plants distributed from the Penang Gardens and the oldest cannot be more than twelve years planted. There is also in the same grounds a fine clump of Palms and a Kayu Rue (*Casuarina*) that look somewhat different to typical *Casuarina esquisetifolia* of which I obtained seeds. On the 2nd August took the morning train at 6.40 to Sungei Siput and called first to see Mr. FORREST who is opening out land for Coffee, Coco-nuts &c. not far from the Station. However he had gone out and the boy said would not be back until the evening, so I retraced my steps through the village and proceeded along the Kuala Kangsar road so far as Kamuning Estate, though I did not at the time know what Estate it was. This seemed to be a favourable place for collecting so I worked around the edge of the clearing collecting living plants for cultivation and specimens for the herbarium

until it was time to return to Sungei Siput to catch the train for Ipoh. The Coffee on this Estate is the finest I have yet seen. Para Rubber planted alongside the road through the Estate do not appear to grow so well as they do in damper soil.

On the 3rd August I went out to some hills about three miles from Ipoh on the Gopeng road to the only habitat I know of *Habenaria Kingii*, an interesting orchid with greenish flowers. Of this I succeeded in getting some thirty plants and a few other things of interest. It is a difficult spot to work as all the rocks are surrounded by swamp. Since I last went along this road a good deal of Coffee has been planted and other smaller cultivations have increased considerably. Before going out in the morning I visited Mr. BARNARD who kindly presented two or three interesting plants for the gardens.

At 5.30 on the morning of the 4th I left Ipoh for Melimbau, a village near the foot of Gunong Kledang. In a rikisha it took half-an-hour to reach so that I was able to start collecting up the hill while it was still cool. There is a good road up the Kledang and a Government Bungalow near the top. The distance from the foot is four and a half miles. Going slowly and dipping into the jungle here and there it was near noon when we got to the top. The lower slopes of this hill have been cleared of all big trees for fire-wood or Charcoal and I noticed several wood-cutters at work. About half way up there occurs, and more or less from there to near the top, a magnificent Palm with a stem six or seven feet high and immense paddle-shaped leaves which the Malays call "Daun Sang". I spent a lot of time in hunting for seeds of this but without success.

We dug up a few young plants, but Palms are always difficult to transplant and I do not expect to save more than one or two. "Daun Sang" occurs I am told all through this range, I saw some leaves used for the side of a native house at Sungei Siput, and if any one in the locality can send ripe seeds it will be a most acceptable contribution to the Penang Gardens. Near the top there grows a very pretty Indian Primrose (*Didymocarpus*) with orange flowers quite new to me and I believe undescribed. Palms of many kinds are a marked feature of the vegetation on this hill, "Rotans" and "Bertam" being very abundant.

On the 5th I packed all plants collected during the previous five days and forwarded them to Penang, and on the following day left for Kuala Depang. Kuala Depang is not the pleasant place it once was. This, the most charmingly situated of Rest Houses, has been turned into a Police Station.

There are, however, two rooms used by Government Officers when on duty, one of which I occupied for two nights before going up Bujong Malacca. It is a pity that this house should be occupied by the Police, for Government Officers, unless they are more fortunate or sounder sleepers than myself, cannot get much rest when in this place.

On Monday at 8 A.M., I left Kuala Depang with four Malays engaged on the spot, and my own man and boy from Penang, to ascend Gunong Bujong Malacca. The Malays were a very poor sample but as my time was limited I took the first that offered. We went on climbing slowly until about 11 A.M., when we came to a Chinese Kongs-house at a place called "Kadongdong." Here the men decided it was time to stop and cook their rice and as the spot looked like a promising collecting ground I raised no objection but poked about among the boulders for an hour while they got "makan." Their style of hill-climbing suited me all right but would have been a frightful nuisance to anyone whose object was simply to reach the top.

After leaving this Kongs-house, in which there are five men, at only a few minutes' walk distant there are two ways up to Ulu Palas, the one to the left being longer but not so steep. This we decided to take in going up and to return by the other. I was very pleased afterwards that the men told me of this longer route as it proved more interesting botanically than the other.

At about 3.30 (watch stopped) we arrived at another Kongs-house in a large valley which the Chinese call "Amokong" and the Malays "Ulu Palas." The Palm "Palas" (*Licuala spinosa*) from which the stream takes its name, is very abundant along all the ridges of this mountain. In this mining Kongs-house in which there are six men, but had apparently at one time been many more, we decided to spend the night and go to the top in the morning. After a brief rest I started out to examine and collect plants in the neighbourhood but the Malays were all asleep inside of ten minutes, and as they were at the other end of the house I saw nothing more of them until the next morning. Washing for tin has been going on in these streams for years and it is a bit difficult at this point to make out just exactly where the original water-courses came in, but so far as I could see there are at least three different streams which join at this spot.

Grubbing for tin has capsized trees in all directions so that it is easy to get to examine the orchids and various other plants growing on them. There had been no rain for some time previous to my visit and many of the smaller things such as filmy ferns both on rocks and trees were quite shrivelled up. Many larger plants of a succulent nature were hanging limp and languishing for rain. They got it before I left. During the night I thought the matter over and came to the conclusion that if I took my bedding, provisions, &c. to the top and slept there it would take the kind of men I had a long time to get up, and I should get but few plants carried. Consequently I decided to leave my boy with all the things at the Kongs-house, take all the men out with me to carry plants and return at night.

From this point none of the men knew the path to the top, but they knew that higher up the stream, there was one more Kongs which if we could find some information could be obtained so we kept to the stream until we struck it. Here some of the men spoke Malay and one came with us to show the path until a point was reached, after which there could be no mistake.

There is a pretty stiff bit before getting on to the last ridge but the whole distance from Kuala Depang to the top could be done in a day by one in pretty good training and desirous of doing the thing quickly. The height I was told is 4,090 feet but judging from the vegetation I should have thought it more. The hut on the top is in excellent order and water is obtainable at a much less distance from the top than I expected. We remained on the top for about an hour, admiring the view and refreshing the inner man, after which we commenced to retrace our steps and collect things spotted on the way up.

Up to this time I had not seen a spot of rain since leaving Penang but during the night it came on heavy and as the Kongs-house leaked like a sieve, things were a bit uncomfortable. On the way down we got another thorough soaking so that by this time the vegetation will be looking much better than when I was up. Altogether it is a most interesting mountain. On the top there are a great number of the fir tree that grows on Government Hill "Kayu Rue Bukit" (*Dacrydium elatum*) but they are smaller and more stunted. Most of the Orchids have rather insignificant or dull coloured flowers but they are very abundant. Some of the ground Orchids are of great interest. Two kinds of Rhododendrons, a pitcher plant, and scores of other things of great interest were noticed and collected. All the way up Palms abound, but the animals, monkeys I think, manage to get all the seeds before they are quite ripe. On the rocks are an abundance of Ferns, Begonias, Indian primroses and other small-growing plants in great variety. Having a day to spare after coming down, I tried Bujong Malacca again from the Kuala Depang Valley side. It is much steeper than the usual path to the top and I did not find anything strikingly different to what I had already collected the previous days. On the morning of the 12th I went out to some rocks near Kuala Depang to get a Begonia and one or two other things noted previously and later in the day went on to Kampar, where I remained the night in the Rest House.

Arrived in Penang on the morning of the 14th.

C. CURTIS.

STRAITS SETTLEMENTS

REPORTS

ON

FOREST RESERVES

SINGAPORE, PENANG AND MALACCA

FOR THE YEAR

1898

PUBLISHED BY AUTHORITY



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1899

REPORT ON THE FOREST RESERVES, SINGAPORE,
FOR THE YEAR 1898.

1. There is little or no material for a report on the condition of the Forest Reserves in Singapore in 1898.

2. In former years there has been a certain amount of Revenue derived directly from them, chiefly from Bakau passes and permits for wood of other kinds, but the issue of these having, for the better protection of the Reserves, been stopped, there is now no revenue obtained from them.

3. Since these Reserves passed from the control of the Gardens Department into that of the Land Office, no money has been voted for their improvement, with I believe the natural result that any improvement which may have taken place in them has been simply due to natural growth and time. When under the Gardens Department, various experiments were tried in them, such as the planting of Para rubber in Sembawang, and of *jambu hutan* and other similar trees along some of the Reserve paths. Comprising as they now do large areas of la'ang and small valueless brushwood, it is a matter for regret that it is not thought advisable to try whether good could not be done by a small expenditure on planting of trees of some value as timber and on thinning the brushwood where there is a natural growth of some of the less worthless trees. There would, however, for many years be no perceptible difference in the Reserves and for many more years no return at all for the expenditure, while the consensus of opinion as to the extreme poorness of Singapore soil leaves it open to suggest that timber of commercial value might never be produced on it.

4. The total expenditure on the Reserves has amounted during the year in question to \$1,158.50 incurred merely in payment of the salaries, etc. of the Corporals and Forest Guards detailed to protect them as far as possible from encroachment and fire. Item by item* this amount was spent on 1 Corporal at \$9 a month, 2 Lance Corporals at \$8 each a month, and 7 Forest Guards at \$7 each a month. The salaries of these men are small and their chance of increases of pay no larger, while the temptation to look with a blind eye on illicit wood-cutting must be great, if any substantial (to them) douceur is offered by the offenders. I am of opinion that these men should at least be put with regard to periodic increments on the same footing as various other members of the subordinate staff, (peons, etc.) who have neither the same opportunities for, nor temptations to, dishonesty. I do not suggest that there has been a custom of yielding to temptation, but I am certain that only through very great vigilance on the part of the Collector and Forest Rangers and a combination of bad luck and recklessness on the part of the Guards could there be detection of connivance in illicit cutting on Coast reserves such as part of Kranji, Morai, and Tuas, etc.

5. The acreage reserved in the three Divisions of the island amounted to 1,241 acres, 1 rood, 24 poles, but this is not an exact figure, the area of part of the Seletar Reserve not being accurately known as yet. More than two-thirds of this were under the direct supervision of Forest Ranger NONIS, while the remaining third was divided between Forest Rangers RAPPA and RODRIGUES. The Forest Guards, as before, made report to them and they passed on their reports to the Collector—a somewhat round about system which has now been changed for the Malacca one of monthly written reports presented to the Collector of Land Revenue by the Guards themselves, but the same supervision by the Forest Rangers continues. I append the tabulated statements of the Forest Rangers named, showing in detail the condition of the Reserves in their charge (A B C).

6. Fires took place in the Jurong and Chan Chu Kang Reserves, but no convictions could be obtained. It will always (except in cases where incendiaries are caught

* Salaries ...	\$888.00
Rice Allowance ...	120.00
Uniforms, &c. ...	75.50
New Boat ...	75.00
	\$1,158.50

in the act) be hard to ascertain the origin of these Fires, but they are variously attributed to the negligence of road coolies or ordinary foot passengers (who smoke and drop matches, etc. about), to the desire of local shikaries and cattle-owners to provide food (fresh lalang sprouts and young grass) for the animals in which they are interested, and to the carelessness of coolies engaged in burning jungle or refuse with the wind blowing (and taking sparks with it) direct towards the Reserves.

7. The Collector himself paid 21 visits to the reserves during the year. The paths were in good order and no traces of illicit cutting were observed.

8. In the earlier paragraphs of this report I wrote somewhat disparagingly of the value of these Reserves. They will however eventually—when the Singapore-Kranji Railway is built—save Government from expending in the purchase of wood fuel very considerable sums. The large expanses of Bakau at Kranji, Morai, Tuas, Pandan and Seletar should, if the unreserved Bakau fails, prove with judicious management practically inexhaustible.

9. I did not take charge of the Land Office, Singapore, till the last day of 1898, and it is therefore with some diffidence that I sign this report dealing with the condition of the Reserves in a year when I had so little official connection with them.

W. L. CARTER,
Acting Collector of Land Revenue.

LAND OFFICE,
Singapore, 22nd August, 1899.

A.—Western Division.

No.	Reserve.	Area.	Nature of Jungle.	No. of Inspections made by Forest Ranger during the year 1898.	
1 †	Bukit Timah Forest Reserve ...	<i>a. r. p.</i> 847 0 00	Mostly big jungle	10 inspections	Total area: 3,584 <i>a.</i> 1 <i>r.</i> 35 <i>p.</i> Three men in charge—Quarters behind Bukit Timah Police Station. One Sampan in order and sails complete. Kept at Kampong Ayer Terjun. Total area; 4906 <i>a.</i> 3 <i>r.</i> 11 <i>p.</i> Three men in charge. Quarters at 14th M. P. Kranji Road. One Sampan in order and sails complete. Kept behind Forest quarters Kranji (river).
2 *	Jurong Forest Reserve	412 0 16	Little jungle mostly swamp & lalang	22	
3	Pandan do. ...	2,140 3 06	Do. ...	20	
4	Ulu Pandan do. ...	4 3 09	Jungle on hill top	4	
5	Bukit Panjang Forest Reserve ...	117 2 16	All lalang and swamp with very little jungle	4	
6	10th mile post Bukit Timah Road (do).	13 0 28	Jungle on hill top	5	
7	Chan Chu Kang Forest Reserve ...	49 0 00	Swampy jungle	11	
8	Toas Forest Reserve	1,601 3 32	Bakau, jungle and lalang	8	
9	S. Morai do. ...	314 1 05	Do. ...	4	
10	S. Buloh do. ...	770 2 16	Do. ...	1	
11	Kranji do. ...	756 0 32	Do. ...	20	
12	Sembawang do. ...	1,046 3 38	Jungle & lalang	8	
13	Mandai do. ...	407 0 32	Do. ...	8	
14	13th mile post Kranji Road (do).	9 2 16	Do. ...	20	
		8,491 1 06	Total, ...	145 inspections	

† Three arrests were made during this year for wood-cutting at Bukit Timah Forest Reserve. Total fines \$24.

* There was only one case of fire during the year 1898 and this was at Jurong Forest Reserve where 5 acres of lalang land were destroyed.

B.—Eastern Division.

No.	Reserve.	Nature of Jungle.	Area.	No. of Inspections made by Forest Ranger during the year 1898.	No. of Bakau licences issued during the year 1898.	No. of licences issued for other wood during the year 1898.	No. of Arrests made during the year 1898.
1	Changi Reserve ...	Big jungle, Bakau, Brushwood, and Lalang ...	a. r. p. 1,393 0 00	27	...	...	...

Remarks.—Forest Station on the 12th mile Changi Road.
Two men in charge.
One boat for inspection of rivers and mangrove swamps.
There was no case of fire during the year.

e

C.—Northern Division.

No.	Reserve.	Nature of Jungle.	Area.	No. of Inspections made during the year 1898.	No. of Arrests made during the year 1898.	Remarks.
1	Seletar Reserve	Jungle, lalang and bakau ...	a. r. p. 1,492 1 08	11	...	} Two men in charge. Quarters at 8½ mile post, Thompson Road. A boat is kept at Sungei Seletar.
2	Chan Chu Kang Reserve ...	Jungle and lalang ...	813 3 08	7	...	
3	Ang Mo Kio Reserve	Jungle and lalang ...	296 0 02	8	...	
4	Sempang Reserve ...	Jungle ...	5 0 00	5	...	
		Total ...	2,607 0 18	31	...	

There was a fire in August in the Chan Chu Kang Reserve where 30 acres of lalang and brushwood were burnt. The cause of this fire was discovered and one SOH KAH was summoned for mischief by fire. Case was dismissed owing to insufficient evidence from witness. The extension of Seletar Reserve was surveyed but not calculated. Acreage not known.

REPORTS ON THE FOREST RESERVES IN THE SETTLEMENT OF
PENANG, FOR THE YEAR 1898.

North-East District, Penang.

STATEMENT OF AREAS.¹⁾

				<i>a.</i>	<i>r.</i>	<i>p.</i>
D. Government Hill,	Lot 34 ¹	Mukim 15	}	5,185	0	32
"	" 134	" 17				
E. Highlands,	" 1	" 16		252	2	36
F. Penara Bukit,	" 32	" 14		233	2	31
I. Part of Relau Hills, 60' and 60"		" 13		18	3	32

[Relau Reserve was proclaimed by Government Notification No. 249 of 1899.]

1. Two Forest Guards, and two coolies have been employed throughout the year in clearing the boundaries and looking out for illicit timber cutting and encroachments.

2. The boundary of the whole of the Penara Bukit block was re-opened early in the year. This was, in parts, a work of considerable difficulty as some pieces of the line had totally disappeared.

3. The boundary from Penara Bukit down to Batu Feringgi has also been re-opened. This line had also disappeared in parts, and had to be re-opened by a Surveyor. Much of this work was very slow and laborious, the boundary being often lost in a dense growth of fern which it was no easy matter to remove. I am told that the boundary which runs up the valley under the Western Hill, below the coffee plantation, had never been cleared since it was originally laid.

4. The boundary from Batu Feringgi to Tanjong Bunga is not yet altogether cleared, but will be finished during the month. From Tanjong Bunga to the Hill Road, below the Half-Way House, the line required very little clearing. From the Half-Way House to Penara Bukit, the boundary has been cleared when necessary during the year, and is now completely open.

5. The boundary of the highlands reserve required no clearing.

6. During some months of the year very little work could be done, owing to bad weather, and to the coolies suffering from fever. The men were also much hampered by the distance of their quarters at Penara Bukit from their work; but I have now obtained permission to build a hut near Batu Feringgi where the men can in future sleep while working in the neighbourhood. Another small house should be built near the road below the Half-Way House for the same purpose. There used to be a Forest Guard's house near the coolie-lines at the Half-Way House, but the proximity of the coolies rendered the place uninhabitable, and it has long been abandoned.

7. There were 15 cases, mostly trifling, of wood-cutting in the Reserves, in 13 of which the offenders were convicted and fined. There were no encroachments.

8. The attached Table will show the expenditure on the Reserves in the North-East District.

9. The Revenue is of course nil, as all cutting is now absolutely prohibited, and there have been no planting operations.

10. I inspected the different parts of the boundaries on the following dates, besides paying numerous visits to other parts of the Reserves:—

Penara Bukit Reserve.

Upper Half, March 19th, June 18th and 24th.
Lower Half, October 25th.

Government Hill Reserve.

From Penara Bukit to Half-Way House. November 3rd and 15th.
Half-Way House to Tanjong Bunga. December 6th.
Tanjong Bunga to Batu Feringgi. December 2nd and 16th.
Batu Feringgi to Western Hill. November 20th.
Western Hill to Batu Itam. November 19th.
Batu Itam to Penara Bukit. December 30th.
Highlands Reserve boundary. May 13th.

11. A new Reserve on the tops of the Relau Hills has been created during the year. The boundaries of this block have not been opened yet, as the vote would not have stood the extra expense last year, but they will be taken in hand as soon as possible.

G. A. HALL,
Acting Collector of Land Revenue.

Expenditure on Forest Reserves, during 1898.

Salaries of Forest Guards,	\$192.00
Maintenance of Forest Reserves, (includes wages of 2 coolies, purchase of tools &c.),	196.54
Total, ...	<u>\$388.54</u>

South-West District, Penang.

STATEMENT OF AREAS.

				<i>a.</i>	<i>r.</i>	<i>p.</i>
A.	Pantai Acheh, Lot	132	...	3,208	0	08
B.	Telok Bahang, "	174	...	465	2	30
C.	" "	181	...	380	1	36
G.	Genting Hill, "	247	...	21	2	14
H.	{ Passer Panjang Hill, 27 } { Bukit Gemuruh, 190 }		...	201	2	04

SIR,—I have the honour to report as follows on the Forest Reserves of this District, and the "Forest operations" carried on in 1898.

2. During the year under review, the number of Reserves has been increased by the establishment of a new one on Balik Pulau Hills, as recommended in Land ⁹⁵⁰/₉₈. As directed in that paper, Mr. RIDLEY, the Director of Botanical Gardens, visited this tract of jungle with me on 29th June, 1898, and, his report being favourable, steps have since been taken to reserve the land in question. It will, however, I think, require re-survey and re-demarcation, as my Forest Staff are unable to find the correct boundary between this District and Mukim Paya Terubong in North-West District. I think also that it would be as well to publish a notice in the *Gov-*

ernment Gazette proclaiming this area reserved. The path round this new Reserve has not yet been cleared, partly because the Forest Staff have been too busily engaged in clearing the other paths, and partly owing to the fact that the correct boundary is not yet clearly defined. I have visited the Reserve at various points on 29th June, 1898, (with Mr. RIDLEY,) and again on 17th September, 1898, 23rd September, 1898, and 17th November, 1898. I have found no recent traces of timber-cutting therein. The Hill in question is, in fact, so close to the village of Balik Pulau that I do not anticipate that there will be any great difficulty in guarding against trespass in this Reserve, since wood-stealers will hardly dare to carry on their operations practically within sound of the District Office, and in momentary danger of being discovered.

3. The other Reserves have been patrolled regularly by the Staff during the year and, by myself, on the dates given below:—

Forest Reserve *A*, Pantai Acheh.—On 26th June, 1898, 8th July, 1898, and 10th December, 1898.

Forest Reserve *B*, Bukit Laksamana.—On 23rd January, 1898, with the Hon'ble Resident Councillor, and on 17th February, 1898, 7th October, 1898, and 19th November, 1898.

Forest Reserve *C*, Telok Bahang.—On 25th June, 1898.

Forest Reserve *G*, Ginting Hills.—On 11th February, 1898, 3rd November, 1898, and 3rd December, 1898.

Forest Reserve *H*, Pasir Panjang and Bukit Gemuruh.—On 8th May, 1898, 10th June, 1898, 26th July, 1898, 11th September, 1898, 3rd November, 1898, and 3rd December, 1898.

4. The work of clearing the paths has been going on continuously throughout the year, but I have been unable to get right round the Pantai Acheh Reserve, about $1\frac{1}{2}$ miles of path on the South-East being unpassable until late in December, when I had no time to visit the Reserve. This was not in any way the fault of the Forest Guards. They cleared the whole path during the year, but as they began on the South, that portion grew up again during the year and had to be re-opened. I have, however, visited the Reserve in question at various points in the neighbourhood of Pantai Acheh Village Site, when there is the greatest risk of trespass, and am glad to say that there are far fewer traces of wood-stealing than in former years. The apparently regularly used paths leading into this Reserve which I mentioned in my report for 1897 have been blocked, and none of the fences put up have been removed. It would seem therefore that the Chinamen of this village site are beginning to realize the fact that the Reserve in question is to be kept inviolate and that any trespass upon it will be severely punished. They have in consequence confined their attentions to the Crown Land in the neighbourhood. As this Reserve is the most important one in the District, I have had it more closely watched than the others whose comparatively inaccessible positions preclude any extensive wood-stealing from them, and the result has been on the whole satisfactory.

5. I attach a list of the number of cases of illicit timber cutting in the Reserves brought before me during the year. There were only six cases, and though I would not say that no other theft of wood has taken place in the Reserves, I think that this list accounts for the majority of the cases of trespass during the year. At any rate, in my visits to each Reserve, I have been able to discover no further traces of the removal of timber, and I have been round all the boundaries with the exception of a small strip of path on the boundary of Forest Reserve *A*.

6. The remarkable increase also in the number of passes taken out for cutting wood in Crown Land goes far, I think, to shew that less timber has been removed illegitimately. The sum recovered under this head in 1898 was \$906.03, as compared with \$563.62 in 1896, and \$594.45 in 1897. I know of no reason for the use of more wood during 1898 by the people of this District, and I think, therefore, that some of the increase represents the value of wood which would have been stolen under other circumstances. The Forest Ranger and his Staff have worked very well throughout the year and as they have been continually visiting the various Reserves, they have made extensive wood-stealing unsafe if not impossible.

7. The work of clearing the boundaries has been an arduous one for the Staff, the rapid overgrowth having necessitated a second clearing of the majority of the paths at the end of the year, and it is unfortunate that their other work renders it impossible for the Forest Guards to do more actual guarding. There are in this District two Forest Guards, and two coolies engaged in clearing. They are all permanently stationed as before in Telok Bahang, the more important Reserves in this District being situated in the North-West of the island. They pay occasional sur-

prise visits to the Reserves in the South of the island, but are engaged most of their time in the neighbourhood of Telok Bahang. The greater part of the remaining Crown Land lies in this direction, and the time of one of the Forest Guards is almost entirely occupied in inspecting passes for wood-cutting on Crown Land and in examining the wood cut, to make sure that it is not in excess of that provided for in the pass. I fear that the new Reserve on Balik Pulau Hills will still further occupy their time in clearing, and that they will thus have less leisure than before for what is their proper duty, *i.e.*, patrolling and guarding the Reserves. If more coolies could be engaged for the necessary work of clearing the paths, the Forest Guards would be able to devote themselves exclusively to patrolling the Reserves. Unfortunately, however, there is no money available for the engagement of other coolies, and the Forest Guards have to do both duties as best they can. I think that at least one extra coolie should be employed for clearing the Forest Reserve boundaries in 1899.

M. S. H. McARTHUR,
Acting District Officer.

Cases of Illicit Timber-cutting in Forest Reserves.

Case No.	Name.	Forest Reserve.	Conviction.	Remarks.
D. C. 38/98.	{ 1. Secunder ... 2. Jamsah ... }	C.	Imprisonment.	{ 1. 4 months' R. I. 2. 3 weeks' R. I.
" 40/98.	{ 1. Peechay ... 2. Towsby ... }	A.	...	Cautioned & discharged. [ed.]
" 173/98.	{ 1. Tin Ah Ngi ... 2. Leong Ah Ham ... }	H.	Fine.	Fined \$5 each.
" 187/98.	Loh Ah Ngim ...	H.	Fine.	\$50 fined.
S. C. 72.	Lim Aw Foon ...	H.	Fine.	\$25 and cost.
S. C. 104.	Low Ah Yin ...	H.	Fine.	\$50 and cost.

Northern District, P. W.

1. There are two Forest Reserves in this District, one at Tassek Glugor and the other at Ara Kuda, the former is 3,055 acres in extent, and the latter 562 acres.

2. I took over the duties of Senior District Officer only at the end of November, so that I have not had time except just to visit them, but the Forest Ranger has visited them on an average about once a week, and there is one Forest Guard who lives close at hand and looks after both of them.

3. Two lalang fires took place in Tassek Glugor Reserve during the year but no timber was burnt. The fires are supposed to have originated by passers along the road by the Reserve carelessly throwing away matches, but no one was caught. No fire took place in the Ara Kuda Reserve.

4. There are very few valuable timber trees in the Reserves and no planting has been attempted. * * * * *

6. There were no prosecutions during the year for illicit timber cutting or other offences in the Reserves.

W. C. MICHELL,
Senior District Officer.

Central District, P. W.

1. The Forest Reserves in the Central District as notified in the *Government Gazette* of 5th June, 1896, are five in number, viz. :—

	<i>a.</i>	<i>r.</i>	<i>p.</i>
1. Bukit Seraya, Lots 679 and 680, Mukim XVII ...	112	0	04
2. Bukit Mertajam, Lot 815, Mukim XVII ...	162	2	01
3. Juru Hill, Lots 542 and 454, Mukim XII ...	525	0	10
4. Bukit Gajah Mati, Lot 637, Mukim XVI ...	6	1	16
" " 638 " " ...	5	1	00
" " 654 " " ...	70	2	37
5. Kubang Ulu Experimental Gardens, Lot 394 ¹¹ , Mukim XX ...	3	2	03

To these has since been added—

6. Bukit Goa Ipoh, Lot 410, Mukim XX ...	341	0	02
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2. The Reserves were visited by the Forest Ranger and Assistant Forest Ranger, forty times during the year. I visited the Bukit Mertajam, Juru, and Bukit Seraya Reserves three times each, and Gajah Mati once. The Experimental Gardens at Kubang Ulu (a small plot of land by the road side) and the Goa Ipoh Reserve were visited at frequent intervals both by myself and the Forest Rangers.

3. In six cases, prosecutions were instituted for unlawful cutting of timber, chiefly in the Juru Reserve. Only two of these cases were of any importance. In one of them a Chinese Towkay of Bukit Tambun had taken out a timber pass to cut wood on unreserved land and had begun operations in an out of the way part of the Juru Reserve. He was convicted and fined the maximum penalty of \$100.

4. Juru Reserve is the only one in which there is any danger of illicit timber cutting. It is much larger than the others and there is more valuable timber in it. It is, moreover, possible to cut and remove timber from it without much difficulty. The other Reserves being for the most part merely the crowns of steep hills whose lower slopes are fully cultivated, it is impossible to cut timber in them without immediate detection, or to remove the timber when cut without great difficulty.

5. In the early part of the year, before the minute of His Honour the Officer Administering the Government forbidding all timber passes in the Forest Reserves was received, three passes for timber in the Juru Reserve were issued to the Public Works Department in connection with the building of the Bukit Minyak Bridge. No other passes have been issued since.

6. The boundaries of the Reserve have been fairly kept clean by the owners of the adjacent lands.

7. The Experimental Gardens at Kubang Ulu were visited also by Mr. CURTIS of the Penang Gardens. There are many trees of mahogany growing there, with some teak, rubber and eucalyptus trees. The planting is much too close and the trees, which have now attained a fair size, are likely to be choked for want of breathing space. As it stands, and unless some use is to be made of the young trees, the Reserve is merely ornamental.

8. Bukit Goa Ipoh Reserve includes a large extent of waste land at the foot of the hill, at present covered with lalang. Frequent fires during the dry season help the growth of the lalang by preventing forest trees from taking root and growing. I received many applications for land in this Reserve, all of which had to be refused. The utility of reserving this land is rather doubtful.

F. J. HALLIFAX,
District Officer.

Southern District, P. W.

STATEMENT OF AREAS.

Bukit Panchor ...	<i>a.</i>
	1,500

SIR,—I have the honour to report on the Forest Reserve in the Southern District in 1898.

1. The Forest Reserve has remained untouched during 1898. No cases of timber cutting have been discovered.

* * * * *

3. The Reserve has been watched throughout the year by a Forest Guard. It has been visited regularly by the Forest Ranger.

4. The District Officer paid two visits to the Reserve during the year.

5. No fires occurred during 1898.

6. No planting operations were undertaken.

7. No applications for timber were received.

R. J. FARRER,
District Officer.

The Dindings.

STATEMENT OF AREAS.

	<i>a.</i>
1. Lumut	900
2. Pangkor	1,250
3. Tanjong Hantu	400
4. Gunong Tunggai	700
5. { Bukit Segari	1,600
{ Telok Sera	
6. Tanjong Burong	450

The Reserves have been regularly patrolled and the boundaries periodically cleared during the year.

No fires occurred and no cases of timber cutting or theft of jungle produce in the reserved areas were reported.

The head-quarters of the Forest Guards have remained as in 1897, viz., at Lumut (2), for watching the Lumut, Pangkor and Tanjong Hantu Reserves; at Bruas (3), for Tanjong Burong, Telok Sera and Segari; and at Beting Luas (2), for Gunong Tunggai.

