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Annual Report of the  
Royal Botanic Garden and the Gardens in  
Calcutta and of the Lloyd Botanic  
Garden, Darjeeling, for 1935-36

Superintendent, Government Printing  
Bengal Government Press, Alipore, Bengal  
1936

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**Agents in India.**

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# Annual Report of the Royal Botanic Garden and the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling, for 1935-36.

## Royal Botanic Garden.

**1. General.**—The art of gardening amongst the general public of Calcutta is coining into its own. No one who has a faculty of observation developed to any degree and who remembers gardening of 15 or 20 years ago can fail to be impressed by the immense improvement that has taken place in the appearance of Calcutta Gardens and in the variety of flowers now generally cultivated here. The interest has become general; it is no longer confined to a class; it has caught on.

The excuse made in an examination paper a quarter of a century ago by a Calcutta student will no longer gain the minimum pass marks. The fern was a plant that grew in the rich man's garden, he said, and how, therefore, could he be expected to outline its life history. Necessity is the mother of invention and ingenuity is always worthy its due, but the patent, of 1914 has run out with the variety and profusion of all kinds of plant now grown in the poor man's garden.

To the Indian a love of flowers is natural. He has a long history of interest in gardening to his credit. The plants with which he lives have been taken by him to many of his religious rites and institutions. They are part of his history, and there are crops of them scattered throughout his mythology. But it is increase in his garden variety and profusion that is noticeable of later years, and if we try to seek reasons for this they may be found in the increased opportunity he has through the services of horticultural firms and societies and in the facilities that now offer for the rapid introduction of varieties that are gaining a place in gardens throughout the world.

From the scientific side of the horticultural effort he benefits by the breeding and crossing experiments going on from which a variety of forms hitherto unknown and unsuspected have come to supplement the stocks he formerly had at his disposal.

The average gardens of Calcutta some 20 years ago might have contained all or some of the following:—

Phlox, Verbena, Dianthus, Pansy, Carnations, Nasturtium, Cosmos, Salvia, Sweet Peas, Balsams, Zinnias, Gomphrena, Browallia, Gaillardia, Coreopsis, Hollyhocks, Cannas and Sunflowers. To-day these are all there; but besides the immense improvement in the kinds of them grown we should find now in plenty though formerly rare Dahlias, Double Nasturtiums, Delphiniums, Gladiolus, Stocks, Clarkia, Gypsophila, Eschscholtzia, Statice, Ageratum, Anchusa, Aster, and a host of others. Perhaps the most marked change is in the variety and profusion of Dahlias and Cannas now grown. The Royal Agri-horticultural Society is able to take credit for not a little of the improvement that has taken place in the flora section.

To say that the variety has been trebled in the last two decades is a conservative estimate and to recognise the enormous improvement effected is a merited compliment to the widespread interest now taken in matters horticultural.

The Royal Botanic Garden has taken its full share in the advance made in the purely horticultural side of its activities. Every year sees a new effort made to test and establish plants not formerly tried, while the standard of production accomplished bears creditable comparison with the effort of lesser known institutions. The exhibits that the Curator has this year put up at horticultural shows have more than held their own in the opinion of the most competent judges. The exhibits were not specially prepared for shows and in quality were fairly representative of the general stocks in cultivation at the gardens.

Improvements effected in the garden during the year range over all sections of its activities; but the progress made towards inclusion of economic plants, especially those of interest to the fruit culturist, deserves special mention. Of recent years the mango has been receiving more than a usual share of attention. Modern methods of transport in cold storage or under other conditions that inhibit the growth of decay organisms have drawn attention to its possibilities in foreign markets. Exhibitions devoted exclusively to the mango, a new departure, are even being organised. The garden was unnecessarily poor in good stock of this tree and additions during the year of 140 mango grafts of good variety were planted out to make good the deficiency. It is unlikely that they will all do equally well but a wider range of material is now here from which in time selections may be made and stock distributed.

Other fruit bearing species will be added till a more just balance in the garden of plants of the purely scientific and economic kind is reached.

