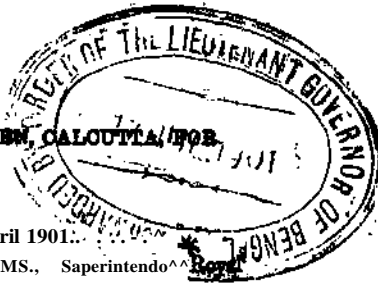




ANNUAL REPORT OF THE ROYAL BOTANIC GARDEN, CALCUTTA, FOR
THE YEAR 1900-1901.



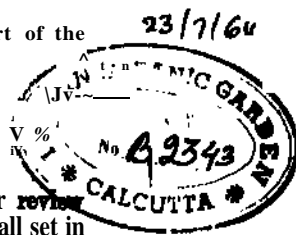
No. 14GK, dated Camp Barjeeling, the 30th April 1901.

From—MAJOR D. PRAIN, M.B., LL.D., F.R.S.B., I.M.S., Superintendent
Botanic Garden, Sibpur,

To—The Secretary to the Government of Bengal, Financial Department.

I HAVE the honour to submit herewith the 4th Annual Report of the
Royal Botanic Garden, Calcutta, for the year 1900-1901.

ANNUAL REPORT OF THE ROYAL BOTANIC GARDEN, CALCUTTA,
FOR THE YEAR 1900-1901.



The weather conditions during the first half of the year under review were normal. In the middle of September a period of excessive rainfall set in which lasted till the 25th. The amount of rain registered during the week, from 19th to 25th September inclusive, was 40½ inches. The arrangements for the surface drainage of the Gardens, which, thanks to the disposition of the garden lakes and ponds, amply fulfil ordinary requirements proved inadequate to meet the needs of precipitation so phenomenal. The 6½ inches that fell on September 19th considerably raised the surface level of the garden lakes, the 13½ inches of September 20th filled all but one of them to overflowing, and the 8½ inches that fell on September 21st converted the whole of the western division of the Garden, which constitutes two-thirds of its area, into an almost unbroken sheet of water. Falls of about 4 inches daily on the 22nd and again on the 24th and 25th helped to maintain the abnormal water level in spite of all the efforts of the staff to drain it off. In the eastern section of the Garden normal conditions were reached before the end of the month and little damage was done by the flood. In the western half, however, it was not till ten days after the cessation of the storm that the lakes and ponds were again at their normal level, and many losses have unfortunately to be recorded. Fortunately little wind accompanied the storm and the damage due to trees being overthrown was confined almost entirely to three species—*Dalbergia sissoo*, the Sissoo tree, *Manihot Glaziovii*, the Ceara-rubber tree, and *Broussonetia papyrifera*, the paper mulberry; many examples of each fell, chiefly, apparently, from their own weight and owing to the sodden condition of the ground. The great damage to be recorded has been the death of many species as they stood. This has occurred not merely in the case of shrubs or herbs more or less covered with water during, and for a few days after, the storm, but largely also in the case of trees, many of them of large size and of considerable age, that stood during this time with only the bases of their stems submerged. The majority of the species that have died were, as might be expected, strangers to the Gangetic delta; many of them, as will be readily understood, it will be difficult to replace. As the question of liability to inundation, and the power of a given species to withstand its effects, is one of practical interest to those engaged in agriculture and horticulture and to those charged with the duty of planting shade-trees on roadsides, it may not be without use to record here a few of the observations made during and after the September floods in these gardens. For convenience of reference, a list of the species that have died is added as a special Appendix to this report.

The majority of the species that have succumbed did so immediately. Nothing seemed the matter while the storm lasted. As soon, however, as the rain ceased and they were exposed to sunshine, their leaves wilted, and the plants at once were seen to be very sickly or quite dead. This was particularly the case with many herbs and shrubs—natives of all tropical countries, and even with some trees—the latter rawly American or African species. With a small number of the species whose leaves thus wilted and fell, the result has not been the death of the plant. This has been notably the case with the reed plant, *Boehmeria nivea*; all the plants of this species lost their leaves

immediately after the storm, but, while a small percentage have died off completely, the majority have survived, though it was not till early March that they showed signs of recovery. It is of practical interest, moreover, to note that, while this has also been the case with some plots of indigo of the Indian kind (*Indigofera tinctoria*) and with a plot of Guatemala indigo (*Indigofera oligosperma*) two plots of *Indigofera* raised from Natal and from Java seed respectively, came by no harm. Another practical point may also be noted. It is generally understood that the sisal hemp plant (*Agave rigida* var. *Sualana*) is at a disadvantage as compared with the Agave commonly planted along Indian roadsides, in that the former does not endure being flooded, while the latter is unaffected by inundation. In the present instance both species were equally unaffected by the inundation.

While, however, many species succumbed immediately, it was found that nearly as many, though fortunately not so many individuals of each, did not die at once, but did so ultimately. These were mainly trees—and mainly Indian or Burmese ones—natives of naturally drier regions than Bengal. Within this group, moreover, an interesting difference has been observed in the behaviour of evergreen as compared with deciduous species. The former, when they have died, showed signs of distress with the advent of the cold season, their leaves wilting gradually, and in a fortnight or so becoming sere and yellow. With deciduous trees on the other hand, there was nothing to show that the roots had been damaged by the floods. The leaves remained on the trees till the natural time for their being shed, and it has only been on examination, induced by the fact that no flowers or new leaves have appeared, that the individual was found to have died. The chief outdoor improvements of the year have been the repair of the Northern or "Amherstia" section of the Thomson avenue and the realignment of the Kurz avenue. A commencement has also been made with the task of continuing the Kurz avenue in the direction of the Banyan tree. This much needed improvement will complete the road system in the northern section of the Garden.

2. *Economy Plants.*—The usual attention has been given by the Garden staff to the propagation and distribution of useful plants throughout the year. In view of the interest that is being manifested in fibre-yielding species, especially in the Agaves, steps have been taken to increase the stock of those available for distribution. Particular attention was paid to the behaviour under cultivation of certain non-Indian *Indigoferas* as compared with the Indian Indigo plant, *Indigofera tinctoria*. A representative collection of the various Indian yams was brought together by the Department of the Reporter on Economic Products; the plants were cultivated in the Garden and as far as possible determined. A complete report on this interesting subject cannot yet be submitted as several of the kinds, and particularly those most commonly found under cultivation, did not flower and so could not be definitely identified. Their cultivation will be continued till this happens. A question having arisen as to the source of the seeds known as "Ohaulmoogra" largely used in native medicine and now attracting considerable attention in Europe, an endeavour was made to settle the point. The seeds in question have hitherto been attributed to the species known as *Gynocardia oarata*. Having satisfied himself that this opinion is erroneous, the Superintendent invoked the assistance of Dr. Watt, Reporter on Economic Products, to clear up the point. Thanks to Dr. Watt's exertions, the matter has now been definitely settled. The seeds known as Chaulmoogra are not those of the tree known by that name, but of the species known as *Taraktogenos Kurzii*. Thanks to the assistance afforded by the Inspector-General of Forests, it has been possible also to finally settle the obscure question as to the source of the timber known as Padouk. This timber has been generally supposed to be yielded by *Pterocarpus indicus*. It now transpires that *Pterocarpus indicus* is not an indigenous tree within the limits of the Indian Empire. The true, or Burma Padouk is the timber of *Pterocarpus macrocarpus*, a species that occurs only in Burma. Andaman Padouk or Andaman Red-wood is the timber of *Pterocarpus dalbergioides*, a species that is found in a wild state only in the Andamans. The use as a fodder-grass of *Paspalum dihtatwn*, a native of Amelia, which has proved very valuable in Australia owing to its drought-resisting qualities, has led to its introduction to India on as large a scale as possible. Finding that very little seed could be procured by Australian correspondents of the Garden, the assistance of the

Agrostolo[^]Jst to the Department of Agriculture of the United States was invoked. I hanks to the kind help of that officer, M large supply of the seed of this grass was obtained from America and has been freeiy distributed throughout India.

3. *ilf>>ba>ium*.—The work of this department has gone on as usual. The number of named specimens distributed to other botanical institutions has been 11,903. The details of this distribution are given in Appendix VI to this report. The work of coUectingin Assam by native agency came to an end early in the year owing to the illness of the Collector, Munshi Abdul Iiuq, who unfortunately succumbed to the fever by which he had been attackon in the performance of his duties, shortly after his return. Dr. A G. Bourne, F.R.S., on the occasion of a visit paid by him to Assam, most kindly suporvised the work of a collector specially deputed to obtain specimens of the grasses of Assam. During the cold weather Mr, N. Gill, Assistant Curator of the Garden, made a very interesting and valuable collection in a portion of Assam not previously explored botanically, but now rendered accessible by the extension of the Bengal-Assam Railway system. In Burma at the commencement of the year another native collector was engaged in the Kachin Hills. This collector had to be recalled and was subsequently sent to Tenasseriin, with the object of working under and in co-operation with the officers of the Forest Department there. The arrangement, however, does not promise to be wholly successful. In the Andamans rhe work of collecting has again been very thoroughly supervised on behalf of the Garden by Mr. E. H. Man, C.I.E., in whose retirement after 32 years' service this institution loses one of the most generous and sympathetic benefactors it has ever known. In Bengal, collection was supervised in Sikkim by the Superintendent during his deputations to the Cinchona Plantation. The contributed collections have again been of much interest and value. The chief contributions came from the Royal Herbarium, Berlin, 1,056 specimens ; the Botanic Garden at Singapore, H85 specimens ; the Cantonal Museum of Fribourg, 318 specimens; the University of Munich, 298 specimens; Harvard University, 240 specimens; the Hof. Museum, Vienna, 205 specimens. Smaller but very valuable collections were also received from Sir W. T. Thiselctn-Dyer, K.C.M.G , Director of the Royal Gardens, Kew; Mr. Medley Wood, Natal; Mr. H. Bolus, Capetown; Mr. Barbey, Boissier, Geneva; Dr. Treub, Buitenzorg; and Mr. C. Curtis, Penang. The chief Indian contributors during the year have been Mr. J. F. Duthie, who has presented 1,032 specimens; Mr. R. L. Heinig, 435 specimens; Messrs. Ryan, Bourdillon and Haines who have sent 57, 56 and 54 respectively.

Sir George King, K.C.I.E., has been engaged at Kew during the past year in elaborating an account of the Malayan *Myrtaceae*. Thanks are again due to him for kindly naming the specimens belonging to the Calcutta Herbarium and assisting in distributing the duplicates.

4. *Library*.—A considerable number of books have been acquired by gift, by purchase, and in exchange. The customary periodicals have been added. Steady progress is being made by Lieutenant Gage with the heavy task of reàrranging the collection.

5. *Botanical Publications*.—During the year the eleventh part of Sir George King's *Materials for a Flora of the Malayan Peninsula* has been issued and the manuscript of the twelfth part completed. The following papers have been published by the Superintendent:—(1) *Novicice Indicae XVII; Some new plants from Eastern India*; (2) *A list of the Asiatic species of Ormosia*, and (3) *Description of a new Himalayan genus of Orobanchacece*, all three in the *Asiatic Society* Journal*, the last written in conjunction with Mr. J. S. Gamble, F.B.S. To the *Indian Forester* the Superintendent has also contributed three other papers; x4) *A new Burmese Timber^Tree*; (5) *Report on the Indian Species of JPTerocarpus* ; and ^6) *A new Assam Timber-Tree*. To the *Scientific Memoirs*, edited by the Director-General, Indian Medical Service, he has contributed a paper (7) *On the characters and relationships of Afzelia, Smith*. Lieutenant Gage, Curator of the Herbarium, has prepared a very valuable report on the diseases of Sugar-cane in Bengal for the Department of Land Records and Agriculture, Bengal (*Bulletin* No. 7, 1900, *Djpartm*ni of land Records and Agriculture*), and has contributed a paper, entitled the Anatomy of the roots of *Phoenix paludosa* Rozb., to the *Scientific Memoirs by Medical Officers of the Army of India*. The manuscript of *Annals of the Royal Botanic Garden*, vol. IX, part I, was completed and sent to press in November 1900, and it is hoped that it may be issued



APPENDIX I.

Statement showing Plants received from 1st April 1900 to
31st March 1901.

From whom received.	Ward-ian oases.	Boxeti.	Number of plants.
1	2	3	4
Royal Gardens, Kew, London ...	1	...	35
Botanic Garden, Bangalore ...	...	•1	300
Ditto, Darjeeling ...	3	10	434
Ditto, Saharanpur ...	...	...	1
Jardin des Plantes, Paris ...	...	...	20
Khusru Bagb, Allahabad ...	...	...	25
Taj Garden, Agra ...	...	1	6
State Garden, Gwalipr ...	...	5	1,343
Government Garden, Cawnpore... ..	...	1	1
Viotoria Garden, Bombay ...	...	2	1,002
Government House Garden, Calcutta	...	••	40
Barraokpore Park ...	...	••	50
Monsieur A. Godefroy-Lebeuf, Paris	1	•••	10C
Agri-Horticultural Society of India, Calcutta	...	•*	312
Ditto Madras ...	...	1	24
Financial Commissioner, Burma, Mandalay ...	...	••	fi
Director of Land Records and Agriculture, jDengai.	...	...	1
Indian Museum, Calcutta ...	...	...	2
Experimental Farm, Si'pur ...	...	...	30
Mrs. S. Apoar, Bally gunge ...	...	...	2
L. P. Broughton, Esq., Calcutta	...	•*	147
G. H. Cave, Esq., Mungpoo ...	...	1	500
B. Coventry, Esq., Dalsing-Sarai, Tirhoot	...	••	14
Edward George, Esq., Bahamas	...	...	120
H. H. Hayden, Esq., Niigiris	...	...	10
J. L. Lister, Esq., Pashok ...	...	2	188
W. A. Lowry, Esq., Chittagoog	...	••	825
A. R. Lamb, Esq., Manipur ...	...	••	243
E. H. Man, Esq., C.I.E., Port Blair	10	9	2,142
G. A. Parrisb, Esq., Shalimar ...	...	...	1
G. MoD. Peoh«S, Esq., Moxdmein	...	7	2,483
H. H. Risley, Esq., C.I.E., from Nioobars	«•	1	12
Dr. George Watt, M.B., C.I.E., Calcutta	••	••	89
S. P. Ohatterjee, Esq., Calcutta	••	2	2,469
Major D. Prain, I.M.S. -Collected in Sikkim	••	...	115
Norman Gill, Esq.—Collected in Assam	••	1	190
Mr. J. O. Praser—Collected in Tavoy	••	3	137
Shaik Mokim—Collected in Tavoy	...	2	556
Revd. L. Cardon, s.j., Bassia, Ranohi	...	1	30
W. A. Talbot, Esq., Belganm ...	...	••	15
Bought from Babu T. C. Nundy, Assam	...	2	408
Total	••	15	63
			14,454

APPENDIX II—continued.

To whom sent.	Wnrdr- ian oases.	Boxes.	Number of plants.
1	2	3	4
District Engineer, Jalpaiguri	12	293
Ditto, Nadia	36	900
Ditto, Saran	6	150
Ditto, Tippera	4	100
Khasmahal Officer, Bhagalpur	4	100
Manager, Hathvra Raj	1	12
Superintendent, Alms House, Calcutta	480
Ditto, Central Jail, Alipore	600
Ditto, Comilla Jail	3	75
Ditto, Mymensingh* Jail	20	500
Ditto, Silchar Jail	4	•100
Ditto, Government Printing in India, Calcutta.	55
Postmaster, Diamond Harbour	100
Sergeant-Instructor, Engineer Company, Caloutta Port Defence Volunteers.	108
Soldiers' Garden, Fort William	1,200
Campbell Medical Hospital, Caloutta	200
Church Mission Society, Calcutta	200
Free Church of Scotland, Caloutta	200
Christian Mission, Bilaspur	1	12
G. E. Li. Mission, Chakradharpur	8	199
Mission House, Mihijam	10	250
St. Joseph's High School, Calcutta	162
Art School, Calcutta	12
Boys' Orphanage and Industrial School, Damoh.	18	404
Civil Engineering College, Sibpur	69
Patna College, Baukipore	4	86
Alipore Observatory	50
Gunpowder Factory, Ishopore	150
Gun Foundry, Cossiporo	2
East India Railway, Calcutta	2,300
Police-station, Sibpur	200
A- Anderson, Esq., Hpwrah	400
Mrs. A. Benson, Shalimar	80
Dr. A. G. Bourne, Madras	3	118
Honourable J. Buckingham, Caloutta	1	24
Major It. H. Charles, Caloutta	2
Revd. Charles Clarke, Caloutta	200
A. Cooke, Esq., Caloutta	1	9
B. Coventry, Esq., Dalsing-Sarai, Tirhoot	1	6
G. Gellatly, Esq., Caloutta	26
'W. Graham, Esq., Caloutta	38
G. Barton-Groves, Esq., Mount Abu	4
Mrs. Li. Hood, Garden Reach	400
Major Hudson, Andaman?	2	60
'W. W- Johnson, Esq., Hyathpur	2	555
Mrs Kirkaaan, ICidderpore	6
G. T. Lane, Esq., Sibpur	55
L>. Loe, E->q., SSibpur	1,076
Sir A. S. Jjethbridgo, Manbhum	2	170
Rovd. C. t&. Li*ckies, Rajgungepur	8	200
J. A. Manning, Esq.	18
£J. H. Man, Esq., c.i E., Port Blair ...	10	...	295
Mrs. H. M. A Atorgan, Calcutta	39
J. E. Needam, Esq., Calcutta	1,114
Miss Ncolo, Calcutta	120
Mrs. E. Ormond, Caloutta ...*	4

APPENDIX ||—conducted.

To whom sent.	Ward-ian cases.	Boxes.	Numbei . of plants.
1	2	3	4
R. Pantling, Esq., Mungpoo	1	1
Revd. E. W. Panes, Jeypur	3	75
G. McD.Peché, Esq., Moulmein	2	8
Mrs. Phelps, Calcutta	600
Mrs. Prain, Sureil	3	55
F. Wright, Esq., Ichapur	1	60
L. P. Shirres, Esq., Bhagalpur	12	800
H. E. Short, Esq., Sewan	5,000
T. E. Spiers, Esq., Calcutta	2
Messrs b\ Sander & Co., St. Albans, England	...	6	3,850
G. M. Vincent, Esq., Bhagalpur	3	67
F. A. Wearing, Esq., Darjeeling	1	24
Maharajah Soorjya Kumar Acharjya Chowdhury, Mymensingh.	...	4	24
S. P. Chatterjee, Esq., Calcutta	1,374
Babu A. C. Sen, Sibpur	12
of D. N. Singh, Mowr&h	8
„ G. O. Datta, Sibpur	70
„ H. C. Mitter, Cossipore	36
„ K. C. Acharjya, Calcutta	1
„ K. N. Seor, Garden Reach	1
„ T. C. Roy, Kalighat	2
„ Eanaye Lall, Allahabad	1	9
Phallaram Malie, Calcutta	1
Gopal Chandra Samonta, Mallie, Calcutta	3
Gopal Chandra Sanati, Mallie, Calcutta	7
Shaik Rohoman Bux, Calcutta	1
Abdool Hock, Calcutta	1
Total ...	46	393	39,300

APPENDIX III.