The present Staff of Guards may be considered adequate for supervising the actual Reserves and preventing the felling of timber and the theft—except on a very petty scale—of Jungle produce; but it is certainly insufficient to check effectually the constant pilfering of small timber, rotans, getah, etc., which goes on in Crown Jungles other than the Reserves in all parts of the Territory. The care of the Reserves alone more than occupies the whole time of the Forest Guards, and the net result of their efforts during the past 12 months was 47 arrests, a figure which probably does not represent more than 5% of the actual number of offences committed. In my opinion, the present strength of the Forest Staff should be doubled, and Stations established at Pangkor, Tanjong Hantu, Segari and Sungei Rotan. A Station at Sungei Rotan is absolutely necessary if that district is to be properly looked after; to reach it, the Guards must, under existing conditions, walk $7\frac{1}{2}$ miles from their nearest head-quarters at Pangkalan Bharu, and must cover the same distance again on their return in the evening; they can hardly be expected to execute any very energetic patrol under the circumstances. The place, which is traversed by the trunk-road from Taiping to Chendrong Klubi, offers perhaps greater facilities than any other portion of the Territory for the illicit removal of timber, etc., into Perak. The small sum, however, which it was requested should be inserted for this purpose in the current estimates was disallowed, as was also the suggestion that a small vote (\$50 was named) should be allotted annually for the maintenance of Forest Reserves. At present there is not a single dollar available with which to meet any incidental expenditure connected with Forest work here, *e. g.*, the salvaging of timber which has been felled, but abandoned in the Jungle, and which, if brought to Lumut or Bruas and sold by auction, would more than repay the expense involved in its transport. It should also be mentioned that the Guards, although one of their chief duties is to keep the Reserve boundaries clear of undergrowth, are not even provided with “parangs” for the purpose.

Another point to which I would call attention is the necessity of providing the Guards with uniforms, as is done in Perak; hitherto they have not been supplied even with a badge to denote their authority, and small blame could be attached to any

individual who, under the circumstances, might decline to recognize it. In view of the fact that nearly 70 per cent. of the total revenue of the Dindings (apart from licences) is derived from its forests, it seems neither politic nor reasonable to stint the Department in such matters as these which, though they call for a most moderate outlay, are yet indispensable to the proper organization of forest conservancy.

The timber revenue here has more than trebled during the last four years, the figures being as follows:—

1895	...	...	...	...	\$3,990.26
1896	...	...	...	...	7,179.50
1897	...	...	...	...	9,824.67
1898	...	...	...	...	15,075.83

The Tanjong Burong Firewood Farm, which had been closed in 1897 in consequence of the Farmer persisting in cutting down trees of a diameter less than that permitted by his Agreement, was re-let early in the year to a new holder under much stricter conditions than before. Under the previous contract, the rent was \$60 per month and the Farmer might employ 100 coolies; the present contract fixes the monthly rent at \$80 and reduces the number of coolies to 60, the minimum diameter of the trees which it is now permitted to cut is 8 inches.

The contract expires at the end of 1899, and I understand that it is not the intention of Government to renew it.

In accordance with instructions issued last year, the dates on which the several Reserves were personally inspected by me are attached, *viz.*:—

<i>Lumut.</i>	<i>Pangkor.</i>	<i>Tanjong Hantu.</i>
June 25th.	May 21st.	January 14th.
July 16th.	June 23rd.	January 19th.
October 10th.	September 16th.	January 20th.
	October 15th.	September 23rd.
	December 13th.	December 21st.
<i>Telok Sera.</i>	<i>Bukit Segari.</i>	<i>Gunong Tunggul.</i>
June 2nd.	May 22nd.	July 9th.
July 13th.	July 27th.	October 1st.
July 27th.	August 17th.	
August 17th.	Sept. 28th and 29th.	
September 28th.	November 16th.	
October 13th.	November 23rd.	
November 16th.	December 7th.	
November 23rd.		
December 7th.		
		<i>Tanjong Burong.</i>
		July 22nd.
		December 12th.
		(and brief inspections weekly).

In addition to the above, numerous casual visits were paid to every Reserve, except Gunong Tunggul, the isolated position of which makes it very difficult of access.

A shelter-hut was built for the Guards at Sungei Panchor in September, and a sampan has also been provided for use in the same locality.

R. P. GIBBES,
Acting District Officer, Dindings.

Lumut, 6th March, 1899.

REPORT ON THE FOREST RESERVES IN THE SETTLEMENT
OF MALACCA, FOR THE YEAR 1898,

RESIDENT COUNCILLOR'S OFFICE,
Malacca, 26th June, 1899.

SIR,—I have the honour to forward herewith the reports of the Collector of Land Revenue and the District Officers at Alor Gajah and Jasin, on the Forest Reserves of their District during 1898.

2. The two chief events of the year as affecting the Reserves were:—

(i) The closing of the Reserves by direction of His Honour the Officer Administering the Government on 8th August.

(ii) The enlargement of the Bukit Bruang Reserve by 2,715 acres.

3. Prior to the closing order permits to cut timber were issued to the Public Works Department, Government Contractors and others. The permits issued to the Public Works Department were for timber required for Government buildings, repair of bridges, etc., and were granted free. Other recipients of passes paid tenths of the value of the timber. The trees were cut under the supervision of the District Officers. The system was initiated and carried on by the Forest Department until its abolition in 1894.

4. The enlargement of the Bukit Bruang Reserve is a very good thing. The additional land consists of small scrub and lalang but will soon be covered with trees if carefully guarded from fires. The whole of this reserve is within easy reach of the town and any good descriptions of timber in it will therefore always be of considerable value.

5. An increase in the staff of Forest Guards was asked for during the year in order to more efficiently preserve the reserves from illicit cutting. It was decided that the present establishment was adequate for the purpose.

6. A small vote was however granted, for the present year, for the establishment of a nursery of forest trees. This is to be situated in the Bukit Bruang Reserve under the control of the Collector of Land Revenue and the special supervision of the Resident Councillor. It should be possible in a few years to plant up a large area of this reserve with valuable timber for the use of future generations. The reserve now contains a number of trees fit for felling and it would, in my opinion, be well if in this and the other reserves, a certain amount of timber were allowed to be felled for the use of Government and others.

7. My annual administration report, paragraphs 253 to 264, a copy of which is * *D.* attached, deals with Forest Reserve matters.

8. I enclose a map of the Settlement showing the reserves as they existed prior * *E.* to the appointment of Mr. CANTLEY as Superintendent, as they were then reformed in 1883-1888 and as they are now.

The areas at the three periods are:—

	Before 1883.	1888.	1899.
Bukit Bruang ...	Nil.	1,734	6,174
Brisu and S. Siput ...	3,890	2,247	5,268
Bukit Panchor ...	2,880	3,640	3,356
Sungei Udang ...	1,980	4,800	4,392
Ayer Panas ...	1,950	3,900	3,242
Merlimau ...	2,000	6,000	6,217
Bukit Senggeh ...	25,000 ^a	12,000	9,429
Bukit Sedanan ...	...	...	11,353
Total ...	37,700	34,321 ^b	49,431 acres.

9. Since the reserves were surveyed in 1885, probably quite fifty thousand acres of large unreserved forest have been felled for tapioca and other cultivation. On the other hand land then worked out and abandoned has again become covered

* *D.*—Paragraphs 253 to 264 of Malacca Administration Report for 1898.

E.—Not printed.

(*a*) A very incorrect estimate.

(*b*) See Administration Report, 1888. Paragraphs 213 and 214.

with young trees and if the present system of reserve belts round large holdings is strictly maintained, all abandoned lands should quickly revert to forest. This rewooding by nature of abandoned lands may be seen going on all over the Settlement except in those localities where long stretches of lalang, unbroken by any belts of timber, have been allowed to become established. These are perpetuated, and only perpetuated, by the continual recurrence of fires, some caused by the careless lighting of roadside fires, by cart-men cooking their meals but too often by deliberate firing in order that the young lalang springing up afterwards may form a grazing ground for cattle. Such wanton mischief almost always escapes unpunished, it being apparently beyond the powers of Police or Forest Officers to detect the offenders in the sparsely populated districts where they occur.

* F. 1 and 2^o
and 4 to 12.

10. Attached to this report will be found extracts from previous reports giving information concerning the various reserves, the trees they contain, planting done in them and other matters which I have thought it may be convenient to collect and re-publish. I propose during the present year to endeavour to locate the plantations made prior to the abolition of the Forest Department and where the trees are found to have survived to have the plantations surveyed and a register compiled of them.

11. I hope that in the near future the Forest Department, abolished on the recommendations of the Retrenchment Committee of 1893, may be re-established and placed under a responsible Officer. The Officer required however is a Forest Officer pure and simple for the conservation and improvement of the Forest Reserves * * *

* F 1.—Paragraph 66 of Report on the Forests of the Straits Settlements for 1882.

F 2.—Paragraph 112 of Report on the Forests of the Straits Settlements for 1882.

F 4.—Paragraph 32 of Malacca Administration Report, 1881.

Paragraphs 44, 45 and 46 of Malacca Administration Report, 1882.

Paragraph 39 of Malacca Administration Report, 1883.

Paragraph 80 of Malacca Administration Report, 1884.

Paragraphs 90, 91, 92, 93, 94, 95, 100, 101, 106 of Malacca Administration Report, 1885.

Paragraph 53 of Malacca Administration Report, 1886.

Paragraphs 212 and 215 of Malacca Administration Report, 1888.

Paragraphs 131 and 134 of Malacca Administration Report, 1889.

Paragraphs 121 and 126 of Malacca Administration Report, 1891.

Paragraphs 94 and 97 of Malacca Administration Report, 1892.

Paragraph 73 of Malacca Administration Report, 1893.

Paragraphs 66, 67, 68 and 71 of Malacca Administration Report, 1894.

Paragraph 81 of Malacca Administration Report, 1895.

Paragraph 106 of Malacca Administration Report, 1896.

Paragraph 143 of Malacca Administration Report, 1897.

F 5.—Paragraphs 51 and 52 of Malacca Administration Report 1886.

Paragraph 224 of Malacca Administration Report, 1888.

Paragraph 126 of Malacca Administration Report, 1889.

Paragraphs 119 and 121 of Malacca Administration Report, 1890.

Paragraph 7 of Mr. RIDLEY'S Report, 1890.

F 6.—Paragraphs 68, 69, 71 and 72 of Malacca Administration Report, 1884.

Paragraphs 98 and 103 of Malacca Administration Report, 1885.

Paragraph 50 of Mr. CANTLEY'S Report, 1886.

Paragraphs 46, 54 and 55 of Malacca Administration Report, 1886.

Paragraph 216 of Malacca Administration Report, 1888.

Paragraph 132 of Malacca Administration Report, 1889.

Paragraph 130 of Malacca Administration Report, 1890.

Paragraphs 27 and 29 of Mr. DERRY'S Report, 1890.

Paragraph 95 of Malacca Administration Report, 1892.

Paragraphs 80 and 82 of Malacca Administration Report, 1895.

Mr. RIDLEY'S Report in Malacca 5196/96.

F 7.—Paragraph 93 of Malacca Administration Report 1885.

Paragraphs 43 and 47 of Mr. CANTLEY'S Report, 1886.

Paragraph 48 of Malacca Administration Report, 1886.

Paragraphs 221 and 222 of Malacca Administration Report, 1888.

F 8.—Paragraph 93 of Malacca Administration Report, 1885.

Paragraphs 43, 47 and 51 of Mr. CANTLEY'S Report, 1886.

Paragraph 49 of Malacca Administration Report, 1886.

Paragraphs 217 and 218 of Malacca Administration Report, 1888.

F 9.—Paragraphs 73 and 79 of Malacca Administration Report, 1884.

Paragraph 43 of Mr. CANTLEY'S Report, 1886.

Paragraph 47 of Malacca Administration Report, 1886.

Paragraph 220 of Malacca Administration Report, 1888.

F 10.—Paragraph 79 of Malacca Administration Report, 1884.

Paragraph 43 of Mr. CANTLEY'S Report, 1886.

Paragraph 223 of Malacca Administration Report, 1888.

F 11.—Paragraph 93 of Malacca Administration Report, 1885.

Paragraph 43 of Mr. CANTLEY'S Report, 1886.

Paragraph 50 of Malacca Administration Report, 1886.

Paragraph 219 of Malacca Administration Report, 1888.

Paragraph 35 of Mr. DERRY'S Report, 1890.

F 12.—Paragraph 214 of Malacca Administration Report, 1888.

Paragraph 129 of Malacca Administration Report, 1890.

* * * * *

12. I thoroughly agree with the remarks of Mr. KYNNEERSLEY in his Administration Report for 1894:—

“ There is much to be said in favour of a nursery in connection with a Forest Department but the attempt to keep up a Botanical Garden was a failure. Half the money voted for forests was spent in the Garden and the time of the Superintendent taken up in trying to grow plants in a sterile soil.”

13. From my own experience and the perusal of the reports on my predecessors and of Forest Officers, I place the uses of the Forest Reserves in this Settlement in the following order:—

1st.—By far the most valuable. The preservation of the sources of the numerous small streams which flow from the hill ranges over which the greater part of the Reserves stretch.

2nd.—The maintenance of the average rainfall. I do not think the area of the Settlement and the addition to the Forest Land of the Reserves in it are large enough to materially affect this.

3rd.—Provision of timber for local use in the Districts adjacent to the Reserves.

4th.—Supply of valuable timber for export.

14. In concluding this report I would call attention to the advisability of passing a Forest Ordinance similar to the Ceylon “ Forest Ordinance 1885”. I attach a rough draft of such an ordinance drawn up by the Honourable C. W. S. KYNNEERSLEY, C.M.G., Resident Councillor of Penang, who was in charge of this Settlement for the first two months of this year during my absence on leave, to whom I am also indebted for the collection of much of the information, culled from old reports, contained in Appendix “ F.”

15. Appendix “ H” * gives the Expenditure on and Revenue from the Reserves in each District during 1898. The totals for the Settlement are:—

Expenditure,	...	...	...	...	\$1,485.48
Revenue,	...	...	...	...	371.86
Net Expenditure,	...	...	...	...	<u>\$1,113.62</u>

I have, &c.,

WALTER EGERTON,
Acting Resident Councillor.

A.

LAND OFFICE,
Malacca, 3rd March, 1899.

SIR,—I have the honour to report as follows on the working of the Forest Department in the Central District during the year 1898.

2. The only Reserve under the Land Office—Bukit Bruang was largely added to during the year. The original area was 3,459 acres and the additional land taken in, in two lots, 2,715 acres. The land round the Water Works which some years ago consisted largely of lalang appears now to be better covered with scrub and the lalang should soon disappear altogether.

3. There have been from time to time Nurseries of rubber and other trees started in the Reserve, two of these are doing well and are looked after by the Mandor at the Reservoir, a third had been somewhat neglected but is now being taken in hand again.

4. The Reserve is looked after by a Corporal and one Guard. One unsuccessful prosecution took place of a Chinaman who was supposed to have set fire to some scrub on the edge of the Reserve when clearing round a grave on adjacent land.

5. No cutting is allowed in the Reserve and there is no Revenue.

The Expenditure was:—

Salaries	...	...	...	...	\$192.00
Rice Allowance	...	...	...	...	36.00
Other Charges (Maintenance of Forest Reserves)	...	...	...	...	94.15
					<u>\$322.15</u>

* G.—Not printed.
H.—Not printed.

6. The Reserve at Bukit Bruang was visited on the 3rd February, 22nd July, and 26th August, and the Reserve at Sungei Udang on the 13th March, (with the District Officer, Alor Gajah). There were several other visits to the Bukit Bruang Reserve and Bukit Sebukor gardens, of the dates of which no record has been kept.

I have, &c.,

L. A. M. JOHNSTON,
Acting Collector of Land Revenue.

B

DISTRICT OFFICE,
Alor Gajah.

1. SIR,—I have the honour to submit the following report on the Forest operation during the year 1898.

Bukit Panchor.

2. A Corporal and a Constable are in charge. The lines are kept clear. I inspected this reserve on 3rd January, 2nd March, 10th June and 28th July, besides visiting it incidentally on several other occasions.

3. The crop of the durian orchards in the reserve were sold for \$137.50 and that of the duku orchards for \$70.

In addition to this \$25.08 was collected on account of jungle produce.

4. No illicit timber cutting was discovered in the Reserve during the year.

Sungei Udang.

5. There are a Corporal and a Constable in charge. The lines have all been reopened and staked out. At the back of the reserve where there is a large quantity of lalang, one encroachment was discovered which has been reported on to Government.

6. I inspected this reserve on 20th January, 13th March, 17th May, 21st September and 7th November.

7. A considerable amount of wood was discovered to have been cut on the edge of the reserve near the road in the earlier part of the year, and the Forest Guards who had been evidently conniving at it, were dismissed. It was decided not to prosecute in this case.

8. A road contractor was prosecuted and fined for cutting timber in the reserve

9. There was collected \$6.05.

Brisu-Sungei Siput.

10. There are no Guards in charge of this reserve. The lines are entirely overgrown and it is impossible to inspect it except where it skirts the road. There were no prosecutions for timber cutting in this reserve during the year.

General.

11. The total revenue of the Forest Reserves was \$238.63 made up as follows:—

Bukit Panchor-Jungle produce, ...	...	...	\$25.08
Sungei Udang do., ...	...	...	6.05
Fruits at Bukit Panchor auctioned,	...	...	207.50
			<u>\$238.63</u>

12. Total expenditure was \$461, of which salaries accounted for \$432, \$26 for uniform and \$3 for implements.

I have, &c.,

H. MARRIOTT,
Acting District Officer.

10th January, 1899.

DISTRICT OFFICE,
Jasin, 4th January, 1899.

SIR,—I have the honour to submit the Annual Report on the Administration and Maintenance of the Forest Reserves in the Jasin District during 1898.

1. The expenditure on the Vote for Maintenance amounted to \$62.04, the Vote being \$100, and was distributed as follows:—

Wages of two coolies clearing lines of Merlimau Forest Reserve at \$7 per month from the 5th September	\$52.97
Tools	9.07

The Forest Guard is now paid from the Vote for Personal Emoluments.

2. It is impossible to say what amount of Revenue was derived from the Forests before instructions were received that no further timber felling or jungle produce collection was to be allowed, as the receipts are mixed up with those of the various penghulus for tenths on jungle produce. In future there will be no revenue derived from this source.

3. *Batang Malaka*:—This Reserve which was formerly under the charge of the Corporal at Bukit Senggeh has been guarded this year by a Lance Corporal who was added to the establishment and one Guard transferred from Bukit Senggeh. They have under their charge the Batang Malaka Reserve and the Northern boundary line of the Bukit Sedanan Reserve. I visited this reserve in September, and found that good progress had been made in clearing the boundary paths which were rather overgrown with "semak" and "resam," as the Reserve had been much too far from the Corporal's quarters to permit of efficient supervision. The boundary line to the North has never been opened up as the Reserve abuts on the unsettled boundary with the Negri Sembilan. From the Negri Sembilan side of the range which constitutes this Reserve, the timber in the distance has every appearance of being good. The nature of the ground is a protection in itself against illicit timber cutting and the timber as far as I could judge is good. At "Gapis" there is a "Mentra" settlement on a hill top inside the Reserve; these people were allowed to remain on their old squatting ground when the forest was reserved and have made no further extension of the ground cleared. There are a large number of pisangs and other fruit trees planted.

4. *Bukit Senggeh*.—This Reserve has been as hitherto under the charge of Corporal ASAN, but there is now only one Guard instead of two, one man being transferred to Batang Malaka. The forest to be preserved is of very large extent, comprising the Bukit Senggeh Reserve and nearly the whole of the Bukit Sedanan Reserve. I visited this reserve also in September, devoting a day to each part of it. The boundary paths of the Bukit Sedanan Reserve are all fairly clear and there is some good timber, but in places it is very inferior. On the Bukit Senggeh side, the boundary path to the South requires re-opening as it has got overgrown; in places it runs through "lalang" which adds to the difficulty of picking up the line. During the small-pox outbreak at Bukit Senggeh three of the sick people were conveyed some way into this Reserve and hidden there for some days before they could be traced.

5. *Ayer Panas*.—The same men as last year were in charge here, *i. e.*, a Lance Corporal and one Guard. I visited the Western portion in January and again in October. On the latter occasion I also went through the Eastern half. The paths are clear and much more numerous than in the other Reserves, the ground being level and paths having been cut intersecting the forest. The timber, as has been remarked in former years, is poor.

6. *Merlimau*.—A Lance Corporal and one Guard were allotted to this Reserve, being an addition to the strength. Owing to the Forest Station being occupied by Public Works Department's coolies, the men did not take charge until the beginning of June when new coolie lines had been built. The first work to be done was to clear the boundary paths which had been almost completely overgrown. In August I visited the Reserve to see what progress had been made in the work. I found that on the Southern side most of the path runs through deep swamp and is almost impassable as the tree trunks which were laid down by the old Forest Department were all submerged and rotted. In consequence of this two coolies were engaged in September to assist in getting the lines cleared, and when I again visited the Reserve in October fair progress had been made on the Northern and Western sides. It will however be necessary to obtain extra help again next year. The Chohong River is

the Eastern boundary and is much choked; this river is, I understand, to be cleared next year in connection with the revision of the Muar boundary. I attempted to get a "jalor" for the use of the Guard, but could not obtain a suitable one for the amount authorised; another attempt will be made next year.

7. Below will be found a tabulated statement of prosecutions for trespass and illicit cutting in the Reserves, none of the cases were serious, the object generally being to cut Umbai, rattan, etc.; in most cases more than one man was involved:—

	No. of Cases	Convictions.	Number involved.	Remarks.
Batang Malaka ...	1	1	3	"Ejok Cutting."
Bukit Senggeh ...	3	2	4	
Ayer Panas ...	2	1	2	
Merlimau ...	3	3	9	

The total fines paid were \$30.70.

Before the closing of the Reserves to cutting, the contractor building the New Office and Police Station obtained \$196.50 worth of timber for those buildings from the Ayer Panas and Merlimau Reserves and paid \$49.13 as royalty.

8. The timber in places is good, notably at Batang Malaka and Merlimau, but in the latter there are numerous traces of illicit cutting which took place during the withdrawal of the Guard; it appears indeed to me that if the Forest Department was re-established on its old basis and timber was properly thinned, the cost of the establishment could be at all events partly defrayed by the revenue which would be obtained.* At present the Forest Ranger has no time to inspect the Reserves and the District Officer can only make very occasional, somewhat cursory and lay inspections, this has been frequently brought to notice in former reports.

I have, &c.,

R. SCOTT,
District Officer.

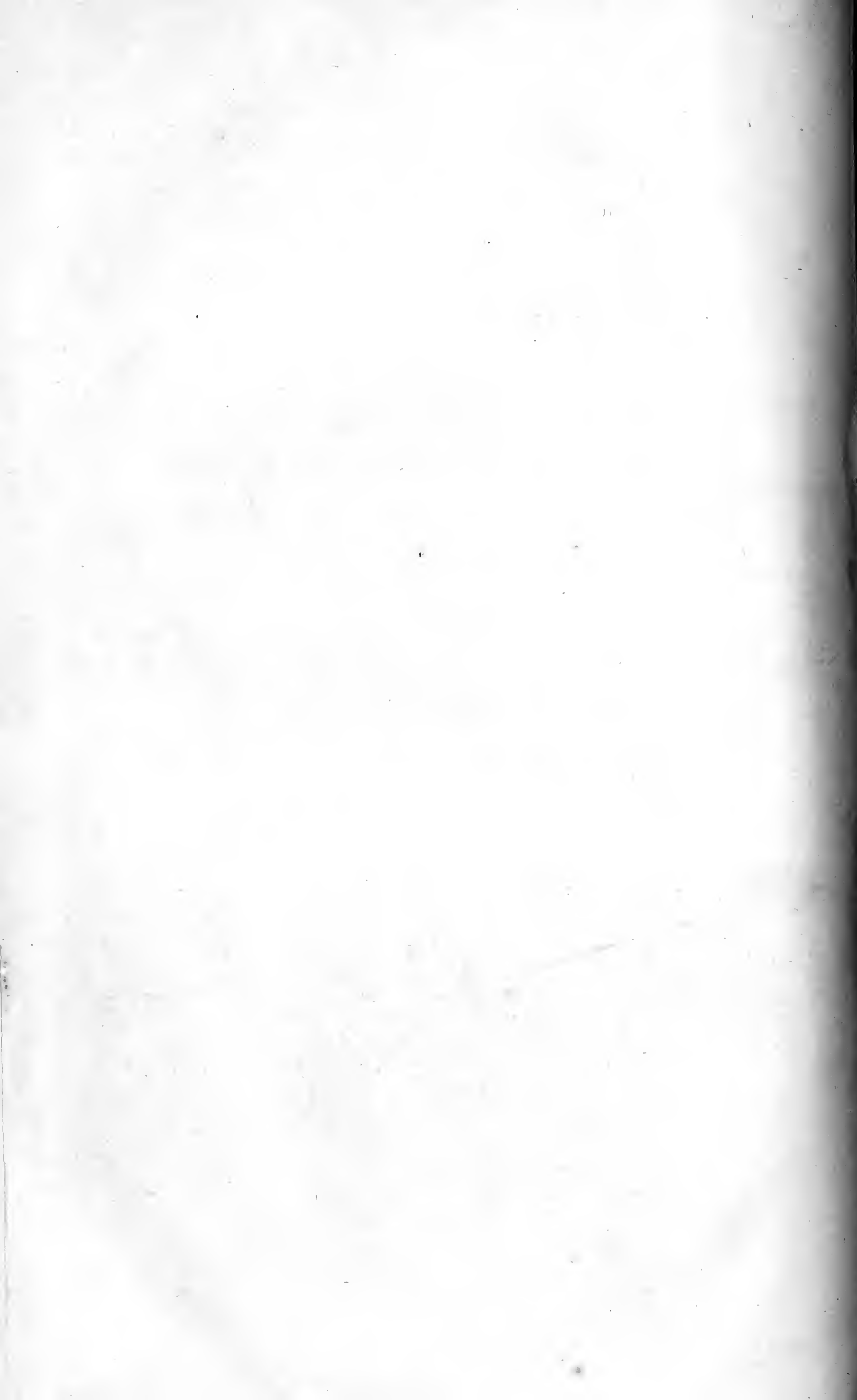
* By such a system as this the Government could obtain good timber, stock it until seasoned and hand it over to its contractors. In this way the use of green timber in new buildings would be avoided and the durability of the work increased.

APPENDIX F III.

Tabular statement showing area of Forest Reserves in 1882, Mr. Cantley's recommendations, the action taken on them, the resulting Forest Reserves, subsequent modifications and the Forest Reserves as they now exist.

Reserve.	Area prior to 1882 and Mr. CANTLEY'S report.	Mr. CANTLEY'S recommendations.	Action taken on recommendations.	Area in 1883-1888.	Subsequent Alterations.	Existing Area.
Jus and Bukit Senggeh (includes reserve now known as Batang Malaka.)	25,000 ^a squatters and villages within the reserve.	Re-adjust so as to exclude villages and squatters' holdings.	Carried out in 1887-1888.	Uncertain. From Administration Report 1888 para. 213-214 about 12,000 acres.	Part alienated for tapioca planting and other land added.	20,782
Kesang or Ayer Panas, ...	1,950	Add 2,000 acres at M. on map.	Acres added. Name altered to Ayer Panas.	3,900	500 acres alienated for tapioca in 1894 and some for tin Mining later.	3,242
Merlimau (or Payah Gemok.)	2,000	Double area by adding at N. or O.	Carried out. About 600 of old reserve cut out and 1,500 acres added at N. and 2,500 acres at O.	6,000	Much larger than proposed by Mr. CANTLEY.	6,217
Gading or Bukit Panchor. (Also called Malaka Pindah by Mr. Cantley.)	2,880	Worthless. Should take in Panchor Hill range.	Carried out. Most of old reserve abandoned and new one formed. Name altered to Bukit Panchor.	3,640	Not traced.	3,356
Sungei Siput, ...	3,890	Only requires protection. Add land at V. and J. on East.	Portion of old reserve abandoned and land added at East and North.	2,247	Not traced.	5,268
Bukit Bruang, ...	Nil.	Make a reserve of 2,000 acres at Bukit Bruang.	Carried out. 1,920 acres reserved at Bukit Bruang.	1,920 (also given as 1,734.)	2,715 acres added in 1898. An addition was also made in 1890.	6,174
Sungei Udang, ...	1,980	Not mentioned in Mr. CANTLEY'S report but map shows recommendation of an addition of about 2,000 acres in West.	2,000 acres added on South of old Reserve.	4,800	Area given in 1888 probably an estimate.	4,392

a. A rough estimate.



1897

STRAITS SETTLEMENTS.

Paper to be laid before the Legislative Council by Command of
His Honour the Officer Administering the Government.

Annual Report of the Botanic Gardens, Singapore.

Staff.

1. Mr. CURTIS, Assistant Superintendent of the Penang Botanic Gardens, having gone home on leave in May 1st, it was necessary to send Mr. FOX to Penang to act for him during his absence. He left for Penang in April 26th and returned November 6th. The plant-collector, TALKA, left early in the year and was replaced by a Malay KASDANI. The apprentice SIMON left at the same time. The coco-nut trees inspection coolie PACKAY, who had been employed for ten years, died of small-pox, and was replaced by a Malay, and an extra coolie was employed for part of the year in cutting down dead and dying trees on abandoned coco-nut estates. The coolies worked well and there was no difficulty in obtaining as many as were required. The beri-beri which had been troublesome among them for the past two or three years entirely disappeared on the destruction of the old cooly lines and there was hardly any sickness of any kind among them after the new lines were built.

Visitors.

2. The number of visitors was as large as usual, and a good number of scientific botanists, planters and others interested in botany visited the gardens. The Regimental band played on moonlight nights and was much appreciated. There were but few thefts and those of a very petty nature and there were no prosecutions.

Flower^s Show.

3. A most successful exhibition of flowering plants, ferns and begonias was held in the Town Hall in April. The display of flowers and especially orchids was much finer than on any previous occasion.

Aviaries.

