RAINFALL

at the Director's house, Botanic Gardens, Singapore, during the first half of the year 1914.

Readings taken always at 8 a.m. and credited to the date in which the twenty-four hours begin.

Day.	January.	February.	March.	April.	May.	June.
1	0.48	0.37	...	0.06	0.02	0.11
2	0.64	1.86	...	0.04	0.01	...
3	4.13	0.05	0.22	0.05	0.05	...
4	5.27	1.14	0.05	0.03	0.62	...
5	0.57	0.02	1.31	0.01	2.32	...
6	1.24	0.01	...	0.05	Trace	...
7	0.22	0.07	...	1.46	0.20	0.31
8	...	...	...	0.54	...	0.27
9	0.01	...	0.52	2.57	0.79	0.06
10	...	0.02	Trace	0.95	Trace	0.94
11	...	0.01	0.01	0.38	...	0.05
12	0.18	0.38	...	...	...	2.11
13	Trace	...	0.51	5.42	...	0.01
14	...	...	...	0.04	0.03	0.18
15	...	...	0.35	...	0.03	0.10
16	1.23	...	0.56	Trace	0.02	0.14
17	...	...	1.38	2.58	0.02	...
18	0.03	...	0.25	...	...	...
19	2.54	...	Trace	0 02	...	0.65
20	1.68	...	0.19	...	0.14	0.04
21	...	...	0.56	...	0.15	...
22	Trace	...	1.58	...	...	...
23	1.11	...	...	1.62	0.08	...
24	2 73	...	...	0.02	...	...
25	0.52	...	...	...	...	2.46
26	0.97	...	0 04	0.10	0.34	0.01
27	0.27	...	...	...	...	0.26
28	0 01	...	...	0.01	0.09	0.24
29	0.33	—	0.54	0.25	0.06	0.16
30	1.23	—	1.71	0.40	...	0.48
31	0.01	—	0.18	—	...	—
	25 40	3.93	9.96	16.60	4.97	8.58

RAINFALL

at the Director's house, Botanic Gardens, Singapore, during the second half of the year 1914.

Date.	July.	August.	September.	October.	November.	December.
1	0.16	...	..	...	...	Trace
2	1.05	...	0.03	...	0.01	0.28
3	Trace	0.11	...	1.14	0.01	Trace
4	...	...	...	0.12	...	0.02
5	...	...	0.04	...	0.03	...
6	...	...	1.47	...	0.01	...
7	...	...	0.17	...	0.14	3.09
8	...	0.31	0.37	...	...	0.56
9	...	...	0.28	...	0.42	Trace
10	...	0.63	...	...	0.58	0.12
11	...	...	0 03	Trace	0.25	0.23
12	1.02	...	...	...	Trace	...
13	...	...	...	...	...	0.43
14	...	...	...	...	0.11	0.02
15	...	0.02	0.32	...	0.41	...
16	...	...	0.02	...	...	0.03
17	0 24	...	0.38	0.07	...	...
18	0.09	...	0.02	0.03	...	1.02
19	0.35	Trace	0.01	1.56	0.14	1.47
20	0.58	Trace	...	0.83	0.02	0.08
21	0.09	...	...	...	0.03	0.02
22	...	Trace	...	..	1 59	0.03
23	...	0.07	...	Trace	0.64	0.41
24	..	...	...	0.03	0.89	0.14
25	1.10	...	...	...	1.72	0.12
26	0.01	...	...	...	0.02	0.58
27	...	...	...	0.03	0.17	0.01
28	Trace	...	...	0.01	0.62	0.02
29	0.02	...	...	0.14	0.05	0.72
30	...	...	...	0.01	...	0.14
31	...	...	—	0.11	—	...
	4.71	1.14	3.14	4.08	7.86	8.54

RAINFALL

at the head of the Waterfall Gardens, Penang, during the first half of the year, 1914.

Readings taken at 8 a.m. and credited to the date in which the twenty-four hours begin.