Statement showing aeds received from 1st April 1900 to Slut March 1901.

From whom received.	Number of parcels or packets.
Sir W. T. ThiFelton-Dyer, K.C.M.Q., F.R.S., C.I.K., Dirootor, Royal Gardens, Kew, London ...	75
Director, Royal Botanic Garden, Peradoniya, Ceylon ...	14
Botanic Garden, Bangalore ...	1
Ditto, Brisbane ...	1
Ditto, Darjeeling ...	A3
Ditto, Durban ...	43
Ditto, George town, British Guiana ...	1
Dtto, Gold Coast ...	15
Ditto, Sabaranpur ...	31
Ditto, Sydney ...	8
Colonial Botanist, Brisbane ...	1
Ditto, Melbourne ...	4
Superintendent, Government Agri-Horticultural Garden, Lahore ...	284
Buper^ntendent, Agri-Horticultural Society, Madras ...	8
Ditto, liortiultural Garden, Naegour ...	1
Dit'o, Gwalior State Gardens, Gāwalior ...	4
Ditto, State Gardens, Baroda ...	50

▼

APPENDIX III—concluded.

From whom received.	Number of parcels or packets.
Conservator of Forests, Bengal, Darjeeling...	5
Ditto, Hyderabad Assigned Districts ...	1
Ditto, Tenasserim Circle, Rangoon ...	6
Acting Conservator of Forests, Coimbatore ...	1
Deputy Conservator of Forests, Pilibhit Division, Bareilly	1
Ditto, Mercara, Coorg ...	8
Ditto, Atram Division, Moulmein ...	1
Ditto, Depôt and Agency Division, Rangoon ...	5
District Forest Officer, North Malabar, Manantoddy ...	1
Ditto, Tinnevely ...	1
Acting District Forest Officer, Camp, Sultan's Battery, Malabar ...	1
The Divisional Forest Officer, North-Western Provinces and Oudh, Gondah ...	1
Director, Botanical Department, Kingston, Jamaica ...	9
Assistant Director, Department of Land Records and Agriculture, Bengal ...	1
Director of Land Records and Agriculture, North- Western Provinces and Oudh, Cawnpore ...	1
Subdivisional Officer, Naogaon, Rajshahi ...	1
Directeur de l'Agriculture, Tananarive, Madagascar ...	5
Experimental Indigo Farm, Dalsingsarai ...	1
Messrs. Herb and Wulle, Naples, Italy ...	30
" J. H. William and Brothers, Heneratgoda, Ceylon ...	3
" Heasoner Brothers, Oneco, Florida, United States, America ...	43
" F. Sander & Co., St. Albans, England ...	12
" T. W. Wood and Sons, Richmond, U. S. A. ...	1
Herrn Prof. Engler, Berlin ...	1
Le Directeur, du Museo National, San José, Costa Rica ...	2
Professor Max Cornu, Paris ...	4
M. A. Godefroy-Lebeuf, Montmartre, Paris ...	2
6. H. Cave, Esq., Mungpoo, Kurseong ...	454
Henry J. Colbourn, Hobart Town, Tasmania, Australia ...	17
J. L. Collingridge, Esq., Daudpore, Muzaffarpur ...	1
Norman Grill, Esq., Assam ...	22
T. Hanbury, Esq., La Mortola, Liguria, Italy ...	193
Sir George King, K.C.I.B., San Remo, Italy ...	1
G. T. Lane, Esq., Barraokpore Garden ...	3
Laurence A. Libert, Esq., Conva, Trinidad ...	3
J. L. Lister, Esq., Pashok, Darjeeling ...	6
E. H. Man, Esq., C.I.E., Port Blair ...	21
B. Pantling, Esq., Munepoo ...	12
Major D. Prain, Darjeeling ...	21
W. F. Pentzke, Esq., Asansol ...	1
T. G. Smith, Esq., Washington, XI. S. A. ...	44
T. J. Spooner, J&Q., Uganda ...	1
George Watt, Esq., M.B., C.M., O.I.E., Reporter on Economic Products to the Government of India, Indian Museum, Calcutta ...	17
S. L. Watkins, Esq., Lotus, California ...	22
N. G. Mukerji, Esq., Civil Engineering College, Sibpur ...	1
Babu Preo Loll Dey, F.C.S., Calcutta ...	2
Shaik Mokim, Tavoy ...	34
Total ...	<hr/> 1,618 <hr/>

APPENDIX IV.

Statement showing seeds distributed from the Royal Botanic Garden during the year 1900-1901.

To whom sent.	Number of parcels or packets,
Sir W- T. Thiselton-Dyer, K.C.M.Q., F.R.S., C.LTS., Director	
Koyal Gardens, Kew, London ...	280
Director, Botanic Garden, St. Petersburg, Russia ...	70
Ditto, Tillis, Russia ...	a
Ditto, Peradeniya, Ceylon ...	79
Botanic Garden, Bangalore ...	19
Ditto, Buitenzorg ...	55
Ditto, Cambridge ...	8
Ditto, Cork ...	12
Ditto, Costa Rica ...	59
Ditto, Canceling ...	208
Ditto, Durban ...	83
Ditto, Kdinburgh ...	86
Ditto, George Town, Demerara ...	4
Ditto, Glasgow ...	2
Ditto, Glasnevin, Dublin ...	8
Ditto, Goneshkhind, Poona ...	1
Ditto, Hongkong ...	68
Ditto, Malta ...	16
Ditto, New York City, U. S. A. ...	270
Ditto, Ootacamnd ...	14
Ditto, Penan g ...	3
Ditto, Port Darwin, Australia ...	8
Ditto, Sahara npur ...	43
Ditto, Saigon ...	65
Ditto, Singapore ...	12
Ditto, St. Anns, Trinidad ...	4
Ditto, Sydney ...	3
Secretary, Agii-Horticultural Society of India, Calcutta ...	33
Ditto, ditto Moulmein ...	4
Ditto, ditto Rengoon ...	6
Ditto, Indian Gardening Apociation, Calcutta ...	14
Superintendent, Government Horticultural Garden, Allahabad, Luok-	8
Ditto, now ...	14
Ditto, "Victoria Garden, Bombay ...	4
Ditto, Government Agii-Horticultural Garden, Lahore ...	7
Ditto, Agii-Horticviltural Society, Madras ...	21
Ditto, Government Garden, Nngpur ...	4
Ditto, Memorial Garden, Oawnpore ...	4
Ditto, State Gardens, Baroda ...	6
Ditto, Taj Garden, Agra ...	4
Ditto, Kmprtss Botaulo Garden, Poona ...	26
Ditto, Government Cattle Farm, Hissar ...	5
Ditto, BeTry VV hite School, DibrugaTh ...	1
Ditto, Small Arms Ammunition J^aotory, Dum-Dum ...	23
Ditto, Gwalior State Gardons, Gwalior ...	11
Ditto, Casrip'-re Practical Institution of Horti-Kiori-Agriculture, Coasipore ...	1
Curator, Botanical Station, Barbados ...	2
Do., ditto, Belize, Biitish Honduras ...	2
Do., dii.to, Lagos ...	4
Do., ditto, St. i?itts, Nevis ...	1
Do., dil-to, Sierra, Leone ...	125
Do., Botanic Garden, University of California, Ben FranoiYco ...	
^Iernn Director des bot. Gartens, Innsbruck, Austria-Hungary ...	87
Ditto ditto, Munich, Germany ...	1
T>iito ditto, Strasbourn; Germany ...	1
Pitto ditto, Uuivorsitat, "Wien, AuBtria-HuE gary ...	1

APPENDIX IV—*continued.*

To whom sent.	Number of parcels or packet.
Harm Director des bot. Gartens, Zurich, Switzerland ...	132
Wohlgeb. Graf zu Sohwerin Windisoh Wilmersdorf, bei Ludwigsfelde, Germany ...	4
M. le Direoteur du Jardin Botanique Athens, Greeoe ...	2
Ditto ditto, Cairo, Egypt ...	1
Ditto ditto, Geneva, Switzerland ...	101
Ditto ditto, Marseilles, France ...	6
Ditto ditto, Bouches-du-Rhone, France ...	4
M. le Directeur, Jardin Botanique, de l'Etat, Pondicherry	2
M. le Direoteur, du Jardin des Plantes, Dijon, France ...	6
Ditto ditto Montpellier, France ...	2
Ditto ditto Paris... ...	202
Ditto ditto Villa Thuret, Antibes, France ..	1
M. le Direoteur, Muséo Nationale, San Jose, Costa Bica, Central America ...	58
M. le Sec-GenL de la Sociéty Nationale d' aoolimatation de France, Paris ...	76*
M. le Direoteur, Jardin d' acclimatation, Hamma, ALger, Algeria ...	7
Ditto ditto, Cannes, Alpes Maritimea, France	1
Ditto ditto, Orotava, Canary Islands ... "	1
M. le. Prof. E. Heckel, Directeur, Musee Coloniale, Mar- seilles, France ...	16
Sig. Direttore dell'Orto Botaucico, Bologna, Italy ...	6
Ditto ditto, Palermo, do. ...	43'
Ditto ditto, Firenze, do. ...	8
Ditto ditto, R. Univereita, Roma, Italy	6
Ditto ditto, Pisa, Italy	1
Sen6r Big. Conde de Fioalbo Director do Jardin bot. da ISsoola Polyteonia, Ldsboa, Portugal ...	6
Sen&r Director do Jardin Botan, JJio de Janeiro Brazil, South America ...	51
Sen6r Director do Jardin bot. da TTniversidade, Coimbra, Portugal ...	23
Sen6r Director del Jardin Botan Madrid, Spain ...	1
Harm Prof. Engler, Direktor Kgl. Bot. Garten, Berlin, Germany ...	138
Signor A. Todaro della Gallia Consul-General de Perse, Palermo, Italy ...	2
Professor of Botany and Director of Botanic Garden, TTnrwBrsity, Upsala, Sweden ...	74
Kultur station Kwai, West TJBambara, German East Africa ...	51
Superintendent, Alipore Jail, Alipore ...	1
Ditto, Barasat Jail, Barasat ...	1
Ditto, Barisal Jail, Barisal ...	1
Ditto, Bhagalpur Jail, Bha^alpur ..	1
Ditto, Bogra Intermediate Jail, Bogra t.	1
Ditto, Chittagong Jail, Chittagong ...	1
Ditto, Comilla Jail, Comilla ...	1
Ditto, Central Jail; Dacca ...	2
Ditto, ditto, Midnapore ...	x
Ditto, ditto, Raipur ...	1
Ditto, ditto, Rajshahi ...	1
Ditto, Darbbanga Jail, Liaheria Sarai	3
Ditto, Dumka Jail, Dumka ...	1
Ditto, Hazariba^h Jail, Hamribagh	1
Ditto, ^Talpaiguxi Jail, Jalpaigori ...	1
Ditto, Jessoie Jail, Jessore ...	1
Ditto, Malda Jail, Malda ...	2
Ditto, Motihari Jail, Motihari ...	1
Ditto, Mymensingh Jail, Mymeneingh	1
Ditto, Noakhali Jail, NoakbaU ...	1
Ditto, Palamau Jail, Palamau ...	1
Ditto, Patna Jail, Bankipore ...	1
Ditto, Rancbi Jail, Ranchi ...	1
Ditto, Rangpur Jail, Rangpur ...	2

APPENDIX IV—*continued.*

To whom sent.	Number of parcels or packets*
Superintendent, Saran Jail, Chapra	1
District Engineer, Baokergunge, Barisal	1
Ditto, Bhagalpur	34
Ditto, Manipur, Assam	2
Ditto, Roorkee, North-Western Provinces	6
Conservator of Forests, Central Circle, Madras	2
Ditto, Quilon, Travancore	6
Deputy Conservator of Forests, Belgaum, Bombay	1
Director, Government Museum and Public Gardens, Travancore Government, Trivandrom	109
Government Botanist and Superintendent, Botanic Garden, British Guiana	6
Government Botanist, Melbourne, Australia	90
Chief Secretary to the Government of Cyprus	6
Commissioner of Revenue Settlement, Land Records and Agriculture, Madras	1
Commissioner of Agriculture for the West Indies, Barbadoes	1
Commissioner of Settlements and Agriculture, Nagpur	1
Deputy Commissioner, Thongwa district, Manbin	3
Survey Commissioner and Director, Land Records and Agriculture, Bombay, Poona	1*
Director of the Department of Land Records and Agriculture, Bengal, Calcutta	22
Director of Land Records and Agriculture, North-Western Provinces and Oudh, Cawnpore	1
Director of Land Records and Agriculture, Lahore	1
Ditto ditto, Lucknow	1
Ditto ditto, Rangoon	1
Ditto ditto, Poona	1
Director, Department of Forests and Botanic Gardens, Pampelousse, Mauritius	1
Director, State Museum, Costa Rica, Central America	14
Dpo. of Farms, Punjab Command, Umbaluk	1"
Do. Department of Public Gardens and Plantations, Hope Gardens, Kingston, Jamaica	17
Secretary and Commissioner, Bureau of Agriculture and Forestry, Honolulu, Sandwich Islands	1
Principal Medical Officer and Sanitary Commissioner, Shillong	1
Colonisation Officer, Jaznrod Canal, Thar and Parkar Range	2
Forest Officer, Khardi, Great Indian Peninsula Railway	1
Director, Shaw School of Botany, St. Louis, Mo., XI. S. A.	1
Consul-General for France, Calcutta	.4
Ditto for United States of America, Calcutta	1
Vice-Consul for Spain, Calcutta	1
His Excellency the Governor, German East Africa, Dafr-Kh-Salaam	75
Surveyor-General, Agricultural Department, Surveyor-General's Office, Salisbury, British South Africa	63
Inspector of Forests, Mourbhanj State, Bah&lda	4
Government/Emigration Agent for Natal, Calcutta	2
Ordnance Officer in charge Gunpowder Factory, Iahapur	18
M. Em. Prnd'homme, Inspeoteur Chief du Service, de 1' Agriculture, Tananarive, Madagascar	38
Postmaster, Cuiçak	28
Ditto, Diamond Harbour	20
Kbaa Tabildar, Sadar, Chittagong	i
Manager, Beraora Tea Company, IA., Baraora, Sylhet...	x
Messrs. H. HOW & Co., London	4
" F. Bander A Co., St. Albans, England	1
" Beasoner Brofhen, Florida, U.S. A.	154
" Herb and Wnle, Naples, Italy	JS
w Dammann & Co., San Giovanni a Tednoeio, Napoli—Italy	64
" yamorin Andrieox & Co., Paris	10
" J. P. William and Brothers, Heneratgoda, Ceylon	1.

APPENDIX IV - *continued.*

To whom sent.	Number of parcels or packets.
Messrs. Stanley Price & Co., Calcutta	1
„ Vishnoo Sadashive & Co., Poona	2
Cremorne Nursery Company, Richmond, Australia	8
Sir J. D. Hooker, G.C.S.I., Sunningdale, London	99
M. Aohard, Inspecteur de V Agriculture, Directeur de l' Agriculture, Saigon, Cochin-China	2
Geo. A. Bishop, Ksq., Public Garden, Bermuda	64
John Beck, Esq., Gorakhpur	1
M. Binot, Petropolis, Brazil, South America	89
G. W. W. Barclay, Esq., Aberdeen, Scotland... ..	91
M. W. Barbey, Lies Jordils, Chambezy, Geneve, Switzerland	XV 71
W. Bull, Esq., Chelsea, London	1
A. K. Bailey, Esq., Neston, Cheshire, England	88
Well. Ed. Heer M Buysman, Middelburg, Holland '	99
G. H. Cave, (Esq., Mungpoo, Kurseong	12
H. Collingridge, Esq., Daudpur, Muzaffarpur	2
O. P- Cook, Esq., Special Agent, United States Department of Agriculture, Division of Botany, Washington	2
Harold S. Cuthell, Esq., Ponampet, S. Coorg... ..	4
M. Cas. de Candolle, Geneve, Switzerland	143
B. Coventry, Esq., Dalsingsarai, Tirhoot	1
Dr. E. D. Cunningham, Torre Mount, Torquay, Devon, England	90
Mrs. J. Curtis, Caloutta	1
G. Dalglish, Esq., Hyaghat, T. S. Railway	1
B. Derry, Esq., Taiping, Perak, Straits Settlements	14
M Demolo, Cannes, Alpes Maritimes, France	1
H. C Eddy, Esq., Narayangunge, Dacca	1
Dr. F. Francesohi, Santa Barbara, California	36
Major J. B. Forrest, R.A.M.C, Dilkusha, Luoknow	2
W. Fawoett, Esq., Hope Gardens, Jamaica	29
Edward George, Esq., Bahamas, West Indies... ..	8
G. A. Gammie, Esq., College of Science, Poona	9
Prof. Goebel, Munich, Germany	1
Commandatore T. Hanbury, F.L.S., La Mortola, Ventimiglia, Italy	14
E. M. Holmes, Esq., London	2
Prof. E. Heckel, Marseille, France	4
S. T. Heard, Esq., Bosdoham, Co. Kerry, Ireland '	1
C. R. Hodgson, Esq., Calcutta	8
Mr. P. N. Aiya, Kodaikanal, Madras	18
W. W. Johnson, Esq., Hyathepur, Malda	1
G. T. Lane, Ksq., Sibpur	7
M. A. Godefroy-Lebeuf, Montmartre, Paris	30
Mrs. Lewni. Parkhurat, Surrey	64
Mrs. Lely, Shahi Bagh, Ahmedabad, Bombay	1
T. L. Lister, Ksq., Pashok, Darjeeling	2
T. H. Lyle, Esq., Nan, Moulmieu, Burma	1
M. J. Linden, Gand, Belgium	13
J. W. Maiden, Esq., Masalipatam, Madras	4
Mrs. Macphail, Chakai, Monghyr... ..	1
E. H. Man, Esq., c I.E., Port Blair	6
E. Mailer, Esq., Calcutta	1
J. D. Maxwell, Esq., Liverpool, England	7
Pastor A. J. Meik, Bethang, Dumka	1
A. E. S. Maolver, Esq., Coonoor, Nilgiris	8
Herbert Moss, Esq., Barj Julie, Assam	1
Dr. Ahmed Mirza, Hyderabad, Deccan ,	1
B. W. S. Mitchell, Esq., C.M.G., Garden Beach, Calcutta	1
N. G. Mukerji, Esq., Engineering College, Sibpur	5
G. li- Newbery, Esq., Polibetta, S. Coog	7
J. Nelson, Esq., Ocalia, Florida	9
jj. Puntling, Ksq., Mungpoo, Kurseonj-	18
G M. Poche, Esq., Moulmieu, Burma	2
A. Pickford, Esq., Calcutta	1
Dr. James Petrie, Zyluland, Africa	3
Col. G. F. Pearson, Kinglon, England	1

APPENDIX IV—concluded.