The rock garden to which reference was made in recent annual reports has been extended and the following plant? added to it :—

*Macleaya yedoensis*, *Taxus baccata*, *Erigeron canadensis*, *Thermopsis fabacea*, *Chrysanthemum coccineum*, *Fragaria indica*, *Lobelia syphilitica*, *Chrysanthemum parthenium*, *Rosa flexuosa*, *Bobinia hispida*, *Lupinus polyphyllus*, *Cerds Siliquastrum*, *Sophora* 8p., *Mirabilis Froebelii*, *I satis tinctoria*^ *Lotus corniculatus*, *Senecio clivorum*, *Cichorium Intybus*, *Talinum crasiifolium*, *Oerbera Jamesoni*, *Lupinus perennis*.

The Curator reports that the year was not very favourable for planting out operations, but the increased importance given to the inclusion of species new to or rare in the garden has not been forgotten. His record of additions includes:—*Clematis integrifolia*, *Moringa oleifera*, *Cordia tremula*, *Dalbergia panieulata*, *Melia sempervirens*, *Bauhinia retusa*, *Pistacia chinensis*, *Dalbergia hupeana*, *Clerodendron trichotomum*, *Peltophorum africanum*, *Balanites aegyptiaca*, *Cryptostegia madagascariensis*, *Sideroxylon dulcificum*, *Ochna mossambicensis*, *Aristolochia*, *altissirna*, *Callitris qmdrivalvis*, *Acacia mollifera*, *Quazuma ulmifolia*, *Psidium pumilum*, *Bauhinia pulchella*, *Schinus dependens*, *Ficus cotinifolia*, *Araucaria brasiliensis*, *Casuarina kpidophloia*, *Papetta indica*, *Diospyros halesioides*, *Acacia spadigera*, *Clerodendron tuberculatum*, *Acacia Richii*, *Pschira rosea*, *Oarcinia tinctoria*, *Rheedia* sp., *Bauhinia scarlet*, *Tecoma argentea*, *Calophyllum antillerum*.

The short rainfall, itself, combined with the reduced normal period of fall affected not a few garden plants in the open, and numbers especially in the river ways entrance to the garden, the Oreodoxa Avenue, had to be removed. This Avenue, so well-known to garden visitors, is now losing its former beauty. Every year one or more members of its stately palm disappear. It is already beginning to look ragged and it must be years before the line of replacements effected some five years ago grows up to allow of a mass removal of the old trees. With the palmyra replacement is easier, for this palm grows so much more quickly that within ten years gaps are nearly filled and the symmetry of its avenues is regained.

In addition to the routine work of the garden the Orchid House has been repaired and a special effort made to make good the damage done to garden labels. This last work is going on apace, but replacement will henceforth have to be viewed as routine work, for time alone and the weather is not responsible for the deterioration in labels that takes place. One would think that a label bearing a Latin name with the name of the family to which a tree belongs and its geographical distribution could excite resentment from no quarter, but the manner in which labels get bent and broken belies the assumption. The damage must be the work of a few malcontents, for the great masses of garden visitors of all classes are orderly and appreciative of what is done for them.

No major work could be undertaken during the year, but a few coolie houses have been partially erected near the economic ground so that some garden labour may live nearby and be able to keep an eye on plant products that excite more than a legitimate interest.

A lotus bowl for experimental work on water plants in the open has been dug near the flower garden and new beds of roses planted up. The garden is now very much richer in the rose class than it formerly was but as with the orchids, rose stock has continually to be introduced. It deteriorates and not all kinds do equally well. Some only just survive. As has been pointed out before the climate of Calcutta is not well suited to this class of plant: Some of our stock has come from abroad but the garden can now depend for regular supplies on the finely stocked gardens of Upper India where the conditions suit it so much better than in Bengal.

As in recent years large numbers of potted plants have been staged out at vantage points throughout the garden.