Date.	January.	February.	March.	April.	May.	June.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
1	...	..	...	...	...	...
2	...	1.92	...	0.13	0.52	...
3	...	0.05	...	0.98	1 00	...
4	...	...	...	1.98	0.27	...
5	...	0·07	...	...	0.04	...
6	...	...	...	0.16	1.16	...
7	1.03	...	0.03	0.95	0 75	...
8	0.01	...	...	...	1.75	1.65
9	...	...	0.23	3.10	0 77	...
10	...	0.10	...	...	0.02	3.35
11	...	...	...	1.03	0.20	2.15
12	...	0.06	1.21	0.08	...	...
13	0.18	..	0.32	0.30	...	...
14	0.20	...	1.30	...	...	0.37
15	...	...	0.65	...	...	0.50
16	...	...	...	...	...	...
17	...	...	...	...	...	0·06
18	...	...	1.17	0.38	...	...
19	0.09	...	...	...	0.22	0 73
20	...	...	...	...	1.08	0.03
21	...	0.03	...	...	0.08	...
22	...	...	...	...	...	...
23	...	...	...	0.02	3.20	...
24	...	2.70	1.35	0.05	1.23	...
25	0.01	0.07	...	0.03	...	...
26	0.07	...	...	0.02	...	...
27	0.26	...	...	...	...	...
28	0.04	...	...	..	...	0.39
29	...	—	...	0.02	...	0.06
30	...	—	...	1.22	...	0.32
31	...	—	0.03	—	0.14	—
	1.89	5.00	6.29	10.45	12.43	9.61

RAINFALL

at the head of the Waterfall gardens, Penang, during the second half of the year 1914.

Date.	July.	August.	September.	October.	November.	December.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
1	0.80	0.38	0.10	0.27	..	...
2	0.79	0.02	0.89	..	...	0.91
3	...	0.04	1.52	0.21	0.20	0.39
4	...	0.07	1 74	0.08	0.19	0.12
5	...	0.46	0.36	0.07	0.02	0.01
6	...	...	0.61	0.15	...	...
7	0.14	0.26	1.15	0.10	...	1.14
8	...	0.29	0.26	1.25	0.17	0.20
9	...	...	0.44	...	0.33	0.01
10	...	0.50	0.15	...	0.44	0.04
11	...	...	2.47	0.65	0.04	0.69
12	...	...	...	...	0.19	2.05
13	...	0.20	0.29	0.18	0.24	0.23
14	...	...	...	...	2.85	0.36
15	0.20	1.15	...	1.54	0.86	0.14
16	1.02	...	0.05	0.77	0.01	3.28
17	...	0.02	1.62	0.56	0.21	...
18	...	...	0.97	0.03	2.18	0.62
19	...	...	1.08	0.58	0.05	...
20	...	...	0.18	1.78	0.07	0.06
21	...	...	...	0.12	0.11	0.04
22	...	0.12	...	0.15	0.11	0.03
23	...	...	...	0.81	0.71	0.03
24	2.40	...	...	0.33	...	...
25	0.83	...	...	0.16	0.55	...
26	...	...	0.06	0.21	0.14	0.24
27	...	...	0.78	1.05	0.41	0.73
28	...	...	0.16	0.54	...	...
29	0.07	...	0.35	1.15	0.90	...
30	...	...	4.60	0.73	0.02	0.31
31	...	...	—	0.52	—	...
	6.25	3.51	19.83	13.99	11.00	11.63

Registered by the Municipality of George Town, Penang.

SUMMARY OF RAINFALL, 1914.

	SINGAPORE.			PENANG.		
	No. of rainy days.	Amount of rain in inches.	Longest Spell without rain.	No. of rainy days.	Amount of rain in inches.	Longest Spell without rain.
January - -	24	25.40	2 days.	9	1.89	6 days
February -	10	3.93	18	8	5.00	9
March - -	19	9.96		9	6.29	
April - -	22	16.60	3	16	10.45	4
May - -	19	4.97	3	16	12.43	7
June - -	19	8.58	5	11	9.61	7 (twice)
July - -	13	4.71	8	8	6.25	7 (twice)
August - -	8	1.14	9	12	3.51	9
September -	14	3.14	13	22	19.83	5
October - -	12	4.08		27	13.99	2
November -	22	7.86	3	24	11.00	2
December -	25	9.54	2	22	11.63	2
Total	207	99.91	...	184	111.88	...

Greatest amount in 24 hours. ...	5.42	4.60
„ „ 48 „ ...	9.40	4.95
„ „ 72 „ ...	10.04	5.50
Excessively rainy periods, more than 5.00 having fallen in 72 hours.	2 (Jan. & April)	1 (September).
No. of days when condition existed. -	7	2
Periods of Comparative drought, less than 0.02 having fallen in 120 hours.	4	15 (All months Jan., to Sept. except April).
No. of days when the condition existed. - - -	32	39

CADAMUSTUS TYPICUS—A MINOR COCONUT PEST.

In August last, Mr. J. H. George of the Dindings-Selama Coconut Company, sent to the Botanic Gardens specimens of a "white fly" found feeding in numbers on the juices of coconut leaves at Matang Kubu in the Dindings. This insect was sent to the Imperial Bureau of Entomology, at the British Museum of Natural History and a reply received from Mr. G. A. K. Marshall, the Director, to the effect that the insect is "*Cadamustus typicus*, Distant, which was originally described from Ceylon, where it was found to attack Cardamons and Bananas." Mr. Marshall adds that it has recently been received from the Philippine islands.