To whom sent.	Number of parcels or packets.
C. G. Rogers, Esq., Darjeeling	1
C. S. Sargent, Esq., Arnold Arboretum Cambridge, Mass., <small>T. J. S. X 3 L.</small> ... ..	..
J. L. Schiller, Esq., Rutherford, New Jersey, U. S. A. ...	10
J. G. Smith, Esq., Assistant in charge United States Department of Agriculture, Washington	68
H. T. Stanes, Esq., Kullakamby, Nilgiris	1
W. Thomson, Esq., Maslemere. Ipswich, England	83
Dr. J. W. H. Traill, F.R.S., Aberdeen, Scotland	81
Norman F. Troup Esq., Almora, N.-W. P.	22
S. L. Watkins, Esq., Lotus, California, 13. S. A.	54
H. Walker, Esq., Commissioner of Lands, Sandakan, North Borneo	X
S. N. Walker, Esq., Palamau	32
J. C. White, Esq.; C.E., Darjeeling	1
George Watt, Esq., M.B., CM., C.I.E., Indian Museum, Calcutta	22
Dr. H. G. Waters, District Medical Officer, E. I. Railway, Tundla	12
W. Woolliscroft, Esq., Savanah-la-mar, George's Plain, Westmoreland, Jamaica	23
Dr. L. G. Bates, Santa Barbara, California, U. S. A.	1
Raja Ghish Chunder Boy Bahadur, Ratahari, Sylhet	"9
Sabu B. M. Chongdar, Sibpur	12
„ Bama Charan Bhattaoharji, Giridih	1
„ Bhuban Chandra Kur, Dum-Duin	1
„ G. C. Datta, Sibpur	24
„ G. C. Chatterjee, Supervisor, Purulia	1
„ Hara Lal Set, Calcutta	7
„ Haridas Mitra, Cossipore	1
„ Jogendra Nath Mukherjee, Saffala, Pabna	1
„ Kanhya Lai, Gossain Tola, Allahabad	15
„ Xunja Behari Basak, Calcutta	7
„ J. M. Nallaswami Pillai, Nandyai, Eurnool	4
„ Netto Gopal Chatterjee, Calcutta	1
„ S. P. Ohattejee, Calcutta	11
„ TTPendra Nath Roy Cbowdhury, Rupdia, Jessore	7
Total	<u>5,670</u>

APPENDIX V.

List of Herbarium Specimens received during 1900-1901.

	No.
Director, Royal Gardens, Kew	136
Well. Ed. Heer M. Buysmann, Hortus Plant Diaphor, Middleburg, Holland	20
Conservator, Herbie Boissier, Les Jordils, Chambezy, Geneva	186
M. le Ptof. M. Musy, Musée Cantonal, Fribourg, Switzerland	318
Director, Hof. Museum, Vienna	205
Ditto Kgl. Bot. Museum, Berlin, Germany	1,056
Herrn. Prof. of Botany, University, Munich	296
Herbarium, Harvard University, Cambridge, Mass., IT. S. A.	240
Prof. A. Nelson, University of Wyoming Laramie Wyoming	875
C. F. Baker Esq., High School, St. Loins Mo., U. S. A.	675
A. H. Curtiss, Esq., Jacksonville, Florida, U. S. A.	193
C. G. Pringle, Esq., Charlotte, Vermont	260
H. Bolus, Esq., Kenilworth, Cape Colony, South Africa	160
J. Medley Wood, Esq., A.L.S., Curator, Durban Botanic Garden, Natal	108
Director's Lands Plantentuin, Buitenzorg, Java	24
„ Botanic Gardens, Singapur	885
O. Curtis, Esq., F.L.S., Penang	50
M. Emile Desohamps, Singapur	662
Mr. J. C. Prazer, Kalewa, Burma	87

APPENDIX V—concluded.

	No.
E. EL Man, Esq., Deputy Superintendent, Port Blair; Andaznans	1,161
B. Li. Seinig, Esq., Deputy Conservator of Forests, Andainans	435
T. JB. Bourdillon, Esq.; Quilon, Madras	56
W. A. Talbot, Esq., Deputy Conservator of Forests, Bombay	13
G. M. Ryan, Esq., Deputy Conservator of Forests, Thana, Bombay...	57
Director, Botanical Department, Northern India, Saharanpur	1,052
J. EL Lace, 23sq., Simla, Punjab	13
C. Maries, Esq., Gwalior State Gardens, Gwalior, C. I.	113
H. EL Haines, Esq., Deputy Conservator of Forests, Chaibassa, Singhbhum	54
Major David Fraim, i.c.s.	311
Lieutenant A. T. Gage, I.M.S.	90
Mr. GL H. Cave, Mungpoo	20
„ N. GUI	254
BabiftA. O. Ohammerjee (Assam grasses)	200
Shaik Mokim, Plant-collector	398
Petty contributions	77
Total	10,740

APPENDIX VI.

List of Herbarium Specimens distributed during 1900-1901.

	No.
Herbarium, Royal Gardens, Kew	444
Ditto, * British Museum, London	534
Ditto, Oxford	51
Ditto, Cambridge University	206
Ditto, Owen's College, Manchester	85
Ditto, Edinburgh University	219
Ditto, Aberdeen	230
Ditto, Science and Art Museum, Dublin	186
Ditto, Queen's College, Cork	112
Ditto, Rijks, Leiden, Holland	177
Ditto, Botanic Garden, Utrecht, Holland	163
Ditto, Jardin Botanique de l'Etat, Brussels	36
Ditto, Jardin des Plantes, Paris	417
Ditto, Boissier, Chambezy, Switzerland	157
Ditto, Musée Cantonal, Fribourg, Switzerland	90
Ditto, Botanic Garden, Geneva	138
Ditto, Botanic Garden, Zurich	460
Ditto, Royal Botanical Museum Florence, Italy	312
Ditto, Botanic Garden, Vienna	164
Ditto*, Hof-Museum, Vienna	197
Ditto, Royal Botanical Museum, Berlin	613
Ditto, Botanical Museum, Hamburg	208
Ditto, University of Munich	312
Ditto, Copenhagen Botanic Garden, Denmark	30
Ditto, Botanic Gardens, Christiania, Norway	28
Ditto, University of Uppsala, Sweden	247
Ditto, Imperial Botanic Gardens, St. Petersburg*	
Russia	360
Ditto, Smithsonian Institution, Washington, U. S. A.,	158
Ditto, U. S. Department of Agrostology, Washington, U. S. A.	396
Ditto, New York Botanic Garden, U. S. A.	124
Ditto, Harvard University, U. S. A.	304
Ditto, Arnold Arboretum, Mass., U. S. A.	115
Ditto, Minnesota Natural History Survey, U. S. A.	133
Ditto, Montana State College of Agriculture, U. S. A.	92
Ditto, Missouri Botanic Garden, U. S. A.	38
Ditto, California University, U. S. A.	43
Ditto, Botanic Gardens, Durban, Natal, South Africa *	154
Ditto, Melbourne University, Australia	251
Ditto, Botanic Gardens, Buitenaorg, Java	234
Ditto, Gardens and Forest Department, Penang	242
-Ditto, Perak Museum	261
Ditto, Forest Department, Singapore	212

APPENDIX VI—concluded.

	No.
Herbarium, Royal Botanic Garden, Peradeniya, Ceylon ...	319
Ditto, Government Central Museum, Madras ...	246
Ditto, College of Science, Poona, Bombay ...	195
Ditto, Botanical Department, Northern India, Saharanpur ...	282
Ditto, Forest School, Debra Dun ...	189
Ditto, of Reporter on Economic Products to the Government of India, Calcutta ...	388
Sir Dietriob Brandis, K.C.I.E., Kew ...	94
G. F. Scott-EUiott, Esq., Dumfries, Scotland ...	30
Well. Ed. Seer M. Buysmann, Hortus Plant Diaphor, Middleburg, Holland ...	54
Mons. Drake del Castillo, Paris, France ...	162
Mons. M. Gandoger, "Ville francoe, France ...	166
Mons. Gas de Candolle, Geneva, Switzerland ...	374
Mons. J. Briquet, Geneva, Switzerland ...	60
Herrn Dr. Prof. Kvanzlin, Or. Liohterfelde, Berlin ...	59
Herm Pastor G. Xuekenthal, Germany ...	38
Herrn Rud. Schleohter Grunewaldstr, 6-7, Berlin ...	66
Dr. J. H. Sandberg, 501, Central Avenue, Minneapolis, Minnesota, U. S. A....	35
Dr. A. G. Bourne, F.K.B., Madras ...	112
W. A. Talbot, Esq., Deputy Conservator of Forests, Bombay	51"
Mrs. Bell, Banda	23
Superintendent, Berry White Medical School, Dibrugarh, Assam ...	14
Petty distributions ...	40
Total	11,903

SPECIAL APPENDIX.

List of Plants that died in the floods of September 1900 and during the cold weather of 1900-1901 from the effects of the floods.

Magnolia fusoaata.	Ipomoea hiloba.
Miohelia ohampaoa.	Mimim macraiiitkum.
Monbdora grandiflora.	Saintpaulia ionantha.
Cananga odorata.	Teooma velutina.
Steroulia oolorata.	Bignonia spp.
„ foetida	Pil. a. aca. s nerrosus.
„ pallens*	„ pulohelluB.
Helicteres Isora.	Sanohezia speotabilis.
Murraya exotica.	Strobilanthus Dyerianus.
Citrus deoumana.	„ scaber.
„ medioa.	„ scaodans.
Spathelia simplex.	Barleria coerulea.
Swietenia Mahogani.	Eranthemum discolor.
Soymida febrifuga.	Aphelandra fulgens.
Cedrela Toona.	Scribographbis flabreghtii.
Spondias axillaris.	Tan ana Sllowiana.
Brya Ebenus.	Clerodendron odoratum.
Indigofera oligosperma.	Premna spp.
„ tinotoria.	Ifyristica spp*.
Lonchocarpus Sp.	Bndelia amosna.
Dalbergia Sissoo.	99 glauca.
Schotia braohypetala,	Croton luofnoniantim.
„ latifolia.	Aoalypha macroph^Ua.
Cassia traohypus.	9, marginata
Acacia arabioa.	99 tricolor.
Enterolobium Saman.	Manihot Glaziovii.
Aralia Veitohii.	Boehmeria nirea.
Exostemma oaribaeum.	Fious Roxburffhii.
Ageratum onysoides.	Phalaenopsis Schilleriana.
Chrysanthemum sp.	Cypripedium Spicerianum.
Canthium glabrum.	99 venustum.
Ldnooiera malabaiica.	Diosoorea sp.
Buddleia madsgasoarionsis.	Thysanolaena acarifera-
Heliotropium sp.	

DAVID PRAIN, M.B., Mayor, I.M.S.,
Superintendent, Royal Botanic Garden, Calcutta.

FINANCIAL DEPARTMENT .

MISCELLANEOUS .

No. 609T.-F.

DAEJEELING, THB 19TH JUNE 1901.

FROM E. N. BAKER, ESQ., as.i.,

Secretary to the Government of Bengal,

To THE SECRETARY TO THE GOVERNMENT OF INDIA,

REVENUE AND AGRICULTURAL DEPARTMENT.

SIR,

I AM directed to submit, for the information of the Government of India, a 'copy of the Report on the Royal Botanic Garden, Calcutta, for the year 1900-1901, and to express the Lieutenant-Governor's satisfaction at the good work done by Major D. Frain, I.M.S., and his subordinates during the year.

I have the honour to be,

SIR,

Your most obedient servant,

E. N. BAKER,

Secretary to the Govt. of Bengal.

No. 610 T.—F.

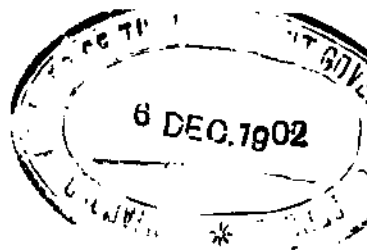
COPT of the above forwarded to the Superintendent, Royal Botanic Garden, Calcutta, for information.

By order of the Lieutenant-Governor of Bengal,

S. R. HIGNELL,

O\$g. Under-Secy. to the Govt. of Bengal.

DARJEELING;
The 19th June 1901.



[Maximum limit) 3 pages.]

ANNUAL REPORT OF THE ROYAL BOTANIC GARDEN, CALCUTTA, FOR
THE YEAR 1901-1902.

No. 25G., dated Boyal Botaoio Uarden, Sibpur, the 15th May 1902.

From—MAJOR D. PRAIN, M.B., LL.D, F.R S.E., I.M.S., Superintendent, Royal
Botanic Garden, Sibpur,

To—The Secretary to the Government of Bengal, Finaioial Department.

I HAVR the honour to submit herewith the 115th Annual Report of the
Royal Botanic Garden, Calcutta, for the year 1901-1902.

ANNUAL REPOBT OP THE EOYAL BOTANIC GARDEN, CALCUTTA,
FOR THE YEAR 1901-1902.

THE chief outdoor improvement to be recorded for the year 1901-1902 is the completion of the new road, alluded to in last Report, from the point of junction of the Kurz and Thomson avenues to the Great Banyan. This road throws open to inspection a portion of the garden that has hitherto been somewhat inaccessible. f'he flooring of the girder bridge in the Kyd avenue which consisted of wooden beams, having become so decayed as to be a source of public danger, has been replaced by a concrete floor of a permanent character. The interior of the Orchid House has been partially, and the small conservatory has been completely, replanted and rearranged during the year.

A severe storm visited the garden on 26th November 1901 and did much damage by uprooting a number of valuable trees and greatly disfiguring many that were not completely destroyed. With this exception the weather during the year was of a normal character and not unfavourable to vegetation.

2. *Economic Plants.*—The investigation of the dye-yielding *Indigoferas* noticed in last annual report has advanced considerably during the past year. The opportunity afforded by a visit to Europe was utilized in a careful comparison of examples of the *Indigo/eras* cultivated in South Eastern Asia with the authentic material preserved in the Herbaria of London and Geneva. The results have beei in some cases unexpected. The belief that at the time of the early intercourse of Europe with India, there were two centres of Indigo export, if not of cultivation, has been confirmed. One of these centres was Surat, where the Indigo grown was a form of the Egyptian Indigo, *Indigo/era articulata*, which still persists in various parts of India, notably, in Scinde and Rajputana where even now this plant alone receives the name "Nil" applied in Tirhut and Bengal to quite a different species. The other centre was Ceylon and the Coromandel Doast where the indigo was obtained from Indian Indigo, *Indigo/era tinctoria*, the produce of which was even in these early times held in less esteem than Surat Indigo. There is evidence that the cultivation of the Surat, or Egyptian Indigo extended gradually eastward, reaching the Upper Gangetic plain about the time of Akbar, and apparently also finding its way later to Patna, Orissa and the Circars. But there is no evidence that Egyptian Indigo ever reached Bengal proper. While the Dutch held possession of Malabar, a third Indigo, *Indigofera sumatrana*, apparently derived from Eastern Malaya, came into uso there. This particular plant seems to have been introduced to Bengal, either from Malabar or directly from Malaya, 'about a century and a half ago, and proving a more satisfactory plant than either the Egyptian or the Indian kinds, has spread westward through upper India as far as the Punjab and more recently southward to Madras, in the first case completely, and, in the second almost completely, driving out of cultivation the Egyptian and the Indian Indigos respectively. From Bengal it was taken to the West Indies whete it was, however, in turn displaced by first one and again a second native American kind, which latter has, in virtue of its superior qualities spread from America to Africa on the one hand and to Polynesia, 8. China, Malaya

and Indo-China on the other; in Upper Burma, for example, this West Indian Indigo is the only species to be met with. Either from the West Indies or directly from Bengal, the plant now grown so largely in the Gangetic plain, was also taken to Senegal and Angola where it is still largely grown side by side with West Indian Indigo, under the name "Indigo of Bengal." The importance of the knowledge thus obtained lies in the fact that another *Indigofera*, East African Indigo, *Indigofera arrecta* has become so favourably known under the name of "Natal Indigo" in the Dutch Indies, that it seems to be displacing the various Asiatic and American kinds, formerly cultivated there. It has been used as an argument against the proposal to introduce this East African *Indigofera* extensively into India that it cannot possibly succeed so well as the kind now grown in India and that it will be difficult to overcome the prejudices of the cultivators in favour of the kind they now grow. The answer to this is that the *Indigofera* now grown in India is not, as is usually supposed, *Indigofera tinctoria*, or Indian Indigo, at all, but is really as much an exotic in Upper India as the East African kind. Further, from the fact that *Indigofera tinctoria* or true Indian Indigo, is still found occasionally in a wild state in Rajpootana, the hills to the south of Agra, and Chota Nagpur, it may be inferred that Egyptian Indigo had in Upper India, long ago displaced Indian Indigo. At any rate it is certain that within historical, and very recent historical times, Malayan Indigo, which is now so generally grown in the Gangetic plain displaced Egyptian Indigo. This being the case there is no reason why East African Indigo should not in turn displace the Malayan kind. It was recorded in the last annual report that during the excessive floods of September 1900 this East African Indigo came by no harm when all the Indian and American kinds were practically destroyed.* It has now to be recorded that in 1901 the experimental plots were attacked by an insect blight which destroyed all save a few plants of every Asiatic and American *Indigofera* under cultivation without affecting in the least this East African species.

Among other economic operations for the year it may be noted that the efforts to extend the cultivation of *Paspalum dilatatum* have been continued and that the difficulties regarding its cultivation in Bengal have been successfully overcome. These difficulties have not yet been surmounted in other provinces and the reports that have been received from correspondents are somewhat conflicting. In Southern India it is found that the drought-resisting qualities claimed for this grass in Australia have not been over-estimated, but in Western and Northern India it is stated that though an excellent fodder grass where irrigation is available, it is as a drought-resisting species distinctly inferior to some well-known native grasses. On behalf of the Department of Agriculture, Western Australia, arrangements have been made to introduce to that Colony the different varieties of Indian Oranges. The kinds known as Sylhet, from the Khasia Hills; Nagpore, from Central India; and Suntolah, from Nepal, have been successfully transmitted; the despatch of other kinds will be effected in due course.

3. *Herbarium*.—The collections made during the year in Assam have been chiefly from the Brahmaputra Valley where an endeavour has been made to bring together a representative collection of the crops cultivated in the province. In Burma native collectors have made large and valuable collections in the Tavoy and Mergui districts. Some small but valuable contributions have also been received from officers of the Forest Department in Lower Burma. In Bengal collections have been made chiefly in districts as known to be still inadequately explored.