Experiments on the pollination of *Amherstia* have been repeated with encouraging results. Some of the seed has gone to Kew where success with the germination of last year's small supply had not been obtained. This tree is in great demand by horticultural institutions throughout the world. Although there is no great difficulty in establishing rooted cuttings of it, the expenses of transporting these in wardian cases militate against its wider distribution. Fertile seed is rarely found, the production of racemes of pendulous flowers, quaint, orchid like and highly specialised seeming to absorb most of the plant's energy leaving little for the production of fertile seed. The absence too of the right pollen carriers, the flowers not seeming to be visited much by insects, may also be responsible for the scarcity of seed. The tree does well under shady conditions at Sibpur, but it is not native here. A suggestion might be

made for pollination experiments to be carried out in Burma where it is native and locally not uncommon. Results might be better.

The introduction or reintroduction continued. The Aracarias do best, the genera Pinus and Thuja. These are being added to and others tried.

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3. Herbarium and Library.--The total imens deter- mined is about 3,500 the majority being lections from the Eastern Himalaya. These gatherings of Sikkim plants include a set of valuable specimens brought from Bhat Sir John An G " T h e s s " S ^ I S e n w e d o u t v i e a S E S ! f W " • T h e s s " S ^ I S e n w e d o f H i l E x c e H e n l y " ! M o ? e r b a n u m . ^ r e p o r t s t h a t s o m e o f t h e s p e c i e s s p e c i m e n w h T h 7 V f ^ 1 0 ? P P e a r \* o b e n e w r e c o r d s . T h r e e o r f o u r £ T r w a s ^ a f e c t a / h f m o f i m a t c h e d t e r e h a d t o b e s e n t t o K e w a n d o c ^ A T ! f T I - a . a t l e i B t a C O U P l e o f t h e m T M ? t u r n o u t n e w t o S S d i i S r T J ^ r - ^ I W f h t a p I 2 n t B S l s o i n c l u d e M r « - T o w n e n d ' s c o l l e c t i o n s f r o m C a n L S P £ ^ T A Z ® j k i m , A c o l l e c t i o o f » b o o t 2 9 0 s p e c i m e n s t o t i u r S n i P 3 t h f v g d m ^ a r d p r o v e d t o \* a s u b s t a n t i a l a d d i t i o n i d e n t i f i e d a n d ^ J n S % - " P H I A A M a m - A U t h e s e s p e c i m e n s h a v e b e e n t o g e t h e r w i t h Z ~ K A ^ P ^ A ^ A g o n e t o t h e B r i t i s h M u s e u m w U : T h e ' c o l l e c t i o n s o f D . N . T p , 0 1 1 8 a s d e s i r e d ^ C a p t a i n K 1 ^ 0 1 1 a n d P h a l u t e f o r m « . \* : N , L < B r a n d M r M B i 8 w a s & o m S a n d a k p h u

se of F. M. Bailey of Nepal, Mother Monica, C. E. Saxton and S. R. Bose of Calcutta and others.



The total number of specimens sent on loan this year is about 421, a much larger number than in the previous year, although the number of correspondents and the variety of specimens supplied are nearly the same. About 95 sheets of *Psilotum* were scrutinised by Mr. C. E. Parkinson. Mr. C. Norman of the British Museum of Natural History examined critically 77 sheets of *Pleurospermum*. Y. Tsiang of the Sun Yatsen University, Canton, China, studied 6 lots from the herbarium belonging to the genera *Aganosma*, *Toxocarpus*, and *Goniostemma*. Dr. S. P. Agharkar of the Calcutta University has had 29 sheets of *Monotropa*. Some 10 sheets of *Daemonorops* were sent for study to the Director of the Botanic Gardens, Singapore while 116 Liverworts formed the subject for study of Mr. R. S. Chopra of the Punjab University who reports about a dozen of them as new records.

The specimens received back from loan is about 754. Mr. V. B. Hutchinson who was engaged in a monographic work of cultivated cotton plants returned, after revising the names, 554 sheets of specimens of *Gossypium* sent to him last year. Dr. H. N. Moldenke, Assistant Curator, the New York Botanic Garden, who is engaged in the study of the sheets of the genus *Avicennia* returned 164 sheets belonging to this herbarium after incorporating necessary notes. About 36 specimens of a *Dipterocarpus* lot have been received back from the Forest Botanist, Federated Malay States Museum. From China, Tashkent and Singapore came 336 sheets presented and from other localities smaller numbers.