4. The following animals and birds were added to the Zoological collection:—One leopard cat (*Felis bengalensis*) presented by Captain MCGILL, and one by the Hon'ble W. EGERTON; one slow loris (*Nycticebus tardigradus*) presented by Mr. R. O. H. DAWES; one Chinese fox (*Canis* sp.) presented by the Officers of H. M. S. *Phoenix*; unfortunately it died in an epileptic fit brought on by excitement, to which these animals when young are subject; one Russian fox (*Canis vulpes*) presented by the Russian Consul; six white rats (*Mus decumanus* var) presented by Mr. YO CHO POK; one black buck (*Antilope cervicapra*) presented by Captain HARDCASTLE; one *Cervus hippelaphus* from Java presented by J. CARROLL Esq.; one *Fabiru* presented by Mr. YAP WAT; three water hens (*Erythra phœnicura*) presented by Mr. ST. V. B. DOWN; three black swans presented by the Sultan of Johore; one owl (*Huhua orientalis*) purchased; three kangaroos from West Australia presented by Mr. LE SOUEF, but unfortunately they succumbed to the excessive wet of our climate. A common python was presented by Mr. ERSKINE, and two tortoises from Selangor by Mr. GOODENOUGH. A common monkey, a hybrid monkey, a deer, a kijang and a phalanger were born as well as a litter of green vipers, *Lachesis Wagleri*.

Plants received.

5. During the year there were received 325 packets and bags of seeds, 300 plants and 1,327 bulbs and tubers. Among which may be specially mentioned a large number of Lily bulbs from Japan, a new Ginger from German East Africa, *Amorphophallus Titanum* (presented by Mr. BUTTIKOFER), and among plants of special economic interest. *Willughbeia edulis* (from Saigon and Calcutta) *Caryocar nuciferum* from Kew. *Dichopsis Krantziana* (Saigon Gutta percha from Saigon.) *Mascarenhaisia elastica* from Madagascar, a new rubber, (Botanic Gardens, Berlin) five varieties of Ramie (Mr. BLUNTSCHLI); an unusually large variety of Papaya (Mr. DARBY).

2/22

The contributors were:—

Dr. Rabe.	Mr. St. V. B. Down.
Mr. Meikle.	Messrs. Dammann.
Mr. G. Penney.	Mr. Pereira.
Prof. Cornu.	Mr. Schalz.
Right Reverend Bishop Hose.	Mr. F. Pears.
Mr. T. H. Tressider.	Mr. C. Baxendale.
Mr. E. Buttikofer.	Mr. Robert Little.
Mr. Micholitz.	Mr. Bluntschli.
Mr. Chatterjee.	Mr. Derry.
Mr. Goodenough.	

and the Botanic Gardens of Saharunpur, Nagpur, Calcutta, Tokio, Saigon, Jamaica, Trinidad, British Guiana, Brisbane, Adelaide, Sydney, Melbourne, Cape Town, Berlin and Kew.

Messrs. CARTER also supplied as usual the flowering Annuals.

Of ornamental or interesting plants, 156 packets of seeds and 114 plants were sent out to various gardens and private persons in exchange, and a considerable number were also purchased by residents, passengers, and others. The chief demand at present is for palms, of which a large stock has to be kept up to supply the demand. Plants and seeds were sent to the gardens of Kew, Calcutta, Saigon, Brisbane, Buitenzorg, Peradeniya, Old Calabar, West Australia, Edinburgh, Melbourne, also to Messrs. LOHER, CHATTERJEE, DAMMANN and WALTER.

Plants in Flower.

6. The following were among the more interesting of the plants which flowered for the first time in the Gardens, *Bauhinia Vahlii* (India) *Grias cauliflora*, the anchovy pear (West Indies) *Begonia sinuata* (Penang) *Begonia* sp. tuberous-rooted (Lankawi) *Plumiera acuminata* (South America) *Adina rubescens* (Singapore) *Tabernæmontana crassa* (West Africa) *Ceropegia lucida* (Penang) *Sarcanthus rostellatus* n.sp. (Perak) *Cælogyne uniflora* (Assam) *Tainia fuscoviridis* (Assam) *Costus pictus* (South America), *C. globosus* (Singapore) *Ludovia crenata* (South America) *Musa violascens* (Selangor). *Tupistra grandis* n.sp. (Perak) *Raphia ruffia* (Madagascar) *Anthurium strictum* (South America) *Aglaonema vittatum* n.sp. (Sumatra) *Amorphophallus Titanum* (Sumatra). *Bowenia spectabilis* (Australia).

Upkeep and Buildings.

7. The borders, beds and shrubberies were cleaned and replanted, many additional ornamental trees and shrubs planted in various parts of the gardens and dying or dangerous trees removed, and a few new small beds and borders were made. The most important building put up was the new Cooly Lines. The old lines were not only in a dangerous state of decay, but so infected with beri-beri that they were no longer fit for habitation and a large new building measuring 120 feet in length and 36 feet in breadth, on brick pillars well raised above the ground was built in another spot, at a cost of 1,206 dollars and the improvement in health of the coolies was immediately noticeable. The watchmen's quarters were also rebuilt. The fern house and the anthurium house were re-roofed.

Artist.

8. Early in the year CHARLES ALWIS from Peradeniya was engaged to make drawings of interesting local plants for the Flora of the Malay Peninsula but did not take up the appointment, and Mr. D. N. CHOUDHURY formerly employed in the Botanic Gardens, Calcutta, was engaged. He arrived on July 22nd and has been employed for the remainder of the year in making drawings.

Vote	...	...	...	\$ 700.00
<i>Expenditure</i>				<hr/>
Salary of Artist	...	...	...	287.09
Materials	...	...	...	38.60
Balance	...	...	...	374.31
				<hr/>
				\$700 00
				<hr/>

Herbarium.

9. Owing to the absence of the Assistant Superintendent for a considerable part of the year, it was impossible to make any botanical excursions, and comparatively few specimens were added to the herbarium. During my annual visit to Penang, the Dindings and Selangor, I obtained a small collection of plants, Mr. CURTIS sent 136 specimens from Penang, Mr. FOX collected some plants in Penang and also in the Thaiping Hills, including a pretty new *Dendrobium*; Mr. DERRY sent also a number from Perak, Mr. GOODENOUGH sent 240 from Selangor, and Mr. MICHOLITZ presented specimens from Labuan.

The plant-collector was sent to Selangor but obtained very little. A hundred specimens of Australian ferns were received in exchange from the Sydney Botanic Gardens.

Duplicate specimens for naming or exchange were sent to various establishments and botanists, *viz.*, 221 specimens to Kew, 439 to Calcutta, 67 to the British Museum, 1,130 to Dr. GANDOGER in exchange for books, 400 to Sydney Museum, 44 ferns to Dr. CHRIST, 30 to the Pharmaceutical Society and 105 mosses to Mr. MITTEN for naming. A number of fungi were sent to Kew, and named by Mr. MASSEE who found a large proportion of new species among them, which were described in the Kew Bulletin.

Five pounds of the bark of *Roucheria Griffithiana* "Ipoh Akar Putih," supposed to be poisonous and used in the Sakai dart poison were sent to Dr. GRESHOFF for examination.

A few specimens of woods were obtained and added to the collection, and a specimen of the Gutta of *Dichopsis Maingayi* from Jelebu was presented by Mr. GUNN.

Library.

10. The following books were added to the Gardens Library during the year:—

- Hiern and Rendle.—Catalogue of Welwitsch's African plants vol. iii presented by the Trustees of the British Museum.
- Trimen, Dr.—Handbook of the Flora of Ceylon, vol. iv.
- Dyer, Sir W. T. Thiselton—Flora of Tropical Africa, presented by Royal Gardens, Kew.
- Lhotsy, I. P.—*Cinchona Calisaya* and *succirubra*, *
- Maiden, J. H.—A preliminary study of Prickly Pears, *
- " Indigenous vegetable drugs, i. ii., *
- " Tracts on New South Wales, *
- " A variety of *Panicum decompositum*, *
- " Notes from the Botanic Gardens, Sydney, *
- " Observations on Eucalypti of New South Wales, *
- " The Weeds of New South Wales, *
- Christ, Dr.—Pteridographische Notizen, *
- " Fougères de Mengtze, Yunnan, *
- " Monographie de *Elaphoglossum*, *
- " Enumeratio de quelques Fougères, *
- Raciborski, M.—Biologische Mittheilungen aus Java, *
- " Weitere Mittheilungen, *
- " Pseudogardneria, *
- " Pflanzen pathologisches aus Java, *
- " Einigen Demonstrationen's versuche mit *Leptomia*. *
- Heine, Dr.—Biologic relations between ants and plants, *
- Medley-Wood, J.—Natal plants.
- Berg, Dr. C.—Comunicaciones del Museu Nacional de Buenos Ayres.
- Riviere, Ch.—Notes on Ramie, presented by Mr. SOUTH.
- Galbraith, S. J.—Vanilla culture, †
- Chesnut, R.—Thirty poisonous plants of North America, †
- Merriam, C. H.—Lifezones and cropzones of North America, †
- " North American Fauna, †
- Trelease, W.—Botanical opportunity, †
- Beal, E. L.—Cuckoos and shrikes, †
- Bailey, L. H.—Factors of organic evolution, †
- Plumb, C. S.—Geographic distribution of Cereals, †

* Presented by the Author.

† Presented by the Department of Agriculture, U. S. A.

- Carleton, F. A.—Cereal diseases of the United States, *
- Galloway, B. T.—Potato diseases and their treatment, *
- " New Spraying Devices, *
- Loew, O.—Cigar leaf tobacco, *
- Murray, John—General conditions of existence and distribution of Marine organisms, †
- Gage, S. H.—Processes of life revealed by the Microscope, †
- Gill, Theo.—Some questions of Nomenclature, †
- Schweinitz, E. A.—War with the Microbes, †
- Huffaker, E. C.—Soaring Flight, †
- Miall, L. C.—Life History studies of Animals, †
- Hamy, E. T.—Royal Menagerie of France, †
- Thayer, A. T.—The law which underlies protective coloration, †
- De Haan, J. V. B.—Mededeeling—Tabak's Aaltje, †
- Bijlert, Dr. A. V.—Oenderzoek van Deli Tabak, †
- Kramers, J. G.—Andere Mededeeling over Koffie, †
- Cameron, J.—Report of a visit to Coorg, ‡
- Moore, C.—Census of plants of New South Wales, ‡
- Wildeman, E. de, and Durand, Jh.—Illustrations de la Flore de Congo, ‡
- " Flore Algologique, ‡
- " Annales de Musée de Congo, ‡
- Gandoger, M.—Flora Europæ, 27 vols., §
- " Flore Lyonnaise, §
- " Rosæ novæ, §
- " Essai Nouvelle classification des Roses, §
- " Decades Plantarum Novarum, §
- " Tabulæ Rhodologicæ, §
- Sebire, R. P. A.—Plantes utiles de Senegal, ||
- Clouth, Fr.—Gummi Gutta percha and Balata, ||
- Massee, G.—Text book of Plant diseases, ||
- Dyer, Sir W. T. T.—Dipterocarpeæ, ||
- Hegelmaier, F.—Monographische Untersuchung der Lemnaceen, ||
- Collingwood, L. C.—Nutmeg and other cultivation in Singapore, ||
- Cogniaux and Goossens—Dictionnaire Iconographique des Orchidees (*continuation*).

Also the following publications were presented to the Library by the various Gardens and Institutions which publish them. Indian Museum Notes, Tropicpflanzen, Chemist and Druggist Agricultural Ledger, Planting Opinion, Report of the Secretary of Agriculture of the United States, Experimental Station Records, Experimental Farm Reports, Ottawa Transactions of the Botanic Society, Edinburgh, Annual Reports of the Botanic Gardens of West Australia, Missouri, Queensland, Old Calabar, New South Wales, Queensland Acclimatization Society, Jamaica, South Australia, Mysore, Calcutta, Grenada, Trinidad, Hongkong, Forest Reports of Madras, British Guiana, Ceylon, Zanzibar, Victoria Zoological Acclimatization Society, Notizblatt of the Botanic Gardens, Berlin, Bulletin Economique de l' Indo-China, Botanic Museum Haarlem. Year book of the U. S. A. Department of Agriculture. Reports of the Botanic Survey of India, Perak Museum Notes, Calcutta Gardening Circular, Forester of U. S. America, Icones Bogoricensis, Bulletin of Buitenzorg, Journal of Agriculture of Zanzibar and Cape of Good Hope, Journal of the Board of Agriculture, Kew Bulletin, Icones Plantarum, Merck's Digests, Report of Selangor Forest Department, Perak Museum Notes, Report of Selangor Planters Association. Ceylon, Jamaica and Trinidad Bulletins, Annals of the Botanic Gardens, Buitenzorg. Journal of the Linnean Society.

While the following journals were purchased as usual:—Botanical Magazine, Tropical Agriculturist, Gardener's Chronicle.

Economic Gardens.

11. A considerable space of ground on the top of the central hill was cleared and dug over for planting gutta percha, and it was planted in part with gutta percha, a row of Suntai *Bassia* sp. from Sumatra which produces an inferior Gutta and a number of plants of Saigon Gutta, *Dichopsis Krantziana*, almost all are growing well.

It was found advisable to make a cart road through the Garden, as the present roads are too narrow for carts to go safely through, when finished it will also make

* Presented by the Department of Agriculture, U. S. A.
 † Presented by the Smithsonian Institute
 ‡ Presented by the Author.
 § Received in exchange.
 | Purchased.

a pleasant drive for carriages. The proposed route starting from the Dalvey Road entrance passes along the base of the central hill and joins the Cluny Road at the main entrance. The first part of the road has been cleared and levelled, the scrub between the boundary and the arboretum being felled, the ground levelled and turfed. It is hoped to complete the road this year, but the vote will not permit of its being laterited at present. A large number of useless, dead and dying trees were cut down and removed, including two large Erythras which were killed by lightning.

Para-rubber.—The demand for this plant shewed no signs of diminution, and the crop of seed supplied by the trees was larger than ever, no less than 157,652 seeds and 4,930 plants being distributed. The larger amount of crop was due in part to the adoption of the plan of gathering the fruit by hand, without waiting for the seed to fall, so that a quantity which was formerly lost by falling upon the roads and into the streams was saved. It was found that the coolies soon learnt what fruits were ripe, and there were no losses from gathering immature fruit. The whole crop amounted to 157,652 seeds and 4,930 plants.

They were distributed as follows:—

Singapore	600 seeds and	30 plants.
Malacca	75,951	900 "
Selangor	70,707	800 "
Perak	7,271	...
Johore	1,850	1,800 "
Borneo	1,273	...
Pahang	...	1,400 "

Seedling plants were less in demand, the planters preferring seed as easier to ship and cheaper; stumps however, *i. e.*, plants of one or two years' old and ten or fifteen feet tall were much in request. Younger plants when planted out are found to be attacked by all manner of pests, deer, mouse-deer, crickets, grasshoppers, wild pigs, snails and even crabs are reported as doing much damage by biting off the tops.

Ramie.

12. Comparatively little was done in Ramie this year, and the cultivation in the Peninsula is not increasing to any extent. Plants of various strains from China, Java, and Sumatra were presented to the Gardens by Mr. RANKINE and Mr. BLUNTSCHLI, over six thousand plants and cuttings were distributed.

Sago.

13. A large number of seeds and plants were sent to Saigon, where it is proposed to introduce the cultivation.

Of other economic plants, Coca, Patchouli, *Coffea stenophylla*, Nutmegs, Gambier-seed, Pineapples, and fruit trees, were distributed. A large number of seeds of timber trees, Tembusu, *Eugenia grandis*, *Pithecolobium bigeminum*, *Albizzia Moluccana*, etc., were supplied to the Forest Department, Selangor.

14. Of economic plants new to the Gardens there were received from Saigon, plants of *Dichopsis Krantziana*, an inferior Gutta percha from Cochin-China, *Willughbeia edulis*, one of the Getah grips from Assam, which produces an edible fruit and an inferior rubber, *Urceola elastica*, from Penang, one of the best local rubbers. *Landolphia* sp. from Trinidad, (sent from Kew). *Mascarenhaisia elastica*, a rubber plant from Madagascar sent from Berlin, *Vanilla pompona* (Mexico) and seeds of the Butternut *Caryocar nuciferum* from Kew; seeds of *Psoralea corylifolia* (a green soiling plant) and good strains of Castor-oil were sent from Calcutta.

Gutta Percha.

15. The diminishing supply of this product has caused some anxiety among the consumers, and the cultivation of the plant has been strongly urged by the Colonial Officer. Steps are now being taken to carry this out on as large a scale as possible. It is now very difficult to procure seed owing to the destruction of all the larger wild trees by the gutta-collectors, so that there are few trees of sufficient size to produce fruit left in accessible parts of the Peninsula, stumps and cuttings are however still procurable from the Peninsula and from Borneo. Mr. DUNLOP procured a large number of cuttings of *Dichopsis* from Borneo which he brought to Singapore. These were dry looking sticks about 8 inches or a foot long of various thicknesses, some being half an inch through, but most were smaller. They had been coated in black mud and packed in bundles in gunnies. These were planted in good soil in the Botanic Gardens, shaded and watered and a number produced shoots and roots, and

have been since planted out in the Garden, and in the Bukit Timah forest reserve. A very large proportion did not grow, and those that did were very irregular in the time of growth, some struck almost at once, others delayed for nearly a year. Enquiries elicited the fact that a considerable proportion had been cut no less than seven months previously, and kept dry all that time. Those that had been cut only two or three months previously grew readily. Among those that came up it was noticed that there were not only *Dichopsis oblongifolia*, but also *D. calophylla* known as Niatoh Waringin in Borneo, a very handsome plant stated to supply a very superior gutta. This species seems to grow better and faster than *D. oblongifolia*. There was also a plant of Getak Sundik, *Payena Leerii*, the white Gutta percha, which grew very rapidly. A number of cuttings of *D. oblongifolia* were also presented to the Gardens by Mr. PEARS of Muar, which seem likely to do well. It seems probable that owing to the difficulty of procuring seed, the system of growing from cuttings will be the most suitable system for cultivation. It is noticed that the small and thin cuttings either do not strike or if they do throw up shoots they soon wither off. The shoots often attain considerable growth before any roots appear on the cuttings, and frequently quite a bushy little plant has only one or two very thin rootlets. This slow development of roots probably accounts for the damping off of apparently strong plants on their being planted out.

Plant diseases.

16. I visited in the spring the districts in Selangor which were affected by the plague of the Coffee caterpillar *Cephonodes Hylas*, and remained at Kuala Lumpur for a few days examining into the life history and habits of the insect, and trying experiments on it. These investigations with those made by Mr. A. L. BUTLER will be described in a Bulletin now in course of printing. A number of injurious insects were sent to the British Museum for identification, and were named by Mr. WATERHOUSE, they included the Banana Weevils, *Sphenophorus sordidus*, Rose sawfly *H. ylesinus* *Victoriae* and others of which accounts are being printed in the New Bulletin.

A very injurious fungus was found attacking the roots of a fig-tree in one of the shrubberies. It spreads all through the ground and destroyed almost every plant for a considerable distance round the tree. Specimens sent to Kew were discovered to be a species of *Rosellinia*, a genus of most deadly root-fungi. The diseased plants were dug up, and all roots, twigs, etc., affected burnt, the ground was dug over and lime and copper sulphate (Bordeaux mixture) freely applied, which arrested the growth of the fungus and quite exterminated it. Bordeaux mixture was also used on Clove trees suffering from a leaf-fungus, the trees being syringed with the solution, with excellent results.

Vote for Economic Gardens	...	\$2,200.00
<i>Expenditure</i> :—		
Salaries	...	\$1,857.72
Manure	...	59.65
Pots and Tubs	...	69.60
Ataps, lime and bricks	...	25.00
Tools	...	141.89
Balance	...	46.14
		<hr/>
		\$2,200.00

Forestry.

17. I visited Penang and the Dindings in the spring, and inspected the forest reserves in part in both places. In December, while in Malacca, I inspected the Gardens at the Ayer Keroh Reservoir, and went over much of the ground which has been marked out for the planting of Gutta percha and India rubber. The various plants in the Gardens, mostly sent from the Singapore Gardens are growing with remarkable vigour, chiefly noticeable are the Para-rubber, *Ficus elastica* and Ceara-rubber. The soil here is gravelly and dry and seems to suit this latter plant very well. It grew absolutely faster than the Para-rubber, and there were one year old trees 10 or 12 feet tall with a stem three inches through at the base. Its latex seemed rich in rubber, and it may prove an useful cultural plant in dry upland gravelly places where little else will grow. *Ficus elastica* was also very thriving, and this plant is becoming, I am informed, popular with the Chinese. The Hon'ble Resident Councillor showed me an excellent sample of rubber taken by Chinese from three year old trees. The country round the waterworks formerly covered to a large extent with

lalang is now nearly covered by secondary jungle, the difference in one year being very marked. The most useful tree in expelling lalang is the Leban, *Vitex pubescens*, which not only kills it out but also is useful as supplying a good building timber. The Tampinis planted here some years ago have grown into trees of considerable size, but for want of pruning have as usual branched too much to supply good beams at present.

At Bukit Timah about three acres of land at the base of the hill, were cleared of scrub, dug and planted with Gutta percha plants. The Bilian trees formerly planted here were freed from the overcrowding jungle, and the Merbau and other trees cleaned, and dug round, Para-rubber, Tembusu and other trees were planted round in suitable places.

The Para-rubber trees at Bukit Mandai were inspected and the grass cleared round them. They have made fair growth but have not yet fruited. A special vote of 455 dollars was granted for the Bukit Timah and Bukit Mandai planting.

Vote	...	...	...	\$455.00
<i>Expenditure:—</i>				
	Salaries of Coolies	...	...	218.61
	'Rikisha for Mandor	...	...	35.70
	Cart hire	...	...	7.50
	Plants	...	...	25.00
	Balance	...	...	168.19
				<hr/>
				\$455.00

Coco-nut Trees Inspection.

18. An additional cooly for cutting down the trees on abandoned and Government ground was employed from April to the end of the year. He destroyed three hundred and eighty-two trees at Teluk Kurau, Gelang Road and Ballestier Road. The old tree-climber having died, he was replaced by another named OSMAN in May. One thousand and eighty-six diseased coco-nut trees, thirty-eight stumps and ten piles of decaying vegetable matter were destroyed during the year. There were no prosecutions under the ordinance.

Vote	...	...	...	\$450.00
<i>Expenditure:—</i>				
	Salaries of Inspector and Coolies	...	...	299.46
	Transport	...	...	112.78
	Uniforms, etc.	...	...	17.45
	Balance	...	...	20.31
				<hr/>
				\$450.00

Government House Grounds.

19. The Gardens were kept up in a good condition by the Mandor ROGERS, and the coolies worked well and there were no complaints. The beds in front of the house were bright with Cannas for most of the year. The hedges were repaired all round, but great difficulty was experienced in keeping natives from breaking them down. The plant-houses were re-attapped, and two iron arches were erected to carry plants of *Ipomea Horsfallia*.

Vote	...	...	...	\$2,360.00
<i>Expenditure:—</i>				
	Salaries	...	...	2,052.96
	Pots and Tubs	...	...	82.64
	Planks and Ataps	...	...	50.33
	Tools	...	...	149.22
	Balance	...	...	24.85
				<hr/>
				\$2,360.00

BOTANIC GARDENS, SINGAPORE.

Statement of Receipts and Expenditure, for the year 1899.

RECEIPTS.		EXPENDITURE.			
	\$ c.		\$ c.	\$ c.	
By Balance in Bank ...	1,254 69	<i>Salaries.</i>			
„ Government Grant	8,500 00	Clerk ...	247 00		
„ Sale of Plants, Seeds and Flowers ...	4,605 76	Mandore ...	251 74		
„ Interest ...	26 55	Carpenters, (three) ...	360 70		
		Masons, (two) ...	150 85		
		Label Printer ...	120 00		
		Plant-collectors, (two) ...	126 79		
		Peon ...	97 00		
		Aviary-keeper ...	92 20		
		Police ...	348 00		
		Coolies ...	3,344 29		
		Rice Allowance ...	652 58		
					5,791 15
		<i>Bills.</i>			
		Tools and Stores ...	503 81		
		Laterite, Gravel, Sand, etc. ...	336 26		
		Timber, etc. ...	433 99		
		Pots and Tubs ...	371 07		
		Birds' and Animals' Food ...	1,466 47		
		Manure and Cartage ...	249 10		
		Buildings and Repairs ...	1,301 84		
		Freight on Plants ...	124 81		
		Books, Papers, etc. ...	233 66		
		Plants and Seeds ...	125 00		
		Subscription to Telephone ...	97 50		
		Wardian Cases, etc. ...	42 00		
		Petty Expenses ...	200 39		
		Miscellaneous ...	218 53		
					5,704 43
		Balance ...	...		11,495 58
					2,891 42
					\$14,387 00
	\$14,387 00				\$14,387 00

Botanic Gardens, Penang.**Waterfall Garden.**

There has been no change in the permanent staff, but Mr. W. FOX was in charge from the 1st May to the 31st October during my absence on leave.

2. Mr. FOX says that owing to exceptionally heavy rains during that time, which caused much damage to roads and paths, and several land-slips, nearly all the available labour was required in repairing and maintaining the roads and grounds in decent order and prevented the carrying out of improvements or extension to any great extent.

3. The most important work of improvement during the year is the reconstruction of the Fern Shed in iron. Most of the material for this was purchased out of the 1898 Vote and the work of erection carried out by the Garden Overseer and coolies. It is a great improvement on the old wooden shed and will be easier and less expensive to maintain in the future.

4. The approach to the granite bridge built in 1898 has been raised and metalled. Three hundred and nine feet of side drains built in rough masonry, and other minor improvements to roads carried out.

5. The large iron plant shed near the entrance has been re-covered with "Chicks" and continues to be one of the most interesting features of the Garden. Many of the local tree ferns and other plants have attained a large size and an appearance such as is seldom seen when grown in pots.

6. As in previous years, Cannas have been an important feature among flowering plants. All the beds were replanted and heavily manured in April and have been in continuous flower right through the wet weather when most other flowers are scarce.

7. A large batch of *Convolvulus* grown in pots were very attractive during the early part of the year owing to their great range of colour. The seeds were obtained from Japan and said to be seeds of double forms, but the nearest approach were a few indifferent semi-doubles of no great merit. The single flowers were however very beautiful.

8. On my way home in May, I took advantage of the boat remaining two days in Colombo to visit the Peradeniya Gardens and made notes of several things which we hope to receive from there later on.

9. On my return from leave in November, I brought out a large collection of economic and ornamental plants, principally from the Royal Gardens, Kew, Messrs. F. SANDER & CO., and Messrs. JAS. VEITCH & SONS; to all of whom the thanks of this department is due for their great liberality. Nearly all these plants, and also two Wards cases of plants handed to my care by the Director, Kew, for the Singapore Gardens, arrived in excellent condition scarcely a plant being dead. Among the valuable plants from Kew are six plants of African rubber (*Kickxia Africana*) all of which are growing. Messrs. SANDER & CO. contributed a fine lot of *Cattleyas*, *Begonia*, &c., and Messrs. VEITCH & SONS, Ferns, Palms, &c.

10. The usual interchange of plants and seeds has been carried on with Botanical and Horticultural Establishments and private individuals to about the same extent as in previous years, and plants sold to the value of \$883.17 which is an increase of \$187.77 on the previous year.

11. The total expenditure of this garden amounted to \$4,482.86, details of which, together with expenditure of other votes, is given in Appendix A annexed.

Governor's Hill Bungalow Garden.

12. During the latter part of the year Mr. O'KEEFE, Overseer in charge, was on leave and his duties were satisfactorily performed by Sergeant WELLS. The usual supply of Vegetables and Flowers were maintained and the grounds kept in fairly good order. During January and February there was a fine show of Annuals, Phlox, and *Dianthus* having done remarkably well. *Dendrobium Fytchianum* planted on the trees flowered very freely and was much admired.

13. As is always the case here a large proportion of the labour was required in repairing damage done by heavy rains. I give below the rainfall registered at this station during the year.

Month.	Rainfall.		Greatest fall in 24 hours.		Month.	Rainfall.		Greatest fall in 24 hours.	
	Inches	P.	Inches.	P.		Inches.	P.	Inches	P.
January	8	30	3	10	July	11	36	2	16
February	1	80	1	10	August	27	99	7	55
March	4	11	1	28	September	26	08	9	30
April	4	19	...	74	October	15	36	2	29
May	22	87	4	11	November	17	42	4	34
June	9	67	2	75	December	5	42	1	18
					Total Rainfall	154	57		

Experimental Nursery.

14. Nothing requiring special mention has been done in this Nursery. Two men only are employed to keep the weeds down and a portion of their time is devoted to keeping in order the grounds of Belle Vue Bungalow.

15. As pointed out in my last year's report there is no further object in spending much on this Nursery as it has been proved that it is not high enough for European fruits, and for the purpose of experiment with rubbers and such other economic products as is likely to be of commercial value, the land is too steep and limited in area.

Preservation of Coco-nut Trees.

16. The Inspector and two men have been employed during alternate months in Penang and Province Wellesley in inspecting plantations, Cow-sheds, stable yards, &c., and in insisting on the destruction or removal of dead trees, manure heaps, &c., in which the Coco-nut Beetle is likely to breed.

17. Three thousand eight hundred and sixty-seven notices were served resulting in the destruction or removal of seven thousand three hundred and sixty-seven dead trees or portion of trees, and seven hundred and forty-two heaps of rubbish. Forty-four persons who failed to comply with the notices within the specified time were summoned and fines inflicted aggregating \$79.

No. of dead Coco-nut Trees destroyed.	No. of Coco-nut Trunks destroyed.	No. of Dung-heaps destroyed.	No. of heaps of Padi-husks destroyed.	No. of Notices issued.	No. of Summonses issued.	Amount of Fines recovered.
						\$ c.
<i>Northern District, Province Wellesley.</i> 873	1,307	151	65	1,920	27	49 50
<i>Central District, Province Wellesley.</i> 482	756	72	34	609	7	12 50
<i>Southern District, Province Wellesley.</i> 114	208	70	26	112	Nil	Nil
<i>Penang.</i> 596	3,031	292	32	1,226	10	17 00
2,065	5,302	585	157	3,867	44	79 00

Agricultural Show.

18. A most successful Agricultural Show was held at Butterworth, Province Wellesley, in June, an account of which was published in the *Government Gazette* of August 25th. Altogether there were nine hundred and eighty exhibits and the total expenditure about \$2,000.

From the Governor's Hill Bungalow Garden was exhibited a collection of European Vegetables (not for competition) which received honourable mention. Samples of Para-rubber from a tree in the Waterfall Garden also attracted attention. Mr. R. DERRY, Superintendent of Government Plantations, Perak, exhibited a splendid collection of tuberous Begonias, Pelargoniums, Fuchsias, &c., grown on Maxwell's Hill at an elevation of nearly 4,000 feet. I am told that from a horticultural point of view this was the most interesting feature of the show. It is also a striking example of what a few degrees of temperature will do for plants. None of these things can be satisfactorily grown in the plains no matter what pains are taken.

Governor's New Quarter, Sepoy Lines.

19. Considerable alteration and improvements have been made in the grounds of the Governor's New Quarter by the removal of the bamboo fences and planting four large clumps of Palms, &c., supplied from the Waterfall Garden. Before planting, the ground had to be raised and the purchase of red earth for this purpose absorbed a large proportion of the money available for this work. The effect, when the trees get up, will be satisfactory.