The number of named specimens distributed to other Botanical Establishments has been 8,500. The number of specimens received has been 8,749; the chief contributors being the Director, Royal Gardens, Kew, 1,051 specimens; and the Director, Royal Gardens, Berlin, 1,134 specimens. Smaller but valuable contributions have to be acknowledged from the Director, Botanical Garden, Buitenzorg; the Botanical Department, Northern India; Botanical Gardens, Sydney; Hof-museum, Vienna; British Museum, London; College of Agriculture, Montana; Botanical Garden, Penang; Royal Botanic Garden, Peradeniya Botanical Gardens, Zurich; Government Botanist, Madras. Among private contributors to whom thanks are due for collections of Indian

plants, are Mrs. A. S. Bell, Band*, 1,160 specimens; C. G. Rogers, Esq., Forest Department, Andamans, 501 specimens; J. H. Lace, Esq., Forest Department, 299 specimens. Smaller, but in most cases, very interesting collections, have been received from Dr. A. G. Bourne, Madras; T. H. Holland, Esq., Geological Survey; G. M. Hyan, Esq., Forest Department, Bombay; W. H. Craddock, Esq., Forest Department, Burma, &c. Some specimens were also acquired by purchase.

Sir George King has continued at Kew the elaboration of the Malayan specimens belonging to this institution and has now dealt with the whole of the Calycifloral orders.

4. *Library*.—As usual a large number of books has been presented to this institution or has been acquired by purchase or in exchange. The task of cataloguing and arranging the collection is making steady progress.

5. *Botanical Publications*.—The fifth volume of the *Annals of the Royal Botanic Garden*, Part I, which was in the Press at the commencement of the year under review, was issued in May 1901. During the year the twelfth part of Sir George King's *Materials for a Flora of the Malayan Peninsula* was published and Part XIII was sent to Press. Other publications have been *Novice Indices XVII*; *The Asiatic Species of Dalbergia*, by the Superintendent, in the *Journal of the Asiatic Society*; *Notes on Madagascar*, by the Superintendent and Mr. E. G. Baker of the British Museum, in the *Journal of Botany*; and *A Botanical Tour in the South Lushai Hills* by Captain A. T. Gage, in the *Records of the Botanical Survey of India*.

6. *Interchange of Seeds and Plants*.—The number of plants distributed during the year was 35,134, slightly below the usual figure, the demand for *Rhea* having been very small. The number of plants received was 8,521; these include some very interesting contributions, the most notable of which are a small collection of authentically named *Sansevieras* (Bow String Hemp plants) from the Director, Royal Gardens, Kew; 389 bulbous and tuberous plants from Uganda, presented by F. J. Spooner, Esq., 305 orchids of remarkable interest, presented by Rev. L. Cardon, S.J., Chota Nagpur; collections of a very interesting nature from Madagascar, presented by M. Em. Prud'homme and from Dar-es-Salaam, presented by Herr Stuhlmann. During the year 1,200 packets of seeds were received and 4,083 packets distributed.

7. *Lloyd Botanic Garden*.—The whole of the ground formerly used as a municipal vegetable garden has now been laid out in conformity with the older portion of the garden. A road that will admit of rickshaws entering the garden has been provided and supplies a want that was greatly felt. A new public museum is being erected within the garden.

8. The monoy allotted for contingencies for the Royal Botanic Garden has been spent in full. There has been a saving under the allotment for establishment of Rs. 5,137-6 due chiefly to the absence for six months on leave of the Superintendent and the deputation of the probationer Gardener attached to the Garden, at the Cinchona Plantation. There has been a saving of Rs. 1,266-13-6 under the allotment for Travelling allowance. In the corresponding allotments for the Lloyd Botanic Garden a saving of Rs. 212-12 was effected on the Garden account and a saving of Rs. 161 under the allotment for Travelling allowance. The revenues from the Royal Botanic Garden of Rs. 874-1-4 and from the Lloyd Botanic Garden of Rs. 895 have been paid into the treasuries at Calcutta and Darjeeling respectively.

9. The Superintendent was absent on special leave, on urgent private affairs, combined with privilege leave for six months from 20th June till 19th December 1901. During his absence Captain A. T. Gage, Curator of the Herbarium officiated as Superintendent in addition to his own duties. Captain Gage availed himself of privilege leave for six weeks from 4th January to 10th February, 1902. Mr. G. T. Lane, Curator of the Garden, was in charge of his post throughout the year till 20th March 1902 on which day he proceeded to Europe on leave for nine months on medical certificate combined with privilege leave. Mr. N. Gill, Assistant Curator, having been appointed Superintendent of the Memorial and other Public Gardens, Cawnpore, vacated his appointment at the Royal Botanic Garden on 7th February 1902; Air. H. F. Green, probationer Gardener attached to the Royal Botanic Garden, but at the time on deputation at the Government Cinchona Plantation, was

appointed Assistant Curator in succession to Mr. Gill. Mr. A. C. Hartleys, Third Assistant, Government Cinchona Plantation having been selected to act as Curator during the absence of Mr. Lane, was deputed to Calcutta to act as Assistant Curator during the interval between Mr. Gill's transfer and Mr. Lane's departure, Mr. Green being left at the Plantation to fill the vacancy caused by Mr. Hartless' deputation. The probationer Gardener has throughout the year been on deputation at the Government Cinchona Plantation, liabu A. K. Bose, eighth clerk, who has been in the service of Government for 17 years, died on 11th November of Malaria. The deceased was a conscientious and hard-working man, and his death is greatly to be regretted. At the Lloyd Botanic Garden, Mr. A. C. Hartless acted as Curator till October 10th, 1901 on which date the Curator, Mr. W. A. Kennedy resumed his duties on his return from furlough for 18 months, of which he had availed himself on 11th April 1900.



(Maximum limit, 3 pages)

ANNUAL REPORT OF THE ROYAL BOTANIC GARDEN, CALCUTTA, FOR
THE YEAR 1902-1903.

No. 1, dated Royal Botanic Garden, Sibpur, the 2nd May 1903.
From—MAJOR-D. PEAIN, M.B.,-1. Superintendent, Royal Botanic Garden, Sibpur,
To—The Secretary to the Government of Bengal, Financial Department.

I HAVE the honour to submit herewith the 116th Annual Report of the
Royal Botanic Garden, Calcutta, for the year 1902-1903.

ANNUAL REPORT OF THE ROYAL BOTANIC GARDEN, CALCUTTA,
FOR THE YEARS 1908-1908.

THE principal outdoor work during 1902-1903 has been the deepening and widening of the ditch lying inside the northern and western garden boundary. The opportunity has been taken along with this work to improve the surface drainage of the adjacent portion of the garden and to fill up several unnecessary pits and ponds. The serviceable area of the garden has thus been considerably increased. The fern-house in the nursery, which had become dilapidated, has been overhauled and thoroughly repaired. The weather during the year was favourable to vegetation, and the show of orchids was particularly good.*

2. *Economic work* *.—As usual the attention of the garden staff has been almost exclusively devoted to the propagation, investigation, and interchange of plants of economic importance. A good deal of public interest has been shown in plants that yield fibre, and assistance has been freely given to enquirers for Ehea and for the fibre-yielding *Agaves* and *Furcrceas*. An important question has been raised regarding the fibres vaguely classed as Indian Hemp; this can only be settled by cultivating and identifying the various plants. It appears that the expression "Indian Hemp" and its vernacular equivalent *Qan* do not exclusively connote *Crotalaria juncea*; further it seems that this *Crotalaria* is not uniformly designated throughout India. The double confusion that results leads to trade difficulties; an attempt is being made to ascertain the actual facts and so remove these difficulties. Among other food plants the Indian Tarns have received close attention during the year. The enquiry into this difficult subject, in which the Superintendent of the Garden and the Reporter on Economic Products are collaborating, has advanced considerably. Having regard to the fact that the East Indian Yams, with hardly an exception, are of very indifferent quality, some of the finest West Indian Yams have been introduced and are being experimentally cultivated. The difficulties that beset the propagation of *Ipecacuanha* having been largely overcome, samples of this drug have been submitted for examination and report to the Medical Storekeeper to Government, Calcutta. The fluctuating* character of the Ipecacuanha market renders it desirable that, provided the drug is otherwise equally suitable, India should be able to depend, at least in part* on local supplies. An intelligent interest has been revived in the, as some believe, equally effective indigenous drug *Rangan*(*Ixora coccinea*, var *Bandhuca*); arrangements have been made to propagate* it largely and supply it freely to enquirers. During the year an attempt has been made to introduce some of the finer kinds of American pine-apples, the ordinary Indian kinds being, as a rule, of the poorest description. An interesting introduction during the year has been the Japanese bamboo known as *MatakS*, which is employed by the inhabitants of the Province of Ghiba in sinking their artesian wells. In the introduction of this bamboo, the garden is indebted to the kind assistance of Dr. Tokuzaro Ito.

3. *Herbarium*:—The botanical explorations made during the year have included a visit by the Superintendent to the Sundribuns; a botanical tour by

the Assistant Curator of the Garden in the North Lushai Hills and a systematic survey of the vegetation of Minbu, a district typical of the desert zone in Burma, by the Curator of the Herbarium. The Superintendent's tour has been possible owing to the help of J. H. Lace, Esq., Conservator of Forests, Bengal; the Lushai tour was arranged with the kind assistance of Major Shakespear, c i. E; the work in Burma, which was still in progress at the close of the year, was greatly facilitated by the aid of the local officers and particularly of Mr. L. Aubert, Superintendent of Land Records, Minbu. The Superintendent has for some years been engaged in preparing a review of the plants of Bengal, and their interest in the work has led to much valuable assistance being given by Mr. Lace, who has made and presented to the Herbarium a valuable collection of plants from Orissa; by Mr. H. H. Haines, Deputy Conservator of Forests, who has sent further collections from Singhb[^]im; and by Mr. F. A. Slacke, Commissioner of Chota Nagpur, who w[!]aie on tour has very kindly supervised the work of a native collector in the Tributary States. The number of .named specimens distributed to other Herbaria has been 10,888. The number received has been 14,920. The chief contributor for the year has been the University of Upsafo, whence 2,758 specimens, mainly South American, and all of great value, have been received. Fine collections have been received also from Professor C. F. Baker, Stanford University, California, 873 specimens; Mons. E. Mouillefarine, Paris, 600 specimens; 's Lands Plantentuin, Buitenzorg, Java, 323 specimens. Smaller but very interesting collections have been contributed by the Director, Royal Gardens, Kew; Mons. Barbey, Geneva; Cantonal Museum, Fribourg; Hof-museum, Vienna; College of Agriculture, Montana; Botanic Gardens, Zurich; Botanic Gardens, Penang; Botanic Gardens, Singapore. Among Indian contributors have been Mrs. A. S. Bell, Banda, 578 specimens; J. H. Lace, Esq., 481 specimens; H. H. Haines, Esq., 206 specimens; Reporter on Economic Products, 190 specimens. Smaller collections have been contributed by the Conservator of Forests, Rangoon; Deputy Conservator, Port Blair; Lieutenant-Colonel J. J. Wood, i. M. S., Mr. W. H. Craddock, Forest Department, Burma; J. Marten, Esq., Forest Survey Department; Government Botanist, Madras; and others. Some specimens were also acquired by purchase.

4. *Library*.—A considerable number of additions have been made to the Library by exchange, presentation and purchase. The collection has now been completely re-arranged and the scientific card catalogue giving both an authors'- and a subject-index has been about half completed* Another large book case has been acquired during the year; this has partially relieved the congestion due to the growth of the collection, but other similar cases will require to be added for several years to come.

5. *Interchange of seeds and plants*.—The number of plants distributed during 1902-1903 was 37,368; the number received was 8,203. Among the plants received were some authentically named *Agaves* from Sir Thomas Hanbury, K.C.V.O., of La Mortola, Ventimiglia ; a set of West Indian Yams from R. W. S. Mitchell, Esq., C.M.G.; a series of Travancore Yams from T. F. Bourdillon, Esq., F. L. S., Quilon; two interesting and valuable sets of Rhea roots from Mons. J. Karpel&s, of the kinds grown in France and in Algeria. Donations of orchids of much interest were made by Captain Wood, B.E_M from Burma ; J. H. Lace, Esq., from the Sundribans; W. Gtoss, Esq., from the Duars. During the year 897 packets of seeds were received and 5,270 packets were distributed. Among the seeds received have been those of some very interesting species from German East Africa and from Madagascar, transmitted by the Agricultural Departments of these Colonies, also a number of extremely interesting species from Mexico, presented by J. C. Harvey, Esq., and from Ecuador, presented by Herr A. Rimbach.

In connection with this work of interchange assistance has been given to the Governments of Western Australia, Jamaica, Trinidad, British Guiana, and Ceylon, and to the British Protectorates in West Africa, in procuring representative collections of plants or seeds of staple Indian products; the Government of Siam has also been similarly aided.

6. *Lloyd Botanic Garden*.—This garden has been in a satisfactory condition throughout the year. In connection with the collection of alpine seeds, which forms a very important feature of the work of the garden, the Curator was

able personally to visit the higher levels at the proper season, greatly to the benefit of the work in question.

7. The money allotted for contingencies for the Royal Botanic Garden, Calcutta, was spent in full. There was a slight saving of Rs. 39-9-11 under Establishment charges, and a saving of Rs. 284-3*6 under the allotment for travelling allowance, in the corresponding allotments for the Lloyd Botanic Garden there was a saving under contingencies of Rs. 442-10; under establishment of Rs. 1,900-9-2, and under travelling allowance of Rs. 67-11. The saving under establishment is explained by the fact that the present Curator is junior in the graded list of Gardeners to his predecessor. The revenues for the Royal Botanic Garden of Rs. 1,160-6, and for the Lloyd Botanic Garden of Rs. 1,133-7-6, have been paid into the treasuries at Calcutta and Darjeeling, respectively.

8. The Superintendent was in charge of his post throughout the year. Captain A. T. Gage, Curator of the Herbarium, was deputed by the Government of Bengal between 17th April and 22nd October 1902 to investigate along with Mr. H. M. Leake, Biologist to the Bihar Planters' Association, the sources and nature of the Indigo seed supply in Upper India. Except for this interruption the Curator of the Herbarium was in charge of his post throughout the year. The Curator of the Garden, Mr. G. T. Lane, was absent at the commencement of the year on leave on medical certificate. He returned to duty on 20th March 1903. During his absence Mr. A. C. Hartless, 3rd Assistant, Government Cinchona Plantation, acted as Curator. With effect from 20th June 1902, Mr. H. F. Green, Assistant Curator of the Garden, was appointed 4th Assistant, Cinchona Plantation, and Mr. O. T. Hemsley, 4th Assistant, Cinchona Plantation, was appointed Assistant Curator, and from the same date was posted on deputation to Delhi in connection with the Coronation Durbar Camp. Mr. Hemsley continued on deputation till 14th August 1903 when he was granted privilege leave under medical advice till 30th September 1903. On 1st October 1903, Mr. Hemsley's services were placed at the disposal of the Government of the Punjab. Mr. J. E. Leslie reported his arrival from England and joined his appointment as Probationer Gardener attached to the Royal Botanic Garden on 2nd April 1902, and was subsequently appointed Assistant Curator, in succession to Mr. Hemsley, transferred, with effect from 1st October 1902. Mr. E. Long, the new Probationer Gardener, reported his arrival from England and joined his appointment on 12th January 1903. Mr. G. H. Cave, 3rd Assistant, Government Cinchona Plantation, was appointed Curator of the Lloyd Botanic Garden on 1st April 1902, in place of Mr. W. A. Kennedy who was on that date permitted by Government to revert to the Cinchona Department. Mr. Cave has been in charge of his post throughout the year.

ANNUAL REPORT OF THE ROYAL BOTANIC GARDEN, CALCUTTA,
FOR THE YEAR 1909-1904.

THE filling up of a pond near the Cinchona office and close to the river bank has been the chief out-door operation during the year. The river, which was separated from this pond by a narrow embankment, showed signs, during recent many seasons, of breaking through. Under the professional advice of the Department of Public Works it was decided to fill this pond, and a special grant of Rs. 3,000 was provided for the purpose and expended in full during the year. The repainting of the Palm house was taken in hand and the cleaning and painting of the outside aisles overtaken, leaving the central dome still to be dealt with.

The weather during the early part of the year was marked by the absence of the usual hot-season rain-storms. The labour force of the garden had consequently to be employed in watering as many trees and shrubs as possible so as to ensure their preservation. In spite of these a considerable mortality took place, over 60 trees and shrubs having died outright. As the watering of every tree in the garden being physically impossible, it was necessary to concentrate our efforts on the rare and valuable kinds whose loss would have meant the disappearance of a species from the collection; the death-roll, as a result, fortunately only includes six or eight of this class. The close of the year was marked by a severe wind-storm (March 9th, 1904), which overturned a number of trees, two or three of which were valuable species, and did much damage in the nursery. With these exceptions the weather throughout the year was favourable to vegetation. A large portion of the central section of the great banyan tree fell spontaneously at midnight on March 16th, 1904; the tree had not apparently been damaged by the storm of the previous week, and there was no wind at the time of the accident, which, it is to be feared, indicates merely the progress of natural decay.

2. *Economic Work.*—The interest taken by the public in plants yielding useful fibres has continued to be great and, in connection with this, progress has been made with the enquiry into the various species of *Agave* that occur in India. The successful introduction through this garden of *Agave Sisalana*, the species that yields the most esteemed fibre of this class, has been recorded in the reports for 1891-92 and subsequent years, and a review of the results so far obtained has been alluded to in the report for 1899-1900. The Sial *Agave* does not thrive equally well or give equally remunerative results in all parts of India, and in certain districts species of *Agave* other than *Sisalana*, already so completely naturalised as to appear indigenous, thrive so much better than *Sisal* and yield fibres commercially so little inferior to the best *Sisal* fibre that their systematic cultivation offers a hopeful field for investment. The idea that any *Agave* is a native of India is a mistaken one; all are American, and all are introduced. The belief that all the *Agaves* naturalised in India belong to one or, at most, two species, *Agave americana* and *Agave vivipara*, would now also appear to be incorrect; it seems that, while, as a rule, more or less well-defined areas have particular species well established, the prevailing species in one area often differs from that most plentiful in another area. Moreover, it is found, when attempts are made to utilize the fibre of these local *Agaves*, that somewhat diverse results are obtained; at times the fibre extracted is reported to be nearly up to the standard of *Sisal*, at other times it proves too weak to be worth extracting. The explanation of these facts appears to be that other species of *Agave* share with *A. Sisalana* the peculiarity of adapting themselves readily to certain localities and thriving less vigorously in others. The original object of the introduction of all the species was to provide secondary lines of defence round stockades, forts and strong villages; in more settled times they have been chiefly used as hedges bordering highways and lines of railway. Vigour of growth therefore has been the only quality considered in selecting plants within any particular area; the nature of the fibre has not till recently attracted

attention. It is too soon yet to say how many different *Agave** have really become naturalised; by what characters they may be most certainly distinguished; or which of them are best for fibre-producing purposes, but sufficient information has already been obtained to show that considerable caution must be exercised by those desirous of laying down extensive plantations of local *Agaves*, and all the information so far available has been freely afforded to numerous enquirers during the year. A similar but less marked confusion prevails with regard to the species of *Furcrcea* or "Mauritius hemp", of which certainly two, and probably three kinds have so far become established in India. Steady progress has been made with the investigation referred to in last year's report into the sources of "Indian hemp". Seeds received from gentlemen interested in this trade from parts of India so remote as Cdbonada, Lower Bengal, Central India, and the United Provinces have been grown experimentally with the result of proving that fibres which in the trade vary in value, according to locality of or[^]hi, from £ 9 to £ 18 per ton are derived from the same plant, *Crotalariastrfuncea*. What is still more interesting is the result that when the plants in question are grown side by side, cultivated under identical conditions, and their fibre is extracted in the same way, the difference in value almost disappears. The greatest variation experienced was of £ 2 per ton only, and it was reported that all the fibres submitted for valuation could have been sold under the same mark. These experiments are to be repeated during the ensuing year on a more comprehensive scale so as to put the results on a wider and firmer basis. The work of cultivating living tubers or bulbs and of growing seeds for the purpose of identifying the sources of economic articles on behalf of the Reporter on Economic Products has gone on as usual during the year, as has also the preparation of grafts of fruit-trees and the raising of stock of trees for planting by Government officers on roadsides and elsewhere. At the request of the Director of Land Records and Agriculture the Superintendent paid three visits to Bihar to inspect various centres of experimental cotton cultivation; he also paid a visit to Burdwan in connection with the experimental cultivation of jute by the Agricultural Department.