Plants going out on an exchange basis include 200 local species to Formosa, 30 specimens of *Phoenix* to America and a collection of flower buds of 17 species in special preserving fluid to Sweden. The National Herbarium, Manila, and other institutions throughout the world also benefited. Enquiries from very many sources on questions that can be answered or regarding which help can be given continue to come to the herbarium.

Some 3,173 specimens have been mounted, 5,017 specimens incorporated and 600 covers changed. The herbarium has this year unfortunately lost through death the services of an expert mounter Debendra Nath Nasker. It is not easy to procure the right type of man for this delicate work of mounting and it takes long experience to acquire the art.

Exploration was largely kept in abeyance due to the Superintendent being on leave but the Officiating Superintendent during the course of inspection work at Darjeeling made a tour to higher elevations.

In addition to Indians who came to headquarters several foreign visitors also visited the herbarium on special quests. Mr. Dowson formerly of the Irak Agricultural Department was helped with the palms and on the methods of their tapping; Professor Tanaka made a prolonged study of our material and literature of *Citrus*.

Short papers on "Jute and allied fibres"; The "Organic growth of the Calcutta Filterworks"; "The Position of the genus *Sansevieria* in India"; "The Vegetation of the Hazaribagh district" and "New species from Assam" were contributed by the Curator of the herbarium.

The treatise on Water plants has attained a larger dimension than was originally intended and delay has resulted in consequence of the inclusion of more cryptogams, but the writing of the work is now completed and the plates nearly all prepared.

The library has been maintained, 30 periodicals being bought and some 106 received on exchange. Several books have been added and the demand for loans increases.

4. **Publications.**—The second part of the text of Sir David Praia and Mr. Burkill's monograph, the genus *Dioscorea*, is still in the Press.

5. **Finance.**—Out of the total budget allotment of Rs. 48,406 for staff and permanent establishment Rs. 48,382 were spent and under all other heads the expenditure amounted to Rs. 46,862 against the total/allotment of Rs. 47,276. There was a net saving of Rs. 438 under all the heads during the year. Receipt of the department during the year amounted to Rs. 2,094.

6. **Staff.**—The writer held the post of Superintendent from 1st April to 30th May 1935, and from 30th November, 1935, to the end of the year. He was on leave out of India from 31st May to 29th November 1935. Mr. K. Biswas was Officiating Superintendent for the six months and was Curator of the Herbarium from 1st April to 30th May 1935, and from 30th November 1935 to the end of the year. Mr. V. Narayanaswami was Officiating Curator of the Herbarium from 31st May to 29th November 1935. Mr. N. Mitra was Curator of the Garden throughout the year. Mr. Md. Quasem Ali was Assistant Curator, Royal Botanic Garden, Calcutta, throughout the year. Mr. K. S. Joneja was Overseer, Royal Botanic Garden, from 1st April to 18th September 1935, and from 1st November 1935 to the end of the year. He was on leave from 19th September to 31st October 1935.

Mr. A. T. Banerjee was Head Clerk throughout the year. All officers and the clerical establishment have performed their duties satisfactorily.

### CALCUTTA GARDENS.

Work in these gardens which include the Eden, Dalhousie Square and Curzon Gardens was again mainly of a routine character. As elsewhere the short rainfall had the effect of delaying planting of winter annuals and the display of these was later than usual. It was, however, in appearance up to the average.

Social function at the Eden Gardens in honour of Their Excellencies The Viceroy and Countess Willingdon also affected to some extent the location and time of planting of annuals, the vicinity of the pagoda being left over till the second week of December.

Number of flowering shrubs and trees were planted out and an improvement effected in the hedges that lead from the pagoda to the bridge. These hedges were being destroyed by visitors who wished to gain short cuts and the *Acalyphas* composing them were replaced by *Barieria*, it being thought that this would be more resistant to encroachment and at the same time provide a change in the colour effect. The result is satisfactory.