Para-Rubber.

20. In last year's report, I gave the result of tapping the largest Para-rubber

tree growing in the Garden, planted in 1885. Since then two more tappings of the same tree have been made, first in April, and again in November, without so far as can at present be seen any injury to the tree. The result of these tappings, all practically within a year, is close on nine pounds of dry rubber. In addition to this, one pound was taken in 1897 and valued at 3/3 per lb. There is said to be a considerable difference in the yield of trees of the same size and age growing under similar conditions, so possibly this is an exceptionally good one and it is desirable that several trees should be operated on at the same time in order to arrive at a correct estimate of the average return. Unfortunately we have not the means of doing this here as there are only a few trees in the Garden and most of them planted in poor dry stony soil where they have made very slow growth. On the first occasion tapping was commenced on the 16th November and terminated on the 20th December, and yielded 3 lbs dry rubber. The second commenced on the 8th of April and continued to 14th May, the result being 2½ lbs of dry rubber. Third commenced on the 23rd November and ended on the 23rd December. The first and third tappings took place towards the end of the wet season and the second at the end of what may be considered our dry season. The same number of collections were made on each occasion. A thin shaving was removed from the lower surface of the oblique cuts, made on the first morning, thirteen times on alternate mornings unless Sunday intervened or rain prevented. At 11 A.M. the tins were brought in and the contents poured into a soup plate and by the following morning it had coagulated. After pressing out the water by hand it was weighed. Unfortunately the record of the weights of the April-May tapping has been lost, but as each day's collection was numbered and preserved there is no doubt as to the correctness of the quantity of dry rubber obtained. The following table shows the quantity obtained each day at the first and third tappings and is interesting as showing the small quantity obtained at the beginning and the necessity of renewing the wound on the same surface.

Weight of Wet Rubber obtained at each collection in ounces.															Total Wet.		Total Dry.	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	lb	oz.	lb	oz.
No. of Collection	1	2	3	4	5	6	7	8	9	10	11	12	13	14	...	...	...	...
Nov. and Dec., 1898	3¼	1¾	3¼	6	9	6½	8½	6½	8½	6	6½	10	8½	8	5	1½	3	...
April-May, 1899	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	8
November-December, 1899	1	1¼	2½	3	6¾	8	10	10¼	6¼	9	11½	11½	11	8	6	4¼	3	4
Total amount of dry rubber from one tree in one year ...															8	12	8	12

Among planters here there appears to be no doubt as to the satisfactory growth of this tree but some have doubts, based mainly on reports from Ceylon, whether the yield will be sufficient to make it a paying crop. From what I saw as the result of tappings at Peradeniya Gardens, Ceylon, last May, and what the Director told me, nothing like the results obtained in Perak, Singapore, and Penang are obtainable there; unless they have not hitherto continued operating long enough on the same cuts. As regards the cost of collection the average time for these experiments was half-an-hour for each collection, or a total of twenty-two hours for eight and three-quarter pounds of rubber. To this must be added the cost of drying, but this is not a serious matter. On the 21st November last, I visited Mr. D. LOGAN'S Estate in Province Wellesley and made notes of the progress of the trees planted there. The first were planted in March, 1898, and had therefore been planted at the time of my visit one year and nine months.

The largest tree measured eighteen feet high with a girth at three feet from the ground of 6¾ inches. Many others are almost as tall and thick and the average of a number of measurement gave 15 feet height and 4½ inches girth. A plot planted nine months later, *i. e.* in December, 1898, has grown relatively better, the average being 12 feet high and 4 inches in girth. The whole plantation looks well but there have been many losses among those planted during 1899 owing to their being submerged before they had become established.

After this tree has become well rooted, flooding the land for a time does not appear to do much harm but when newly planted it is fatal. Some rows that I advised being manured with cattle manure in the early part of the year as an experiment show no appreciable benefit from the treatment.

Gutta Percha.

21. On my return from leave at the beginning of November, I received from the Hon'ble the Resident Councillor some correspondence with reference to "Gutta Taban" (*Dichopsis gutta*). I have not yet had time to examine all the forest reserves so as to be able to give a definite idea of the number of trees in Penang but I am certain that there are many more than is generally supposed.

In one morning, I counted twenty-three trees, some of them sixty feet high, and the smallest forty. The largest measured 51 inches in circumference at 6 feet from the ground and the smallest eleven inches. With the exception of a few young trees, two to four feet high, found near two of the largest trees, there appears to be nothing intermediate in size between those mentioned (which are probably all about the same age) and young seedlings of three or four months' old, which shows that some of the trees fruited during the past year. There are several possible ways of accounting for the absence of trees of intermediate stages, such as the destruction of the seeds or young plants by animals, or as is sometimes the case in this country, the trees only fruiting at long intervals, but I believe the correct explanation lies in the fact that up to 1884 which was the first conception of Forest Conservancy in this Settlement every Gutta tree was cut down in the customary native manner as soon as it was big enough to pay for working and before it was old enough to produce seeds and this season is the first crop of any importance that has been produced for a long time. I am confirmed in this opinion by the fact that we have been watching for fruit of this tree for many years and only on one occasion succeeded in getting a few just sufficient for herbarium specimens. About eight hundred young plants have been collected and planted in pots to be grown on until large enough to be planted out in some suitable place.

Propagation by cuttings again proved a failure. Attempts at tapping one tree in the same manner as Para-rubber proved a failure, a little gutta is obtained when the incisions are first made but not enough to pay for collecting in this manner, and a renewal of the cuts as in Para-rubber yield nothing.

Botanical Tours.

22. In February, I obtained the use of the Government Steam Launch for four days and visited the Langkawi Islands. Many of the small Didymocarps and other rock plants were however shrivelled up and difficult to find. Most of the trees on the smaller rocky Islands were quite leafless and presented a striking contrast to the vegetation in Penang at the same season.

Impatiens Mirabilis (Gouty Balsam) which was one of the objects of my journey, I found quite leafless at this season.

It grows on and between sharp pointed dark coloured rocks within a few yards of the sea beach and at a short distance has a striking resemblance to the antlers of a deer. Plants five to six feet high, and with stems more than a foot in diameter at the base were seen, but the branches are so brittle that it is almost impossible to get them down from the rocks without damaging them. I did not attempt to bring away the largest plants, and those we did get were only obtained in good condition by placing several men in a line a few feet apart and passing the plants from hand to hand, then moving on and repeating the process.

To move about on these sharp rocks in an upright position is a matter of great difficulty even with strong boots, and with bare feet almost an impossibility.

Many other interesting plants were collected and it is desirable that a visit should be made to these Islands about the middle of the rains. There are no doubt many small rock plants that are not to be seen in the dry weather and that is the only season at which any collector has so far as I know been there.

The reason for this is that during the South-West Monsoon it is not very safe to go out in a small Launch and there is no other way of doing it except in a sailing boat.

On my return from the Island of Terutau to Kwah, I had the good fortune to meet there His Highness the Rajah Muda of Kedah, who not only assisted me at the time but promised every assistance should it be found possible to get out there this year during the wet weather.

23. In October, Mr. FOX, while acting here, made a short visit to Perak and added many specimens to the herbariums both in Penang and Singapore. He also collected many living plants for cultivation.

C. CURTIS,

Assistant Superintendent of Forests.

17th January, 1900

APPENDIX A.

Revenue and Expenditure of the Botanic Gardens, Penang, 1899.

REVENUE.		EXPENDITURE.	
	\$ c.		\$ c.
Government Grant— Maintenance of Water- fall Garden ...	4,500 00	{ Wages of Gardeners and Coolies	3,054 58
		{ Tools and Materials for Repairs	304 25
		{ Material for renewing Plant-shed	129 43
		{ Do.	390 00
		{ Planks for boxes and labels ...	131 07
		{ Pots and Tubs ...	126 93
		{ Chicks for Plant-sheds ...	89 14
		{ Freight and Cartage ...	24 10
		{ Plants ...	10 50
		{ Periodicals ...	16 25
		{ Material for Herbarium ...	17 55
		{ Manure and Cartage ...	31 95
		{ Paint and Oil ...	18 92
		{ Iron-work for Fernery ...	18 67
		{ Lime ...	8 70
		{ Miscellaneous and Petty Expenses	110 82
		Balance ...	17 14
		Total ...	4,500 00
Government Grant— Upkeep of Grounds of Governor's Hill Bungalow	1,000 00	{ Wages of Gardeners and Coolies	834 60
		{ Manure ...	82 45
		{ Seeds ...	36 73
		{ Tools and Material ...	43 41
		997 19	
		Balance ...	2 81
		Total ...	1,000 00
Government Grant— Maintenance of Experi- mental Nursery ...	200 00	{ Wages	174 86
		{ Manure ...	21 60
			196 46
		Balance ...	3 54
		Total ...	200 00
Government Grant— Expenses of carrying out Provisions of Coco-nut Trees Preservation Or- dinance ...	836 00	Inspector's Salary and Travelling Allowance ...	516 00
		Salaries of Notice Server and Climber ...	192 00
			708 00
		Balance ...	128 00
		Total ...	836 00

APPENDIX A—*Concluded.**Revenue and Expenditure of the Botanic Gardens, Penang, 1899.*

REVENUE.		EXPENDITURE.	
	\$ c.		\$ c.
		Pony Allowance	213 00
Government Grant—		Personal Allowance and Expenses	
Travelling and Personal	330 00	of Botanical Tours	73 80
Allowance		Passage of Assistant Superintend-	
		ent of Gardens, Singapore, and	
		family to Penang	39 80
		Travelling Expenses in Province	
		Wellesley	3 00
			<hr/>
Total amount of Gov-	6,866 00	Balance	329 60
ernment Grant }			40
			<hr/>
			330 00
Revenue from sale of		Total Expenditure	\$6,714 11
Plants	883 17		
Receipts from Swim-			
ming bath }	28 50		

C. CURTIS,

Assistant Superintendent of Botanic Gardens.

**Reports on the Forest Reserves in the Straits Settlements,
for the year 1899.**

SINGAPORE.

No additions were made to the Reserves during the year and their number remains twenty as last year. I am counting the Seletar Reserve as distinct from its extension which is really a new Reserve. The names, areas, etc., of the Reserves are given in the subjoined table:—

No.	Name of Reserve.	Area.	Number of visits by C. L. R.	No. of visits by Forest Ranger.	Nature of Reserve.
1	Bukit Timah ...	<i>a. r. p.</i> 847 0 00	5	8	Hilly. Big jungle tailing off on East into scrub.
2	Jurong ...	412 0 00	3	15	Swamp and hill mixed, not much good jungle.
3	Pandan ...	2,140 3 16	2	14	Almost all mangrove swamp, a little lalang scrub.
4	Ulu Pandan ...	4 3 09	9	10	A little patch of 25 years old jungle on small hill.
5	Bukit Panjang ...	117 2 16	2	6	Practically all lalang, with a crown of fair jungle on hill top and some wild getah.
6	Bukit Timah Road 10th mile ...	13 0 28	1	6	Small jungle on small hill.
7	Chua Chu Kang ...	49 0 00	2	5	Low-lying small jungle.
8	Tuas ...	1,601 3 32	2	4	Mostly mangrove swamp. Rest, except in one place, poor jungle.
9	Sungei Murai ...	314 1 05	3	5	Mostly mangrove swamp. Good jungle on one or two hills.
10	Sungei Buloh ...	770 2 16	2	10	Mangrove swamp and poor jungle.
11	Kranji ...	756 0 32	2	10	do. with one patch of better stuff.
12	Sembawang ...	1,046 3 38	1	4	Hilly. Good jungle and scrub getting worse towards Chan Chu Kang.
13	Mandi ...	407 0 32	2	4	Hilly, covered with bluker and scrub except Bukit Mandi where the jungle is good.
14	Kranji Road 13th mile ...	9 2 16	1	10	High land, scrub covered.
15	Changi ...	1,393 0 00	2	19	Some fair jungle towards North and East, the rest very poor.
16	Selitar ...	1,429 1 08	2	9	Mostly poor scrub and mangrove.
17	Chan Chu Kang ...	813 3 08	3	9	Several good patches of jungle; the rest better than in many reserves.
18	Ang Mo Kio ...	296 0 02	9	9	All small scrub and swamp growths.
19	Sempang ...	5 0 00	1	6	Nice jungle on road side, swamp growths at back.
20	Selitar Extension ...	Not known	2	6	Mangrove swamp, poor scrub and lalang.

Numbers one to fourteen of the above table were in charge of Forest Ranger NONIS, under whom were 6 of the Forest Guards. Three of these Guards were stationed at Bukit Timah and looked after the first 5 Reserves enumerated above. The other three, stationed at Kranji, did the same for the remaining nine Reserves of this district. Each party had for use in the sea side and river side Reserves a sampan kept in the one case at Kampong Ayer Terjun and in the other at Kranji. Despite the large area (8,491 acres 1 rood 6 pls.) of these Reserves the paths and boundaries were kept in very good order and their condition reflects great credit on the Forest Ranger and his subordinates.

2. The Changi Forest Reserve was under the supervision of Forest Ranger RAPPA who had, to assist him, two Guards stationed at the XII mile (Changi Road). During his absence from work through sickness, two of the paths were allowed to become overgrown, but they are now all in fair order again. The Guards have a Government boat, kept at Changi.

3. The remaining Reserves were in charge of Forest Ranger RODRIGUES whose two Forest Guards were quartered at Chan Chu Kang. It was only after considerable trouble that the Ang Mo Kio paths were put into proper order, and only quite at the end of the year that the streams running through Selitar Extension Forest Reserve were bridged; before this was done part of the Reserves could not be inspected except from the River. It seems difficult to get or keep good Guards here and the present men complain of the work a good deal. A boat is kept at Chan Chu Kang.

4. Prosecutions in respect of the Reserves were instituted to the number and with the results shown below:—

	<i>No. of Cases.</i>	<i>No. of convictions.</i>	<i>Cases dismissed.</i>	<i>Cases settled.</i>	<i>Fines inflicted.</i>	<i>Fines recovered.</i>
Western Division	15	15	...	...	\$652	\$252
Northern Division	4	4	...	...	234	24
Eastern Division	...	...	...	...	...	...

In the Western Division nearly half the cases were cases of laterite stealing. Only one was a case of occupation of part of a Reserve, and the offender was ejected.

5. There were 8 fires in the Reserves during the year as shewn below:—

Date.	Name of Reserve.	Amount and nature of Reserve burnt.	Remarks.
Feb. 1899.	Pandan. ...	50 acres of lalang burnt ...	No evidence to enable prosecution to be instituted.
Dec. 1899.	Bukit Timah Road 10th mile. ...	½ acre of resam and scrub burnt ...	Offender allowed to settle in Land Office by payment of twice the value of the wood burnt.
21st Nov., 1899.	Changi. ...	A few trees on edge of reserve scorched. ...	As above.
8th Feb., 1899.	" "	8 acres of lalang burnt ..	No evidence for a prosecution could be got.
4th Feb., 1899.	Selitar ...	15 acres of lalang and brush-wood burnt ...	" "
25th Aug., 1899.	" "	10 " "	" "
6th Sept., 1899.	Ang Mo Kio ...	2 " "	" "
25th Sept., 1899.	Chan Chu Kang ...	4 acres of lalang burnt and few rengas and glam trees	" "

6. In the early part of the year the Getah plantation at Sembawang was cleared of undergrowth by the Forest Guards and a small sum was voted to the Gardens Department for its more efficient up-keep. Another small sum was voted to the same Department, and Getah planted by it in a small patch of the Bukit Timah Reserve. Sanction was also obtained of a scheme for paying a small bonus to each of the Forest Guards who succeeded in forming near his quarters in his leisure moments nurseries of useful timber trees for future transfer to the Reserves. And quite at the end of the year the Collector was called on to formulate a scheme for the improvement of the position of these Guards who are, as was pointed out in paragraph IV of last year's report, peculiarly exposed to temptations to dishonesty. There are no other improvements or attempted improvements of the Reserves to be recorded for 1899.

7. No passes to cut wood in the Reserves are now issued and the revenue from them was therefore nil.

8. The expenditure on the Reserves amounted to \$1,048.16, of which all but \$81 (spent on uniforms and bill hooks for the Guards) represents wages and rice allowance, the Corporal being paid \$9, the two Lance-Corporals \$8 each and the seven ordinary Guards \$7 each per mensem. The expenditure in 1898 was \$1,158.50, but in that year a boat was purchased.

9. As far as possible the Collector of Land Revenue's inspections enumerated in the table in paragraph 1 have been surprise visits by the Collector of Land Revenue alone, but in Reserves like Selitar, Tuas, Pandan, Morai, Kranji, etc., the Guards have

necessarily had previous notice, as without their boats complete inspections of these places are impossible. On 25th June, however, the Collector of Land Revenue was able to take the Guards straight without notice from Mandi to Morai, with the result that a party of Malays was there detected cutting wood on a private pass issued by Corporal KASAN. The Corporal absconded at night, but was later on arrested, and on conviction of receiving illegal gratifications sentenced to a month's imprisonment.

10. He was dismissed the service and his place filled departmentally. In place however of three of the Guards who gave up their work, outside men had to be engaged. These three resignations confirm or tend to confirm the suggestion made in paragraph 4 of last year's report that the conditions of the service are not such as to attract or retain men. The men at present employed are all Javanese. In a Malay Country one feels that Malays have a kind of claim to billets of this sort, but I am told that the genuine native when so employed suffered more from sickness and laziness than his Javanese successors do.

11. From the table at the beginning of this report it will be seen that much of the Collector's attention was bestowed on three Reserves (Bukit Timah, Ulu Pandan, and Ang Mo Kio). These were peculiarly exposed to depredations, the last two being practically surrounded by alienated land, the home of numerous small Chinese cultivators squatting there. In a supplementary statement the dates of the Collector's visits are given.

W. L. CARTER,
Acting Collector of Land Revenue.

LAND OFFICE,
Singapore, 29th January, 1900.

PENANG.

North-East District.

1. The Forest Reserves in this district are as follows:—

Block <i>D.</i> Government Hill, etc.,	Area 3,185 acres	} Omitting fractions of acres.
Block <i>E.</i> Highlands	252 "	
Block <i>F.</i> Penara Bukit	233 "	
Block <i>I.</i> Relau Hill	18 "	

2. I visited these Reserves where the boundaries were open at least once during the year and some of them several times.

The two Forest Rangers paid 78 visits between them to different parts of the Reserves.

3. The staff employed is two Forest Guards and two coolies with three extra coolies employed during the latter part of the year.

The work of this staff is confined to keeping the boundary lines open and preventing encroachments in the Reserves named at the head of this Report.

4. There were five prosecutions for wood-cutting, all except one in Block *D.* One case was dismissed. In the other four fines amounting to \$40 were imposed.

5. I regret to say that the present staff is not sufficient to keep the boundaries properly cleared. For instance, it was impossible to get the line from Penara Bukit to the Western Hill opened during the year, but with this exception the boundaries of the Government Hill Block, the Highlands and Penara Bukit Block are fairly well cleared.

6. The new block *I* has not yet been opened by a surveyor, but I hope that this will be done shortly.

7. The present staff with small additions recommended elsewhere is sufficient to protect the Reserves from encroachments and from timber cutting of any consequence.

8. The Expenditure was as follows:—

Salaries of Forest Guards	...	...	\$216.00
Coolies, purchase of tools, etc.	...	...	284.25

9. The total area of the Reserves in Penang Island is over 10,000 acres.

G. A. HALL,
Acting Collector of Land Revenue.

LAND OFFICE,
Penang, 26th January, 1900.

South-West District.

Sir,—I have the honour to forward herewith my report for 1899 on the Forest Reserves in the South-West District.

2. Name and area of each Forest Reserve:—

					<i>a.</i>	<i>r.</i>	<i>p.</i>
<i>A.</i>	Pantai Acheh	Lot 132	Mukim I		3,208	0	08
<i>B.</i>	Laksamana	" 174	" II		465	2	30
<i>C.</i>	Telok Bahang	" 181	" II		380	1	36
<i>G.</i>	Ginting Hills	" 247	" VII		21	2	14
<i>H.</i>	Bukit Gemuruh	" 27	" VII	}	205	3	06
		" 52 ¹¹	" VII				
		& " 190	" IX				
<i>I.</i>	Part of Relau Hills	" 79 ¹ , 75, 80 ¹¹ , 43 ¹¹ , M V	Mukim X	}	151	2	25
		& " 1					

3. Each of these Reserves has been visited by myself or my predecessor and the Forest Ranger respectively during the year as follows:—

Forest Reserve	<i>A.</i>	By the District Officer twice; by the Forest Ranger 21 times.
"	<i>B.</i>	" three times; " 7 "
"	<i>C.</i>	" twice; " 9 "
"	<i>G.</i>	" once; " 11 "
"	<i>H.</i>	" four times; " 18 "
"	<i>I.</i>	" four times; " 17 "

4. *Staff.* The Staff consists of one Forest Ranger, one Forest Ranger's Man, two Forest Guards, and two coolies. The Forest Ranger and his man are stationed at Balik Pulau, but their supervision extends over the whole group of Reserves situated within this District. The rest of the staff are located at Telok Bahang, where the most important of the Reserves, *A.*, *B.* and *C.*, are situated. I have tried to introduce some kind of division of labour, assigning to one Guard and one coolie the clearing and patrolling of Forest Reserves *B.* and *C.* and half of Forest Reserve *A.*; and to the other Guard and the other coolie the remainder of Forest Reserve *A.* and Reserves *G.*, *H.* and *I.* It is however impossible to rigidly adhere to this distinction.

5. *Prosecutions.* Only one prosecution occurred during the year in connection with the Reserves. This was for cutting wood from the new Forest Reserve on Relau Hills and the man was fined \$15 and costs.

6. *General.* During the month of January some Chinamen in clearing land newly taken up near Forest Reserve *C.* burnt down about one or two acres of that Reserve. As the damage appeared to have been accidental, they were not prosecuted, but consented to pay \$25.35 for the damage done. They have also been kept further off the boundary of the Reserve than would otherwise have been the case.

It was reported towards the end of the year that people were cutting "getah taban" under the name of "Ekor". They have been warned against this practice and passes to cut "Ekor" are no longer issued. I would suggest, however, that it would be as well to cut that wood out of the Timber Roll.

The boundaries of the new Forest Reserve could not be cleared during the year, as it had not yet been re-surveyed. Both operations have since been begun.

The present staff were unable to get all the boundaries of all the Reserves quite cleared during the year. I believe, however, that an augmentation of their number is under consideration.

In Forest Reserve *A.* which reaches to the seashore, it appears to have been the custom of some Malays for some years past to encamp on a small piece of the shore, in order that they may be able to prosecute their fishing during stormy weather, without having to return to Telok Bahang. I understand that they have in former years obtained permission to do so, on the condition that they erected nothing in the shape of a house, but slept simply under "Kajang" which they bring and carry away with them. Although I believe that they have never given any trouble, nor raised any suspicion of cutting wood there, I am not certain that the practice is an advisable one, and do not feel justified in sanctioning its continuance on my own authority.

Forest Reserve *H.* was increased during this year by the addition of a piece of formerly alienated land of about four acres. The land is virgin jungle on the top of the hill, and had for some time been included in practice in the Reserve; it has now been formally included in the Reserve, the owner having been unaware that the land

belonged to him and consenting to give it up on repayment of the rent, etc. which he had paid on it.

G. A. HEREFORD,
Acting District Officer.

PROVINCE WELLESLEY.

Northern District.

The areas of the two Reserves remain the same as last year.

- (a) Tasek Glugor 3,055 acres.
(b) Ara Kuda 562 acres.

Tracings are attached* showing roughly in different colours the proportions of the Reserves consisting of virgin jungle, secondary jungle and lalang interspersed with brushwood. I have found in Tasek Glugor Reserve the remains of an old Malay Kampong, abandoned some 15 years ago, on which are one or two coco-nuts and some fruit trees. There is but little good wood; the Reserves are only known to contain 9 mirbau trees, 10 metopus trees and about 200 young tembusu trees.

2. The Reserves were each visited once a week by the Forest Ranger during the year. The Forest Guard visited some part, of one of them, about 24 times a month. I visited the Tasek Glugor Reserve in the end of December but had to postpone visiting that of Ara Kuda for want of time. It was visited by my predecessor early in the year. I only took up my appointment on the 16th December.

3. The boundaries were kept clear as well as could be done by a single man. Where the boundary line runs through lalang it has been found useless to attempt to clear it, as it grows up again directly. The line is best kept along the small holdings where the owners residing on the spot are required to maintain it.

4. There were six fires in the Tasek Glugor Reserve consuming in all about 150 acres of lalang. The worst of these fires is that they do not extirpate the lalang which grows again with renewed vigour, while they entirely destroy the brushwood which would in time drive out the lalang and enable the ground slowly to revert to forest. There were four fires in Ara Kuda Reserve consuming about 70 acres of lalang and brushwood. The cause of these fires can only be conjectured; probably most of those in the Tasek Glugor Reserve were due to the throwing away of lighted matches by coolies passing along the road from Bukit Salarong to Tasek Glugor, which bisects the Reserve.

5. There was only one conviction for trespass. This was against a Chinese planter named Fong Swee Kong for cutting timber in the Ara Kuda Reserve. He was fined \$10.

A. W. O'SULLIVAN,
Senior District Officer.

23rd February, 1900.

Central District

1. The Forest Reserves in the Central District are:—

	<i>a.</i>	<i>r.</i>	<i>p.</i>
1. Bukit Seraya, Lots 679 and 680, Mukim XVII ...	112	0	04
2. Bukit Mertajam, Lot 815, Mukim XVII ...	162	2	01
3. Bukit Juru, Lots 542 and 454, Mukim XII ...	525	0	10
4. Bukit Gajah Mati, Lots 637/8/654, Mukim XVI ...	82	1	13
5. Bukit Gua Ipoh, Lot 410, Mukim XX ...	338	0	35
6. Kubang Ulu Experimental Gardens, Lot 394 ¹¹ Mukim XX ...	3	2	03
	<hr/>	<hr/>	<hr/>
	1,223	2	26

* Not printed.

2. The visits paid are shewn in the following table :—

	<i>Reserve</i>	<i>Times visited by D. O.</i>	<i>Times visited by F. Ranger.</i>
1.	Bukit Seraya	1	9
2.	Bukit Mertajam	3	5
3.	Bukit Juru	3	8
4.	Bukit Gajah Mati	5	9
5.	Bukit Gua Ipoh	4	9
6.	Kubang Ulu Experimental Gardens	4	8

3. There is no special staff employed to look after these Forest Reserves, but it is the duty of two Forest Rangers to inspect them from time to time.

4. There were only four prosecutions in 1899 in respect of the Reserves, *viz.* :—

	<i>Summons Case No.</i>	<i>Fined</i>	<i>\$25 and costs</i>
1	Bukit Seraya	79	20 and costs
2	Bukit Mertajam	34	20 and costs
	do.	39	20 and costs
3	Bukit Juru	316	20 and costs

5. No fires took place in any of the Reserves.

6. The Gua Ipoh Reserve consists chiefly of lalang. If it is to be of much use as a forest, some good trees should be planted and the lalang cleared. At present the only Reserve with much good timber is the Juru one.

7. The Experimental Gardens were visited by Mr. FOX. They have been placed under the charge of the District Officer, but there is no vote for the up-keep consequently very little can be done. The trees are planted very closely together and appear to be somewhat stunted. The land is small and rather out of the way, but if Government decide to retain it as a Reserve a gardener should be appointed to look after it. A nursery of this kind may be very useful, but the utility of this particular one is doubtful.

8. The other Reserves form the crowns of hills and are useful for the maintenance of rainfall on the lower slopes.

W. PEEL,
District Officer.

BUKIT MERTAJAM,
January, 1900.

Southern District.

Bukit Panchor Reserve, Lot 1531 Mukim VIII, Area 1,471 acres 1 rood 36 poles.

1. The Reserve was visited on four occasions by the District Officer *viz.*, on the 7th March, 6th June, 22nd September and 31st December, and on 15 occasions by the Forest Ranger.

2. The staff employed is one Guard at \$12 per mensem.

3. The number of prosecutions undertaken was three.

In the first case, KHO AH TEK was prosecuted for planting Tapioca in a portion of the Reserve which consists solely of lalang. His trespassing seemed at the time to be due to a misunderstanding, he was therefore cautioned only, but his Tapioca was uprooted.

In the second case, MAT was prosecuted for cutting Bertam and fined \$3.

In the third case, the former defendant KHO AH TEK was found to have re-entered upon the ground from which he had been ejected. In default of payment of the fine of \$50, he received 3 weeks' rigorous imprisonment, and for resisting the Forest Guard a further period of 3 weeks' rigorous imprisonment.

4. The Forest Reserve as it now stands has an exceedingly irregular boundary, portions of it being almost entirely isolated from the main block by alienated lands. These portions are as a rule composed of lalang or sparse and small brushwood, and the main block would be far more easily protected if these unimportant outlying portions were separated from it entirely.

5. The rest of the Reserve is for the most part big jungle on hilly ground. To the East it is bounded by the frontier of Kedah. On this side the jungle in Kedah territory stretches for some miles, so that there is little likelihood of illicit wood-cutting.

6. The vote for maintenance of the Reserve is \$80, of this \$32.75 was spent in clearing the boundaries.

7. No fires occurred during the year.

R. J. FARRER,

Acting District Officer, Nibong Tebal.

8th March, 1900.

DINDINGS.

1. The Reserves remain the same in number as in 1898, *viz.*, six, as follows:—

- (1) Tanjong Burong (firewood only)
- (2) Bukit Telok Sera and Bukit Segari.
- (3) Gunong Tunggal.
- (4) Tanjong Hantu.
- (5) Lumut Hills.
- (6) Pangkor Island (containing 2 separate Reserves, classed as one).

As none of these Reserves have been surveyed it is not possible to give their areas even approximately. I am, however, convinced that figures given in previous reports—but which it was stated at the time were little more than guess-work—have considerably under-estimated the actual area in every case.

The boundaries of the largest Reserve, *i. e.* Bukit Telok Sera and Segari have been slightly extended during the year: the Eastern boundary was previously, for about three miles of its length, the bridle path connecting Lumut with Bruas: this path has recently been converted into a cart road, and in the Segari district it was found advisable to abandon the old line in favour of one lying about a quarter of a mile farther east. As the road forms the natural boundary the extra strip of jungle has now fallen within the reserved area.

Inspection, etc.

2. The Reserves were inspected during the year as follows:—

	<i>By District Officer.</i>	<i>By Forest Inspector.</i>
Tanjong Burong, ...	three times	four times.
Telok Sera and Bukit Segari	four „	ten „
Gunong Tunggal ...	twice	nine „
Tanjong Hantu ...	three times	seven „
Lumut Hills ...	ten „	sixteen times.
Pangkor ...	eight „	twenty-eight times.