3. *Herbarium*.—The botanical explorations made during the year included a visit by the Superintendent to Independent Sikkim and Tibet. The journey was undertaken by the invitation of Colonel Younghusband, and with the consent of Government, in order to organise Botanical Survey operations in Tibet in connection with the frontier mission. The results of the visit were very satisfactory. Captain Gage, Curator of the Herbarium, was deputed to Assam in order to make a systematic survey of the district of Cachar with the object of linking up the results obtained in the course of the investigations already made in the Lushai country. The visit gave very satisfactory results, but some time must elapse and more exploration work must be undertaken before it is possible to give a connected account of the botanical features of the country lying between the valleys of the Barak and the Irawaddy. Collections by means of native collectors were made in Lower Burma. The number of named specimens distributed to other Herbaria during the year has been 16, 110. The number received has been 20,976. These include collections presented by the Director, Royal Gardens, Kew, 128 specimens; Botanic Garden, Zurich, 161 specimens; Imperial Museum, Vienna, 110 specimens; Botanic Garden, Berlin, 544 specimens; Botanic Garden, Durban, 108 specimens; also by the following private contributors, C. B. Clarke, Esq., London, 300 specimen; Mons. E. Mouillefarine, Paris, 1,002 specimens; S. A. Prince Roland Bonaparte, 391 specimens; J. Baagoe, Esq., Denmark, 44 specimens; O. F. Baker, Esq., California, 628 specimens; C. G. Prinze, Esq., Vermont, U. S. A., 280 specimens; H. H. Smith, Esq., Pittsburgh, U. S. A., 1,890 specimens. In India the chief donors have been C. G. K. Rogers, Esq., Port Blair, 203 specimens; B. B. Osmaston, Esq., 138 specimens; C. E. C. Fischer, Esq., 93 specimens; F. B. Manson, Esq., 82 specimens; H. H. Haines, Esq., 76 specimens; T. F. Bourdillon, Esq., 32 specimens; J. S. Slater, Esq., 195 specimens; P. Brühl, Esq., 190 specimens; J. Marten, Esq., 162 specimens; J. L. Lister, Esq., 72 specimens. The thanks of Government are due to all of these institutions and individuals for their valuable contributions. Some specimens were also acquired by purchase and those

obtained through the agency of this institution included 1,960 specimens collected in connection with the Tibet Frontier Mission viz., 797 by Col. Younghusband and Mr. J. C. White and 1,163 by the Superintendent during his visit to the frontier, and 1,641 specimens obtained by the Curator of the Herbarium and native collectors in Assam and Burma. From the "Sistan Boundary Commission, 127 specimens were received.

i. *Library*.—A large number of books have been added to the library during the year; many of these have been presented or given in exchange for publications. Further progress has been made with the card catalogue and another bookcase has been added. The rate of accession to the library is however, so great that it has been necessary to solicit the provision as soon as possible of further extra accommodation.

5. *Botanical Publications*.—The chief publications issued during the year in connection with the garden have been:—*Annals of the Royal Botanic Garden* Vol. X, Part I, (*The species of Diptera of South Eastern Asia*), by the Superintendent; *Flora of the Sundribuns*, (*in records of the Botanical Survey of India*), also by the Superintendent; *A Census of the Indian Polygonums* (*Records Botanical Survey*), by Captain Gage, Curator of the Herbarium. Sir George King has continued his *Materials for a Flora of the Malayan Peninsula*, based largely on material belonging to the Calcutta Herbarium; of this invaluable work, Part IV dealing with *Gaprifoliaceae* and part of *Rubiaceae*, has been issued during the year with Sir George King, Mr. J. S. Gamble, F.R.S., has now become associated in this work.

6. *Interchange of Seeds and Plants*.—The number of packets of seeds distributed during the year was 6,152. The number of packets received was 1,677. These included valuable contributions from Australian Botanical establishments of seeds of *Eucalypti*; a fine collection of Japanese seeds from the Imperial Garden at Tokio; most interesting contributions from Mexico, by Mr. J. C. Harvey; from Eftrope, by M. Robertson-Proschowsky of Nice, and Signor C. Sprenger of Naples; from Gerrifen East Africa, by the Agricultural Department at Dar-es-Salaatn. They also included over 200 different seed packets received from the Reporter on Economic Products for experimental cultivation and subsequent identification. The number of plants distributed during the year was 8,887; these included a collection of useful species (340 plants) issued to the Rev. Dr. Russell Scott on behalf of an Industrial Mission Colony that is being established in British East Africa; over 2,000 issued to assist in the development of Uganda; a collection of the various kinds of pineapples grown in India (87 plants) sent to Jamaica at the instance of His Excellency the Viceroy; economic plants asked for by the Bureau of Agriculture, Manila; representative collections of the various *Agaves* naturalised in India to the Director s'lands Plantentuin, Buitenzorg and to the Directeur de l'Agriculture, Saigon; a farther consignment of representative Indian oranges to the Government of West Australia and a collection of *Sevea brasiliensis* plants to the Consul-General for Italy at Calcutta on behalf of the Italian Government. The number of rhea plants issued in India was 12 only, indicative of the fact that those interested in cultivating this plant have now received sufficient supplies; on the other hand, over 2,000 plants of rhea were issued to our Central and East African Colonies. The number of fibre plants other than rhea issued included 2,014 *Agaves*; 2,235 *Furcrceas*; and a few plants of *Sansevieria*, or "Bowstring hemp." The number of plants received was 11,019. These include a very interesting collection of 68 plants received from the Director, Royal Gardens, Eew; an instructive collection of the *Agaves* established in Upper India from the Superintendent of the Botanic Garden, Saharanpur; a fine collection of orchids from the Salween Valley presented by Captain H. Wood, R.&, of the Survey of India; a valuable collection of economic tubers from Chota Nagpur by the Rev. Father Cardon; a fine collection of pine-apple suckers by R. G. Girard, Esq., some interesting and valuable tubers presented by the Bureau of Agriculture, Manila; and over 6,000 tubers, Jwbs and cuttings, mostly for the purpose of cultivation with a view to subsequent identification on behalf of his department, from the Reporter on Economic Products.

7. *Hooyd Botanic Qarden*.—The condition of this garden has been satisfactory throughout the year. The Curator again visited personally the higher

levels in connection with the collection of Alpine seeds, with once more very satisfactory results. During the year a consignment of Valerian roots was collected on behalf of the Agricultural Chemist to Government in connection with investigations regarding the preparation of an insecticide,

8. The money allotted for contingencies for the Royal Botanic Garden, Calcutta, was spent in full. There was a saving of Rs. 371-14-9 under the allotment for establishment charges and of Rs. 462-14-6 under that for travelling allowance. In the corresponding allotments for the Lloyd Botanic Garden there were savings under contingencies of Rs. 92-8-6 and under establishment of Rs. 149-7-9. The revenues for the Royal Botanic Garden of Rs. 935-11, and for the Lloyd Botanic Garden of Rs. 857-10-6 have been paid into the treasuries at Calcutta and Darjeeling respectively.

9. Except during the period occupied by his visit to the Tibet Frontier, between 10th September and 19th October 1903, when the Curator of the Herbarium carried on the current duties of the department, the Superintendent held charge of his post throughout the year. Mr. J. S. Leslie, Assistant Curator of the Royal Botanic Garden, was on deputation at Kotah between 7th January 1904 and 11th February 1904, his services having been temporarily placed by Government at the disposal of the Kotah State. Mr. G. H. Cave, Curator of the Botanic Garden, Darjeeling, availed himself of privilege leave for six weeks from 22nd December 1903 to 1st February 1904. During this period Mr. E. Long, Probationer Gardener attached to the Royal Botanic Garden, Calcutta, acted for Mr. Cave. Subsequently the services of Mr. Cave were placed temporarily by Government at the disposal of the Government of Madras. In connection with his transfer, Mr. Cave was placed on special duty at the Royal Botanic Garden, from 22nd February 1904 to 3rd March 1904, and was deputed to Madras for 8 months from 4th March 1904. Mr. A. C. Hartless, Third Assistant, Government Chinchona Plantation, acted as Curator, Lloyd Botanic Garden *vice* Mr. Cave, with effect from 22nd February 1904. The Curator of the Herbarium attached to the Royal Botanic Garden and the Curator of the Garden were in charge of their respective posts throughout the year.

D. PRAIN, M.B., *Major,*

Superintendent, Royal Botanic Garden, Calcutta.

AMONGST the chief out-door works of the year were, the deepening of several of the tanks, the raising of a mound near the flower-garden with the soil left over after filling up the office tank, and the (re)construction of the Palmyra avenue. The nursery has been laid out on an improved plan and several of the plant-houses in the nursery have been reconstructed. The weather during the greater part of the year was normal. An abnormally low temperature existed during part of January and February 1905, but appears to have left no permanent ill-effects on the garden. A severe storm on the 9th April 1904 overthrew about forty trees.

2. *Economic work.*—The investigations into the species of *Agaves* found in India, referred to in last year's report have been continued and concluded during the year by Lieutenant-Colonel Praia and Mr. J. R. Drummond, i.c.s. Their results, which promise to be of great value, are in the press. In connection with this investigation, a complete set of the *Agaves* grown in the Calcutta Garden has been sent to the Director of the Missouri Botanic Garden, who is an authority on *Agaves*. The experiments with 'sunn' hemp (*Crotalaria juncea*) are being continued. It appears that the time of sowing is not the same in all parts of the country. It appears to take place considerably earlier in the year at such places as Cawnpore, and Coconada than in Bengal. This accounts for the fact that whereas the fibre from Cawnpore, Coconada, and some other localities comes into the market in October-November, the best kind of 'sunn' hemp—the Bengal or figlachia brand—does not come into the market until about February. Considerable attention was given to the growing of the different species and varieties of cotton—supplied by the Agricultural Department and the Reporter on Economic Products—cultivated or attempted to be cultivated in India. The plots furnished material for botanical identification, but in other respects the experiment was practically a repetition of the one made in 1870-71, as detailed in the garden report for that year, and with the same unsatisfactory results. The economic work of growing seeds, tubers and plants and identifying them for the Reporter on Economic Products to the Government of India has been carried on as usual during the year.

3. *Herbarium.*—The past year has been a notable one in the history of the Herbarium. In the annual report for 1889-90 Dr. (now Sir George) King writes that when the mounted collection was removed from the old building into the present one, it was contained in 93 cabinets. In 1890 the collection filled 180 cabinets and the number of specimens was estimated at over half a million. Since 1890 the collection has increased so prodigiously that until this year the cabinets were overflowing and many thousands of specimens had to be piled on tables and on the floor. The special grant allotted to the garden during the year under review has enabled the general Herbarium in the gallery of the building to be entirely reorganised. All the old cabinets which were arranged in groups of nine have been replaced by large handsome double-sided cabinets, built in four sections so as to allow of easy handling, each new cabinet occupying no more floor space than nine old ones, but having a capacity half as great again as the nine old ones. There are now thirty-two cabinets in the general Herbarium with a total capacity of about a million specimens. It is hoped to replace the old cabinets still remaining on the ground floor and containing the local herbaria and unclassified collections during the coming year. When this will have been done the capacity of the present building will be utilised to the fullest extent. It would be rash to prophesy how long the present improved accommodation will suffice, but in the natural course of development of the institution, congestion is bound to recur, and when it does so it will have to be relieved by enlarging the building itself. It is very satisfactory to be able to chronicle such a great improvement as the liberality of Government has enabled the officers responsible for the Royal Botanic Garden to effect. It would, however, have been still more satisfactory to be able to state that the scientific staff had increased *part passu* or approximately so, with the development of the Herbarium. During the last forty years the Herbarium and Library have

increased at least five-fold. The scientific staff of the Herbarium still consists of only one man, exactly as it did half a century ago. In the annual report for 1889-90 already quoted, Sir George King, referring to the work of the Herbarium, states that then the work was getting very heavy and that it might be necessary before long to apply for the services of yet another botanist. If fifteen years ago the work of the Herbarium justified Sir George King's remarks, still more does the great increase in the collection which has gone on steadily during those years render imperative a re-statement of them. The re-arrangement of nearly a million specimens in the new cabinets entailed a great amount of extra work during the year, and this, coupled with the absence of the Curator of the Herbarium for six months, made it impossible to depute any European officer to collect specimens. Native collectors, however, were sent to Tenasserim and to Sylhet; and towards the end of the year, by the kindness of Mr. Merk, Chief Commissioner for the Andamans, a collector was sent to the Nicobar islands. Collections have also been made by Lepcha collectors in the Chumbi valley, working under the supervision of Mr. G. L. Searight, the officer in charge of the road survey there. The number of specimens received in the Herbarium amounted to almost 7,000. The specimens distributed are considerably less than the usual number owing to the interruption caused by the re-arranging of the general Herbarium. They number about 4,000 sheets.

Laboratory and Museum.—In the year 1876, Sir Richard Temple, Lieutenant-Governor of Bengal, wrote two Minutes bearing on the science of Botany. One, dated 9th September 1876, had for its subject the Herbarium at the Botanic Garden, Calcutta; the other, dated 14th September 1876, is entitled "Inquiries and Experiments in the Physiological Branch of Botany." The recommendations in the first Minute concerned with the Herbarium have to a certain extent been carried out or are being carried out. The recommendations in the second Minute have remained unacted upon for practically thirty years. It is true that in 1901 the newly appointed Cryptogamic Botanist to the Government of India was stationed in the Royal Botanic Garden. He, however, was soon afterwards transferred to another department, and the Garden relapsed into its former condition of being without a laboratory and without an officer, who had both the time and the knowledge to study physiological and histological problems. During the year, however, a beginning has been made to provide at least the tools for carrying out the physiological and histological investigations referred to in Sir Richard Temple's second Minute. A room above the Cinchona Office with accommodation for four workers has been fairly well equipped with the most recent appliances, such as are used in the foremost English laboratories, which the Curator of the Herbarium visited, while on leave, for the purpose of selecting the best equipment. A dark room with all the appliances for ordinary photographic and photo-micrographic work has, also been erected. The laboratory, although small, should be of great use to any botanist desiring to study tropical vegetation from a physiological or histological stand-point. Until, however, a permanent additional appointment is created for such investigations, the amount of work turned out from the Laboratory will depend to a large extent on volunteer workers. Until such an appointment has been created as well as an additional one for the Herbarium, the scientific staff of the Calcutta Garden can be described only as very inadequate for the amount of work that waits to be done. Although a fairly good beginning has been made it must not be supposed that the Laboratory is complete in every detail. A supply of electricity—so necessary for certain physiological investigations—is lacking. In connection with the Laboratory a part of the south verandah of the seed-house has been transformed into a email museum, which has been fitted up with excellent, show-cases. As a beginning for a larger and better museum in the future it should promise well.

6. *Library.*—During the year the Library has undergone as complete a reorganisation as the Herbarium. The did clumsy bookcases have been replaced by sliding doors, each new case giving nearly twice as much space as four of the old ones, and in addition of valuable drawings executed in the years. The work of transferring the books

from the old to the new cases naturally put a temporary stoppage to work on the card-catalogue, which should now, however, go on with greater rapidity. During the year a large number of books were added and several portraits of illustrious botanists were presented to the Library.

6. *Publications.*—During the year there were issued the following numbers of the Records of the Botanical Survey of India:—

Volume III, No. 1.—*The Vegetation of the district of Minbu*, by Captain A. T. Gage, Curator of the Herbarium.

Volume III, No. 2.—*The Vegetation of the districts of Hughli-Ilowrah and the 24-Parganas*, by Lieutenant-Colonel D. Prain, Superintendent of the Garden.

Volume IV, No. 1.—*An Hpitome of the British Indian Species of Impatiens, Part J* by Sir J. D. Hooker.

Colonel Prain also published a paper "On the Morphology, Teratology, and Diclinism of the flowers of Cannabis," forming No. 12 of the Scientific Memoirs by Officers of the Medical and Sanitary Departments of the Government of India, as well as *Novicie Indicum*, Nos. XXIV and XXV, contributed to the Journal of the Asiatic Society of Bengal, Volume LXXIII, Part II, 1904.

During the year also Sir George King and Mr. Gamble have published Part XV of their *Materials for a Flora of the Malayan Peninsula*.

7. *Interchange of Seeds and Plants.*—During the year 3,368 packets of seeds were distributed and 1,674 packets were received. The latter included collections from the Botanic Garden, Sydney; the Botanic Garden, Sapporo, Japan; the Bureau of Forestry, Manila; Messrs. Reasoner Brothers, Florida; M. Buysmann, Middleburg, Holland; Sir Thomas Hanbury, M. Herb and M. Sprenger, Italy; and Mr. J. C. Harvey, Mexico, as well as gifts from the chief Botanical Gardens in England and the Continent. Large collections were contributed by the Reporter on Economic Products, by Mr. G. H. Cave while officiating as Curator of the Garden at Ootacamund, and by the Lepcha collectors in the Chumbi valley under Mr. Searight. The number of plants distributed was 40,898. These included a collection of Pomeles sent to the Bureau of Plant Industry, Washington, a large collection of Rhea roots to Uganda and several thousands of Sisal Hemp plants to various parts of India. The number of plants received was 4,584. These included several hundreds of *Agaves* contributed by Mr. C. A. Barber of Madras; Dr. E. J. Butler; Mr. Cameron of Bangalore, and several others, primarily to aid the investigation into *Agaves* by Colonel Prain and Mr. Drummond. Mr. T. J. Spooner of Dharwar presented over 300 plants. For the Reporter on Economic Products over 500 plants and tubers were cultivated.