The stocks of ferns and potted palms and orchids were maintained and increased by propagation.

As a result probably of differences in the water-supply the Eden Gardens prove a very much better place than the Sibpur Gardens for the development of *Victoria regia*. The leaves of this aquatic reached an enormous size. They became interesting objects to the public for photographic purposes and the plants flowered well.

A welcome collection in exchange was received from the Municipal Gardens, Bombay. This included a considerable number of *Marantas* for the shade houses and of varieties of *Hibiscus* for the open. The roads and benches have been kept in as good order as the limited funds would permit.

In the Eden Gardens some 42,000, in the Curzon 16,000 and in the Dalhousie Square Garden 13,000 square feet of road were attended to.

Estimates have been prepared for the excavation of the tanks in the Eden Gardens. Their proximity to Government House and the Council Chamber render it necessary that they should be free of mosquito larvae, and the proposal to excavate them has the object of making the locality more sanitary. It is not likely that a scheme of this magnitude will readily find a place in the schedules for new expenditure and the ordinary and not very satisfactory palliatives of cleaning and spraying with oil will have to be continued.

The Gardens as a whole look well and there is continued improvement in the Curzon Garden.

One bad factor that will require more attention in the coming year is the state of the iron fences in the Eden Gardens. The budget allotment has been fairly distributed to the most necessary works and the state of all the gardens reflects this.

**Finance.**—Out of the total grant of Rs. 30,763 under all heads Rs. 30,754 were spent leaving a balance of Rs. 9. Receipts of the Calcutta Gardens during the year amounted to Rs. 10.

**Staff.**—Mr. Merlin Jones was Assistant Curator, Government Gardens\* Calcutta, throughout the year. Mr. Gholam Muhiuddin was Overseer<sup>1</sup> from 1st April 1935 to 2nd March 1936. He went on leave for three months from 3rd March 1936. Mr. J. A. Hulbert, Overseer, Cinchona Plantation, Munsong, acted in his\* place from 3rd March 1936 to the end of the year.

### LLOYD BOTANIC GARDEN, DARJEELING.

The rainfall at this Garden was 107\*8 inches over the year, being below the average. But heavy continuous rain nevertheless destroyed seedlings in the open and replacements had to be made in beds in some cases more than once. The routine work of the Garden has been continued and several attempts at improvement made. Amongst these the most important was a renovation of the rockery. This involved the transport of fresh material to the Garden but the result has been much appreciated by the visiting public. A small ferroconcrete bridge and an artificial waterfall have been added to enhance the effect of the improvement. Species of the following genera from alpine and temperate regions have been planted up in the rockery :—*Rhododendron*, *Rosa*, *Str#obilanthes*, *Agapates*, *Vaccinium*, *Genista*, *Cotoneaster*, *Swertia*, *Spiraea*, *Lilium*, *Silkifraga*, *Anaphalis*, *Aster*, *Primula*, *Hypericum*, *Lonicera*, *Allium*, *Onosma*, *Pentapterygium*, *Gentiana*, *Smilax*, *Iris*, *Ranunculus*, *Berberis*,

Daphne, Veronica, Jlelianthemum, Cathcartia, Meconopsis, Achilles\* Arenaria and others. Several of these were collected by the Curator while on botanical tours.

Besides the usual display of flowers on beds the special beds of Meconopsis Wallichii, M. nepalensis, M. combrica, Cathcartia villosa, Pnmuia cashmeriana grown from acclimatised seed, Liliu Nepalense, L. 8<sup>1</sup>te\*<sup>n</sup>teum and L. Wallichii attracted many visitors. The Curator also records a long list, some of interesting or rare flowers in this part, that bloomed during the year. He has added to the Garden collections of orchids by drawing freely on the local jungle supply, & the elevation of Darjeeling or lower down. Parts of the lawns again had to be combed to restrict the growth of moss. Only those who have tried to maintain pure lawns in a damp climate at such elevation in the Eastern Himalayas can know how repeatedly the operation of combing has to be done to secure a satisfactory turf.