The Reserves have also of course, been regularly patrolled by the Forest Guards.

Supervision.

3. The distribution of the Forest Guards was the same as in the previous year, *viz.*:—

- At Lumut, 2 (for watching the Reserves at Lumut, Pangkor and Tanjong Hantu).
- At Beting Luas, 2 (for Gunong Tunggal and Segari).
- At Bruas, 3 (for Bukit Telok Sera and Tanjong Burong).

Prosecutions.

4. No prosecutions for illicit cutting in the Reserves were undertaken in 1899. As has already been pointed out, the felling of large timber cannot be carried out undetected in this district; but to effectually check the removal of smaller jungle

produce is out of the question with the present inadequate staff of guards *e. g.* it is impossible for the 2 guards at the Lumut Station to patrol effectively the Reserves on Pangkor Island and that at Tanjong Hantu in addition to the Lumut Reserves. Two men cannot be simultaneously in three places, and in this case they cannot even be simultaneously in two inasmuch as their Reserves are separated from each other by several miles of sea and at least 2 men are required to man the boat which takes them there. At the same time I have no reason for thinking that petty thefts of jungle produce from the Reserves are common: the unreserved areas of jungle contain an almost inexhaustible supply of bertams, mengkuang, rotan, etc., and the fees for licenses to collect such products are so low that there can be small temptation, even to the poorest class of native, to risk the heavy penalty attached to cutting in the Reserves. I recall only two instances in the past year where I noticed traces of jungle produce having been so cut. In each case it was 'bertam,' and the quantity removed was inconsiderable.

5. If, however, the Reserves are to be patrolled at all, provision should be made for patrolling them effectively. Under present conditions this cannot be done, and I recommend that the number of Guards be increased from 7, as at present, to 11, to be distributed as follows:—

Lumut	...	2	
Pangkor	...	2	
Tanjong Hantu	...	1	} This Reserve is the smallest and most easily patrolled.
Beting Luas for Gunong Tunggal		2	
Bukit Segari and Teluk Sera		2	
Bruas, for Tanjong Burong		2	

Quarters are already available at Lumut, Beting Luas and Bruas for the Guards stationed there. A light-house is to be erected at Tanjong Hantu next year with quarters for the Keepers, and the latter might be extended to include accommodation for the Forest Guard: while at Pangkor the men can be quartered in the unoccupied rooms at the Police Barracks. A new station will be necessary at Segari (Kampong Acheh) the cost of which would be, roughly, \$200.

6. It is, I understand, the intention of Government to increase the number of Reserves in this district. Any addition to the present areas will involve a proportionate increase in the protective staff.

7. The lease of the Tanjong-Burong Firewood Farm expired on December 31st 1899, and will not be renewed. The terms of contract, regulating size of timber to be cut, number of coolies to be employed, etc. were very strict and effectually precluded the possibility of the stock of firewood in the district being even temporarily exhausted. It has been decided, however, that this Reserve is to be placed on the same footing as those containing large and individually valuable trees, and closed absolutely and unconditionally for any cutting operations whatsoever. This decision is, in my opinion, a matter for regret. Bakau, Tingah, Alang Gadei and similar firewoods are quick-growing trees which attain full size in 10 to 12 years from the time their first shoots appear, they are very prolific, and a bakau jungle in which cutting has been carefully regulated, and only trees of a diameter of not less than eight inches at, say, four feet from the ground have been cut will renew itself indefinitely. To treat such jungles on similar lines to those reserved for the protection of such valuable trees as Damar Laut, Chengai, Resak, Halbau, Mirbau, etc. which attain maturity only after forty or fifty years and whose reproductive capacity is relatively small, seems, I respectfully suggest, scarcely reasonable; the hard and fast closing of a thickly-growing tract of bakau such as Tanjong Burong means a waste of useful timber and a considerable decrease of revenue simultaneously with an increase in expenditure in protecting it—for the benefit of nobody.

8. Although this report deals primarily with the crown Reserves it may not be out of place—in view of the fact that the Dindings contributes nearly nine-tenths of the total revenue derived by the colony from Timber Royalty—to attach a few remarks on the forests which are not included in the reserved areas.

On January 1st 1899, the Kongsis engaged in the felling, sawing and export of large timber, as opposed to firewood Kongsis, were five in number, *vis*:—

- (1) at Beting Luas, Manager TEH NEO SOO.
- (2) at Sungei Gapis, Manager ONG TEK KWANG.
- (3) at Sungei Segari, Manager BEH CHOW NEO.
- (4) at Ulu Sempit, Manager TEO TEW SENG.
- (5) at Batu Undan, Manager CHEW LIM SWEE.

Early in the year, however, the Beting Luas and the Sungei Segari houses were closed, the coolies from the former were removed to Nior Sebatang, a district some miles to the North of Beting Luas, and a new Kongsis established. The Segari Kongsis was not replaced.

A few months later the Batu Undan Kongsis was also closed and a new one opened by the same owner at Kota Siam.

There were thus four Kongsis working in the district at the end of the year, of which three dealt mainly in meranti and one—the Ulu Sempit house—exclusively in hard woods. The average monthly number of coolies employed in these houses during the year, exclusive of buffalo drivers, grass-cutters, cooks, clerks, barbers, etc., was 104, woodcutters numbering 38 and sawyers 66. In addition to the above a sawyard has also been working all the year at Pengkalan Bharu on the Bruas River, owned by CHIN A CHONG and employing on an average about fourteen sawyers each month. The wood treated at this yard is all cut in Perak territory (Ulu Bruas) and floated down the river in rafts for convenience of transport, the Bruas not being navigable for junks above Pengkalan Bharu.

9. Eleven Firewood Kongsis were at work in the district at the beginning of the year, of which two subsequently closed and two more, belonging to the Firewood Farmer at Tanjong Burong, ceased work at the expiry of the farm lease on December 31st. A new house was, however opened at once by the ex farmer on the opposite bank of the river, and there are thus eight licensed Kongsis in present working. Seven hundred and forty-five passes to cut firewood were issued during the 12 months.

The average aggregate number of coolies employed monthly by the Kongsis (exclusive of the men employed by the Tanjong Burong Farmer) was 62.

One Charcoal-burning Kongsis was open throughout the year at Tebing Rebah employing 13 men. The owner is LIM A TANG.

10. The total number of passes issued for cutting smaller jungle produce, *e.g.* mengkuang, bertams, nibong, rotan, etc., and for collecting damar, was 1652.

11. The scale of fees, duties etc., levied in connection with the various forest industries in the Dindings during 1899 were as follows:—

Monthly passes—

Wood cutters	...	...	...	\$3 per man.
Sawyers	...	...	...	\$3 "
Charcoal burners	...	...	...	\$1 "
Firewood cutters	...	...	...	\$2 "
Jungle produce passes for all produce except nibongs	...	...	...	50 cents.
Nibong passes	...	...	...	\$1
Kongsis owners license	...	...	...	\$1 per 6 months.

a royalty of 15% *ad valorem* on all kinds of hard wood and of 10% on meranti cut in the territory was also levied. In 1900 the monthly passes for charcoal burners and firewood cutters will carry a uniform fee of \$3 instead of \$1 and \$2 respectively as hitherto, and the Kongsis-owner's license will be raised from \$1 to \$6 for the half year.

12. The gross revenue derived from timber royalty during the 12 months under review was \$12,440.48 made up as follows:—

Passes to cut and saw large timber	...	...	\$4,266.00
Passes to Firewood cutters	...	...	2,450.00
Passes to Charcoal burners	...	...	145.00
Passes to Collect jungle produce	...	...	1,216.00
Kongsis owner's licenses	...	...	24.00
Royalties	...	...	4,339.48
			<hr/>
			\$12,440.48

13. Thirty-four prosecutions were instituted for illicit cutting or removal of timber or produce from unreserved Crown Lands, in 26 of which convictions were obtained. The remaining 8 cases were discharged.

The amount of the fines imposed was \$345.50 of which \$266.52 was realized,

The absurdly small number of arrests effected for this offence is due, as has been already pointed out, to the inadequate strength of the Forest Staff. The guards are fully occupied with the care of the Reserves alone, and it is satisfactory to learn that their number will shortly be increased and that separate staffs will in future be

detailed for the protection of the reserved and the unreserved forests of the territory.

14. A small annual sum has been granted for supply badges, parangs, etc., for the guards and for meeting casual petty expenses in connection with forest work here. I would, however, again urge the necessity of providing the Forest Inspector and his men with suitable uniforms, as is done in Perak.

15. Three jungle fires occurred during the year, of which none were in Crown Reserves. No serious damage was done, and, so far as could be ascertained, the fires were in each case accidental.

16. Fifty-five junks cleared from Lumut with planks, scantlings, logs, etc., 272 with firewood, the former without exception being consigned to Penang; of the firewood exported about 50% was taken to Perak ports.

R. P. GIBBES,

Acting District Officer, Dindings.

19th February, 1900.

MALACCA.

SIR,—I have the honour to forward reports from the Collector of Land Revenue and the District Officers at Alor Gajah and Jasin on the Reserves in their Districts, giving record of the number of visits of inspection made to each reserve during the year, the staff of Forest Guards maintained by Government to protect each Reserve and the prosecutions instituted for injuries done to the Reserves.

2. The area of the Reserves at the commencement and the end of the year was:—

	1st January 1899.	31st December 1899.	District in which situated.
1. Bukit Bruang	6,174	6,174	Central.
2. Brisu and Sungei Siput	5,268	5,268	Alor Gajah.
3. Bukit Panchor	3,356	3,356	do.
4. Sungei Udang	4,392	4,392	do.
5. Ayer Panas	3,242	3,242	Jasin.
6. Merlimau,	6,217	6,217	do.
7. Bukit Senggeh	9,429	9,430	do.
8. Bukit Sedanan	11,353	7,806	do.
9. Batang Malaka	...	3,549	do.
10. Bukit Sebukor	...	44	Central.
	<u>49,431</u>	<u>49,478</u>	

They now cover 12.61% of the total area of the Settlement.

3. No cutting of timber either for sale or for Government use is allowed in the Reserves.

4. A site for a forest nursery at Ayer Keroh was cleared and drained during the year and seeds of the following timber trees sown. Mirbau (*Azalia Palembangica*), Kledang (*Artocarpus lanceifolia*), Petaling (*Stromboria Javanica*), Tembusu (*Fagraea peregrina*), Serayah (*Hopea cernua*), Leban Tandok (*Vitex vestita*), Nibong (*Oncas-perma filamentosa*), Penah (*Balanocarpus Sp.*). These will be ready for planting out in 1900.

5. Great difficulty was experienced in getting a sufficient supply of seeds and I was disappointed in not receiving more assistance in this matter from the Penghulus in the Alor Gajah and Jasin Districts.

6. In addition to the above the plantation of Para Rubber trees was much enlarged by the planting of stumps and seedlings received from Singapore and a number of locally grown seeds were also sown and planted out at the latter end of the year.

7. A plantation of 200 cuttings of Getah Rambong (*Ficus Elastica*) was also formed at Ayer Keroh. These grew so well that 400 more cuttings were taken from them in December.

8. If rubber planting should become general the Government will, in a few years, be in a position to supply any quantity of seeds and cuttings required by local planters.

9. The para rubber plantations at the 6th and 7th miles on the Ayer Keroh Road were surveyed and are now known as lots 39,844 and 39,845. The number of the trees

in the first named plantation was doubled. The older trees in these plantations should begin to bear seeds next year.

10. I have included the old Government Garden at Bukit Sebukor in the list of Forest Reserves. It was partially re-opened during 1898. The crop of para seeds was sold for \$133. Seeds of this tree were also sown and planted out and a nursery of roadside trees formed. A quantity of Tembusu seed was also sown for planting out in the waste land in the garden.

11. The ground for the large plantation of Gutta percha producing trees (*Dichopsis Gutta* and *Payena Leerii*) locally known as 'Getah taban percha' and 'Getah Sundek') was selected. It is intended to plant up the whole of the South Western portion of the Bukit Bruang Reserve with these trees,

I have, &c.,

WALTER EGERTON,
Acting Resident Councillor.

RESIDENT COUNCILLOR'S OFFICE,
Malacca, 19th February, 1900.

Central District.

LAND OFFICE,
Malacca, 16th January, 1900

SIR,—I have the honour to forward the Annual Report on the Forest Reserves in the Central District.

2. Part of the Sungei Udang Reserve is included in the District but it is administered from Alor Gajah. The only Reserve in charge of the Collector of Land Revenue is that of Bukit Bruang which now contains an area of 6,173 acres 3 roods and 33 poles.

3. I have paid frequent visits to different parts of the Reserve. On the 20th August I went from Ayer Salak through the Reserve to near Bukit Bruang School. On the 5th September I went through the Reserve from Bukit Bruang School to the boundary at Gapam and on the 8th September from Tualang to Ayer Salak partly along the boundary and partly through the Reserve. I have also been to different parts of the Reserve on various other occasions. The Forest Rangers have not paid special visits, their time being occupied in dealing with applications for Crown land and sub-divisions of holdings.

4. The staff consists of a Corporal and one Forest Guard. The Corporal has 14 years' service and has at one time or another been through most of the Reserves in Malacca. He is aided by the Penghulus of the Mukims adjoining the Reserve, part of whose duty it is to see that no timber cutting goes on.

5. There was no prosecution during the year. Two cases were reported where some saplings had been cut; as they were cut in a part of the Reserve where the growth is light and closely resembling the adjacent unreserved jungle, it was impossible to trace them. There has been no case of cutting the better class timber.

6. There is little to record of the Reserve itself. The lalang is disappearing in many places, but in others there is still no scarcity. It is impossible to say after one year's observation whether these tracts are decreasing in area, but from the nature of the soil and the appearance of similar country in other parts of the Settlement there is every reason to hope that they will be overgrown before many years. To ensure the growth of jungle over these lalang tracts it is only necessary to preserve them from fires. This however is far from easy and fire will throw back the growth of forest seedlings several years while giving renewed vigour to lalang. It is satisfactory to report that only one fire and that of no great extent occurred during the year. If it is difficult to detect trespassers who cut small trees. It is practically impossible to catch the originator of a lalang fire, which may have been burning for hours without attracting notice.

7. A nursery of forest trees was started under the personal supervision of the Acting Resident Councillor and large numbers of seeds of useful trees collected and planted. Re-forestation on a large scale is still some way off, but it has now made a beginning and progress should be steady.

8. The Plantations of Rubber and Forest Trees have been looked after during

the year and are already shewing the good effects of care. The Rubber Trees planted at the Water-works have made particularly good growth.

I have, &c.,

L. A. M. JOHNSTON,
Acting Collector of Land Revenue.

Alor Gajah District.

ALOR GAJAH,
15th January, 1900.

SIR,—I have the honour to submit the following report on the Forest Reserves in the district for the year 1899.

Number and Area.

2. The Forest Reserves are four in number.

Bukit Panchor	area	3,856	acres
Sungei Udang	"	4,392	acres
Brisu	"	5,268	acres
Sungei Siput	"		
	Total	13,016	acres

Inspections.

3. The above forest reserves were visited on the following occasions by the District Officer and the Forest Ranger.

Bukit Panchor by District Officer, 11th May, 20th July, 17th October and 17th December.

Sungei Udang by District Officer, 18th May, 20th September and 30th October. Forest Ranger 20th December.

Brisu—Sungei Siput by District Officer, 24th October, 21st December. Forest Ranger, 20th April and 19th October.

Staff.

4. The staff at each reserve in 1899 is shewn as under.

Bukit Panchor.—1 Corporal and 1 Guard.

Sungei Udang.—1 Corporal and 1 Guard.

Brisu, Sungei Siput—No Guard.

Prosecutions.

5. There were three prosecutions instituted during the year.

(1) On 27th February, TAN AH SENG was fined \$3 for cutting timber in the Bukit Panchor Reserve.

(2) On 18th October, WI AH PIT was fined \$10 for encroachment on the Reserve. This man had been allowed a prospecting licence for tin but remained in occupation after the licence had expired.

(3) In December 4 Chinamen were arrested for firing the lalang in the Sungei Udang Forest Reserve and the case was pending on the 31st December.

Revenue.

6. The total revenue collected on account of the Forest Reserves was \$226.93 made up as follows:—

Bukit Panchor Sale of durians	...	...	\$176.00
" " dukus	...	...	16.80
Miscellaneous (Ataps &c.)	...	...	29.33
Sungei Udang Miscellaneous	...	...	4.80
			<u>\$226.93</u>

Expenditure.

7. The total expenditure was \$400 made up as follows:—

Salaries.	{ 2 Corporals at \$108 2 Guards at \$84 }	\$384.00
Uniforms	...	16.00
		<u>\$400.00</u>

Miscellaneous.

8. Authority has been obtained to employ a corporal and guard at Sungei Siput Brisu in 1900, and to insert an extra pair for the same reserve in the estimates for 1901. It will be also necessary to have extra assistance to re-open the lines which have been entirely overgrown.

9. The paths in the other two reserves have been kept open and are in a satisfactory state.

10. In December there was a rather serious lalang fire on the edge of the Sungei Udang Forest Reserve whereby a great deal of young brushwood was destroyed. Four men have been arrested, and the case is still pending at the date of writing.

11. In Bukit Panchor and Sungei Udang no traces of illicit timber cutting have been discovered beyond those already mentioned. In Brisu Sungei Siput there has undoubtedly been a certain amount of timber cut, partly due to the uncertainty of the boundaries. This will be prevented by the presence of a guard.

I have, &c.,

H. MARRIOTT,
District Officer.

Jasin District.

DISTRICT OFFICE,
Jasin, 8th January, 1900.

Sir, — I have the honour to submit my report on the Forest Reserves of the Jasin District for the year 1899.

The divisions and names of the Reserves in question are given below:—

Reserve.	Area.			Times visited by D. O.	Times visited by F. R.
	a.	r.	p.		
Ayer Panas ...	3,242	1	35	Once specially—October 19th	Frequent-ly passed along the roads which partly bound the Reserves } Nil. The Forest Ranger's time was entirely taken up in reporting on current applications.
Batang Malaka * ...	3,286	0	00	Once specially—November 29th	
Bukit Singgeh and Bukit Sedanan ...	17,708	0	00	Once specially—November 28th	
Merlimau ...	6,217	0	00	Twice specially—February 19th and October 13th	

3. Details with reference to the staff in charge, prosecutions &c are given below:—

Reserve.	Staff.	No. of Prosecutions.	Result.
Ayer Panas ...	1 Lance Corporal and 1 Guard	Nil	
Batang Malaka † ...	do.	2 Quarrying in Reserve. Cutting "ejok"	2 Convictions. Convicted.
Bukit Singgeh and Bukit Sedanan ...	1 Corporal and 1 Guard	1 Cutting "ejok"	
Merlimau ...	1 Lance Corporal and 1 Guard	Nil	Nil

* Areas taken from tracings of Reserves in the office.

† This Guard is in charge of the northern boundary of the Bukit Sedanan Reserve.

Fines amounting to \$16.50 were inflicted.

4. *Ayer Panas*.—The guard were furnished with a carbine and ammunition owing to the prevalence of tigers; on one occasion they were scared away from their work by one.

5. *Batang Malaka*.—On my visit on November 29th, I followed the Southern boundary path from Nyalas to Batang Malaka. The northern boundary is to be opened up in connection with the delimitation of the new Malacca-Johol boundary. Systematic cutting here is impossible owing to the nature of the ground. The population of the neighbouring Kampongs is scanty. I visited the "orang bukit" settlement at Gapis, which is in this Reserve, on a separate occasion, the guard have special orders to see that no clearing is done beyond the spot, where they live.

6. *Bukit Singgeh*.—The old boundary path on the south east side has been cleared almost to the end; the distance from the quarters in this reserve are so great that progress has been slow.

7. *Merlimau*.—The boundaries on the southern side are now nearly cleared, they pass through a great deal of deep swamp covered with thickly growing "umbai" and small stuff which is difficult to clear thoroughly.

8. On no occasion on my special visits or when passing along the boundaries where they abut on the roads did I see any traces of illicit timber cutting. The guards were engaged during the year in looking for various seeds for the nurseries established at Ayer Keroh.

I have, &c.,

R. SCOTT,
District Officer.

STRAITS SETTLEMENTS

ANNUAL REPORT

ON THE

BOTANIC GARDENS

FOR THE YEAR

1900

BY

H. N. RIDLEY, Esq.,

Director.



PUBLISHED BY AUTHORITY

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Annual Report on the Botanic Gardens, Singapore.

Staff.

1. There were but few changes in the Staff during the year. The plant-collector KASDANI proved very indolent and was discharged, a former peon IDRIS being taken on in his place. The Garden's peon was discovered to be stealing and suppressing letters entrusted to him to post, and was arrested and charged at the Magistrate's Court and sentenced to nine months' imprisonment. The coolies worked well, but the supply of good labour is very short, and the price of labour is very high now. The watchmen were a very poor lot and had to be constantly changed. In fact, the class of labour all round is very inferior to what it formerly was, and it is nearly double the price.

Visitors.

2. The number of visitors was unusually large chiefly on account of the large number of persons passing through to China, and the Philippines. There were also an unusual number of Scientists who visited the Gardens. The Regimental Band played as usual on moonlight nights and was highly appreciated. Beyond the theft of four small palms and a few flowers there were no thefts and no prosecutions.

Aviaries.

No additions were made to the aviary buildings during the year, except a few small additional enclosures for special animals. The following animals and birds were added to the collection:—An Albino Porcupine with a normal young one (*Hystrix longicauda*) purchased. A Philippine Deer (*Cervus moluccanus*) presented by Madame HINNEKINDT. One Bornean bear presented by Capt. CUMMING (died shortly after). One Kijang (*Cervulus Muntjac*) female, presented by AHMAT BIN HADJI OMAR. One Mias (*Simia Satyrus*) presented by Mr. DITTMAR. One Slowloris and young (*Nycticebus tardigradus*) presented by CUSTAWI. One Indian Mongoose male, presented by YEO CHEOW BOCK. One Cuscus (*Phalangista* sp.) purchased. Two hybrid Monkeys, one Kijang, and one common Deer were born. During the year two Rhinoceros (*R. sumatrensis*), were on deposit in the Gardens by Mr. PUSTAU. One died from injuries received in trapping, but one was thoroughly healthy and was eventually shipped to Vienna. These animals created a great deal of interest in the public who came in crowds to see them. Among the birds a black Adjutant was presented by GARASAMY PILLAI. One Cockateel presented by Mr. W. NANSON. Two Egrets from Sumatra presented by AHMAT. Three young Owls presented by Mr. BODEN KLASS. One Eagle by Mr. T. BIN CHING. Six whistling Teals, by Mr. A. F. BISCHOFF. Four Christmas Island Pigeons (*Carpophaga Whartoni*) presented by Mr. CLAYTON. One Pergam *Carpophaga aenea* presented by Mr. THOMAS. Four Cassowaries, purchased. A short-eared Owl *Asio accipitrinus* caught in Singapore, the first recorded for this region was purchased.

Reptiles.

One *Python reticulatus* presented by Hon. W. EGERTON. One large *Python curtus* captured at Bukit Timah. One large Tortoise (*Testudo emys*) was obtained at Batu Pahat during an expedition there, and another fine specimen was presented by YEOH KOK CHY, from Telok Anson.

The mortality among the animals was no greater than in former years, and, as usual, chiefly occurred in newly imported animals, which often are sent in in a sick condition; others died apparently from old age among which was a jungle pheasant which had been in the Gardens for over 18 years.

Flower Show.

An exhibition of flowers and flowering plants was held in the Town Hall on April 10th. The plants shown in most classes were not up to the average of past years, though some classes, such as ferns and begonias, were very fairly well shown. There was however a deficit on the working expenses.

Upkeep and Buildings.

The chief building alterations were the reconstruction of the back of the large plant-house, the old wooden posts and ataps were removed and the aisles roofed with chicks from Penang, supported on iron pillars. The old Beaumontia, which climbed over the roof was lowered when the roof was taken away and supported on an arch made of rough coral, in the interstices of which ferns and other plants have been planted. A tank for water-plants was made at one end of the plant-house and has been very attractive. The old wooden tables which used to carry smaller plants in pots were removed and replaced by permanent brick and cement structures which add much to the ornamental appearance of the house. Four additional long coral and cement tables were made in the Nursery, with brick pillars and iron arches to carry chicks or battens which will form a large addition to the space required for pot-plants.

The beds, borders and shrubberies were renewed as required, and manured and cleaned at intervals. About a hundred yards of road running down from the main hill towards the lake was remetalled.

Plants in flower.

The following were among the more interesting of the plants which flowered for the first time in the Gardens. *Camænsia maxima* (West Africa), *Vatica Wallichiana* (Malay Peninsula), *Ilex nigro-punctata* (Brazil), *Ravenia spectabilis* (Cuba), *Solandra grandiflora* (South America), *Ixora barbata* (India), *Bignonia incarnata* (Guiana), *Gymnostachyum Ceylanicum* (Ceylon), *Bignonia* n. sp. (Penang), *Dammara robusta* (Australia), *Aristolochia saccata* *Clærodendro* n. sp. (Borneo), a most remarkable climber with the terminal leaves on the flowering spray of a beautiful red colour *Cleistanthus parvifolius* (Pahang), *Triomma malaccensis* (Singapore).

Korthalsia Scaphigera *Dendrobium refractum* *D. Foxii* n. sp. (Perak), *Cyanastrum cordifolium* (Africa), *Hæmanthus Lindeni* (Africa), *Arisæma Roxburghii* (Penang), *Amomum* n. sp. (New Guinea), *Habenaria Columba* n. sp. (Siam), *Amorphophallus giganteus* and *A Titanum* flowered again.

Plants received and distributed.

During the year there were received 337 packets and bags of seeds, 600 plants and tubers besides the monthly supplies purchased from Messrs. CARTER & Co. Among the seeds of importance were 8 bags of mahogany and 5 lbs. of *Pterocarpus Macrocarpus* from Dr. PRAIN of Calcutta. Some rare palm seeds from HERR WENDLAND of Hereenhausen and Prof. CORNU of Paris. Of the new plant introductions the most valuable from an economic point of view came from the Royal Gardens Kew; amongst them being a new Coffee, and a new variety of Cocoa, a new African rubber *Landolphia Klainei*, some interesting palms and a new pisang, *Musa Livingstonei*.

The finest introduction of ornamental plants was a fine series of nymphæas from Messrs. HENRY A. DREER of Philadelphia, U. S. A., which have flowered very freely and made our lily ponds a beautiful sight in the early morning.

The contributors were as follows:—

The Royal Gardens, Kew.	Messrs. Herb & Wulle.
Botanical Gardens, Buitenzorg.	Messrs. Dammann.
" Melbourne.	T. W. Brown, Esquire.
" Trinidad.	J. S. Goodenough, Esquire.
" Berlin.	M. Cornu.
" Queensland.	M. Vernet.
" Ootacamund.	Messrs. Williams Bros.
" Ceylon.	St. V. B. Down, Esquire.
" Calcutta.	E. R. Salisbury, Esquire.
" Old Calabar.	J. Pereira.
" Sydney.	W. D. Barnes, Esquire.
" British Guiana.	H. Wendland, Esquire.
Conservator of Forests, Dehra Dun.	W. Meikle, Esquire.
" Chittagong.	Dr. Braddon.
H. A. Dreer, Philadelphia.	C. Curtis, Esquire.

There were 399 plants and 134 packages of seeds sent out to various gardens and contributors besides those sent to planters and others in the Colony and Native States. Five Wardian Cases of fruit trees and economic plants were sent to His

Excellency the Governor of British New Guinea, and seven cases of various economic plants to the Congo Free State. A Collection of 69 packages of Carpological specimens was sent to Messrs. HERB & WULLE in exchange for living seeds of cultural plants.

Artist.

The Artist CHOUDHURY was employed in making drawings of interesting plants till July when he was attacked by brain disease and became insane. He was sent to the Asylum and eventually returned to Calcutta. CHARLES d'ALVIS was transferred from the Public Works Department where he had been employed as photographer and commenced work here on November 1st.

Vote	...	...	...	...	\$ 700.00
<i>Expenditure.</i>					
Salary of Artist	...	...	...	...	\$ 450.00
Purchase of Colours, Brushes, Pencils, Rubbers, &c.	...	...	...	...	\$ 33.35
Balance	...	...	...	...	\$ 216.65
					\$ 700.00

Herbarium.

A small number of plants were collected in Malacca and Province Wellesley during my visit in the spring, and an extensive series were obtained during an expedition to Batu Pahat, and also at Panchur on the Johore River. Thirty-three specimens were received from Mr. CURTIS from Penang, and a very interesting collection of 122 specimens was presented by Mr. W. D. BARNES, from Kluang Terbang in Pahang at an altitude of 5,000 feet. Forty-four specimens from the collections of Scortechini were received from Calcutta. Two hundred and seventy-nine Australian and Polynesian ferns and other plants were received in exchange from the Botanic Gardens, Sydney.

Twenty-six specimens of Dichopsis, and Verbenaceæ were received from the Botanic Gardens, Buitenzorg.

The following were distributed to various establishments:—878 specimens to the Royal Gardens, Calcutta, 143 plants and 24 specimens of woods to Kew, 65 specimens and 82 samples of woods to the British Museum, 227 specimens to the Botanic Gardens, Sydney, 12 specimens of sea-weeds to Mr. E. HOLMES for identification, 24 specimens of Dipterocarpeæ to Dr. HEIM of Paris. Twelve pounds of bark of *Roucheria Griffithiana* stated to be poisonous were sent to Dr. GRESHOFF for analysis.

A number of local wood specimens were added to the collection, including a specimen of Chandan presented by Mr. W. D. BARNES and specimens of Perak and other woods obtained by Mr. H. C. HILL, and a specimen of fossil wood presented by Mr. WALSH.

Library.

The following books were added during the year:—

Greshoff Dr.—Indische Vergift rapporten. Presented by Author.

„ Nuttige Indische Planten.

Smith, E. F.—Wilt disease of Cotton, Water-melon and Cowpea. Presented by [Author.

Carleton, M. A.—Cereal rusts of the United States.

Hables, W. H.—A contribution to the Mineralogy of Wisconsin.

Cornstock, G. C.—Studies in Spherical and Practical Astronomy.

Weidman, S.—On Quartz and Keratophyre and Associated rocks.

Schlundt, H.—On the speed of the liberation of Iodine.

Barnes, C. R.—Analytic key to the Genera and species of North American Mosses.

Vernhout, Dr. J. H.—Onderzoek over Bacteriea by de Fermentation der Tabak.

Maiden, J. H.—A second contribution towards a flora of Mt. Koscinko.

„ Some exotic grasses.

„ Native Food plants.

„ The Noogoorra-burr.

„ A new variety of *Dendrobium undulatum*, Useful Australian plants, (eight tracts).