Cadamustus typicus is a Tingid fly of small size with the wings beautifully laced and the body curiously shaped.

A VERY DESTRUCTIVE FLASH OF LIGHTNING.

In the night of January 10th—11th, 1914, a grove of coconuts on the coast near Bedok, east of Singapore, was struck by lightning, and the number of trees which died at once or slowly over the months which followed amounted to one hundred and four.

The case in recorded on account of the extent of the damage, and of the fact that the cause of the death of the trees is in this case indisputable. This usually is not the case when a malay ascribes the death of a coconut palm to lightning.

I. H. BURKILL.

BORROWINGS FROM NEW BOOKS.

Culture et Exploitation du Caoutchouc au Brésil, by O. Labroy and V. Cayla, Paris, 1913, pp. 1-233.

This book is a report to the Government of Brazil upon the conditions under which rubber is produced in that country at present and the existing facilitities for planting agriculturally viewed. It does not cover the whole ground of rubber-production in Brazil, but for certain regions only; and much of the book is intended to teach the adoption of planting as practiced in Malaya. But there are many interesting observations scattered through its pages, some of real importance to Malaya. The authors (p. 30) say that *Hevea brasiliensis* shows considerable variability in the Amazon basin

observable in the colour of the bark, its corkiness, and its thickness, the colour, shape and size of the leaves, the number of glands on the petiole, the time when fruiting begins, the number of seeds in the fruit, their shape, size and colour, and lastly of the greatest importance in the amount of latex. On p. 63 the authors recommend the collection of seeds from wild trees found to yield well; from p. 42 forward the way in which the Brazilian seringueiro taps is described, the conclusion being reached that the better "to avoid damage to state property resulting from bad tapping, it will suffice to increase the control of the work of the seringueiro instead of as Akers advised enforcing the disuse of his tapping axe in favour of a tapping implement more modern but strange among the Amazon workmen."

What the authors say about the endebtedness of the seringueiro to the middlemen exposes the weakest spot in the industry of Brazil.

After dealing with Hevea, the authors discuss Manihot. Of species several are defined including a new one *Manihot Toledi;* and as regards them the conclusion is reached that generally it is best to plant *M. Glaziovii,* if it is a case of planting a Manihot, although of the smaller species *M. heptaphylla* and *M. piauhyensis* for instance might be planted, or *M. Toledi* which is intermediate in size.

The authors give a series of facts showing that about two centres in Brazil, Ceara rubber planting is taking a hold. They add that the wild plant has received such severe treatment that it no longer counts as a reliable source of commercial rubber.

The establishment of an experimental station to select, improve a nd experiment with Ceara rubber is set forth as desirable.

The last few pages of the book are devoted to a discussion of *Castilloa Ulei* and *Hancornia speciosa.*

Annual Report of the Board of Scientific Advice for India for the year 1913-14 (Calcutta, 1915). Among the records in this report of extensive work done, a few are of special interest in Malaya. In the report for 1912-13 it had been explained how in the soil of swampy paddy lands various gases are produced, notably methane or marsh-gas, nitrogen, hydrogen and carbonic-acid gas; and that after the paddy has been planted out a film forms on the surface consisting largely of bacteria, and minute green organisms such as algae and diatoms. Messrs. W. H. Harrison and Subramania Aiyar, continuing their work, show (page 9) how this film lives on the gases that exist as a result of changes within the soil and doubtless are in continual process of formation, using up the methane and the carbonic-acid gas (in part at any rate) with a liberation therefrom of oxygen. The function of this surface film is thus to liberate oxygen, so that the rice roots are more liberally aërated than they would be without it. Drainage of rice land by producing a flow of water through the film into the soil carries this oxygen to the rice roots below; but as too

great a drainage prevents the full development of the film, there is an optimum to be aimed at,—an adjustment of the water supply to the drainage, and the production of the right rate of percolation into the soil. Green manuring by increasing the output of gases in the soil, increases the activity of the surface film, and aided by the percolation increases the aëration of the soil in contact with the rice roots. The ploughing in, as we see it in Malaya, of sedges on rice fallows is green manuring. The authors appear to hold that the important benefit to be got from this is the indirect one of aëration at the roots of the rice.