8. *Lloyd Botanic Garden.*—This Garden suffered somewhat from the severe cold in January and February. Plants representing about twenty different indigenous species and as many exotic species were killed. Otherwise the condition of this Garden was normal throughout the year. The usual collections of Himalayan seeds were made for distribution. #

9. *Financial.*—The allotment for contingencies for the Royal Botanic Garden, as well as the special grant for the reorganisation of the Herbarium and Library and establishment of a Laboratory and Museum were spent in full. There was a saving of Rs. 2,839-4-1 under establishment charges and of Rs. 781-3 under travelling allowance. All the allotments for the Lloyd Botanic Garden were spent. The revenues for the Royal Botanic Garden of Rs. 1,415-0-6 and for the Lloyd Botanic Garden of Rs. 331-4 were paid into the Calcutta and Darjeeling treasuries, respectively.

10. *Staff.*—Lieutenant-Colonel Prain, LMS, held charge of his post of Superintendent from the beginning of the year until 1st November 1904, when he went on leave for thirteen months. Captain A. T. Gage, M.S., Curator of the Herbarium, was absent on six months' combined leave from 27th April. He has officiated as Superintendent from 1st November 1904. By special arrangement, approved by Government, Mr. J. R. Drummond, i.c.s., was in charge of the current botanical duties of the Curator of the Herbarium from May until 24th August 1904, and again from November 1904 until the 18th April 1905. From 24th August 1904 to the 28th October 1904,

Dr. Archer Irvine-Fortescue acted as Curator of the Herbarium.. Mr. G. T. Lane held his post of Curator of the Garden throughout the year/ Mr. J. E. Leslie was Assistant Curator from 1st April 1904 to 30th September 1904; on deputation to the Cinchona Plantation, Mungpoo, from 9th August to 30th September 1904; and transferred to Nagpur as Superintendent of the Public Gardens, with effect from 1st October 1904: Mr. Ernest Long, probationer Gardener, was on deputation to the Botanic Garden at Saharanpur, from 26th May to 31st August 1904; acted as Curator of the Lloyd Botanic Garden from 6th to 30th September 1904; and was transferred to Fyzabad as Superintendent of the Gardens there, on 1st October 1904. Mr. R. H. Locke arrived from England as probationer Gardener on 22nd October and was appointed Assistant Curator of the Garden from 25th October. He was deputed on 1st December 1904 to act as Superintendent of the Memorial Gardens at Cawnpore, where he still is. Mr. J. T. Johnson arrived from England as probationer Gardener on 1st December 1904, and has been appointed to act as Assistant Curator of the Garden from that date. Mr. G. H. Cave, Curator of the Lloyd Botanic Garden, was on deputation to Ootacamund up to 21st February 1905. Mr. A. C. Hartless acted as Curator of the Lloyd Garden from 1st April to 5th September 1904, Mr. E. Long from 6th to 30th September 1904, and Mr. W. A. Kennedy from 1st October 1904 to 21st February 1905. Mr. G. H. Cave resumed charge of the Curatorship on 22nd February 1905.

A. T. GAGE, *Captain, I.M.S.*
Acting Supdt, Royal Botanic Garden, Calcutta.

(Maximum limit 3 pages.)

ANNUAL REPORT OF THE ROYAL BOTANIC GARDEN, CALCUTTA,
FOR THE YEAR 1905-06.

DURING the year weather conditions were normal, except for the unusual rainfall in February 1906, which, however, did not appreciably affect the garden. The principal outdoor works were the continued improvement of the nursery; the re-making of the Scott avenue leading from the riverside avenue to the Banyan avenue; the relaying of the paths around the Herbarium and Cinchona office; the erection of a stone parapet to the bridge on the Jacquemont Path, to replace the old tile parapet which had fallen into a ruinous condition, and the re-alignment of the path between the bridge and the Banyan avenue; the renovation by the Public Works Department of the two shelter-pavilions, and the complete renewal of the roof of the smaller one; the improvement of the Howrah gate entrance to the garden, and the re-planting of the large palm house. A minor improvement is the erection of a notice-board at each entrance to the garden, which shows by means of a simple arrangement for changing the figures, the hour of closing of the garden on any given day.

2. *Economic work.*—'Sunn' hemp (*Crotalaria juncea*)—seed of which was obtained from all parts of India, where it is grown—was again cultivated in small plots. It was thought that by sowing fairly late towards the end of October, better results than those of last year might be obtained. As it turned out the result was the reverse of what was expected. Almost all the plants began to flower when little more than a foot high, and they obstinately declined to grow much higher. On two occasions every plot was flattened out by heavy rain, which did not tend to improve matters. As far as yield of fibre is concerned, no results which could be relied upon could be obtained from plants which behaved in such a manner. As the cultivation of 'Sunn' hemp is likely to prove of very considerable importance to India, it is proposed to continue plot-experiments until some definite results are obtained, or until the Agricultural Department can take up the experimental cultivation on a larger and more satisfactory scale than is possible on the very limited amount of ground available in the garden. Apart from the experimental side of economic work a considerable amount of useful work has been accomplished during the year in the distribution of economic plants by seed or otherwise throughout India and in their introduction into other countries. The space allotted to this report permits mention of only a few illustrative instances. In India there has been a revival of interest in rubber, and not a few applicants have been furnished with information and seed or plants of *Ficus elastica* and *Manihot Olaziovii*. The latter, which yields Ceara rubber, appears to thrive in Bengal and Assam, but it is doubtful whether it yields rubber equal to that obtained from the same species cultivated in Southern India and Ceylon. Camphor-seed has been supplied to certain parties. Sisal hemp plants have been distributed to certain jails, and lime-seeds as usual to many of the jails in Bengal. Seeds of timber and other useful trees have been largely distributed over India and to other tropical or semi-tropical countries. Outside of India seeds of the species of *Aeschynomene* which furnish 'Sola' pith were supplied to the Jardin Colonial of Paris; collections of economic bamboos and of seeds of useful Indian trees were distributed to the Hon'ble Mr Joseph Baynea, C.M.G., and Mr. Charles Hitchins of Natal,—who had both personally visited the garden last year—for attempted acclimatization in South Africa; deodar seed was supplied to the Transvaal Landowners' Association, and jute seed to the Government of German New Guinea; seed of 'Sunn' hemp was distributed to the United States Agricultural Department in the Philippines, and Indigo seed to the Dutch Agricultural Department in Java, and to a correspondent in the Ile de la Reunion; tea-seed was sent to the Agricultural Association of the Island of Sicily. The economic additions to the garden include Caravonica cotton; a collection of grasses from the Transvaal Agricultural Department; a similar collection from the United States Department of Agriculture; and a collection of economic plant seeds from the Estacion Agronomica of Havana.

3. *Herbarium*.—Since July 1905, owing to unavoidable circumstances, there has been no Curator of the Herbarium. Consequently work has suffered to a considerable extent, as the multifarious duties of the Officiating Superintendent during the past year have allowed him exceedingly little time for botanical work. However a decided improvement has been effected in the completion of the scheme of renewal of the cabinets on the ground floor of the building, referred to in last year's report, and the facilities for consulting the collection are now vastly superior to what they were two years ago. During a considerable part of the year the Herbarium was utilised by, and all help accorded to, Mr. A. Meebold, a German botanist, in studying his large collection of specimens gathered on behalf of the University of Breslau during a tour through India and Burma. The same gentleman made a tour on behalf of the Botanical Survey up the Bramahputra valley and across the central mountain mass of Assam *via* Kohima and Manipur, thence down the Surma valley to Silchar. In Burma as there was no European botanist available, a native collector was sent to the district of Pakokku, in order to extend the survey which had been done in the district of Minbu just to the south. In Bengal collections of specimens of special orders continued to be made by the men working under the Revd. Father Cardon, s.J., in Chota Nagpur. A collector was sent to Pusa by permission of the Director of the Agricultural Research Institute there, to collect the interesting flora of the still wild parts of the estate. The Officiating Superintendent collected on the Government Cinchona Plantation and the surrounding district, with the view of beginning the formation of two representative herbaria of the flora of the Darjeeling district, one to be placed in the Llyod Botanic Garden, Darjeeling, where the present collection is by no means satisfactory, the other in the Superintendent's house on the Cinchona Plantation where it would be available for consultation by official or other visitors to the plantation." The number of specimens received in the Herbarium from India and from other countries amounted to 6,882. The specimens distributed to other Herbaria were about 7,000. A beginning has been made with the formation of a curd-index of orders, genera, and species in the Herbarium numbered according to Bentham and Hooker's *Genera Plantarum* and Hooker's *Flora of British India* to facilitate direct reference to the Herbarium shelves.

4. *Laboratory and Museum*.—With the scientific staff of the Garden for the greater part of the year reduced to one officer, whose time was very largely taken up with purely administrative work, there naturally could be but little done in either Laboratory or Museum. However, a considerable number of specimens for the Museum have been collected for mounting when time is available. A commencement also has been made with a photographic survey of the Garden. It is proposed to systematically photograph the whole Garden and specially interesting individual trees, and to register the actual area taken in by, and the point of view of, every photograph on skeleton maps of the Garden, divided up into lettered and numbered squares.

5. *Ziirary*.—Owing to the Curatorship of the Herbarium being vacant for the greater part of the year, not so much progress as would be desirable has been made in Library work. It has not stood still however. The usual number of accessions was registered. The Index of new species of plant* which is published monthly by the *Herbier Boissier* in Switzerland in the form of small oblong slips has been converted into an excellent card-catalogue by pasting the slips as published on to the regular size of cards and ananirw the latter in specially made cabinets. S^{lu}S

6. *Publications*.—During the year there were issued:—*Annal« nf *h** Royal Botanical Garden, Calcutta, Vol. X, Part II, *The Aconites of India* 1 Monograph with 27 plates by Dr. O. Stapf, of the Kew Herbarium. -
^ fV*Z*f o the *ten ic al S urve . of Ir ,ia . Vo J. 1V > No. 2, *An Epitome of the British Indian Species of Impatiens*, Part II, by Sir J. D. Hooker.

Non-official publications include:—*Materials for the Flora of the Malayan Peninsula*, Parts XVI, XVII, XV JII, by Sir George King and Mr J. S. Gamble, M.E. in the *Journal of the Asiatic Society of Bengal* • *Munsonim Tribe of the Natural Order Sterculiac* by Lieut. Colonel ^ ^ J ^ A In Sc d To the *Journal of the Linnean Society*. The Officiating Superintendent has contributed several short papers descriptive of new species to the *Journal of the Asiatic Society* and the *Indian Forester*. < vumai <*

7. *Interchange of seeds and plants.*—During the year 2,181 packets of seeds were distributed and 1,163 received, while the number of plants sent out reached 53,281 and the number received amounted to 2,292. The seeds and plants of economic importance have already been referred to as far as space permits under "Economic work." The number of plants sent out is the largest for many years, and includes over 17,000 for Dalhousie Square and the Esplanade in Calcutta.

8. *Lloyd Botanic Garden.*—The condition of this Garden was satisfactory throughout the year. The Curator and the Lepcha collectors visited the high levels to collect Sikkim plant seeds for distribution to the botanical and horticultural institutions of Europe and America.

9. *Visitors.*—During the year the Garden has been visited at various times by the officers of the Imperial Agricultural Department and of the Agricultural Department of the Bombay Government; the Reporter on Economic Products to the Government of India; the Economic Botanist to the Government of Madras and others, who also freely consulted the Herbarium and Library. Towards the end of the year the Garden had a distinguished visitor in the person of Dr. A. Engler, the Director of the Imperial Botanic Garden of Berlin who spent a few days in the Garden and also on the Cinchona Plantation, along with the Officiating Superintendent.

10. *General.*—The condition of the Garden generally is satisfactory, but there is room for improvement in various directions, some of which may be indicated briefly here. The present seed-house accommodation is very imperfect, and a properly built and properly fitted up seed-house is a pressing desideratum. The present office of the Curator of the Garden is a small dilapidated godown, quite unworthy of its purpose. There is no store-godown in the nursery for carpenters and blacksmiths' tools and such like small stores. There are no glass houses in the parts of the Garden open to the public for the display of the fine collection of Ferns and Cacti which at present, for lack of such houses, have to be kept hidden away in the nursery. There is no storage godown for the Herbarium, so that at present a room in the Superintendent's quarters has to be used as such.

11. *Financial.*—The allotments for contingencies for the Royal Botanic Garden were fully spent. Under "Establishment"¹⁷ charges there was a saving of Rs. 5,380-9-7 for the Royal Botanic Garden, and under "Travelling Allowance" a saving of Rs. 33415. The allotments for the Lloyd Botanic Garden were spent in full, except for the sum of Rs. 2-2 saved on travelling allowance. The revenues for the Royal Botanic Garden of Rs. 846-7 and for the Lloyd Botanic Garden of Rs. 233-6-6 were paid into the Calcutta and Darjeeling treasuries respectively.

IS. *Staff**—Lieutenant-Colonel D. Prain, I.M.S., who was on furlough at the beginning of the year under review was granted an extension of furlough for nine months from 1st December 1905. Since then he has been appointed Director of the Royal Botanic Gardens, Kew. The writer of this report officiated as Superintendent throughout the year. Mr. A. Irvine-Fortescue, M.B., acted as Curator of the Herbarium from 1st May to 28th October 1905, on which latter date he resigned the service of Government owing to illness after being on medical leave from 29th July to 23th October 1905. Since 29th July 1905 the current duties of the Curator of the Herbarium have been performed, as far as possible, by the Acting Superintendent.* Mr. G. T. Lane held his post of Curator of the Garden throughout the year. Owing to the creation of a series of new gardening posts in Upper India, and a succession of casualties amongst the officers holding the older posts, there has been an unprecedented drain on the gardening staff of the Calcutta Garden. During the year the following officers consecutively held the post of Assistant Curator of the Garden, substantive or acting:—Mr. R. H. Locke from 1st April to 2nd August 1905, during the whole of which period he was on deputation at Cawnpore, whence he was transferred permanently to Delhi on 3rd August 1905; Mr. J. T. Johnson from 3rd August to 16th October 1905, during the whole of which period he also was on deputation at Cawnpore, being permanently appointed to the Memorial Garden there on the latter date; Mr. W. R. Brown from 3rd November 1905 to 9th January 1906 when he was transferred to Lahore; Mr. A. E. Brown from 9th to 24th January 1906 when he was transferred to Fyzabad; Mr. E. Little, from 24th January to 31st March

1906. The probationers during the year were Mr. J. T. Johnson from 1st April to 2nd August 1905; Mr. A. E. Brown from 3rd November 1905 to 23rd January 1906; Mr. E. Little from 15th to 23rd January 1906; Mr. P. T. Russell from 9th to 31st March 1906. Mr. W. R. Mustoe, special probationer for Upper India, served in the Garden from 24th December 1905 to 31st March 1906. From July to November 1905 the effective Garden staff was reduced to the Acting Superintendent and the Curator of the Garden, and the changes in the gardening staff were so numerous that for the greater and worst part of the year the Curator of the Garden was practically single-handed. All the greater credit therefore attaches to Mr. Lane for his efficient and ungrudging performance of double duties especially when a great deal of extra work in connection with the improvement of the open spaces in and about Calcutta was also laid upon him. Mr. G. H. Cave held his post of Curator of the Lloyd Botanic Garden, Darjeeling, throughout the year, and gave every satisfaction in the discharge of his duties.

A. T. GAGE, M.B., CAPTAIN, L.M.S.,

Acting Superintendent of Royal Botanic Garden, Calcutta.

IN the Koyal Botanic Garden, Calcutta, the most important outdoor work has been the commencement during the latter part of the year and partial carrying out of a survey of the Garden on an adequate scale as a preliminary to the preparation of a proper catalogue and the institution of an accurate system of records of the plants cultivated in it. Beyond this no specially large work was carried out, but various minor improvements were accomplished or initiated. A considerable clearance was made in the north-west corner of the Garden, partly to allow the 'Gold-Mohur' trees, which were planted several years ago along the Roxburgh Avenue eastward of the Roxburgh Monument and were suffering from lack of space, to recover themselves, and partly to have a piece of ground available for a representative collection of economic plants. A fair amount of work still remains to be done before the Economic Garden can be started, but the immediate result has been a distinct improvement in the appearance of that part of the Garden. Through the courtesy of the Hon'ble Mr. A. A. Apcar, C.L.E., the avenue of Royal Palms between the Water-gate and Kyd's Monument was rehid with several tons of gravel-sand obtained from Kowloon. The improvement of the river bank, which is very unsightly in several places, has been taken in hand, and towards the end of the year arrangements were made for the supply of a quantity of stone-ballast to be deposited near the Superintendent's quarters, where the bank is particularly in need of repair. The scheme of improvement of the main nursery was appreciably advanced during the year, and it is hoped that the coming year will see it completed. The centre beds of the orchid-house were demolished and relaid with distinctly better effect on the general appearance of the house. The Garden roads have been kept in repair, but the advent of the motor-car with its dust-throwing propensities will render it necessary in the near future to adopt some more effective means of watering the roads than the present slow and primitive methods.

2- *Economic*.—In accordance with the intention mentioned in last year's report, the plot experiments with 'Sunn hemp' (*Crotalaria juncea*) were repeated, and this time with great success as far as development of the plants and appearance of the fibre were concerned. The fibre was sent to London for valuation, but up to the time of writing no report has been received. It is not proposed to continue this experiment longer or to initiate any similar one during the coming year. Circumstances have greatly altered since the days when the Calcutta Botanic Garden was the chief place in India for experimental economic work. Now that there are the imperial and the various local agricultural departments, each provided with an expert staff, land and laboratories for the investigation of economic problems, there does not appear to be the same necessity as formerly existed for the very restricted staff of the Calcutta Botanic Garden spending time—to the possible neglect of pure botanical research—on work which could be done now under much more satisfactory conditions elsewhere. But because there is now generally speaking no necessity for the Garden to undertake economic experiments, it is not to be implied that it is to cease to take interest in economic plants. A large field of usefulness still remains in the exchange of seeds and plants of economic importance between India and other countries, and such exchanges formed quite a considerable part of the year's work. To mention a few instances, consignments of *Bambusa Tulda** one of the most useful bamboos grown, were sent to the United States Department of Agriculture and to German East Africa for experimental cultivation; sweet potatoes of the best varieties obtained through the Imperial Agricultural Department were sent to several foreign countries; cinchona seeds were sent to California, lemon grass to Kew *Gynostemma*, *odorata* to the French Colonial Bureau, etc. Amongst the useful plants or seeds introduced for cultivation in the Garden or in other parts of India were *Apocynum Venetum* a fibre yielding plant—from the Botanic Garden

of Tiflis; varieties of *Sorghum* from the Bureau of Agriculture of the Philippine Islands; *Funtumia elastica*, a rubber-yielding plant—from the Botanical Department of Trinidad, *Canhamo brasiliensis*, the so-called Brazilian linen-plant—through the Director-General of Commercial Intelligence, As usual seeds of timber and other useful trees were distributed very widely.