Lotsy, Dr. J. P.—Physiologische Proevengenom met Cinchona.

Schiffner, Dr. V.—Die Hepaticæ von Buitenzorg.

Knapp, S. A.—The present state of Rice-culture in the United States.

- Kamer, G. and Zehnter, L.—Archief voor de Java Suiker-industrie.
 Raciborski, Dr. M.—Parasitischen Algen und Pilze Java's.
 Zimmerman, Dr. A.—De Nematodea der Koggie Wortels.
 Christ, L. and Warburg, O.—Filices Faurieanæ.
 Trimen, Dr.—Handbook of the Flora of Ceylon, part 5.
 Handbook of Jamaica. Presented by Royal Gardens, Kew.
 True, A. C.—Organization Lists of the Agricultural Colleges and experimental Stations of the United States.
 Hicks, G. H.—The germination of seed.
 Kramers, J. G.—Andere mededeelingen over Koffie.
 Godefroy le Beuf, A.—Les Caoutchoucaniers Du Para, Ceara, Panama, de Pernambuco, de l' Afrique, Le Balata, Le method de culture de Para. Catalogue des plantes utiles.
 Vernon Baily.—North American Fauna.
 Palmer, T. S.—The germination of seeds.
 Shea, V. O.—Aspects of mental economy.
 Miller, W. S.—Contributions from the Anatomical Laboratory Wisconsin.
 Maxwell Lefroy, H.—Moth-borer in sugar-cane. Presented by the Commissioner for the West Indies.
 Deane, H. and S. H. Maiden—Observations on the Eucalyptus, part V. VI.
 Dyer, Sir W. Thiselton.—Flora of Tropical Africa, Vol. V. Presented by the Government.
 Andrews, C. W.—Monograph of Christmas Island. Presented by the Trustees of the British Museum.
 King, Sir George.—Materials for a flora of the Malay Peninsula.
 Woods, A. F.—Stigmonose, a disease of Carnations.
 Romburgh, Dr. P. V.—Caoutchouc en Gutta Percha in Nederlandsche Indie.
 Kearney, T. H.—The plant covering of Ocracoke Island.
 Mohr, J.—Overhet Drogen van de Tabak.
 Hart, J. H. and P. Carmody—Seedling canes of Trinidad.
 Bijlert, A. V.—Over Deli-Groud en Deli Tabak
 Boerlage, J. G.—Flora van Nederlandsche Indie.
 Beale, F. E. L.—Food of the Bobolink.
 Webber, H. J.—The immediate effect of Pollen in maize.
 Schreuk, H. V.—Two diseases of red cedar.
 Galloway, B. T.—Progress of commercial growing of Plants under glass.
 " Progress in the treatment of plant diseases.
 Webber, H. J. and E. A. Bessey, —Progress of plant breeding.
 Schmidt, J.—Flora of Koh Chang, part I.
 Heern, G.—Catalogue of Welwitsch's African plants.
 Greshoff, Dr.—Beschrijvingder giftige-planten bij den vischvangst.
 Merrian Hart.—Results of a Biological Reconnaissance of the Yukon River.
 Wood, J. Medley—Natal plants, Vol. 2. Part 2. Vol. 3. Part 1.
 Hitchcock, F.—Trade of the Philippine Islands.
 " Our Foreign Trade in agricultural products, 1890-1898.
 " Trade of Puerto Rico.
 " Section of Foreign Markets.
 Magnussou, C. F.—Anomalous dispersion of cyanin.
 Istvanffi, Dr. G. de—Une visite au Jardin Botanique-de kolosvar.
 Wildeman, E. and Durand.—Illustrations de la Flore du Congo.
 Christ, H.—La question des petites espèces.
 Palmer, T. S.—Legislation for the protection of birds.
 Koorders and Valetton.—Boom sorten op Java.
 And the following serial publications:—
 Journal of the Board of Agriculture, Experimental Station Records (America).
 Annales du Jardin Botanique, Journal of Agriculture for Zanzibar, Planting Opinion,
 Notizblatt (Berlin), Queensland Agricultural Journal, Bulletin Economique de l'Indo-
 Chine, Der Tropenpflanzen, Koloniaal Museum Haarlem, Jamaica Bulletin, Agri-
 cultural Ledger, Indian Museum Notes, Chemist and Druggist.
 Agricultural Journal of the Cape of Good Hope, Icones Bogorienses (fasc. 3)
 Trinidad Bulletin, Mercks Annual Report and Digests, Pharmaceutical Review,

Buitenzorg Bulletin, West Indian Bulletin, Revue des Cultures Coloniales, Acta Horti Petropolitani Transactions of the Botanical Society of Edinburgh and Garden and Forest Reports of South Australia, Queensland, Barbados, Trinidad, Mysore, Ceylon, Hongkong, British Guiana, Natal, Madras (Forest Department), Calcutta, Tenasserim Agrihorticultural Society.

Purchased.—Journal of the Royal Horticultural Society, 14 volumes. Gardener's Chronicle Botanical Magazine. Journal of the Linnean Society. Tropical Agriculturist. Dictionnaire Iconographique des Orchidees for the year.

Bulletins.

A bulletin dealing with Native Rubbers Insect Pests including the outbreak of the bee-hawk moth in Selangor, *Kickxia Africana*, notes on Para Rubber, injurious fungi and other subjects was published in May. A paper on Dammars and Wood-oils, was prepared and printed in the Journal of the Straits Asiatic Society. Another bulletin on the Timbers of the Malay Peninsula was prepared and will be printed in the following year.

Expeditions.

In the early part of the year I accompanied Mr. H. C. HILL in his tour of inspection in the Colony, and in November made a botanical expedition to Batu Pahat in Johore. Arriving there on October 31st, and remaining till November 18th. During this time I explored the hills, Gunong Banang, Pengaram and Soga, and ascended the rivers Sempang Kiri and Sempang Kanan, ascending the latter as far as Tebing Tinggi for two days, and exploring also the rocks at the mouth of the Batu Pahat River at Bata. Although the collector I took with me was ill and almost useless the whole time I obtained a large series of plants from this hitherto unexplored district, including many new and rare plants. The highest hill in this district is Gunong Banang, 1,500 feet, and I had expected to find a flora resembling at least the lower part of Mount Ophir, but there were but few hill forms to be met with. The most striking tree was a very tall *Podocarpus*, evidently the same species as the one on Mount Ophir but attaining a very large size. A new *Bromheadia*, *Sonerila*, and a number of other small plants were obtained here, but the flora was much less rich and striking than that of Gunong Pantii, a hill of no greater size on the west of the Peninsula. The general aspect of the flora of this district is that of Singapore with however a number of additional forms, and the remarkable absence of others. This is a great contrast to the flora of Eastern Johore which resembles that of Pahang. In fact the Flora of the Peninsula may be said to be divided into two by a line running down the centre of the Peninsula.

Besides herbarium specimens, a number of living plants, orchids, etc., and a very fine Tortoise *Testudo Emys* captured at Batu Pahat were brought to Singapore.

BOTANIC GARDENS, SINGAPORE.

Statement of Receipts and Expenditure, for the year 1900.

RECEIPTS.		EXPENDITURE.			
	\$	c.			
			<i>Salaries.</i>		\$
					c.
By Balance in Bank ...	2,891	42	Clerk	284	00
„ Government Grant	9,150	00	Mandores (three)	484	44
„ Sale of Plants, Seeds and Flowers ...	2,703	10	Carpenters (two)	291	66
„ Interest ...	49	20	Masons, (two)	183	36
			Label Printer	120	00
			Plant-collector	118	33
			Peon	103	28
			Aviary-keeper	96	00
			Police	331	65
			Coolies	3,347	09
			Rice Allowance	662	29
					6,022 10
			<i>Bills.</i>		
			Tools and Stores	913	33
			Laterite, Gravel, Sand, Bricks, etc.	338	27
			Timber, Planks, Laths, etc.	390	41
			Pots and Tubs	117	56
			Birds' and Animals' Food	1,539	33
			Manure and Cartage	218	87
			Buildings and Repairs	569	66
			Freight on Plants, etc.	182	26
			Books and Papers	302	65
			Plants and Seeds	387	40
			Subscription to the Telephone	90	00
			Wardian Cases	121	50
			Petty Expenses	268	22
			Miscellaneous	297	90
					5,747 36
					11,769 46
			Balance in Bank ...	...	3,024 26
					\$14,793 72
					\$14,793 72

Economic Gardens.

A considerable portion of ground covered with scrub lying adjacent to the Bukit Timah Road was cleared and planted with Para Rubber stumps and seedlings which have thriven well. The Merabau trees in the remaining portion of the scrub were cleared round and the ground opened up. A band of scrub was cleared along the Eastern boundary of the Garden for planting *Castilloa* as it seemed the most suitable spot for it. A number of cuttings of *Ficus elastica* were planted in various spots, for experiment, many trees were added to the arboretum. Among the Economic plants received during the year were—*Pachylobus edulis* from Calabar, *Coffea Laurentii-robusta*, *Theobroma pentagona*, *Landolphia klainei*, and *L. Owariensis* from Kew; *Kickxia elastica*, of which three lots of seeds were received from different contributors, but unfortunately none germinated. This is the tree which produces the Kickxia Rubber of Africa and not the *K. Africana* which was previously distributed from Europe.

The large fruited bamboo *Melocanna bambusoides* was sent by the Chittagong Forest Department.

Para rubber.—The demand for seed showed no signs of diminishing. During the year 145,600 seeds and 6,400 plants were distributed as follows:—6,000 plants and 46,750 seeds to the Colony, 79,350 seeds to Selangor, 17,500 to Johore and a few to Sumatra, in exchange for Gutta Percha, and to Pahang.

The number of planters in the Colony does not increase and the demand for seed in the early part of the year when the crop was at its greatest was not large. The interest in its cultivation generally, has however, shown no signs of diminution and is only checked by the insufficient supply of seed.

The trees fruited more or less all through the year, the largest amount of seed being obtained in September and October.

The chief enemy complained of by planters was the termite, *Termes Gestroi*, which has done a good deal of damage in different parts of the Peninsula to young trees. It coats the outside of the tree with mud up to a height of some feet, and also burrows up the centre. This termite however is an inhabitant of dense jungle rather than of cleared ground and will probably disappear altogether when the ground has been under cultivation for some time.

Further experiments were made in tapping trees, and in the preparation of the rubber by Creosote. It was found that one or two drops of Creosote dropped into the latex prevented decomposition and no odour was produced during drying. It made no difference in the colouring of the rubber which eventually became as dark as rubber not so treated.

The Creosote however had a tendency to make the rubber sticky, and more than one or two drops produced an objectionable amount of stickiness. Whether creosoting the rubber improves it from a commercial point of view remains to be seen.

In July an average sized tree measuring 60 feet in height, with a circumference at the ground of 5' 5" and a clean stem up to 10' 3" from the ground, approximate age 12 years, was selected for tapping with a view of seeing what could be got out of it irrespective of any conditions, in other words to bleed it to death if necessary. The experiment began on the 5th of July, and was carried on until the 27th September, a period of 84 days on which date the latex ceased to flow. Throughout such a long period as might be supposed all kinds of weather was experienced, from very dry to very wet. On the whole, however, it can be said that the prevailing conditions were comparatively dry, for out of the 84 days on 71 very little or no rain fell at all. The total rainfall registered during the full period being 18.07. The method of tapping was that usually practised, *viz.*:—longitudinal incisions of a V shape fed by similar incisions about a foot apart. The receptacle in which the latex was collected was a small cigarette tin, with a lid on in such a way as to admit of the latex running in whilst keeping out the rain, notwithstanding this, however, a certain quantity of water did get in the tins during wet weather, as will be seen by the great difference in weight between the wet and dry states of the rubber; the total in the wet state being seven and-a-half pounds and in the quite dry three pounds only. The greatest yield in twenty-four hours was 6 ounces on July 12th, and the smallest $\frac{1}{2}$ an ounce on the 28th of the same month. On four days out of the total there was no flow of latex at all, of these four days, three were wet and one dry. The quality of the rubber was necessarily of a scrappy nature, especially when quantities of less than an ounce was taken per day, whereas quantities over an ounce consolidated into nice little cakes. As regards coagulation no difficulty whatever was experienced, a few hours being sufficient to coagulate the latex to the consistency of soft cheese, and as regards the offensive odour due to the decomposition of the proteids it was found that a couple of drops of Creosote was sufficient to entirely get rid of the bad smell. On the whole the experiment may be said to have proved—1st, That three pounds of dry rubber can be obtained from an average tree—whether this quantity can be taken yearly remains to be seen—that it could be taken every other year, one is safe in predicting from our knowledge gained of the time other trees have healed of their wounds. 2nd, That it does not appear to injuriously affect the tree in the slightest.

Insect Pests.

A number of injurious insects were reported on by planters and remedies for them suggested. Among the important ones were *Batocera octomaculata*, a large longicorn beetle, the grubs of which bore up the stems of various species of *Ficus*, and among others the Rambong, being a very large insect it is easily caught and destroyed, but in large Rambong Estates it might prove very destructive. The life history of the Crinum caterpillar which destroys the Crinums cultivated for ornament was worked out, it proved to be the larva of a noctuid moth *Calogramma festiva*.

An obscure disease of the shoots and leaves of *Ficus elastica* was reported from Muar. It was partly due to a leaf fungus, specimens of which were sent to Kew for identification:—

Vote for upkeep of Economic Gardens	...	...	...	\$2,200
<i>Expenditure:—</i>				
Salaries of Mandore and Coolies	...	...	...	2,002.63
Tools and Stores	...	...	...	113.17
Manure	...	...	...	30.00
Sand	...	...	...	7.50
Purchase of plants	...	...	...	26.40
Balance	...	...	...	20.30
				2,200.00

Inspection of Coco-nut trees.

During the year, 699 trees and 21 piles of rubbish containing or likely to contain beetles destructive to coco-nut trees, were destroyed, and 266 trees were destroyed on abandoned ground chiefly at Teluk Kurau by a coolie employed for the purpose till July. Notices were served on 156 persons and there were no prosecutions.

There is, I think, no doubt that the number of red beetles has considerably diminished in Singapore. They seem to be comparatively rare now. The destruction of abandoned trees and trees in neglected patches is I think responsible for this.

Vote	...	...	...	...	\$486.00
<i>Expenditure:—</i>					
Salaries of					
Inspector, climber and cooly	...	...	...	...	324.00
Transport	...	...	...	...	141.76
Uniforms	...	...	...	...	12.75
Balance	...	...	...	...	7.49
					\$486.00

Gutta Percha and Rubber Planting.

The small vote for this purpose allowed of three men being employed to clear the forest on the lower slopes of Bukit Timah, and plant as many trees of Getah Taban as were procurable. The plants planted on the previous year were cleared and replaced where they had died as far as possible, and the trees growing in the forest on the Eastern slope were inspected, the shrubs and jungle trees which were crowding them out were cleared away, and a number of over-crowded young plants were removed from that locality and transferred to the new plantation. The ground on the left side of the road going up to the Bukit Timah Hill proved less suitable for the growth of Getah Taban than was expected, and although a few plants planted on the previous year made a very good growth, one attaining a height of nearly 8 feet 6 inches and several from 3 to 5 feet; the others made a much slower growth, and at one part a large number died. It became clear that the plant requires at least, at first, partial shade and is better grown in secondary growth, sufficiently cleared to allow light to reach them. Hills sloping to water courses covered with thin wood suits the plant better than anything else, provided that they are not planted too close to the water. Suitable ground was found on the right side of the road, and here the fern was cut down and spaces cleared so as to plant as many as could be procured. In the meanwhile steps were taken to secure as many plants as possible and with the aid of a small vote for purchase of seeds and plants, 2,300 seedlings were obtained, and 720 stumps were presented by M. LE COMTE D'ABBANS. These were not sufficiently far advanced in growth to plant out till the end of the year and the weather then being exceedingly dry was not favourable. They will be planted out in 1901. Besides these 1,400 stumps of Getah Sundik (*Payena Leerii*) were purchased and grown on so as to be ready for planting. This gutta is in demand for mixing with Getah Taban for cable purposes, the Taban not being sufficiently plastic alone. A few plants of *Dichopsis calophylla* came on previous occasions mixed with *D. oblongifolia*. This contains a valuable gutta, but less so than *D. oblongifolia*. It is evidently a stronger and more rapidly growing plant than *D. oblongifolia* and stands the sun much better.

At present it has been found impossible to procure seeds of *D. oblongifolia* or *D. Gutta*. Two trees in the Botanic Gardens flowered this year, one rather heavily, it however does not appear to have set a single fruit. At present the only way of procuring plants is to have them dug up from the forests in the form of seedlings or more commonly as young trees about $\frac{1}{2}$ to $\frac{3}{4}$ inch through or less. The tops of these are removed and the stumps with the tap root kept damp till they can be planted. These stumps after a period of 4 to 6 months put out strong shoots, but it is remarkable that the new rootlets do not appear usually till after the shoots have made some growth, and often one can find stumps quite leafy with hardly a visible rootlet. It is found advisable therefore to allow the stumps to remain a long time in the beds or boxes till they have put out strong roots as well as leaves before planting out. The plan of planting the stumps as received *in situ* in the plantation is now being tried, so as to avoid injuring the roots by moving.

The various forms of Marcottage have been tried on *D. oblongifolia* and *D. calophylla*. These are all successful in almost every case, the time required for the roots to be fully emitted so that the marcot can be removed, varies from 3 to 6 months.

For work on a large scale this method of propagation is too slow and expensive. Simple cuttings were also tried but though a few thus treated grew the percentage is too small to be a satisfactory method of propagation. Another method of propagation by laying the young plant horizontally and allowing it to throw up lateral shoots and then cutting the stem into segments each bearing a shoot has been tried with more or less success. This method has however given it is said good results in Sumatra, and plants so propagated have been received thence which are very strong and healthy, but it is noticeable in this case as in the matter of stumps that the proportion of roots produced is very small in proportion to the size of the shoot. The young trees planted in various exposed positions were found to suffer very much from the attacks of a caterpillar which spun the leaf shoots together and destroyed them. It is rather difficult to deal with as it escapes the action of insecticides by concealing itself in the spun-up leaf. Attempts to rear the caterpillar to the moth state failed. It was noticed that not only were young trees freshly planted attacked but even in the jungle when the surrounding vegetation was cleared so as to let in light the pest appeared on the trees in a very short time.

It is regrettable to have to record the destruction of five fine large sized trees in the Bukit Timah Forest by a party of Malays during the year, who destroyed also others in different parts of the Island. Two of the men were captured but with the present value of Gutta Percha, severer penalties and a more adequate staff of Forest Guards will be required to prevent the destruction of the remaining large trees.

The question of the name of the species common in the Malay Peninsula, whether *D. gutta* or *D. oblongifolia* has more than a botanical importance, inasmuch as the values and qualities of the produce of the trees known under these names have been stated to be different. Dr. ROMBURGH who visited the Gardens during the year affirmed that the old trees in the Garden were *D. oblongifolia* and not *D. gutta*. Specimens of the two species as known in Buitenzorg were supplied to the herbarium by Dr. TREUB, but I fail to see any tangible difference. The form of the leaves varies very much in different parts of the same tree and still more markedly with age, and the flowers of the tree identified by Dr. ROMBURGH as *D. oblongifolia* do not appear to differ from those figured as *D. gutta* in Dr. BURCK'S paper on Gutta Perchas. It is still more remarkable that the original *D. gutta*, which was originally obtained in Singapore and has now, according to the Buitenzorg botanists, utterly disappeared, although the *D. oblongifolia* which was discovered very much later is still comparatively abundant, and appears to have replaced it. Botanically speaking the question is of some importance and perhaps economically so, though it must be remembered that in any case at least the bulk of the trade Gutta Percha for upwards of fifty years or more has been derived from *D. oblongifolia*.

The trees of Para Rubber at Bukit Mandai were gone over by the men employed on the vote and all belukar trees which had come up among them and were interfering with their growth were removed.

Vote for timber planting.

The vote for planting valuable timbers in the forests, *viz.*, 300 dollars allowed of three men being employed on this work. The ground was cleared where necessary, in the same district of the Bukit Timah Forest Reserve which was selected for the planting of Gutta Percha, the ground unsuited for that plant being planted with timber

trees. Altogether an area of about 60 acres was opened up and planted and 15 acres planted on the previous year were cleared and the trees weeded. The chief trees planted were Mahogany (large-leaved) 17,600; Merbau 6,800; Eugenias and various plants 982; Rengas, (Melanorrhoea) 300, all raised from seed, and 1,380 Balam removed from the Botanic Gardens were also planted. The Mahogany and Merbau made very satisfactory growth and there were but few failures. The Merbau seed was found to do very well, planted at stake, without the necessity of raising in nursery beds and transferring later to the wood. A large quantity of seed of the small-leaved Mahogany was sent from Calcutta, but failed to germinate. The large-leaved kind is however in every way more suitable for cultivation, being more rapid in growth and altogether a stronger tree. A number of seeds of a *Shorea* found in fruit in the jungle were planted, but made very slow growth, and are not yet ready for transplanting, a few seeds of *Xylia dolabriformis* the Pynkado and seeds of *Pterocarpus macrocarpus* the Padouk were sent from Calcutta and were planted and germinated well. Some thousands of seed of Kranji (*Dialium*) were purchased in the market where the fruit is sold for eating and germinated freely. This very valuable timber is of slow growth at first but increases more rapidly after a few years. The Merbau trees at Bukit Mandai and at the old plantation by the Bukit Timah Forest Station, were opened up, the scrub and other trees growing round them and interfering with their growth were removed, and the few billion trees on Bukit Timah which have survived the encroachment of fern and scrub were also cleared round, and have already shewn signs of increased growth, unfortunately the greater number planted in 1884, succumbed to want of clearing in the following years.

Mr. HILL during his visit to Singapore inspected the planting on Bukit Timah, and made many valuable suggestions which are being carried out as far as possible.

Vote	...	...	...	\$300
<i>Expenditure:—</i>				
	Salary of 3 coolies	...	...	252.14
	Transport	...	...	9.39
	Cart hire	...	...	7.50
	Rent and 'rikisha hire	...	...	21.00
	Balance	...	...	9.97
				<hr/>
				\$300.00

Government House and Domain.

The Mandore, ROGERS died in May and as there was some difficulty in getting a suitable man to replace him, the Mandore ANIFF was transferred till a man had been trained for the work, and remained there till the end of the year. The coolies worked satisfactorily and the gardens and park looked well.

Vote...	...	...	...	\$2,360.00
<i>Expenditure:—</i>				
	Salaries of Mandore and Coolies...	...	...	\$1,974.89
	Tools and Stores	...	...	231.48
	Hand Cart...	...	...	29.00
	Lawn Mower	...	...	27.00
	Pots and Tubs	...	...	87.00
	Manure	...	...	7.60
	Balance	...	...	3.03
				<hr/>
				\$2,360.00

Botanic Gardens, Penang.

Waterfall Gardens.

For several years there has been no change in the staff of this Garden. MAHOMAD HANIFF, Overseer, and MAHOMAD HUSSAIN, Propagator; the two men on whom the working of this Garden devolves during my absence on other duties both served three

years' apprenticeship here before obtaining their present appointments and are useful men. As I have been absent from Penang about a month and-a-half at different times during the year I wish to record the satisfactory manner in which the work has been done during my absence.

2. Besides other work MAHOMAD HUSSAIN has made a considerable number of drawings of new or imperfectly known plants in which he is sufficiently proficient to make it desirable that his whole time should be devoted to this work.

3. The supply of gardeners and coolies is by no means all that could be wished. Changes are frequent and at times it has been difficult to obtain sufficient labour owing to the demand for railway and other work where the pay is better, and this is the experience of most persons engaged in Agricultural pursuits.

4. Since the German line of Steamers commenced calling at this port, the number of European travellers visiting this Garden has increased, as many as twenty gharry-loads sometimes coming from one of these boats, and there has always been something of interest for them to see.

5. On the whole I think the Orchid House has been brighter this year than usual. From July to the end of the year one of the side stages was kept full of flower with large number of *Calanthe veratrifolia*, *C. vestita*, *C. rosea*, *C. rubens*, *Habenaria*, *Carnea* and *Phalænopsis violacea*; with which were interspersed in lesser numbers as they came in flower such things as Angrecums, Cattleyas, Vandas, Dendrobiums, *Ærides*, *Erias*, *Miltonia Roezlii*, *Dilochia Cantleyii* and various others.

6. While devoting a good deal of attention to the cultivation and determination of plants of botanical interest from the surrounding Islands and mainland, the more showy, and to some visitors the more interesting, garden forms are not neglected. Caladiums, of which we have a first class collection, are well grown and much admired, and the same may be said of Palms, Ferns, Aroids and other ornamental foliage plants. Flowering plants, especially Annuals, are not easy to grow during the rains, but from November to March we can do a good many things that it is quite impossible to grow satisfactorily during the other months.

7. Contributions of plants or seeds have been received during the year from the Royal Gardens, Kew, the Botanic Gardens, Calcutta, Ceylon, Singapore, Brisbane and Hongkong. The Agri-Horticultural Societies of Calcutta, Rangoon, and Madras; from Messrs. F. SANDER & Co., Messrs. JAS. VEITCH & SONS, Messrs. DAMMAN & Co., Messrs. CHATTERJEE and C. MARIÉS. Other contributors are Messrs. BAKER, Perak, BUTTIKOFFER, Sumatra, BURCKARDT, Sumatra, BIRCH, Penang, CUNDALL, Manila, DERRY, Perak, GOLDHAM, Perak, HALLIFAX, Dindings, LOGAN, Penang, MOORE, Rangoon, PECHE, Moulmein, SCHMIDT, Sumatra, STEPHENS, Perak, VERSMANN, Sumatra, YAPP, plants from Gunong Inas.

8. Of recently introduced economic plants, the most promising is *Kickxia Africana*, of which six small plants were brought from Kew in November, 1899. After nursing these in pots for two months they were planted out and the largest is now over four feet high with a stem nearly an inch in diameter. *Landolphia florida*, obtained from Kew at the same time, has made shoots twelve feet long and commenced twining up the trees. *Castilloa elastica* does no good in this Garden. We have tried it in both sun and shade but it refuses to make progress under either condition.

9. Improvements and extension of the Garden, so far as funds permit, have been carried out, but the extent is limited as the Government Grant for Maintenance remains the same as it was nine years ago, while labour and every article that has to be bought has considerably increased in price.

10. One of the old wooden span-roofed plant-sheds in the Nursery, fifty feet long and eighteen feet wide, has been renewed with iron supports and roof, covered with bertam chicks, and the beds on which the plants are set reconstructed with rough soft granite covered with *Selaginella serpens*. Nearly sufficient iron has been accumulated to construct another and larger shed during the current year when the land now owned by the Tramway Company has been acquired.

11. The large iron plant-shed in which the plants are all grown in rock-work has been gone through, overgrown specimens removed to more suitable quarters and the others re-planted and manured. In this shed are some fine tree ferns and shade loving palms. New beds have been made and planted up with miscellaneous flowering shrubs, and a great number of Palms and trees of various kinds planted out in different parts of the grounds.

12. Three old bridges have been reconstructed in stone and iron which is a permanent improvement and completes the bridging of the one and-a-half mile of carriage road within the Garden. There are now three bridges of stone and iron spanning the main stream which bisects the garden, and three on the tributary sources which are practically dry at certain seasons. Five hundred and fifty lineal feet of carriage road, thirteen feet six inches wide, have been entirely retalled and other parts repaired.

13. No special excursion for collecting botanical specimens has been undertaken by myself this year, but on each occasion I have gone out on forest duty, I have taken the necessary apparatus and a collector and added considerably to the collection of specimens in the herbarium, and to plants in cultivation in the garden. In September, the Overseer, MAHOMAD HANIFF, went out to the Lankawi Islands for a fortnight, but the monsoon was blowing so strong at the time that he found it impossible to get far. I am of opinion that if one could get about there in the middle of the rains, there are many interesting deciduous rock plants to be collected that one never sees in the dry season, but I know from experience that boating at that season is difficult and dangerous. However, he brought back several interesting plants some of which have since flowered and two of the Orchids, a *Bulbophyllum* and *Dendrobium*, have been described by Mr. RIDLEY in manuscript as new species.

14. The expenditure on this Garden during the year amounts to \$4,497.44 as shown in Appendix A, and the Revenue derived from sale of plants and use of Swimming Bath to \$588.20. This expenditure covers the cost of renewal of plant-shed, retalling of roads and in fact all matters except the construction of bridges which was a budget item and carried out by the Public Works Department. The amount collected as revenue has been paid in weekly to Revenue Account.

Governor's Hill Bungalow Garden.

15. Mr. O'KEEFE returned from leave and resumed duty on the 2nd February and has, in addition to his own duties, been acting as Signal Sergeant since the end of May. He reports having been handicapped as regards coolly labour during the last three months in the year, being for some time three and four men short out of a staff of seven, which he attributes to higher pay being obtainable elsewhere.

16. The rainfall was less than in the previous year by about 30 inches, the wettest month being September with 33 inches, and the driest, December with 1.27 inches only.

17. With an adequate supply of manure and water a great many kinds of European Vegetables and flowers can be grown on this hill from November to March, but the present cost of carrying up manure is prohibitive, and when the rainfall falls to a point so low as in December last the rain water tanks on which we are dependant for gardening purposes become exhausted and it then requires all the available labour to carry from the nearest spring enough water to keep things alive. When the hill railway is made, it is hoped that the first of these troubles will be overcome, and I hope that the time will then not be far distant when water will also be made more easily available.

18. No new work has been undertaken, the sum authorised for upkeep being barely sufficient to keep the grounds in order, to grow enough ornamental plants for house decoration when the Bungalow is occupied, and maintain a regular small supply of vegetables. When the railway is made the hill will be largely visited by travellers passing through as well as by residents in the Island, and in that case more money should be spent in making the hill attractive.

Experimental Nursery.

19. The experimental Nursery on Government Hill has been practically abandoned for two years and steps are now being taken to re-afforest the site with useful trees.

Coco-nut Tree Preservation.

20. Mr. BALHETCHET, Inspector of Coco-nut trees, and two men have been employed six months in the year in Penang and six in Province Wellesley, in inspecting plantations, &c., and in serving notices on persons having on their premises dead trees or other matter likely to prove breeding places for beetles. The number of dead trees reported is less than in previous years and I believe this is

owing to diminution in the pest. Altogether 1,931 notices were served and twenty-nine persons prosecuted as shown below:—

Name of District.	No. of dead Coco-nut trees destroyed.	No. of pieces of Coco-nut Trunks destroyed.	No. of heaps of Cattle Manure removed.	No. of heaps of Paddy-husks destroyed.	No. of Notices issued.	No. of Summonses issued.	Amount of Fines recovered.
							\$ c.
Province Wellesley. Northern District,	554	2,147	104	66	824	14	28 50
Province Wellesley. Central District,	194	436	69	49	306	5	14 50
Province Wellesley. Southern District,	97	183	49	44	94	Nil	Nil
Penang Island.	634	2,074	181	25	707	10	35 00
Total.	1,479	5,047	403	184	1,931	29	78 00

Forests.