Some 196 young plants were put out to permanent situations in the Garden during the year. The list includes additions to species already there, repeat trials with those that had not previously succeeded and a number of plants new to the Garden; Chizandra grandiflora and Stephania rotunda are new additions.

A fairly large number of additions was made as a result of exchange with the Sun Yatsen Memorial Park, Nankin, China. It is to be noted that the Lloyd Botanic Garden freely gave material to help and establish the Memorial Park some years ago. From China we are now in receipt of Aucuba chinensis, Idesia polycarpa, Vanieria tricuspidata, Deutzia pilose, Prunus ruforaicans, P. anomala, P. Willsonii, P. pubigera and species of Photinia, Lonicera, Cassia, Lindera, Rubus, Hydrangea, Clematis and other more or less temperate plants.

Some 5,009 packets of seeds, 313 plants and 9,969 seedlings were distributed.

The herbarium and library were kept in good condition and added to. The existence of a local herbarium in Darjeeling may not be so generally known as it should be. It is possible that more local collectors would use it if they knew of its existence. It is the work of successive Curators of the Garden, especially of Mr. Cave, and contains a fairly representative set of the plants of the Darjeeling district. The Curator will be glad to place its collections at the disposal of any local botanists who call to compare specimens and if they fail there the staff at Sibpur will always be glad to supplement the help from headquarters.

Two botanical tours were undertaken by the Curator during the year one to the higher and one to the lower elevations and he helped Mr. Biswas during the latter's inspection with materials for a Guide-book.

Over 47,000 visitors were counted at the gates.

As in former years the garden staff did what was possible to make the local annual flower show a success. The alpine groups staged by the garden were not at their best but the public showed its usual interest in them all the time.

Finance.—Out of the total allotment of Rs. 15,774 under all heads Rs. 15,543 were spent and a sum of Rs. 219 was surrendered leaving a small balance of Rs. 12.

Staff.—Mr. S. N. Basu was Curator, Lloyd' Botanic Garden, Darjeeling, throughout the year.

C. C. CALDER,

Superintendent, Royal Botanic Garden, Calcutta.

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CURRENT MISCELLANEOUS PUBLICATIONS.—

Boards. The Bengal—Miscellaneous Rules, 1934. Be. Ma† (to),

Bulletin—

"District Faridpur." As. 3 (1a.).

"District Pabna." As. 4 (2a.).

(Compiled by Bengal Board of Economic Enquiry.)

Cinchona. Seventy-second Annual Report of the Government—Plantations and Factory in Bengal for the year 1934-35. As. 6 (2a.).

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Dispensaries. List of Hospitals,—and other Medical institutions in Bengal, corrected up to 31st December 1933. Re. 1-2a. (4a.).

Dispensaries. Annual Report on the Working of Hospitals and—under the Government of Bengal for the year 1933. Rs. 2 (6a.).

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# Annual Report of the Royal Botanic Garden and the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling, for 1937-38.

## ROYAL BOTANIC GARDEN.

**General.**—During the year under review the most important event was the celebration on the 6th January of the 150th Anniversary of the Royal Botanic Garden, Calcutta. The Hon'ble Nawab Khwaja Habibullah Bahadur of Dacca, Minister, Agriculture and Industries Department, presided over the celebration which was attended by the British and the Indian botanists who had come to Calcutta to attend the Silver Jubilee Session of the Indian Science Congress Association. Sir James Jeans, the General President of the British Association and of the Indian Science Congress Association, and Sir Arthur Hill, Director, Royal Botanic Garden, Kew, addressed the gathering and amongst well-known British botanists present were Professor A. R. H. Buller, Professor F. E. Fritsch, Dr. C. D. Darlington, Professor R. Gates and Professor I. H. Harrison. Messages of congratulations and wishes for continued success were received from many scientific institutions and persons from India and abroad.

A Sesqui-centenary Volume of the Royal Botanic Garden, Calcutta, is under preparation in which the full proceedings, together with the contributions from many distinguished botanists on various branches of Indian botany, will be published.