3. *Herbarium*.—The Curatorship of the Herbarium has been vacant throughout the year. As soon as the post became permanently vacant, proposals for its filling up were submitted to Government, but so far no officer has been appointed. A Herbarium without a Curator is like a set of tools without a workman to use them, and it is not surprising that botanical work in the Herbarium has been more or less at a standstill. During the year, however, over 12,000 specimens were added to the Herbarium, comprising amongst others about 1,500 collected by the Calcutta and Lloyd Botanic Garden collectors in Bengal, Assam, Burma and Sikkim; about 600 specimens from the Coimbatore district presented by Mr. C. E. C. Fischer, Deputy Conservator of Forests; over 2,000 from the Bureau of Science of the Philippine Islands; over 2,000 European plants from Mr. A. Meeboid of Heidenheim, Germany; over 800 from the University of Pennsylvania, U. S. A.; over 300 from Mr. J. C. White, c. i. B., of Gangtok, Sikkim; over 200 Indian plants from Mr. A. R. Tucker of the Imperial Revenue and Agricultural Department, and a valuable collection of N.-W. Frontier plants from Mr. James Marten of the Survey Department. The number of specimens distributed is only about 1,000, as owing to there being no Curator, this work has had to remain in abeyance.

Although botanical work in the Herbarium itself has been an impossibility, the collections have not lain entirely useless, for certain orders and genera of plants have been freely loaned for research work outside India to botanical institutions like those of Berlin and Buitenzorg.

4 *Laboratory and Museum*.—These still await the officer who will put them to use, and there is nothing to add to or qualify the last two annual reports regarding them.

5. *Library*.—About the usual number of accessions by purchase and exchange was registered. Most of the books apart from periodicals are strong individualists as regards colour and material of binding, but now in binding new and in rebinding old books some uniformity is being introduced.

6. *Publication**.—Part II of Volume IX of the Annals of the Garden, entitled *The Otxhidaceae of the North* Western Himalaya*, by Mr. J. F. Duthie, B. A., P. L. 8., ~~by the Director of the Botanical Department of Northern India, was issued after~~ a very long delay in the Press. This monograph gives descriptions of all the orchids known to occur in the Western Himalaya, with plates of all the species not already figured. Volume Xf, constituting a huge monograph of the genus *Calamus* of climbing palms by Signor Beccari of Florence, with superb plates, and Part II of Volume VI, being descriptions of Burmese alga by Messrs. W. and Q. 8. West, have been in the Press for a long time, but are now practically all in type, so that their early appearance is anticipated.

Of the record* of the Botanical Survey of India, No. 3 of Volume IV has been published, being the third and concluding part of Sir J. D. Hooker's *Epitome of the British Indian species of Impatiens*. Number 3 of Volume III of the same publication, embodying descriptions of new species of *Sapindem* by Professor L. Kadhkofer of Munich is in the Press and should issue very soon. The Superintendent has contributed several botanical papers to various unofficial periodicals, and has written a sketch of the herbaceous vegetation of Burma for Sir George Scott's handbook to that country.

7. *Interchange of seeds and plants*.—Over a thousand packets of seeds from all parts of the world were received and 1,680 packets distributed. Over 45,000 plants were distributed and over 2,000 received. The seed-distribution list has of late been considerably increased with corresponding benefit to the Garden in the way of exchange.

8. *Arboriculture*.—In connection with the scheme for the development of arboriculture in Bengal, arrangements have been made for the Curator of the Garden to give practical instruction in the planting and care of trees to District Overseers, Sub-Overseers and Road Sarkars, who are to be sent to Sibpur in batches during August to October for that purpose.

9. *Lloyd Botanic Garden*.—The Curator reports that extensive damage was done to unprotected plants by severe hailstorms on three occasions. Alpine plants are gradually being established on the Indigenous Rockery. The Garden workshops were rebuilt during the year and a new glass propagating house and a seed-room erected in the Nursery. A second cloak-room and a 'shelter' were also built, and the boundary fencing was extended along the north of the Garden to prevent irregular entrance on that side. So far as labour was available, the gradients and alignments of some of the paths and the slope of some of the rougher banks were improved. The statistics supplied by the Curator show that the work of this Garden has increased markedly during the last few years.

10. *Financial*.—The allotments for contingencies for the Royal Botanic Garden, Calcutta, and the Lloyd Botanic Garden, Darjeeling, and the travelling allowance of the former were spent in full. There was a saving of Rs. 68-8 on the travelling allowance of the Lloyd Botanic Garden. In the Royal Botanic Garden account, owing to the Herbarium Curatorship being vacant throughout the year, the readjustment of the Superintendent's pay, the deputation of the Assistant Curator of the Garden and other minor causes, there was a saving of Rs. 11,556-13-10 under salaries. The revenue from the Royal Botanic Garden, was Rs. 457-1, paid into the Calcutta Treasury. Owing to the fact that the Lloyd Botanic Garden has ceased to compete with the private nursery enterprise that has recently developed in Darjeeling, that Garden's revenue has dropped to almost nil. The total for the year was Rs. 19-2, paid into the Darjeeling Treasury.

11. *Staff*.—Captain A. T. Gage, I.M.S., officiated as Superintendent of both Gardens until 30th July 1906, and on the retirement of lieutenant-Colonel D. Prain, I.M.S., F.R.S., C.I.E., was confirmed with effect from the 31st July 1906, since which date he held charge to the end of the year. The Curatorship of the Herbarium was vacant throughout the year. Mr. G. T. Lane held charge of his post of Curator of the Garden throughout the year. Mr. E. Little was Assistant-Curator of the Garden up to 29th October 1906, when he was transferred to the Government Gardens, Bombay. Mr. W. R. Mustoe, probationer for Upper India served in the Garden on 1st April 1906 and was transferred to Lahore on the following day. Mr. P. T. Kusaell served as Probationer Gardener until his appointment as Assistant Curator from 30th October 1906. He has been on deputation to the Cinchona Plantation, Mungpoo, since 12th May 1906 to the end of the year. Mr. K. Badgery, Probationer Gardener, arrived in the Royal Botanic Garden on 8th November 1906, from which date he has acted as Assistant Curator of the Garden. Mr. G. H. Cave was Curator of the Lloyd Botanic Garden, Darjeeling, throughout the year.

All the officers and the clerical staff under the Superintendent have given every satisfaction to him in the discharge of their duties.

A. T. GAGE, M.B., CAPTAIN, I.M.S.,

*Superintendent, Royal Botanic Garden, Calcutta,
and Lloyd Botanic Garden Darjeeling.*

(Maximum limit 3 pages.)

ANNUAL REPORT OF THE ROYAL BOTANIC GARDEN AND OTHER GARDENS IN CALCUTTA, AND THE LLOYD BOTANIC GARDEN, DABJEELING, FOR THE YEAR 1907-08.

Royal Botanic Garden.—In the Royal Botanic Garden the weather conditions, generally speaking, were normal throughout the year. The storms of the 24th and 25th June 1907, however, wrought a deplorable amount of destruction. Over one hundred trees were uprooted and the appearance of others hopelessly ruined by the tearing away of great branches, while, as a secondary effect, the necessary diversion of a considerable part of the labour force to the removal of the wreckage interfered for a considerable time with the ordinary work of the garden. The survey of the garden which was initiated last year is almost completed, and a basis for an accurate catalogue of the plants of the garden laid down. From the large map a small scale map is being prepared, which will serve both as an index map to the garden officials and will displace the present Garden Guide map, no longer accurate, when the next edition of the Guide is issued. The photographic survey of the garden has also been continued during the year, and there is now in existence quite a good collection of excellent negatives both of landscape views and of individual plants. Many of the photographs are of great scientific interest, and it is hoped that when a sufficient collection has been formed it will be possible to publish selections with descriptions from them. The area of the nursery available for work has been increased by deepening one half of the nursery pond and filling up the other half with the soil so obtained. The river bank has been strengthened near the Superintendent's quarters by the deposition of about 100 tons of stone ballast, but further work in this direction has been checked for the present by the impossibility of obtaining more ballast. The improvement of the south-west corner of the garden was taken in hand with good results both in the appearance of that part of the garden and in the comfort of the *durwans* and peons whose lines are situated there. For the better housing of those *durwans* and peons the Department of Public Works has, at the request of the Superintendent, prepared plans for new lines of more hygienic design, which, it is hoped, will replace the present unsatisfactory row of godowns. The same department has also prepared plans for new cloak rooms which will replace the existing hideous structures. Plans for the erection of a new office for the Curator of the Garden during the coming year have been sanctioned. Proposals for the introduction of a filtered water-supply into the garden have been under consideration during the year for submission to Government by the Department of Public Works. The dust nuisance occasioned by motor cars has been reduced by treating the dustiest roads with crude petroleum oil as suggested by the Curator of the Garden. It has been found to be fairly effective, and it is proposed, as far as financial considerations will allow, to extend and to continue the treatment. To make conditions more comfortable for visitors, about 30 additional garden chairs have been put out. Minor improvements have been the addition of ornamental iron gates to the Orchid House, the erection of glazed notification boards at each entrance to the garden, the substitution of less unsightly signboards for the garden roads and the abolition of various disfiguring and unnecessary notices. The Superintendent's office has been enlarged by the glazing in of the north verandah, while the extremely dilapidated floor of the adjoining godown and seed-house has been replaced with Indian patent stone. The system of office work has been drastically overhauled and the registering of general office work of seed, plant and herbarium accession and distribution, of garden stores and implements has been entirely remodelled upon similar scientific and simple lines to those on which the systematic classification of plants themselves is based.

2. *Economic.*—As hitherto, plants of economic interest have been cultivated in the garden on behalf of the Reporter on Economic Products to the Government of India and facilities have been afforded him for his investigations in connection therewith. The garden has continued to keep in touch with other Botanical Gardens and Agricultural Departments both within and outside of India with mutual benefit. The garden has established specially a close connection with the United States of America and has been the means of introducing into America, directly or indirectly, various species of economic

importance, such as rice of various varieties, *Bassia latifolia*, *Phragmites Karki*, *Bambusa arundinacea*, Indian varieties of Soybean and Cowpea. Amongst the introductions into India during the year have been Manicoba rubber plants, a species of Manihot received from the Royal Botanic Gardens, Kew; sugarcane from Barbados on behalf of the Agricultural Department of Eastern Bengal and Assam; a fine collection of South Sea palms from the Commissioner of Agriculture, Honolulu, Hawaii; a collection of navel seedless oranges from the United States Department of Agriculture on behalf of Eastern Bengal and Assam Agricultural Department, &c, &c.

3. *Herbarium*.—During the year over 7,000 sheets were added to the Herbarium. The chief contributions were over a thousand specimens of Tibetan plants from Captain F. H. Stewart, I.M.S. ; over 1,600 specimens from Mr. I. H. Burkill, M.A., Reporter on Economic Products to the Government of India from Baluchistan, Eastern Himalaya and Burma; over 300 specimens of North-West Frontier plants from Sir H. A. Deane, E.C.S.I., Chief Commissioner, North-West Frontier Province ; about the same number of plants of Southern India from Mr. C. E. C. Fischer, Deputy Conservator of Forests, Malabar; over 500 Eastern Himalaya plants from the collectors attached to the Lloyd Botanical Garden, Darjeeling. In addition to Indian plants extra Indian plants are represented by collections from the Philippine Islands; from Siam, sent by Mr. W. F. Lloyd, Conservator of Forests there; from Russia, Austria, Switzerland, and Australia. Several orders and genera have been sent out on loan for study by Botanists in various parts of Europe. The number of specimens distributed amounts to nearly a thousand. During the year the usual quadrennial repairs of the building were carried out by the Department of Public Works,

4. *Library*.—About the usual number of accessions by purchase and exchange was registered.

5. *Publications*.—As regards the Annals of the Garden, Part 2 of Volume VI comprising "A Memoir of Burmese Algae" by Mr. W. and G. S. West has been in the Press throughout the year, but final printing orders have been passed some considerable time ago, so that its appearance should not be much longer delayed. Signor Beccari's "Monograph on the Genus Calamus," referred to in last year's report, is now practically completed and should also soon be published. Of the Records of the Botanical Survey of India, 2 parts have appeared, Nos. 3 and 4 of Volume III, the first being entitled "Sapindaceae Novae Indiae et Malaicae" by Professor Radlkofer of Munich; the second "A Revision of the Genus Cedrela" by M. Casimir de Candolle of Geneva. The Superintendent has contributed several botanical papers as usual to various periodicals.

6. *Interchange of seeds and plants*.—Over a thousand packets of seeds were received from all parts of the world and nearly 8,000 packets distributed. Over 40,000 plants were distributed and nearly 4,000 received, most of the plants and seeds distributed being of economic importance, such as bamboos, timber trees, fibre plants, and so forth. During the year the means of dealing with distribution of seeds have been improved by the acquisition of several special cabinets for storing and sorting of seeds.

7. *Arboriculture*.—During August and September practical instruction in the planting and care of trees was given by the Curator of the Garden to District Overseers and Road Sirkars, who were sent to the Botanical Garden from the various districts in Bengal. It is hoped, as time goes on, that this course will undergo development.

8. *Lloyd Botanic Garden*.—Attention has been given during the year to the garden paths, many of which have been taken up and remodelled. The large plant house was provided with a cement floor. A large number of plants have been supplied for planting the ground in and around the new Cantonment at Lebong, while Conifers and other forest trees, bamboos, and shrubs have been supplied to public places and vacant spots in and around Darjeeling.

9. *Calcutta Gardens*.—Towards the end of 1907 the various gardens in and about Calcutta comprising the Eden Gardens, Dalhousie Square, Curzon Gardens, Government House Gardens, at Barrackpore and Calcutta, and Hastings House were placed under the administration of the Superintendent of the Royal Botanic Garden and an Assistant Curator placed in executive charge. These Gardens have been too recently taken over to permit of any improvements being taken in hand in time to be mentioned in this

year's report, and some time will probably have to be allowed before they get into thorough working order under the new conditions.

10. *Financial.*—The allotments for contingencies for the Royal Botanic Garden, Calcutta, and of the Lloyd Botanic Garden, Darjeeling, have been expended in full, with the exception of Rs. 100 on account of service postage stamps for the Royal Botanic Garden, Calcutta, and Rs. 74 on account of telegram charges for the Lloyd Botanic Garden, Darjeeling. There was a saving on account of travelling allowance of the Royal Botanic Garden of Rs. 576 and of the Lloyd Botanic Garden, Rs. 166-12. Owing to the appointment of Captain Gage as Superintendent in succession to Lieutenant-Colonel Prain, retired, and to the vacancy in the post of the Curator of the Herbarium for over seven months of the year, there was a saving of Rs. 5,903 under "Establishment" of the Royal Botanic Garden. On the other hand, there was an excess expenditure of Rs. 1,755 under "Establishment" of the Lloyd Botanic Garden, Darjeeling, owing to long leave granted to Mr. G. H. Cave, Curator of the Garden, and* appointment of Mr. W. A. Kennedy, a senior officer, to officiate for him. The total expenditure for the gardens in Calcutta for contingencies and establishment since the date they have been put under the administrative charge of the Superintendent of this garden amounts to Rs. 9,477 as detailed below:—

				KB.
Eden Garden	...	...	...	7,103
Dalhousie Square Garden	...	...	...	1,190
Curzon Garden	...	...	...	777
Hastings House Garden	...	...	...	407

The revenue from the Royal Botanic Garden was Rs. 570-10-6, paid into the Calcutta Treasury. The revenue from the Lloyd Botanic Garden was Rs. 20, paid into the Darjeeling Treasury. The revenues for the Calcutta Eden Garden of Rs. 162 and for the Dalhousie Square Garden of Rs. 34 were paid into the Calcutta Treasury.

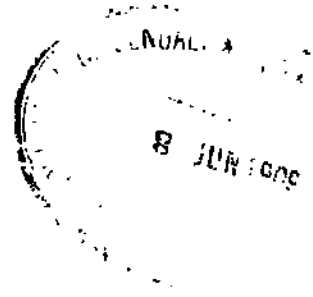
11'. *Staff.*—Captain A. T. Gage was Superintendent, Royal Botanic Garden, Calcutta, from 1st April 1907 to 14th March 1908. From the 15th March to the end of the financial year he was on privilege leave. Mr. W. W. Smith, M.A., took over charge of the Curatorship of the Herbarium on the 14th November 1907 and continued in charge up to 14th March 1908, after which date he officiated as Superintendent to the end of the financial year. Mr. G. T. Lane was in charge of his substantive post as Curator, Royal Botanic Garden, Calcutta, from 1st April 1907 to 23rd January 1908, on which latter date he went on combined leave. Mr. F. H. Butcher, Probationer Gardener, Royal Botanic Garden, Calcutta, acted as Curator from 24th January 1908 to the end of the year. Mr. P. T. Russell, Assistant Curator, Royal Botanic Garden, Calcutta, was on deputation to the Cinchona Plantation from 1st April 1907 to 14th June 1907 (after which he was transferred to the Cinchona Department). Mr. R. Badgery, Probationer Gardener, acted as Assistant Curator from 1st April 1907 to 14th June 1907, and from 15th June 1907 he was appointed Assistant Curator and from 18th November 1907 he has been deputed to the Cinchona Plantation, Mungpoo. Mr. F. H. Butcher, Probationer Gardener, was appointed to act as Assistant Curator from 18th November 1907, and from 24th January 1908 he acted as Curator in addition to his own duties to the end of the year. Mr. E. (J.) Stroud, Probationer Gardener, arrived on the 14th June 1907, and he acted as Assistant Curator, Government Gardens in and near Calcutta, from 15th June 1907 to 13th January 1908, after which he was transferred to the United Provinces. Mr. J. T. Johnson was Assistant Curator of the Government Gardens in and near Calcutta from 28th January 1908 to the end of the year. Mr. G. H. Cave was Curator, Lloyd Botanic Garden, Darjeeling, from 1st April 1907 to 20th May 1907, after which he went on combined leave. Mr. W. A. Kennedy acted as Curator, Lloyd Botanic Garden, Darjeeling, from 21st May 1907 to the end of the year.

All the officers and the clerical staff under the Superintendent have given every satisfaction to him in the discharge of their duties.

W. W. SMITH,

*Offg. Supdt., Royal Botanic Garden and other gardens in Calcutta,
and Lloyd Botanic Garden, Darjeeling.*

[Maximum limit, 3 pages.]



ANNUAL REPORT

OF THE

ROYAL BOTANIC GARDEN AND OTHER GARDENS IN CALCUTTA,
AND OF THE LLOYD BOTANIC GARDEN, DARJEELING,

FOR THE YEAR

1908-1909.

ROYAL BOTANIC GARDEN >

General.—The abnormal high temperature and drought that characterised the first and last few months of the year under review affected the garden to a certain extent. The garden ponds sank to an extremely low level, with which the garden pumping-engine, now almost at the end of its usefulness, had difficulty in coping, while latterly the small portable steam pump—a recent and most useful acquisition—had to be kept at work every day watering the trees and shrubs all over the garden. The survey of the garden was completed early in the year, and during the cold weather the task of ticketing the trees and shrubs was carried through. Over 13,300 trees and shrubs were carefully numbered with reference to the co-ordinated squares on the map previously prepared, and were provisionally named in a rough list. As only one number was given in cases where there were several specimens of the same species forming a group or part of an avenue, the actual number of individual trees and shrubs cultivated in the garden falls probably little short of 15,000. Considerable progress has already been made in checking the provisional identifications, but it will take some time to complete such an enormous number. This, however, must be done before a complete and accurate catalogue can be published. Continued attention has been given to combat the undermining effect of the river on certain parts of its bank and a new plan of defence, which it is hoped will prove more permanently effective than the system of driving piles, has been devised and put into execution. Towards the end of the year a beginning was made with the opening up of the Palmetum, most of the palm groups in this part of the garden having become extremely congested of late years. So far the result has been a decided enhancement of the landscape effect. A beginning has been made with the substitution of imperishable labels with raised lettering for the present painted zinc plant-labels, which readily become illegible after exposure to the weather and require constant repainting.