21. In February I visited the Dindings to inspect some proposed additions to the Forest Reserves in that District on which I reported on my return and of which I attach a copy (Appendix B).

Visits were also made at the request of District Officer to Tassek Glugor and Bukit Panchor Reserves, Province Wellesley.

22. In accordance with instructions from His Honour the Acting Governor, I went to Malacca in May with five hundred plants of "Gutta Taban" (*Dichopsis Gutta* or *D. oblongifolia*) and selected two sites on which to plant them. These trees were planted out 20' x 20' in partial shade, the idea being to gradually cut away the surrounding "bluker" as the plants acquire strength. While these enquiries were made and samples collected of some of the local climbing rubbers, which together with leaf specimens were sent to Kew, and a report on these has already been published in the *Government Gazette*. The Forest tree Nursery at Ayer Kroh was also inspected and at the request of the Acting Resident Councillor a few simple instructions in writing drawn up for the guidance of the Overseer in charge.

23. From June the 18th to July 2nd, I was detailed to accompany Mr. H. C. HILL of the Indian Forest Department during his tour of inspection of the Forests of the Colony in Penang, Province Wellesley and the Dindings. Mr. HILL has since reported on these Forests and the manner in which they should in future be administered.

24. In September, I obtained permission to visit Perak for three days to make some enquiries and observations in connection with Gutta Percha, especially the hill forms. On my return I furnished a short report on this trip, a copy of which is attached (Appendix C).

Para Rubber.

25. In my last two Annual Reports I have furnished information as regards the method adopted and results obtained from tapping a single Para Rubber tree (*Hevea brasiliensis*) growing in the Waterfall Garden, and the matter is of so great importance to the Agricultural Community of the Colony and Native States that no apology is necessary for again referring to the subject and repeating to a certain extent what has already been recorded in these reports. The tapping of this one tree has now been continued over a period of two years and the result is such as to confirm the opinion that in this cultivation lies a source of wealth of the greatest importance. This particular tree is now fifteen years old and has yielded in two years twelve and a half pounds of dry marketable rubber without any apparent injurious result to the health of the tree. It is growing on a dry gravelly bank, not at all the sort of place I should select from choice, and is fifty-five feet high. At three feet from the ground it is sixty-six

inches in circumference and forks at three feet six forming two straight stems measuring at five feet from the ground, 42 and 32 inches in girt. The branches are not greatly spreading in proportion to its height and for trees of this size 20' x 20' apart gives ample room. This would give 108 trees to the acre and supposing them all to be equally as good as this one the result would be 675 lbs. of rubber per annum which at 3s 10d per lb. the price realised for three hundred weight sold in the London market by Mr. DERRY, Superintendent of Government Plantations, Perak, in April last, works out to over £129 per acre. It is not probable that all the trees on an estate would be equally good, in fact experience proves that there is a considerable difference, but Mr. DERRY informs me that in tapping once about a hundred trees in Perak, the average was three and-a-half pounds per tree, and much more could have been taken but it was feared that further tapping might interfere with the seed crop. This comes fairly near the result of our one tree which shows an average of three and one-eighth of a pound for each of the four tappings. In addition to the experience gained in tapping this one tree over a period of two years, two other trees in a group of twenty planted 12' x 12' have been tapped once, the result being 2lb. 9 oz. of dry rubber from the two. These are comparatively small trees about forty feet high and measuring 23 and 25 inches in girt at five feet from the ground. They are the same age as the large one but have grown slowly as might be expected in the sort of place they are planted. I think that this result from trees of this size will appear perfectly satisfactory to planters some of whom I know base their calculations on one pound per tree per year after the seventh or eighth year, and in good soil I believe that trees equal in size to these two will be grown in that time. The cost of land, clearing, and planting, is well known to those interested in the matter and the question of more importance to them at present is the quantity of rubber to be expected and the cost and method of collecting it. I have already shown the result as regards quantity, and as regards cost the time occupied in collecting this 12½ lbs. occupied one man about 28 hours, but the cost of tapping small trees will be proportionally greater. The only other labour involved is smoke drying which if the rubber is rolled out into thin sheets is a simple and inexpensive operation, but should be done as soon as possible after coagulation. A good deal has from time to time been written about the particular kind of nut that is used in Brazil for this purpose but in a recent Consular Report by Mr. Vice-Consul TEMPLE on the state of Amazonas, Brazil, he says that it is a mistake to suppose that any considerable portion of the rubber exported is prepared in this manner and he further states that wood chips which give less trouble to procure are preferred which is what might reasonably be expected seeing that the thing has to be done quickly. I find Coco-nut husks answer the purpose admirably. The latex coagulates as a rule without any trouble but if it contains a large proportion of rain-water there are various chemical re-agents that will cause coagulation. Acetic Acid and corrosive sublimate are recommended, but I have only tried Alum and Spirits of Wine. The latter is instantaneous in its action and if it does not injuriously affect the rubber, and I do not think it does, it may open a market to the sugar planters for their spirit. As regards the method of tapping I have found no better than that described in my last year's report that is that after having made a certain number of V. shaped or herring bone incisions to continue working on the same cuts by removing with a sharp chisel a thin shaving from the lower surface on alternate days. Very little milk is obtained at the first and second operations, but after about the third time it begins to run freely as will be seen by the following record of each day's collection:—

Date of tapping.	Weight of Wet Rubber obtained at each operation in ounces.														Total weight of wet rubber.		Weight when dry.	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	lbs.	oz.	lbs.	oz.
Nov.-Dec., 1898	¾	1¾	3¼	6	9	6½	8½	6½	8½	6	6½	10	8½	8	5	9¾	3	0
April-May, 1899	Daily record mislaid																2	8
Nov.-Dec., 1899	1	1¼	2½	3	6¾	8	10	10¼	6¼	9	11½	11½	11	8	6	4	3	4
Oct.-Nov., 1900	0	½	3	4½	6	9½	11	9½	12¾	14	14	12	15	12	7	11¾	3	12
Total ...	1¼	3½	8¾	13½	21¾	24	29½	26¼	27½	29	32	33½	34½	28	19	9½	12	8

It will be seen by the above that this tree yielded freely after the third operation and continued to do so up to the end of the tapping and that there was no reason to discontinue the tapping on account of falling off in the quantity of latex, the only reason for doing so being that the cuts were by this time from three-quarters to one inch wide, and although they heal rapidly it was not thought wise to make them wider. New bark has completely grown over the cuts of the first three tappings. It would appear that October to December are better months for tapping than April and May, but too much importance should not be attached to an experiment made on a single tree either as regards the yield or best months for tapping. I simply record the facts for what they are worth, but as regards yield it should be considered in conjunction with the result obtained in Perak with a hundred trees, the oldest seventeen years old, and this should I think induce capitalists and the Government to consider whether this tree has as yet received the attention it deserves. In the Consular Report already referred to, it is stated that hundreds of miles have to be traversed to reach the rubber districts in Brazil, and although there are probably fifty million acres of forests at present being worked for rubber it is estimated that for Districts where it is fairly plentiful, the average is only one Hevea tree to every two acres, and the estimated yield one to one and-a-half kilos per annum. In a few roughly calculated tests made here I found half a pint (10 fluid ounces) of latex gave three ounces of dry rubber, and coagulated rubber weighed wet lost about 50 % of its weight in drying.

Gutta Percha.

26. In 1899 it was decided by Government to form plantations of Gutta Percha in Malacca, and in May last I was instructed by His Honour the Acting Governor to take down 500 young trees and plant them in Bukit Bruang Reserve. These are the half of a batch of seedlings raised in Penang. Since then Mr. H. C. HILL, in his report on the forests of the Colony has advised that plantations on a large scale should be made both in Penang and Malacca, and by way of a beginning the remaining 500 will be planted in Penang at the proper season. Consequent on this recommendation a good deal of attention has been devoted to this subject during the past few months. None of the trees in Penang have fruited this year nor have we been able to obtain seeds elsewhere. Mr. DERRY, Superintendent of Government Plantations, Perak, wrote me in November that a tree growing in the Resident's grounds at Kuala Kangsar was in fruit, but on a subsequent visit, a month later, he found that squirrels had eaten them all with the exception of two fruits which he sent me for herbarium specimens. These are the only fruits I have seen or heard of this season. All the *Dichopsis* are slow growers and transplant badly, great care will therefore be necessary in preparing plants and laying out plantations. Young plants in the Nursery under most favourable conditions have grown about a foot in height in a year. The tree referred to as fruiting at Kuala Kangsar is said to be eighteen years old and is twenty-five feet high, with a girth of twenty-four inches at three feet from the ground. As it is uncertain when we may be able to obtain seeds in sufficient numbers to plant on a large scale we have been trying recently in various ways to propagate from cuttings. It is too soon yet to say what percentage will grow from cuttings but the prospect of raising a large stock by this means is not encouraging. Some species of *Dichopsis* may grow from cuttings fairly well (though seedlings, of all if obtainable should have the preference) but *D. gutta* or *D. oblongifolia*, whichever the Penang plant may be, and there is some doubt about it, is a most difficult subject. To obtain cuttings and information as to the quantity of gutta to be obtained, &c., we cut down one tree in the Highland Reserve and collected the gutta in the native manner, the result being one and-a-half pounds of first class gutta percha. This tree was 55 feet high with a moderately clean straight stem 39 inches in circumference at five feet from the ground, and at least forty years old. I do not consider this method or the result satisfactory and some other and better way of extracting the gutta will have to be devised. Tapping in the same way as rubber trees is not applicable to this tree and the solution of the problem will probably be some system of cutting the plantations at a comparatively early age, when they will coppice, and treating bark and leaves at a central factory; unless the leaves alone are found to be of sufficient value and produced in sufficient numbers to render plantations remunerative *Dichopsis gutta* occurs only at low elevations and it is desirable to introduce for planting the upper portions of Penang Hills the species that occur on Perak Hills up to 3,000 feet. This is known locally as "Gutta Taban Putih" and is I believe *D. pustulata*, I have recently had an opportunity of observing this tree on the Taiping

range and found it abundant at 2,000 to 2,500 feet, whereas the Penang tree seldom or never occurs above 1,000 feet.

C. CURTIS,

Assistant Superintendent of Forests.

Penang, 15th January, 1901.

APPENDIX A.

Revenue and Expenditure of the Botanic Gardens Department, Penang, 1900.

REVENUE.		EXPENDITURE.	
	\$ c.		\$ c.
Government Grant— Maintenance of Water- fall Garden ...	4,500 00	{ Wages Plants and Seeds Pots and Tubs Manure and Cartage Material for Herbarium Books and Periodicals Planks for cases and labels Tools Material for repairs, &c. Iron for renewing sheds Road metal Miscellaneous Petty Expenses	3,174 61 87 27 153 25 31 00 103 70 28 00 147 25 113 10 343 14 85 64 107 00 123 48
		Balance	4,497 44 2 56
		Total	4,500 00
Government Grant— Upkeep of Grounds of Governor's Hill Bungalow ...	1,000 00	{ Wages Seeds Tools Pots Manure Material for Repairs, &c.	795 54 33 67 61 84 22 00 33 09 51 70
		Balance	997 84 2 16
		Total	1,000 00
Government Grant— Maintenance of Experi- mental Nursery ...	200 00	{ Wages Manure	155 30 40 00
		Balance	195 30 4 70
		Total	200 00
Government Grant— Expenses of carrying out Provisions of Coco-nut Trees Preservation Or- dinance	736 00	{ Salaries and Wages Travelling Allowances	588 00 121 73
		Balance	709 73 26 27
		Total	736 00

APPENDIX A—Concluded.

Revenue and Expenditure of the Botanic Gardens, Department, Penang, 1900.

REVENUE.		EXPENDITURE.	
	\$ c.		\$ c.
Government Grant— Travelling and Personal Allowances	462 00	Pony Allowance ...	225 00
		Expenses of trip to Dindings ...	52 75
		Expenses of sending Overseer to Lankawi	43 54
		Expenses of journey to Perak ...	41 76
		Expenses while on duty with Mr. H. C. Hill	60 75
		Miscellaneous ...	3 02
		Field and Personal Allowances	19 96
Total Government Grants	6,898 00		446 78
Revenue from Plant sales	550 80	Balance ...	15 22
Revenue from Swim- ming Bath	37 40	Total ...	462 00
Total Collected ...	588 20	Total Expenditure ...	6,847 09

C. CURTIS,

Assistant Superintendent of Forests.

Appendix B.

BOTANIC GARDENS.

Penang 28th, February 1901.

SIR,—In accordance with your instructions, I went to the Dindings on the 15th instant, and inspected the two blocks of Forest it is proposed to add to the Reserves. I also took the opportunity of seeing as much as I could in the time of the already demarcated areas which are practically those I had the honour of suggesting in 1888, and in which no cutting of any importance has been authorized since that time.

2. From the papers you sent me to see I gather that there is an impression that Mr. CANTLEY at some time visited this District and made certain suggestions, but I think this is a mistake. I have no recollection of his having been there subsequent to my joining the service in 1884, and I am pretty sure that he had not previously done so.

3. The present Reserves consist of six blocks, *viz* :—Pangkore Island, Lumut Hills, Tanjong Hantu, Bukit Segari, Gunong Tunggal, and Tanjong Burong. The latter is all mangrove and is reserved specially for fire wood.

4. The two portions that it is now proposed to add are several miles apart, one being in the extreme North of the District, and the other in the extreme South. The District Officer proposes that these should be known as Ulu Bruas, and Tulloh Morah Reserves.

5. Ulu Bruas Reserve is a triangular block of forest land, mainly hilly, but including some low wet jungle, which has been recently worked by timber cutters. The boundaries on two sides are well defined by the territorial boundary line which divides Perak and the Dindings, and the third by a cart-road for a distance of about two-and-a-half miles. A good deal of land has been taken up along the edge of this road for cultivation so that in places the road will not be the actual boundary but a line running more or less parallel with it above the line of cultivation. It is difficult to estimate the area with anything like correctness but it is safe to say that the area is not less than 1,500 acres. This Reserve contains the only Gutta Percha (Gutta Taban) I saw in the District. I actually saw only half-a-dozen trees but I have no doubt there are many more. The largest measured had a girth of 5' 6" at five feet from the ground.

6. Tulloh Morah is an oblong block of well wooded hills, the boundaries of which will follow the base of the range leaving out the flat land suitable for cultivation along the coast line. With the little I was able to see of this, I should not like to make a guess as to the area.

7. As regards your instructions that I should suggest new Reserves, or additions to existing ones, there is some difficulty. There has been no survey and consequently it is impossible to say what proportion of the District is already reserved. One thing is certain and that is that the rough estimate as given in the District Officer's Report for 1898 is a very long way below the mark. Pangkore Island for instance which with the exception of village sites is practically all Forest Reserves, is put down at 1,250 acres. The total area of Pangkore Island which is about 4 miles long cannot be less than 5,000 acres, probably more, and the village sites and cultivated portions do not I should say represent one-fifth of the whole, so that the Reserve must be more like 4,000 acres.

8. There is also another matter to be considered in suggesting any considerable addition and that is the system it is intended to pursue in the future as regards these Reserved Areas. The original idea of prohibiting wood-cutting within the areas known as Forest Reserves was for the purpose of allowing time for them to recover by natural means the effects of severe and indiscriminate cutting in the past, and as soon as that had been accomplished to again open them for working, one or more at a time, in rotation, but without satisfactory maps and an intimate knowledge of the area and contents of each Reserve it is impossible to formulate a working plan or to say when the time will have arrived to put this intention into effect.

9. The whole of the Dindings is practically forest. It appears from the District Officer's Report that the Revenue from Forest produce in 1888 was over \$15,000 and represented 70% of the Revenue of the whole District. The population is not supposed to be increasing and so far as I can see no appreciable increase in cultivation has taken place during the past ten or twelve years. Under these circumstances it is important that the Forest should be managed so as to derive as much Revenue as is consistent with their being maintained in a state of efficiency, which is to say that the quantity cut each year must not on the whole exceed the annual normal increase.

10. If I may venture to offer a suggestion it is this, seeing that the greater portion of the Dindings is forest and that neither population nor agriculture shows any appreciable increase the whole of the Crown Forests, both reserved and unreserved should be considered from a business point of view and supervised by one Forest Staff, to do this the Forest Guards would have to be increased in number and stationed in different parts of the District, preferably in the immediate vicinity of the principal Reserves. Each guard should be kept informed of all licences issued for his part of the District and it should be his duty to see that the produce removed corresponds with the licence both as regards kind and quantity. It would also be his duty to arrest any person cutting or removing without a licence jungle produce from any Crown Forest whether reserved or not. This would in my opinion be simpler for the Officer in charge, and more economical and effectual than keeping one staff for reserved and another for unreserved forest, and that without in any way rendering the protection of the Reserves less effective than at present. On the contrary, my experience in Penang has been that nine times out of ten it is professional wood-cutters who take out Passes that get into the Reserves and it is most important for the Forest Guards to know who have licences and where they are working.

11. The principal distinction I would draw between reserved and unreserved Forests in this District is that no portion of the former should at any time be granted for agricultural purposes, while the latter is available for that purpose should a demand for land arise. For the present, and probably for some years yet no cutting should be allowed within the Reserves but the time will come when a considerable Revenue should be derived from these Reserves.

12. In one of the papers you sent me to see I noticed that His Honour the Officer Administering the Government considers that one-fifth of the District should be Reserves, and I think that with the two new portions now to be added, the total area will not fall far short of that; but in the absence of any survey it must be more or less guess work.

I have, &c.,

C. CURTIS,

Assistant Superintendent of Forests.

Appendix C.

BOTANIC GARDENS,
Penang, 2nd November, 1900.

SIR,—In accordance with your verbal permission to proceed to Perak for three or four days to obtain more definite information about the range of Gutta Percha trees, &c, on Taiping Hills, and to collect Orchids and other plants of interest for cultivation in the Public Garden here, I left for Taiping at 10 P.M. on the 25th October, and returned at 7 P.M. on the 30th.

2. On arrival in Taiping I proceeded first to the Museum where Mr. L. WRAY, the Curator, kindly allowed me to look through his herbarium specimens of *Sapotaceæ*, in which order are included our most important Gutta Percha producing trees, and gave me much valuable information. He also showed me samples of Gutta from various species, most of which have been collected and prepared by himself, and as the herbarium specimens were collected at the same time and from the same tree these samples are of more than ordinary interest and value.

3. On leaving the Museum I walked up to Maxwell's Hill where Mr. DERRY, Superintendent of Government Plantations, gave me all the information and assistance in his power.

4. During my stay in Perak I saw only two species of *Dichopsis* (Taban) neither of which appear to be *Dichopsis Gutta*, and until flowering and fruiting specimens are obtainable their specific names must remain more or less doubtful. I showed Mr. WRAY leaf specimens on my return from the hill and he thought they corresponded with what the Malays call Taban Chaier and Taban Putih, and which have been determined for him at Kew as *Dichopsis polyantha* and *D. pustulata*. In the absence of flowers or fruit the difference in appearance is not great. At a little distance they look all alike, but those in Perak and Penang, and it is only on examining them closely that one sees there is a difference.

5. The question of the correct botanical name, although most desirable to know is not of so great importance as the question of the quality of the Gutta and the situation in which each particular species is found growing naturally, so that in any planting scheme we may plant the right species and in the right place.

6. On the Taiping Hill, Taban Putih (*D. pustulata*?) extends up to 3,000 feet and is most abundant at 2,000-2,500 feet. I collected a small sample of gutta and it is so far as I can judge of good quality. Mr. WRAY who knows the tree well informs me that it is always considered very good gutta, but not so good as *Dichopsis Gutta* (Taban merah).

7. *Dichopsis gutta* occurs only at low elevations. Much of the available and uncultivated land in Penang that it is desirable to re-forest, such, as areas within the Reserves and abandoned spice gardens, are at an elevation of from 1,000-2,000 feet and it therefore seems probable that this Perak mountain form *D. pustulata*? will prove more suitable for planting in places in Penang than *D. gutta*.

8. *Dichopsis polyantha*? (Taban Chaier) grows at a much lower elevation than *D. pustulata*? (T. Putih) and is found quite down to the foot of the hill, but as *Dichopsis Gutta* also grows at low elevations and is the more valuable of the two, this will probably be of less importance as a tree for planting unless it should prove that it is the quicker grower or yields a greater quantity of gutta which might compensate for the difference in price. On these and many other points more definite information than is at present available is wanted.

9. Of Orchids, Palms, and other plants for cultivation in the garden, I collected great numbers.

I have, &c.,

C. CURTIS,
Assistant Superintendent of Forests.



STRAITS SETTLEMENTS

ANNUAL REPORTS

ON

FOREST RESERVES

SINGAPORE, PENANG AND MALACCA

FOR THE YEAR

1900



PUBLISHED BY AUTHORITY

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1901

**Report on the Forest Reserves of the Straits Settlements during
the year 1900.**

SINGAPORE.

The year saw no change in the extent of the Reserves and little or none in their condition. The usual details of their position, area, nature and the steps taken to safeguard them may be gleaned from the tabular statement below:—

No.	Name of Reserve.	Area.	Number of visits by C. L. R.	No. of visits by Forest Ranger.	Nature of Reserve.
1	Bukit Timah ...	<i>a. r. p.</i> 847 0 00	5	16	Hilly. Big jungle tailing off on East into scrub.
2	Jurong ...	412 0 00	2	19	Swamp and hill mixed, not much good jungle.
3	Pandan ...	2,140 3 16	3	16	Almost all mangrove swamp, a little lalang scrub.
4	Ulu Pandan ...	4 3 09	15	10	A little patch of 25 years old jungle on small hill.
5	Bukit Panjang ...	117 2 16	2	8	Practically all lalang, with a crown of fair jungle on hill top and some wild getah.
6	Bukit Timah Road 10th mile ...	13 0 28	3	14	Small jungle on small hill.
7	Chua Chu Kang ...	49 0 00	2	16	Low-lying small jungle.
8	Tuas ...	1,601 3 32	2	15	Mostly mangrove swamp. Rest, except in one place, poor jungle.
9	Sungei Murai ...	314 1 05	1	7	Mostly mangrove swamp. Good jungle on one or two hills
10	Sungei Buloh ...	770 2 16	1	28	Mangrove swamp and poor jungle.
11	Kranji ...	756 0 32	1	28	do.
12	Sembawang ...	1,046 3 38	3	10	Hilly. Good jungle and scrub getting worse towards Chan Chu Kang.
13	Mandi ...	407 0 32	3	14	Hilly, covered with bluker and scrub except Bukit Mandi where the jungle is good.
14	Kranji Road 13th mile	9 2 16	1	28	High land, scrub covered.
15	Changi ...	1,393 0 00	4	22	Some fair jungle towards North and East, the rest very poor.
16	Selitar ...	1,429 1 08	1	9	Mostly poor scrub and mangrove.
17	Chan Chu Kang ...	813 3 08	3	11	Several good patches of jungle; the rest better than in many reserves.
18	Ang Mo Kio ...	296 0 02	12	9	All small scrub and swamp growths.
19	Sempang ...	5 0 00	1	10	Nice jungle on road side, swamp growths at back.
20	Selitar Extension ...	Not known	3	13	Mangrove swamp, poor scrub and lalang.

2. As usual the Reserves (Nos. 1-14) under F. R. NONIS' charge were very well protected and the boundary paths kept clean to a considerable width. The good results of this care were apparent in two instances where fires starting on unreserved land reached the boundary paths but failed to cross them and make any impression on the Reserve. Under F. R. NONIS six Forest Guards were working, as last year.

3. The Changi Reserve (two guards) was fairly well kept.

4. The condition of the remaining Reserves was again far from satisfactory, and despite frequent changes (5) in the two Guards primarily responsible for this it seems impossible to get these Reserves properly kept. The Collector's visits seldom found the paths here so cleared as to be any protection against fire, and the roller-riding left much to be desired. It is hard to say whether additions to the numbers of the Guards would effect any improvement proportionate to the increase in expenditure.

5. The four Forest boats used for river work were kept in the same places as last year. The Chan Chu Kang boat is woefully leaky, is over large and heavy for the purpose for which it is required, and might in no long time be with advantage replaced by a new one.

6. (a) The number and result of the various prosecutions instituted in respect of the reserves will be seen hereunder.

	CASES.			FINES.	
	<i>No. of</i>	<i>Convicted</i>	<i>Dismissed</i>	<i>Inflicted</i>	<i>Recovered</i>
Western Division	10	9	1	\$500	\$250
Northern Division	7	6	1	51	41
Eastern Division	1	1	...	20	20

6. (b) At the XII mile Tampinis Road 4 or 5 acres of lalang were burnt. In the Kranji Reserve the same fate came upon $1\frac{1}{4}$ acres of brushwood in April. In the Reserves at Ang Mo Kio, and in the Selitar Extension there were five small fires, but only lalang was destroyed, and the guilty escaped.

7. Necessarily the more exposed Reserves claimed the greater part of the Collector's attention, and nearly fifty per cent. of his surprise visits were paid to the Bukit Timah, Ang Mo Kio, and Ulu Pandan Reserves. However great the vigilance of the staff it must be admitted that depredations do from time to time take place and the loss of Getah taban trees at Bukit Panjang (Reserve) Bukit Timah (Reserve) and Ayer Terjun (Crown jungle) is not compensated by the fact that in two out of three cases the offenders expiated their crime.

8. The nurseries of useful trees which the Guards were to make in their leisure moments have not progressed very far. At Bukit Timah have been planted a fair number of trees (mainly Penaga, Tembusu and Tampinis) and they look well. The trees in the Changi nursery (Rengas Klat and Tampinis) are sickly, while the Kranji and Chan Chu Kang (Tembusu, Rengas and Jambu Air) nurseries are very poor things indeed.

9. The Revenue from the Reserves was again nil, the Expenditure on them amounted to \$1,085.15 all but \$88.25, being the wages, etc.; of the Guards. Government allowed the Collector to bring forward a scheme for slightly improving the positions of these men and materially bettering their prospects, in the hope of attracting and keeping a good class of Guards, but sanction for his proposals has as yet not been obtained, one cause of delay being the necessity for evolving a scheme which will work fairly for the Guards all over the Colony. Their temptations are many, their prospects should be good enough to make it pay them to resist.

10. Nothing that occurred during the year was so likely to improve the Reserves as their inspection by Mr. H. C. HILL, Inspector-General of Forests (Indian Forest Service). As far as regards Singapore Mr. HILL's recommendations resolve themselves, speaking broadly, into the appointment of a trained Forest Officer to be in supreme charge of the Reserves of Singapore, with the rest of the Colony, the encouragement of natural re-afforestation with protection of the jungle from fire, and systematic cutting of the Bakau. How much Bakau will be required for the Railway it is not at present possible to foretell, but should there be any considerable surplus, the adoption of the last recommendation would give the Reserves the appearance of being what they will be, a paying property. The absolute cessation of Government Bakau passes having raised the price of Bakau firewood from \$6.37 per 1,000 to \$6.75 per 1,000 billets tends to show that any coupes not required for Government purposes would find a ready sale.

W. L. CARTER,
Acting Collector of Land Revenue.

PENANG.

North East District.

Block.	District.	Mukim.	Lot Nos.	Area.			Total area.		
				a.	r.	p.	a.	r.	p.
"D"	N.E.	15	34 ⁱ	425	3	06	5602	3	26
		17	134	4757	3	36			
		26 lots in Mukim No. 17 added to block "D" vide Govt. Notn. No. 111 of 25th January, 1901.			419	0				24
"E"	N.E.	16	1	252	2	36	252	2	36
"F"	N.E.	14	32	233	2	31	233	2	31
Part of "I"	N.E.	13	60 ⁱ	14	3	27	18	3	32
"	"	"	60 ⁱⁱ	4	0	05			
Grand Total							6,108	1	05

2. I visited all the Reserves several times during the year. The Forest Rangers paid altogether 93 visits.

3. Mr. H. C. HILL of the Indian Forest Department visited Block *D* in June in company with Mr. RIDLEY, Director of Gardens and Forests, Mr. CURTIS, Assistant Superintendent, Botanic Gardens, and myself. Mr. HILL'S report was published in the *Government Gazette* of 21st September, 1900. He appeared at the time to be much struck with the natural reproduction going on in the Reserves with which he deprecated any interference. His recommendations on the *Getah* producing area inside and outside the Batu Ferenghi side of the block are now being carried out. 419 acres have been added to the Reserve bringing the boundary up to the path from Batu Ferenghi to Bukit Laksamana. Of this, 33 acres were acquired from two Chinese owners for \$1,000. The extension of the boundary to the path will save the Forest Guards much labour in clearing, on the other hand it considerably reduces the area within which woodcutting passes were issued and a sharp watch will have to be kept over owners of fishing stakes to prevent illicit cutting. I have very little faith in the possibility of exploiting this area as a *Getah* preserve.

4. Blocks *E*, *F* and *I* call for little comment. *E* and *F* contain fair timber but no *getah*.

The line of *I* was only opened out in November; with the exception of a few acres it is all scrub and small jungle.

5. As far as I can ascertain very little illicit cutting and that only of stakes and jungle produce goes on in any of the Reserves. The difficulty of carrying away large timber in addition to the risk of almost certain detection is sufficient to deter the most inveterate timber thieves. 10 prosecutions were instituted during the year, in most cases for trespass, and fines to the amount of \$99 inflicted.

6. Two Forest Guards and 4 coolies were employed during the year. PAUL, the head Forest Guard, was sick for much of the latter part of the year. He is still hardly fit for work and will be replaced as soon as a suitable man can be found. I employed two Kling coolies during the last quarter of the year and found they worked much better than the Siamese who are quite incapable of *changkulling*.

7. The staff allowed for 1901 is 1 Forest Guard at \$10, two Forest Guards at \$8 and three coolies at \$7 each. I consider this an uneven distribution and would

suggest the following:— 2 Forest Guards at \$15, four coolies at \$8. This would entail an addition to the Forest Reserve vote (Fixed Establishment and Temporary) of about \$100. The deficit could be made up by dispensing with the services of the Assistant Bailiff and Forest Ranger attached to the Land Office on \$39 per mensem whose salary is unnecessarily high, and by appointing in his stead an Assistant Bailiff on \$20.25 per mensem. For \$15 per mensem fairly reliable Forest Guards could be employed.

8. The Reserve boundaries are cleared with the exception of 5 miles from Telok Tekus to Sungei Kechil, Batu Ferenghi Ice dam and four miles from Sungei Pinang Path to Western Hill. These are now being cleared of the bracken which quickly overspreads them. The Forest Ranger has shewn commendable energy in keeping the coolies up to their work.