It will be appreciated that the maintenance of the Garden's usefulness in many of its directions carries with it a necessity that living and herbarium specimens of plants from other Gardens abroad are regularly obtained. During the past year, the Superintendent when on study leave in England had an opportunity of reviving the arrangements by which the Royal Botanic Gardens, Kew, the British Museum (N.H.) London, and the Royal Botanic Garden, Edinburgh, promised to supply by way of exchange to the Sibpur Herbarium specimens which are rare or new or may be missing there. Sir Arthur Hill, Director, Royal Botanic Garden, Kew, and Sir William Wright Smith, Regius Keeper, Royal Botanic Garden, Edinburgh, have to be thanked for the very generous gift of some rare specimens from Kew and some new *Primulas* from Edinburgh. These are valuable acquisitions to the Herbarium.

The display of the cold weather annuals which this year did very well was highly appreciated by the public. The Garden carried away some of the best prizes at the flower show of the Royal Horticultural Society of India held on the 18th December, 1937. About 162 plants were planted in the Garden of which the following were new, the remainder being the always necessary replacements:—

*Acacia leucophloea*; *Caesalpinia sepiaria* var. *Japonica*; *Acacia* sp.; *Clausena heptaphylla*; *Piper Betle*; *Aglaia perviridis*; *Eugenia lineata*; *Clerodendron Colebrookianum*; *Anona glahra*; *Ostodes paniculata*; *Barleria cristata* var. *Scarlet*; *Sesbania paniculata*, *Millettia reticulata*; *Diospyros Jiaki*;

« *Lagerstroemia subcostata*; *Bauhinia fassoglensis*; *Aloe striatula*; *Aloe africana*; *Albizzia Julibrissin*; *Dolichondrone Hildebrantii*; *Erythrina tomentosa*; *Clerodendron Zambesica*; *Acacia Senegal*; *Millettia oblata*; *Platanus occidentalis*; *Celtis Tala*; *Cordia Holstii*; *Bauhinia acideata*; *Caesalpinia Gilliesii*; *Ruprechtia salidfolia*; *Manihot palmata*; *Calliandra bicolori\**; *Terminalia australis*; *Acacia bonariensis*; *Sesbania Tripetti*; *Acacia visco*; *Cordia interrupta*; *SormeraUa apetala*.

2. **Plant and seed exchange.**—Five hundred and eighteen plants were received and 10,150 plants were despatched, out of which a large number have as usual been utilised for horticulture and roadside beautification of this country. One thousand one hundred and forty-six packets, 45 lbs. and 4oz. of seeds were distributed to various places abroad including Australia, Puerto Rico, Washington, China, Caucasus, Java, England, Holland, Brazil, Egypt, Africa, Trinidad, Germany, etc., and to the different parts of India, including Bombay, Lahore, Madras, Benares, Burma, Saharanpur, Nilgiri, Agra, etc.

f Six hundred and forty-four packets and 3 lbs. of seeds were received from different foreign countries including China, Germany, England, Japan, Java, Australia, Singapore, and also from many parts of India. Of the new plants introduced into the Garden, *Victoria Curziana* and *Salvinia auriculata* proved to be of special interest.

Eighteen plants of *Nepenthes Kliasiana*—an interesting but rather delicate species—were received from the Deputy Commissioner in charge of Forests, Shillong. Of these three survived. One dozen selected plants of the Nilgiris (South India) were received for the 150th Anniversary Show from the Curator, Government Botanic Gardens, Ootacamund and are to date doing well. Our thanks are due to the Deputy Commissioner in charge of Forests, Shillong, and to the Curator, Government Botanic Gardens, Ootacamund for the gifts.

The road work was continued as in the past. Tarring of about 50,000 square feet of road was done during the year. Necessary repairs of bridges, houses, etc., were also done.