2. **Economic**—The usual amount of work in the way of exchange of plants and seeds of economic importance with other countries has been done, but space does not permit of a detailed account. The introduction probably of the most economic importance during the year has been that of two new species of rubber-yielding trees. Last year the introduction through the Director of Kew of a new species of *Manihot* was chronicled, the name of which had not then been definitely ascertained. This year, however, a large consignment of seeds of two named species *Manihot dichotoma* Ule and *Manihot piauhyensis* Ule was received from the Director of the Royal Gardens, Kew. The only rubber-yielding species of *Manihot* hitherto cultivated in India is *Manihot Glaziovii* the Ceara rubber tree. The two new species are natives of North East Brazil, as is the Ceara rubber tree and come from the neighbouring provinces of Bahia and Piauhy respectively. The importance of the present

introduction lies in the much superior yield of rubber claimed for the new species. They are said to have a less hard bark, to be less liable to injury by wind or careless tapping and to give a much higher yield of good quality rubber than the Ceara rubber tree. Further, they are said to adapt themselves to cultivation in dry and comparatively unfertile areas more readily than the latter, *Manihot dichotoma* or Jequie Manitoba as it is called from the town of Jequie, which serves as the centre for the trade in its rubber, is a tree about 16—40 feet high, with a more compact crown and a thinner and paler bark than the Ceara tree possesses. *Manihot piauhyensis* is said to be a low tree (6—16 feet) with a broad and densely leafy crown. *Manihot dichotoma* is said to be the best for a firm loamy soil, while *Manihot piauhyensis* prefers a light sandy soil. *Manihot piauhyensis* is said to be ready for tapping from its third year of growth and *Manihot dichotoma* from its fourth year. In Brazil the trees are planted out about 1,000 to the acre. The annual yield of rubber per tree is said to be about 3*5—7 ounces for *Manihot dichotoma* with present methods, and 1 lb. - 2 lbs. for *Manihot piauhyensis* or roughly 1/2 of a ton per acre for the latter. Further details regarding those species are to be found in the Kew Bulletin of Miscellaneous Information No. 2 of 1908, from which the statements above are culled. All the available seed has now been distributed to various parts of India, but a good deal has been sown in the Garden, and next year and the following it is hoped there will be a considerable number of well-established plants available for distribution.

3. **Herbarium and Library.**—Between seventeen and eighteen thousand specimens were added to the Herbarium during the year. Of Indian plants the most important contribution was made by Mr. A. Meebold, in all nearly 9,000 specimens, chiefly from Assam, Southern India and the North-Western Himalaya, Mr. W. W. Smith, Curator of the Herbarium, collected about 3,000 specimens from the Eastern Himalaya, chiefly from the lower elevations. Mr. W. G. Craib, while officiating as Curator of the Herbarium, collected and subsequently named over 1,300 specimens from the North Cachar hills. The late Sir Harold Deane, K.C.S.I., forwarded what unhappily was his last collection of some hundred specimens from the North-Western Frontier. The accessions from outside India by gift or purchase comprise collections from Eastern Tibet and Yunnan, Java, the Philippine Islands, Australia, South Africa, North Africa, Persia, Europe and America. Over 5,000 sheets, chiefly Malayan and Himalayan specimens, have been distributed to other herbaria in and outside of India. Materials for the monographing of various natural orders and genera have been lent to botanists in India, Java, Great Britain, Hungary and Germany. Much of the Curator's time has been occupied in overtaking the arrears which accumulated during the long period the post was vacant. During the rains Herbarium work was entirely disorganised for about two months owing to serious leakage in the Herbarium roof, necessitating extensive repairs by the Department of Public Works. Library work has been of a normal routine character, calling for no special remarks.

4. **Publications.**—During the year Part 2 of Volume VI and Volume XI of the Annals of the Garden were issued from the press. The first comprises a Memoir by Professor G. S. and Mr. W. West, of 85 pages with 7 plates on Algae from Burma, and forms a valuable contribution to the Cryptogamic Botany of the East. The second is a magnificent monograph on the climbing palms of the genus *Calamus*, of over 500 pages with 238 double plates, by Signor Odoardo Beccari, the distinguished Italian botanist, explorer and authority upon Palms. It forms one of the most important contributions to systematic Botany that have appeared of late years. The third volume of the Records of the Botanical Survey of India was finished during the year, Mr. W. W. Smith, Curator of the Herbarium contributing the index to the whole volume. *

5. **Interchange of seeds and plants***—Over 1,100 packets of seeds of many various species were received from institutions and individuals in all parts of the world. Over 3,000 packets of seeds of tropical, semi-tropical and temperate plants, the last from the high altitudes of the Eastern Himalaya, were issued all over the world. Seeds of economic plants as usual formed a large proportion of the distribution. Over 9,000 plants were received during the year, the principal contributors being the Director of the Royal

Gardens, Kew, the Director of Agriculture, Dutch Indies, M. Buysman of Lawang, Java, and the United States Agricultural Department. Over 33,000 plants were distributed, mostly within India, and consisting chiefly of trees for road-ride arboriculture! the improvement of stations generally and such like.

CALCUTTA GARDENS.

6. In connection with these gardens excellent work has been done by Mr. J. T. Johnson, the Assistant Curator, under somewhat disadvantageous circumstances. In the Eden Garden the old formal flower garden has been remodelled, and a new rose garden laid out, but lack of funds prevented the improvement of the garden in the neighbourhood of the bandstand being carried out, as was intended. In the Dalhousie Square Garden the experience of the last few years has shown the necessity of modifying the alignment of and widening certain of the paths, while narrowing others. There is scope also for better effect than at present in the treatment of the borders, and of the lawn* along the tank, and it is hoped that during the coming year something will be accomplished in this direction. Considerable changes have been effected in the Gurzon Garden in the way of remodelling and replanting the former rather unwieldy beds of shrubs, while several of the paths have had to be re-made. All those gardens suffer under the disadvantages of there being no provision for Durwans' quarters, or for the proper storage of tools and stores. The officer in charge is as yet unprovided with quarters nor has he so much as a room at his disposal for ordinary clerical work.

LLOYD BOTANIC GARDEN, DARJEELING

7. This garden has been maintained in good condition throughout the year. Several of the sloping lawns have been remade, and the nursery accommodation increased by the addition of three terraces. A good deal of trouble has been caused by the presence of the cockchafer grub, an old enemy of the garden, but means have been taken to restrict its ravages. During the year the bamboo *Arundinaria Hookeriana* flowered throughout the station and died, with the result that some handsome clumps of it in the garden have disappeared.

8. **Financial.**—The allotments for all the Gardens referred to in this Report have been spent in full, with the exception that there was a saving under salaries and establishment of Rs. 9,40-12-4 in the Royal Botanic Garden.

The revenues of Rs. 380-4 from the Royal Botanic Garden, of Rs. 152 from Hastings House, and of Rs. 240 from the Dalhousie Square Garden were paid into the Calcutta Treasury. The revenue of Rs. 38 from the Lloyd Botanic Garden was paid into the Darjeeling Treasury.

9. **Personal.**—It is with deep regret that there has to be recorded the death at San Remo on the 12th February 1909 of Sir George King, K.C.I.B., F.B.S., formerly Superintendent of the Royal Botanic Garden, who practically converted the Garden from a wilderness to its present beautiful form, and raised it once more to the front rank of the botanical gardens of the world. An old and faithful servant of Government in the person of Sheik Shadir, the head Indian Gardener, who had been connected with the Garden for over 40 years, died on 5th August 1908. An excellent and zealous worker* and a most estimable man, his death is a heavy loss to the Garden. Captain Gage, Superintendent, was absent on leave from the beginning of the financial year until 14th December 1908. During his absence Mr. W. W. Smith, M.A., Curator of the Herbarium, officiated as Superintendent while Mr. W. G. Craib, M.A., officiated for Mr. Smith. Mr. G. T. Lane, Curator of the Garden, was on leave and Mr. R. Badgery, Assistant Curator of the Garden, on deputation to the Chinchona Plantation throughout the year. Mr. V. H. Butcher, Probationer, officiated both as Curator and Assistant Curator of the Garden from 1st April to 10th May, and as Assistant Curator only to 3rd November 1908, thereafter

being deputed to the Government Garden at Ootacamund. Mr. G. H. Cave officiated as Curator of the Garden from 20th May 1908 to the end of the year. Mr. J. T. Johnson and Mr. W. A. Kennedy held charge respectively of the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling, throughout the year. The Superintendent is glad to express his appreciation of the work done by the officers under him and by the clerical staff both in the general Garden Office and in the Herbarium.

A. T. GAGE, CAPTAIN, I.M.S.,
*Supdt. of the Royal Botanic Garden, Calcutta,
and Lloyd Botanic Garden, Darjeeling.*

[Maziimun limit, 3 pages.]

ANNUAL REPORT

OF THE

ROYAL BOTANIC GARDEN AND OTHER GARDENS IN CALCUTTA,
AND OF THE LLOYD BOTANIC GARDEN, DARJEELING,

FOR THE YEAR

1909-1910.

ROYAL BOTANIC GARDEN.

General.—Weather conditions were practically normal throughout the year and the Garden was kept in good order except that during the cold weather the ponds were again at an unsightly and unhealthy low level—an undesirable condition that is certain to recur until it is found possible to replace the worn-out pumping engine by a new one. The chief outdoor works were the thinning of overcrowded parts of the garden, the development of vistas along suitable lines, the continued improvement of the nursery and the means of dealing with plant distribution and the solidification of the river bank which suffered badly during the heavy tides of September. The **method** now adopted in checking the river erosion is to push out buttresses built up of disused bricks held together in bundles by wire-netting and then to connect the buttresses at several levels along the bank by cross walls similarly built up. The result has been to check the destructive scour of the tides and to allow silt to be deposited between the buttresses and their connecting walls, thus making the river itself help to repair under new conditions the damage done under the old. The large palm-house was replanted during the year and repainted while the orchid house also had much of its contents renewed. The show of orchids was about up to the average. Arboricultural instruction was given to selected overseers from Bengal and from Eastern Bengal and Assam during the rains, and a report thereon furnished to the Director of Agriculture of each Province. The preparation of a new guide to the Garden was commenced during the year.

2. Economic—Interchange of Seeds and Plants.—A large number of seeds or plants of economic importance have been received from many botanical, agricultural and forestry departments throughout the world as well as from private individuals. An indication merely of this side of the work of the Garden may be got by mentioning some of the sources of supply such as the Royal Botanic Gardens of Kew and Ceylon; the Botanic Gardens of Penang, Java, Mauritius, Durban, Missouri, Sydney; the Agricultural Department of Formosa; the Forestry Department of Honduras; Pomona College, California, etc. The Garden on the other hand has distributed a great variety of both plants and seeds of general economic importance and seeds and plants of special things as rubber and fibre-yielding plants, lemon grasses, mangoes, cinchona, ipecacuanha, tea, etc., to such departments and places as the United States Agricultural Department, the Java Agricultural Department, the Hawaiian Islands, the Fiji islands, the Agricultural Department of Formosa, Japan, Uganda, etc. As usual the Garden has afforded facilities for the economic experiments of the Reporter on Economic Products to the Government of India. Nearly 1,600 packets of seed were received and over 4,700 packets distributed during the year. Over 3,000 plants were

received from various sources and nearly 44,000 were distributed. Not included amongst the latter were about 15,000 plants of *Azolla* sent to various parts of India for experiment as a preventive of mosquito larvae in tanks. The bulk of the plants distributed were roadside trees', shrubs and flowering plants. Nearly 300 plants of maniocoba rubber were sent out.

3. **Herbarium and Library.**—Over 20,000 specimens were received in and over 10,000 distributed from the herbarium. Most of the specimens received are Indian and include, from Burma collections by Messrs. J. H. Lace, G. K. S. Gubitt, H. W. A. Watson, A. Rodger and E. M. Buchanan of the Forest Department and Captain JR. W. MacGregor, i. M. S. ; from the Burmo-Chinese Frontier collections by Mr. G. Forrest; from the Eastern Himalaya collections made by Mr. W. W. Smith, M. A., and Mr. G. H. Cave in the extreme north-west corner of Sikkim, and by Mr. R. E. Cooper and the late Mr. R. Pantling on the lower outer hills; from the Central Himalaya (Nepal) by Mr. I. H. Burkill, M.A., F.L.S.; from the North-West Himalaya by Mr. N. Gill, F.L.S., and Mr. A. R. Tucker; from Southern India by Mr. C. E. C. Fischer of the Forest Department. The foreign contributions include Chinese and Cochinchinese collections from the Museum d'Historie Naturelle, Paris; Malayan collections from the British Museum and the Singapore Botanic Garden; Philippine plants from the Bureau of Science, Manila; plants of Persia and Asia Minor from Mr. J. Bommuller; European collections from Professor Pax of Breslau; African plants from M. Pitard of Tours and from the Botanical Garden of Zurich. The duplicates were distributed to the chief botanical gardens and herbaria throughout the world, and material of various orders and genera for study by specialists was sent out on loan as usual.

Library work has been of a routine character throughout the year. Through the kindness of Mr. Meebold, an artistic book-plate has been designed with the Kyd monument and the Avenue of Royal Palms for its *motif*.

4. **Publications***—No publication has appeared during the year, but volume XII of the Garden Annals—being an illustrated monograph of the genus *Daemonrops* of climbing palms by Signor Beccari—and Mr. Burkill's account of the botanical results of his visit to Nepal and the first fasciculus of the Garden Catalogue—forming parts of the Records of the Botanical Survey—are in the press. Mr. W. W. Smith's account of his tour in North-West Sikkim made in conjunction with Mr. G. H. Cave during the year under report and Mr. Meebold's account of his tour in Assam and Burma are also about ready for the preps.

5. **Financial.**—The allotment of Rs. 35,850 for contingencies was expended in full. Under salaries and establishment there was a saving of Rs. 2,422-2-5 and under travelling allowances and compensation for dearness of provisions a saving of Rs. 348-12-6. The revenue of Rs. 581-7, being Rs. 218-9 short of the sanctioned estimated receipts, was paid into the Bank of Bengal.

6. **Staff**—Major A. T. Gage, I.M.S., and Mr. W. W. Smith, M.A., were respectively Superintendent and Curator of the Herbarium throughout the year. Mr. G. H. Cave officiated as Curator of the Garden from the 1st to the 18th April, thereafter Mr. G. T. Lane on return from leave was Curator to the end of the year. Mr. R. Badgery, Assistant Curator of the Garden, was on deputation to the Cinchona Plantation from the 1st to the 27th April 1909, performed the duties of his substantive post from the 28th April to 4th June 1909, and thereafter was OP deputation to Cawnpore for the rest of the year. Mr. Alexander Hardie, probationer-gardener for Upper India joined on the 5th April 1909 and acted as Assistant Curator throughout the year except during the period that Mr. Badgery was in the Garden and from the 25th June to the 31st August 1909, when he held charge of the Lloyd Botanic Garden, Darjeeling, during the absence of the Curator of that Garden on a collecting tour in Sikkim* Mr. F. H. Butcher, probationer for Lower India was on deputation to Ootacamund throughout the year. The Garden has sustained a heavy loss in the death of Shaik Diwan Nusker, the head Indian gardener in charge of outdoor work, which occurred on 8th March 1910, at the age of 64 years. He had faithfully served in the Garden for very many years. Both he and Shaik Shadir, whose death was reported last year, were men of the old

stamp whom it is practically impossible to replace. The staff of the Herbarium; Garden and office have worked well during the year.

CALCUTTA GARDENS.

7. These comprise the Eden Gardens, Dalhousie Square Garden, Curzon Garden and Hastings House grounds. The work in connection with these is almost entirely horticultural and to a great extent of a routine character calling for little remark. Mr. J. T. Johnson has been in charge throughout the year and has been assiduous in attention to his duties. The continuous improvement of the appearance of all the gardens has been aimed at though the results may not be instantly visible. A number of flower-beds have been laid out on the Esplanade corner adjoining the Curzon Garden and planted up temporarily. Horticultural work there, however, is not likely to show to advantage until the general plan of improvement—which is in other hands—has been completed. The total revenue, as far as the horticultural side of these gardens is concerned, paid into the Bank of Bengal, amounted to Es. 326-8, being Rs. 178 from Dalhousie Square Garden and Rs. 113-8 from Hastings House.

LLOYD BOTANIC GARDEN, DARJEELING.

8. Mr. W. A. Kennedy officiated as Curator from the 1st to the 32nd April 1909, thereafter Mr. G. H. Cave was Curator until the end of the year. The latter has furnished a full account of the work done during the year that deserves more space than the exigencies of this report allow. Following the method adopted in the Calcutta Botanic Garden and referred to in previous reports for the accurate cataloguing of its contents, Mr. Cave has mapped out the Lloyd Botanic Garden into squares of 100 feet side and up to the end of the year has numbered with stamped tickets about half the non-herbaceous plants in the Garden. It is hoped hereafter to publish a catalogue for the information of visitors and for the purposes of facilitating exchange with gardens in temperate regions of the world. The regularising of the slopes has been continued and most of them and of the lawns have been renewed. The collection of living plants has as usual been increased, amongst the year's additions a set of willows from M. Oude of Paris deserving special mention. The Indian collection is increasing in size and number of species and some surprising results as regards tolerance on the part of different species of Darjeeling climatic conditions have been gained. The direct road from the main entrance has been improved in gradient and made passable to rickshaws, while about 500 feet of the wooden boundary fence that had become rotten was replaced by the municipal pattern of iron fencing. The paths of the smaller public conservatory have been concreted and a new propagating house fitted with heating appliances has been erected in the nursery. Over 5,000 pot plants and over 2,700 dozens of annual seedlings were distributed to Government institutions and more than 1,000 packets of seeds were distributed, mostly abroad. The herbarium—restricted to Eastern Himalayan species—and Library and the means of dealing with high level seeds for distribution have been greatly improved, but it is much to be regretted that a more suitable building than a watchman's disused hut could not be provided for the accommodation of the specimens and books. The number of visitors to the Garden during the year was almost 50,000. The restriction as regards sale of Garden produce necessarily limits the revenue to a negligible quantity and only Rs. 42-2-9 were paid into the Darjeeling Treasury during the year. In addition to his charge of the garden Mr. Cave has done good work in connection with the Darjeeling Improvement Fund, the Municipality and Government House estate.

A. T. GAGE, MAJOR, I.M.S.,

*Supdt. of the Royal Botanic Garden, Calcutta,
and Lloyd Botanic Garden, Darjeeling.*