9. Expenditure was as follows:—

Salaries of Forest Guards...	...	...	\$216.00
" " Coolies	...	...	289.28
Rice allowance	...	...	49.00
Miscellaneous expenses	...	...	5.03
			<u>\$559.31</u>

J. M. KINDERSLEY,
Acting Collector of Land Revenue

LAND OFFICE,
Penang, 11th February, 1901.

South-West District.

The number and covers of the Forest Reserves in this District remained the same as in the preceding year.

			a.	r.	p.
A. Pantai Acheh	Lot 132	Mukim I	3,208	0	08
B. Laksamana	" 174	" II	465	2	30
C. Telok Bahang	" 181	" II	380	1	36
G. Genting Hills	" 247	" VII	21	2	14
H. Bukit Gemuroh	{ " 27 & 52 ^{II}	" VII }	205	3	06
	{ & " 190	" IX }			
I. Relau Hills (part)	{ " 79 ^I , 75, 80 ^{II} , 43 ^{II}	" V }	151	2	25
	{ & " 1	" X }			
Total area of Forest Reserves			<u>4,433</u>	<u>0</u>	<u>39</u>

2. *Pantai Acheh* was visited by me four times during the year: once by the Collector of Land Revenue and twenty-four times by the Forest Ranger. The boundary was kept well cleared.

Laksamana was visited by me four and by the Forest Ranger fourteen times. The path was kept cleared during the year, but the bridges were not properly kept up and on my last visit I had considerable difficulty in getting round.

To *Telok Bahang* I paid three visits and the Forest Ranger seventeen.

Genting Hills was visited once by me and sixteen times by the Forest Ranger.

Bukit Gemuroh I visited on three and the Forest Ranger on twenty-one occasions. This was the only Reserve of which the boundaries were not satisfactorily cleared during the year.

Relau Hills was visited by me four and by the Forest Ranger forty times.

3. The staff consisted of one Forest Ranger, one Forest Ranger's man, two Forest Guards, two coolies employed during the whole of the year, two employed for about seven months of the year, and two extra coolies employed for short periods in

assisting to clear the boundaries of the new Reserve on Relau Hills. In March it was discovered that a large amount of wood was being stolen from the Forest Reserve at Telok Bahang and there was reason to suspect that almost the whole of the staff stationed at Telok Bahang, namely, two Forest Guards and two coolies, had connived at the offence. One of the former absconded and has not yet been arrested: against the other there was not sufficient evidence to warrant proceedings: but he was dismissed: and one of the coolies was also dismissed. In consequence of this I put the Forrest Ranger's man at Telok Bahang to work as Forest Guard: and I found the arrangement so satisfactory that I kept him there during the whole of the year. I recommend that for the future the pay now given to the Forest Ranger's man of \$18 per month be given to the Senior Forest Guard, and the former paid only \$8 per month. This would not mean any increase in the cost of the staff: and would, I think, be a method of remuneration in better proportion to the services rendered by the two men respectively. The Forest Ranger's man has no responsibility thrown on him, and as he always accompanies the Forest Ranger he has an opportunity of learning his work before he is put to do more responsible work. If the post of Forest Ranger's man is the best paid, the Senior Forest Guard naturally expects to get it, when a vacancy occurs, and his services are then practically lost.

4. For 1901 the employment of a third Forest Guard and the insertion of a vote of \$144 for clearing the boundaries of Forest Reserves have been sanctioned. The vote for the maintenance of Forest Reserves which was formerly under the Land Office and amounted to \$500 to be divided between the Land Office and this office, has now been split up, and a vote of \$350 for this purpose allotted to this District for 1901.

5. *Prosecutions.* As already mentioned traces of extensive wood-cutting in Telok Bahang Reserve were discovered during the year. None of the trees cut appear to have been more than six inches in diameter but a large number were cut, and the stumps then covered over with leaves and mould, so as to escape observation. A man called TAMBISAH was prosecuted in Penang, but it was not possible to prove that he had taken the wood from the Reserve and the Magistrate, before whom the case was tried, pointed out that there was nothing on the licence which he produced to prevent him cutting the wood from any Reserve, since then all licences are endorsed "not to be cut from the Forest Reserve" but it is open to doubt whether a new printed form would not be advisable. The man TAMBISAH was fined \$14 for cutting wood of a description other than that mentioned in his licence. Mr. CAPEL'S tyndal was prosecuted for clearing a small plot about 6 square feet in area, in the Relau Hills Reserve and making a nutmeg-tree nursery there. He tendered an apology to the Court, and as he had only just come to the District he was only fined \$5. For cutting bertam in the Forest Reserve on Laksamana a Chinaman was fined \$10.

The only other prosecution in connection with Forest Reserves during the year was for cutting rattan at Pantai Acheh, the defendant was discharged.

6. During the year the District was visited by Mr. HILL from India, accompanied by Messrs RIDLEY and CURTIS: they did not however, visit any of the Reserves in this District. At the suggestion of the former I append a statement of the expenditure on and revenue received from the work of the staff during the year. The Reserves of course, give no revenue, except from the undesirable source of fines for wood stealing. But as the Forest Ranger has many other duties than those of looking after the Reserves while the Forest Guards have to supervise the cutting of timber under licences, it is impossible to say what is the exact proportion of expenditure on the Forest Reserves alone.

The total expenditure thus amounted to \$1,095.43, made up as follows:—

Forest Ranger's salary	...	...	...	\$396 00
Forest Ranger's man salary	...	...	...	120 00
Rice allowance	...	...	...	12 00
Clearing boundaries of Forest Reserve	...	...	...	122 49
Maintenance of Forest Reserves	...	...	...	206 36
Rice allowance	...	...	...	46 58
Forest Guards	...	...	...	192 00
				\$1,095 43

The revenue was \$920.15, made up as follows:—

Timber Royalty	...	...	...	\$616 74
Expenses of Preliminary Survey (undertaken by the Forest Ranger)	...	...	...	153 40
Timber and Fruit sold by Forest Ranger	...	...	...	20 44
Fines (for wood-stealing in Reserves, and other Crown Land and for encroachments, all undertaken by the staff)	...	...	...	130 00
				\$920 58

Thus although the staff engaged has to look after about 4,500 acres of Reserve producing no revenue, the expenditure was only \$175 in excess of the revenue.

7. From Pantai Aceh Forest Reserve wood continues to be stolen by the inhabitants of Pantai Aceh Village Site. The Reserve comes right down to the sea and is perfectly accessible on that side from the village site, but it is impossible for anyone to approach it from elsewhere without giving notice of his approach, and I regret to say that not a single arrest has been effected there during the year. The Reserve is undoubtedly far the most valuable in the Island as a Reserve of timber, because the very qualities which lay it open to the attacks of wood-stealers at present will, when it is decided to utilise it, facilitate the extraction of the timber.

8. There have been no fires during the year in the Reserves.

9. The boundaries of the Relau Hills Reserve were surveyed and opened up during the year: considering its comparatively small area the boundary is a very long one and where it runs along the boundary of the North-East District the work was difficult; the land on the other side of the boundary is jungle belonging to Mr. LOGAN and I think it might be well, if the Collector of Land Revenue considers it feasible, to repurchase that land and throw it into the Reserve.

10. During the year I have been on the look out for good specimens of "getah taban" trees, all that I have found are on the North of the Island: and practically all of these are outside the Reserves: on the East side of Telok Bahang Reserve, which overlooks the Batu Feringhi Valley I found one or two small trees. I have no reason to believe that they are being cut down any longer.

G. A. HEREFORD,
Acting District Officer.

8th February, 1901.

PROVINCE WELLESLEY.

Northern District.

1. There are two Reserves in this District, *vis*:—

(a) Tassek Glugor, 3,095 acres.

(b) Ara Kuda, 562 acres.

Part of the Reserve consists of primary jungle, part of secondary jungle and part is lalang and brushwood.

2. I took over the duties of Senior District Officer at the end of October. I did not find time to visit the Reserves during November or December. The Forest Ranger has visited them about once a week, and there is a Forest Guard living at Tassek Glugor, who looks after both Reserves.

Mr. O'SULLIVAN, the Senior District Officer, visited both Reserves in June. He was accompanied by Mr. HILL of the Indian Forest Department, who has since written a full report on all the Reserves in the Settlement. This report is published in the *Government Gazette* of 28th September, 1900.

4. There are very few valuable trees in the Reserves. In his report for 1899 the Senior District Officer stated that the Reserves contain, among other things, about 200 young tembusu trees. He has however left it on record that the number 200 is a mistake and that there are in fact about 20,000 young tembusu trees in the Reserves.

5. There were 6 fires in the Tassek Glugor Reserve and 7 in Ara Kuda during the year. They were lalang fires, none of the primary or secondary jungle was consumed.

6. There was one prosecution for cutting timber in the Reserves. The defendant was fined \$5.

L. M. WOODWARD,
Acting Senior District Officer.

9th February, 1901.

Central District.

1. The Forest Reserves in the Central District at present gazetted are:—

	a.	r.	p.
1. Bukit Seraya, Lots 679 and 680, Mukim 17 ...	112	0	04
2. Bukit Mertajam, Lot 815, Mukim 17 ...	162	2	01
3. Bukit Juru, Lots 542 and 454, Mukim 12 ...	525	0	10
4. Bukit Gajah, Lots 637, 638 and 654, Mukim 16...	82	1	13
5. Bukit Goa Ipoh, Lot 410, Mukim 20 ...	338	0	35
6. Kubang Ulu Experimental Gardens } Lot 394 ⁱⁱ , Mukim 20 ...	3	2	03
	<u>1,223</u>	<u>2</u>	<u>26</u>

2. I have recommended that to these should be added:—

Bukit Langkap, Lot 435, Mukim 19 ...	189	2	10
Bukit Goa Gempas, Lot 323 ⁱ , Mukim 19 ...	13	2	20
Part, Bukit Gajah Mati, Lots 606 and 607, Mukim 16...	11	3	18
	<u>215</u>	<u>0</u>	<u>08</u>

3. Mr. H. C. Hill, Head of the Forest Department in India, paid a flying visit to the District on June 23rd inspecting the Experimental Garden at Kubang Ulu. It was in consequence of his report that I have recommended that Bukit Langkap should be added to the Reserves.

4. The visits paid to the Reserves are shewn in the following table:—

Reserve.	Times visited by D. O.	Times visited by F. Rangers.
1. Bukit Seraya ...	1	3
2. Bukit Mertajam ...	2	2
3. Bukit Juru ...	2	12
4. Bukit Gajah Mati ...	2	8
5. Bukit Goa Ipoh ...	2	13
6. Kubang Ulu, Experimental Gardens ...	3	14

5. There is no special staff employed to look after these Reserves, but it is the duty of the two Forest Rangers to inspect them from time to time. I did, however, employ a man temporarily to cut away the grass and lalang, and clean the boundaries on the Kubang Ulu Reserve.

6. There were only 4 prosecutions for trespass in 1900, all on the Goa Ipoh Reserve, viz.:—

Summons Case No. 108	3 Defendants each fined \$20 and costs.
do. 117	1 Defendant fined 20 and costs.
do. 194	1 " " 10 and costs.
do. 215	1 " " 5 and costs.

7. No fires took place, except a very small one on the Goa Ipoh Reserve where a portion of the lalang was burnt.

8. No real use has yet been made of the Experimental Garden, while the Goa Ipoh Reserve which is close to it, still remains largely covered with nothing but lalang.

W. PEEL,
Acting District Officer.

BUKIT MERTA JAM,
14th January, 1901.

Southern District.

1. There is only one area in the Southern District containing 1,471 a. 1 r. 36 p. which has been set apart to serve as a Forest Reserve. It is situated on the top of Bukit Panchor and is known as the Bukit Panchor Forest Reserve.

2. It was visited:—

By District Officer, seven times during the year, *viz.*, on the 8th March, 6th and 10th April, 9th and 24th June, 5th September, and 18th October.

By Forest Ranger CHEE, ten times, *viz.*, on the 12th January, 7th February, 12th March, 6th April, 7th April, 24th June, together with Mr. HILL and District Officer, 5th and 23rd July, 8th August and 7th September.

By Assistant Forest Ranger OOSMAN, ten times, *viz.*, on 29th January, 28th February, 30th March, 26th April, 26th May, 24th June, visited with Indian Forester and District Officer, 27th July, 21st August, 26th September and 27th October.

It was continually visited by the Forest Guard.

3. There was only one case of trespass brought before the Court, two Chinese charcoal burners were arrested by Mr. CURTIS and myself on 8th March, cutting up a fallen tree within the Reserve and charged before Mr. FARRER.

4. On the 24th of June, the Forest Reserve was inspected by Mr. HILL accompanied by Mr. CURTIS and myself.

5. During the year the owners of several lots towards the border of the Reserve for which grants had been given by Government, agreed to surrender these grants for inalienable leases. They were further compensated for the surrender of these grants in that they received half the value of the land.

C. GREEN,

Acting District Officer, Nibong Tebal.

DINDINGS.

1. The Forest Reserves of this District, with the number of times they were visited by the Forest Ranger or Forest Inspector and the District Officer, are shown in the following table:—

	<i>Visited by Forest Ranger and Forest Inspector.</i>	<i>Visited by District Officer.</i>
A. Tanjong Burong	... five times	twice
B. Telok Sera and Segari Hill	... eight times	four times
C. Gunong Tunggul	... seven times	twice
D. Tanjong Hantu	... thirteen times	four times
E. Pangkor { South	twenty-seven times	{ three times
{ North	twenty-five times	{ four times
(two separate blocks, treated as one Reserve)		
F. Lumut	... forty-two times	six times
G. Ulu Bruas	... three times	four times
H. Telok Muroh	... six times	four times

2. The two last on the list, G. and H., are new Reserves, demarcation of which was completed just at the end of the year at a cost of \$313. The others remain as last year with the exception that the boundary of Pangkor Reserve South has been slightly altered in order to improve the boundary path and to make more use of natural boundaries, and that in Tanjong Burong Firewood Reserve paths have been cut excluding the fishing villages of Tanjong Burong and Sungei Panchor which were formerly included in the Reserve.

3. The Staff of Forest Guard was the same as in 1899, *viz.*: 3 Guards at \$9 per month and 4 at \$8. They were stationed as last year, *viz.*:—

3 at Bruas,
2 at Beting Luas,
2 at Lumut,

one man at \$9 being at each Station with one man at \$8 with him (2 at Bruas). This staff was inadequate and would have been more so this year since the addition of the two new Reserves at Telok Muroh and Ulu Bruas; and the addition of 6 new Guards together with an additional Forest Ranger has been accordingly sanctioned. New

stations will be established at Sungei Rotan (for Ulu Bruas), Pangkor, and Kampong Acheh (for Bukit Segari), each to have one Forest Guard at \$9 and a man at \$8. The existing stations will be maintained as at present though the Reserves allotted to the Guards at each station for patrolling will be re-arranged. The new Forest Ranger will be stationed at Bruas.

Prosecutions.

4. There were four prosecutions during the year for trespass in the Reserves, *viz.*, two for cutting timber, in which the defendants were fined \$23 in all, one for trespass by encroachment in which the defendant was discharged, and one for theft of firewood. In this last case two Chinamen were arrested in June at Sungei Panchor, for cutting firewood in the Tanjong Burong Reserve. They had come across from the Perak side of Sungei Panchor; on being arrested by the Forest Guards they resisted and shouted to their friends on the Perak side for help. A number of Chinamen came out from Sungei Panchor village and the prisoners were rescued. Warrants were afterwards taken out and 5 Chinamen were convicted and sentenced to rigorous imprisonment for periods of from 4 to 6 months.

5. The theft of firewood and small jungle produce is the only way in which the Reserves can be violated. The felling of large and valuable timber undetected is almost an impossibility and I think I may venture to say is never attempted in the Reserves. The risk of being caught is so great, the fines or other punishment so heavy, and there is such abundance of timber outside the Reserves that there is no inducement for theft. Smaller jungle produce is however occasionally stolen, but the harm done (if any) is of the slightest. It is a question in fact whether more good is not done than harm, by clearing away too luxuriant undergrowth and allowing a freer circulation of air about the roots of the larger trees. I should be inclined to recommend that passes for various kinds of jungle produce, such as bertams, rotans and nibongs, should be issued in the Reserves. If necessary the fee for a pass might be double that for a corresponding pass not in the Reserve. The Revenue from this source would not be great, because the open jungles contain an almost inexhaustible supply of these kinds of produce and the Reserve would not be entered upon (at the double rate) until the supply outside the Reserve fell short. At the same time there are some kampongs as at Teluk Gedong, Teluk Chempedak, &c., which are close to Reserves but have no open jungle anywhere in the vicinity. The inhabitants are now compelled either to steal or to go long distances for the rotans and nibongs they may require for repairing their house, &c., not to mention the fact that a fairly lucrative source of income is closed to them unless they are willing to go and live for a time at a distance from their homes. Mr. H. C. HILL of Indian Forest Service expressed the opinion in his Report on the Reserves of the Dindings that such passes at double rates would do no harm in the Reserves. I should be very glad to see the arrangement brought into force.

6. None of the Reserve has been properly surveyed, and a guess at the area is almost impossible owing to the devious and up and down nature of the boundaries. The present Forest Inspector (Mr. T. DESOUZA) has had some experience of surveying in India and I accordingly instructed him to make rough surveys of each of the Reserves as occasion served. He completed the measurement of Lumut Reserve but he was then stopped as I understood from correspondence that the Survey Office were to survey all the Reserves. This was in September last. The Survey Department have not commenced operations yet. The Forest Inspector's rough compass survey of Lumut Reserve gives the area to be about 1,225 acres. Taking this as a basis and judging by the comparative time it takes to walk or row round the other Reserves, I should estimate that the total area of Reserve Land in the Dindings would not fall far short of 20,000 acres.

A proper survey of the Reserves (and, indeed, of the rest of the District) is very much needed. This work will, I hope, be done this year. When once begun it should not take much time to complete, as the Reserve boundaries are all kept clear and in good order by the Guards and in some places fairly long shots could be taken with the theodolite.

7. On the 26th June, Mr H. C. HILL, Conservator of Forest in the Indian Forest Department (now Acting Inspector-General of Forests for India) and Mr. CURTIS of the Penang Gardens arrived on their tour of inspection of the Forests of the Colony. Mr. HILL made a thorough examination of the system of collecting revenue from timber and forest produce in the district, inspecting the more important timber Kongsis and Forest Reserves. He laid stress on the point that Reserves should not

be treated separately, as district sub-departments from other Crown Lands but that all Crown Lands, Reserved and Unreserved should be treated together as one Estate.

He condemned the present system of monthly passes to cut timber as wasteful, and I hope that effect will be given to his suggestions for superseding this system of passes to coolies by issuing passes for specified trees, with no limitation of the number of coolies to be employed. The change would be analogous to that from time work to piece work and the advantage would be all on the side of the Government. It is the easiest thing in the world for the owner of a timber Kongsí to employ a number of men without passes among his other coolies. These unlicensed men cut regularly, and accept the risk of being caught when the Forest or District Officer makes a surprise examination of the Kongsí—not a very “sporting” risk, considering that the Kongsí are always in the middle of the jungle and that escape and concealment till the examination is over are by no means difficult. Each man so employed means a monthly loss to Government of his licence fee of \$3. The total loss may not be very great but it could be avoided by issuing the licence, not to the man but for a specified tree or number of trees. This is the system established I believe in Burma and Ceylon and the details could easily be adopted to the needs of the Straits. Mr. HILL and Mr. CURTIS left the Dindings on the 2nd July continuing the tour *viâ* Perak.

This matter is not however strictly connected with the Reserves and should not perhaps be included in a Report dealing only with the Reserves. The Revenue of this District is however so largely derived from forest produce that the inclusion may be justified. There are of course no licensed cutting operations in the Reserves.

8. There were no fires in any of the Reserves. Their isolated position, generally at a distance from cultivation and cleared ground, at present forms a safeguard. The Pundut side of the Lumut Reserve is the only one where the proximity of lalang causes danger of the spread of fire.

9. The two new Reserves of Teluk Muroh and Ulu Bruas are well timbered hills. The former is one of the largest of the Reserves, the boundary cut round it being probably 5 or 6 miles in length.

F. J. HALLIFAX,

Acting District Officer, Dindings.

24th January, 1901.

MALACCA.

LAND OFFICE,

Malacca, 28th January, 1901.

Sir:—I have the honour to report on the Bukit Bruang Forest Reserve for the year 1900.

2. I have been over the whole of the boundary line since taking charge of the Land Office in September, with the exception of a small piece, at the South West corner leading up to the Sungei Gapam, where the line disappeared in a thick growth of scrub. I have taken steps to get this part re-opened.

3. The Forest Rangers do not inspect the Reserve, their time being fully occupied in dealing with land application and similar work.

4. The staff consists of a Corporal and a Forest Guard.

5. There is still a very large stretch of lalang on each side of the northern boundary, but it appears to be gradually giving way to small bushes and trees and if protected from fire will no doubt disappear in a few years.

6. There were no prosecutions during the year.

7. The Nursery of Forest Trees, under the personal supervision of the Resident Councillor, was maintained and a number of trees planted out. This however is a work which requires special knowledge and should be under the control of an officer with the necessary technical training. A Superintendent of Government Plantations and Forests has been provided for in the Estimates for 1901.

8. The plantations of rubber trees appear to be doing satisfactorily.

I have, &c.,

G. HALL,

Acting Collector of Land Revenue.

Jasin District.

DISTRICT OFFICE,

Jasin, 24th January, 1901.

Sir :—I have the honour to submit my report on the Forest Reserves of the Jasin District for the year 1900.

2. The Reserves are five in number, their names and approximate areas are as follows :—

<i>-Reserve.</i>	<i>Area.</i>		
	<i>a</i>	<i>r</i>	<i>p</i>
Ayer Panas ...	3,242	0	00
Merlimau ...	6,217	0	00
Batang Malaka ...	3,549	0	00
Bukit Singgeh ...	9,430	0	00
Bukit Sedanan ...	7,806	0	00

	30,244	0	00

3. The above Forest Reserves were visited on the following occasions by the District Officer and Forest Ranger respectively :—

Ayer Panas by the District Officer on 16th August.

Merlimau by the District Officer on 13th December, by the Forest Ranger on the 20th February and on the 6th September.

Batang Malaka by the District Officer on the 23rd March.

Bukit Singgeh by the District Officer on 29th August.

Bukit Sedanan by the District Officer on 30th August.

4. The Reserves at Ayer Panas, Bukit Sedanan and Batang Malaka were visited by Mr. H. C. HILL of the Indian Forest Service.

5. The staff in charge of each Reserve is as under :—

Ayer Panas, one Lance Corporal, one Guard.

Merlimau, do. do.

Batang Malaka, do. do.

Bukit Singgeh } one Corporal, one Guard.

Bukit Sedanan }

The Guard at Batang Malaka is also in charge of the northern boundary of Bukit Sedanan Reserve.

6. I would point out that although the Jasin Reserves are very much larger in area, the staff is the same as that provided for the Alor Gajah district in the Estimates for 1901. Thus the three northern Reserves, while exceeding in area all those of the Alor Gajah and Central district together, have a staff of only four men. If effective supervision is to be exercised the present staff should, I submit, be increased by at least one Lance Corporal and one Guard.

7. A considerable portion of the time of the staff in charge of Northern Reserves was occupied in superintending the newly discovered gutta trees.

8. There were no prosecutions during the year.

9. The southern boundary of the Merlimau Forest Reserve has now been practically all cleared, but the ground through which it runs is, even in dry weather, so swampy that it will always be very difficult to pass along this boundary.

10. A portion of the boundary of the Bukit Singgeh Forest Reserve has not yet been cleared; the lines of all the other Reserves have been kept open.

I have, &c.,

S. CODRINGTON,

Acting District Officer.

Alor Gajah District.

DISTRICT OFFICE,

Alor Gajah, 18th January, 1901.

Sir :—I have the honour to forward the following report on the Forest Reserves of this district for the year 1900.

Number and Area.

2. The Forest Reserves are four in number:—

Bukit Panchor	area	3,356	acres
Sungei Udang	"	4,392	"
Brisu & Sungei Siput	"	5,268	"
Total		<u>\$13,016</u>	"

Inspections.

3. The above Forest Reserves were visited on the following occasions by the District Officer and Forest Ranger.

Bukit Panchor by District Officer, 30th March, 6th April, 9th July, 7th August, 26th November.

Bukit Panchor by Forest Ranger, 29th October, 30th November.

Sungei Udang by District Officer, 22nd February, 16th May, 17th September, 16th October.

Sungei Udang by Forest Ranger, 23rd and 24th February.

Brisu and Sungei Siput by District Officer, 26th February, 26th April, 16th August, 31st August.

Brisu and Sungei Siput by Forest Ranger, 25th and 26th January, 2nd April, 16th May.

Staff.

4. The staff at each Reserve in 1900 is shewn as under:—

Bukit Panchor.—1 Corporal and 1 Guard.

Sungei Udang.—1 Corporal and 1 Guard.

Brisu and Sungei Siput.—1 Corporal and 1 Guard, stationed at Brisu.

Prosecutions.

5. There were instituted three prosecutions in 1900, and one was decided which was pending on 31st December, 1899.

(1) Against 4 Chinamen who set fire to about a square mile of lalang in taking a bee's nest in December, 1899. Three were fined \$25.00 each and the 4th discharged. Fines paid.

(2) 20th January, 1 Chinaman arrested for burning a strip of jungle about $\frac{1}{2}$ square mile in adjoining his holding. Fined \$25 or 1 month (fine not paid).

(3) 25th January, 2 Chinamen for firing about 300 fathoms square of jungle in Sungei Udang Forest Reserve. Discharged.

(4) 11th May, 1 Chinaman for burning about 5 acres in Sungei Udang Forest Reserve. Fined \$25, paid.

Revenue.

6. The total revenue collected on account of the Forest Reserve was \$240.50, made up as follows:—

Bukit Panchor—Sale of durians	...	...	\$170.00
" " dukus	...	...	62.00
Miscellaneous	...	...	8.50
			<u>\$240.50</u>

Expenditure.

7. The total expenditure was \$681.75, made up as follows:—

Salaries, 3 Corporals at \$108 and 3 Guards at \$84...	\$576.00
Rice Allowance	72.00
Uniforms	27.00
Tools	6.75
<u>\$681.75</u>	

Miscellaneous.

8. A Corporal and Guard have been now placed at Brisu, and from 1st January, 1901, a similar Guard will be stationed at Ramuan China Kechil. The lines will also be opened and paths made round the Reserve. The lines round the small Reserve at Sungei Siput have already been identified and partially opened.

9. The paths and boundaries in the other two Reserves have been well kept.

10. Owing to the dry weather, lalang fires were rather prevalent during the year, but with the exception of the Sungei Udang Forest Reserve no serious damage was done. In Sungei Udang a great extent of brushwood which was growing up nicely was destroyed on the coast side.

In Bukit Panchor the brushwood is growing up very well and in many places is able to hold its own against any ordinary lalang fire.

11. No traces of illicit timber cutting were discovered in either Sungei Udang or Bukit Panchor. In Brisu there was a case of rattan stealing but not of any great amount or importance, and no conviction was obtained.

12. A small area of about 20 acres has been reserved at Tebong on account of its containing getah taban trees. Altogether 338 trees were identified and marked, but none of them were of any size larger than 17 inches girth, and only one was found to be in flower.

I have, &c.,

H. MARRIOTT,
District Officer.

Gutta Percha.

On the 10th February, 1900, the Acting Resident Councillor (Mr. EGERTON) reported that 31 Getah Taban trees (*Dichopsis Gutta*) have been discovered in various parts of the Settlement (*vide* Malacca $\frac{1220}{00}$). Three of these trees were afterwards found to be not *Dichopsis Gutta* but Getah Sundek (*Payena Leerii*).

2. His Honour the Officer Administering the Government then gave orders that a Register should be kept by the Resident Councillor of all such trees, and that they should be regularly visited, and all seed should be collected when mature.

3. Since that date, 667 trees have been discovered, of which 505 are in the Alor Gajah District and 162 in the Jasin District. All these are reported to be either Getah Taban Merah (*Dichopsis Gutta*) or Getah Taban Sutra (*Dichopsis Oblongifolia*). The latter is very closely akin to the former, and I believe that Mr. RIDLEY now inclines to the belief that it is merely a variety of *Dichopsis Gutta*. In one minute he alludes to it as "the long-leaved form of *Dichopsis Gutta*." Some of the trees were discovered by Forest Rangers, some by Surveyors and a good many by a Police Corporal, who had formerly been a Getah collector, and was sent out specially to look for trees. Two *Dichopsis Obovata* trees (Niato bunga) were also discovered, one at Bukit Duyong and the other at Bukit Katil.

4. In some cases the trees were found growing on land which had been alienated, and the land was resumed, the owners being given an equal area of land elsewhere.

5. A register of all trees discovered has been kept, as ordered by the Officer Administering the Government, and the total number of trees on the register is now 695.

6. The trees have been marked, and in some cases fenced in with barbed wire, and the undergrowth has been cleared away, so as to give self-planted seedlings a chance to grow up. Most of the trees are quite young, and although there are a few older trees, no seed has yet been obtained. The trees have been frequently visited by the District Officer, the Forest Ranger and the Forest Guards.

7. When Mr. CURTIS arrives, he will be able to instruct the Forest Guards and Penghulus as to the times when any of the trees may be expected to bear seed, and an effort will be made to obtain a supply for planting in the nursery at Ayer Kroh.

8. Five hundred seedlings of *Dichopsis Gutta* were obtained from Penang and planted, some at a spot selected by Mr. CURTIS at the 7th mile on the Ayer Kroh road, and some near the reservoir. They are planted in secondary jungle, the ground having been cleared of undergrowth, and most of them appear to be doing well, especially those near the Reservoir.

9. Mr. EGERTON purchased 200 stumps and 100 cuttings of *Dichopsis Gutta* from Mr. F. PEARS of Muar, which were planted at Ayer Kroh. They were not a success, and only 13 are now growing.

10. The total amount spent out of the vote of \$2,000 was \$1,124.16. An abstract of the expenditure is attached.

E. M. MEREWETHER,
Acting Resident Councillor.

*Statement of Expenditure under the vote for expenses of forming a Nursery of
Gutta Percha Trees.*

	\$	c.
Wages Mandor and Coolies	235	20
Cost of plants and freight	64	70
Passage and allowance of Mr. CURTIS	131	15
Cost of erecting Coolie-lines at 7th milestone	484	35
Tools, etc.	37	95
Barbed wire	60	00
Miscellaneous	62	20
	<hr/>	
	1,075	55
Discount	3	96
	<hr/>	
	1,071	59
Spent at Alor Gajah	32	11
" " Jasin	20	46
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Total \$	1,124	16
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Conserved by