On page 109 is given an important conclusion arrived at by Mr. C. M. Hutchinson, the Imperial Agricultural Bacteriologist, namely that with such soils as he used for experiment the most rapid and complete nitrification of any given quantity of nitrogenous organic matter could be effected in soil by producing anaërobic conditions with water saturation and subsequently draining and aërating; the rapidity with which nitrification takes place under these conditions depends upon the relative completeness of the anaërobic and subsequently of the aërobic conditions, i.e., the soil must be open.

Experimenting with lime, Mr. Hutchinson "found that decomposition of nitrogen-yielding manure was rapid in proportion to high lime content, although in time the soil lower in lime attained the same nitrate concentration". And lime we know goes a long way in keeping a soil open; but the connection of lime and nitrification is not yet established in detail.

In connection with forestry it is recorded (page 120) that "data showed large quantities of tan barks" to be "available in the mangrove forests of Tenasserim and Arakan, that they can be exploited at a reasonable cost, and that the local conditions are generally favourable for the erection of a factory."

Messrs. Grieve and Shebbeare have drawn attention to the circumstance that the unmixed forests of the Sal tree—*Shorea robusta*, Gaertn.—which occur in the Sub-Himalayan tracts of Bengal are there at any rate artificial; for if fire be withheld an evergreen undergrowth asserts itself against which the sal seedings cannot compete in spite of repeated clearings. This *Shorea* is thus seen to be a pioneer in reafforestation, for it appropriates to itself in time savannahs annually fired.

Proceedings of the Third International Congress of Tropical Agriculture, held at the Imperal Institute, London, June 32rd to 30th, 1914. (London John Bale, Sons, and Danielsson, 1914, p. xii-407. Price 10s. net). Abstracts of the papers read at the Congress, and full reports of the discussions are printed in these Proceedings, together with the opening address by the President, Professor W. R. Dunstan. The Transactions of the Congress containing the papers themselves, are in preparation.

Chief among the subjects dealt with are Technical Education in Tropical Agriculture, Organisation of tropical Departments of Agriculture in relation to Research, Agriculture Credit-Banks and Co-operative Societies; Sanitation on Estates, Legislation against Tropical pests, Fertility of Soils, Rubber, Cotton and other fibres; Cereals, Sugar, Cocoa, Tobacco, Oil seeds.

The Capitalist is a need in the Tropics; and experts from most of the warmer parts of the world were at the Congress to meet him; consequently a not inconsiderable part of the time of the sessions was occupied in his education; with this was interwoven the devout wish to attract scientific workers to the immense field open to them. The proposed College of Tropical Agriculture appeared conspicuously in the discussions, whereat both East and West laid claims to it.

As regards legislation against Plant diseases and Pests, the Congress met with no clashing interests. Never was there before any meeting a subject where discussion started with a more common purpose. It ended in the adoption of a motion by Dr. Warburg that a Committee should be appointed to formulate proposals in regard to points of difficulty in applying the suggestions of the International Phytopathological Convention of Rome. The paper which led the discussion will appear in the Transactions.

Pages 132-156 give the whole discussion on the subject of the variability of plantation rubber, and Professor Dunstan's summing up "that the time is premature for considering what may be called standardization."

A series of resolutions (pp. 385-407) closed the Congress:—

i. To appoint a Committee to collect information on the organization of Government Departments of Agriculture.

ii. To appoint a Committee to report on the question of estate sanitation.

iii. To arrange for the exchange of publications.

iv. To appoint a Committee to collect information on agricultural co-operation including credit, against the next Congress.

v. To appoint a Committee to support the London Committee which is promoting the establishment of an Imperial College of Agriculture.

vi. To appoint an International Committee to consider how far the proposals of the International Phytopathological Conference of Rome, 1914, are applicable to the Tropics; and that the official delegates should be asked to report this to their Governments.

vii-ix. Personal.

x. To support the formation of a British Institute of Tropical Agriculture.

xi. To appoint a committee to co-operate with the International Institute of Agriculture in Rome.

xii. To appoint a committee to discuss the internal affairs of the Association Scientifique d'Agronomie Coloniale et Tropicale, i.e., the organisation under whose auspices these Congresses are held.

Dr. J. D. Gimlette's "*Malay Poisons and Charm Cures*," (J. & A. Churchill, London, 1915, pp. viii + 127) and the *Rubber Receuil* of the International Rubber Congress and Exhibition, (Batavia, 1914, J. H. de Bussy, Amsterdam, 1914, pp. 614), are books recently published, which should find their way to every station in the Peninsula.

The poisonous Depu plandok mentioned by Dr. Gimlette on page 48 and elsewhere proves to be a new species of *Wikstroemia*,—*W. Ridleyi*, Gamble,—which is restricted to Pahang, Tringganu and Kelantan, as far as we know at present.