3. **Herbarium and library.**—Three thousand one hundred and thirty-five specimens were identified for a large number of correspondents, both official and unofficial, from all over India. The largest number of specimens was received from the Botanical Officer, Shillong Herbarium, in connection with the publication on the Flora of Assam which is being published by the Assam Government. Five thousand one hundred and ninety-eight sheets of this herbarium were again on loan this year to workers on special groups of plants, especially outside India. They included 4,293 sheets of the rest of the Indian *Labiatae* to Sir William W. Smith of the Royal Botanic Garden, Edinburgh, in connection with the preparation of a monograph on Indian *Labiatae* by Mr. S. K. Mukherjée, M.Sc, who was studying there; 236 sheets of *Hydnocarpus. Tardktogenos and AsteriasUgma to Berlin*; 24 sheets of *Ficus glabelta* to Canton University, China; 104 sheets of *Microtropis* to Elmer D. Merrill of the Harvard University; 259 sheets of *Selaginella* to Mr. J. Ramsbottom, Keeper, Department of Botany, British Museum (Natural History), London, which were duly worked out by Mr. A. H. G. Alston partly in collaboration with the Superintendent; 10 sheets of *Allium* to Mr. J. E. Dandy of British Museum (N. H.); 110 sheets

Photograph of the British and Indian botanists.



From left to right: (1) Sir J. J. Burrows, Director of the Botanical Survey of India; (2) Sir Arthur Hill, Director of the Botanical Survey of India; (3) Dr. K. R. Reddy, Director of the Botanical Survey of India; (4) Dr. J. S. Burrows, Director of the Botanical Survey of India; (5) Professor Blackmore, Director of the Botanical Survey of India.

of *Cuscuta* to Leiden (Holland); 9 sheets of *Anihistiria* to the Forest Botanist, Dehra Dun; 29 sheets to Mr. A. Das of Assam and 133 sheets of *Libium* to Mr. A. D. Cotton, Curator of the Kew Herbarium. Two thousand eight hundred and fifty-five sheets including those of *Derris*, *Lilium*, *Hydnocarpus*, *Selaginella* and part of *Labiatae* which were on loan were received back in the herbarium. Two hundred and forty-eight sheets hailing from Japan (Professor Tanaka), China and Buitenzorg were additions to the herbarium either as exchange or free gifts. Three thousand and ninety-three sheets were incorporated into the general herbarium. About 1,000 sheets were mounted and repaired.

The increased demand for free supplies of botanical materials for purposes of research in and outside India was complied with satisfactorily. They included 182 named and mounted sheets of Bengal plants to Professor J. R. Mathews of the Aberdeen University; leafy twigs of *Ficus Krishnae* to Mr. Kotwal of Bombay; collection of Garden *Selaginellas* to Mr. A. H. G. Alston of the British Museum; Bulbils of *Dioscorea alata* to Mr. I. H. Burkill; specimens of *Salvinia species* to Assistant Professor of Botany, Fergusson College, Poona; preserved material of 12 species of Himalayan conifers to Dr. Heber of Berlin; specimens of *Polypore*\* to Dr. S. R. Bose of the Carmichael Medical College, Calcutta; packet of seeds of *Abroma augusta* to the Deputy Director of Agriculture, Mysore; 16 packets of seeds of *Helicia erratica* to several botanical and agricultural institutions throughout the world; 1 packet of seeds of *Phaseolus calcaratus* to the Director of Plant Breeding, Department of Agriculture, Sydney, Australia; packet of seeds of *Sapiwn sebiferum* to the Botanic Gardens, Peradeniya, Ceylon. Besides supply of materials, considerable amount of valuable information of a miscellaneous nature covering such subjects as botanical, economic plants, medicinal, horticultural and agronomy, was liberally supplied to a wide circle of correspondents too many to be mentioned in this brief report.

Mr. A. Das, the editor-author of the "Flora of Assam," Dr. N. L. Bor, the Forest Botanist, Dehra Dun, and Mr. C. E. Parkinson, the retiring Forest Botanist, Dehra Dun, visited the herbarium to work out their specimens. They were all given necessary facilities and assistance. Mr. Das has been in constant touch with the officers of the Herbarium in connection with the work on the flora of Assam and with the identification of his collection of Monghyr plants. The two assistants, Mr. N. Goswami and Mr. H. L. Chakravarty, worked in the herbarium throughout the year in connection with the investigation of the Indian medicinal plants by Br.-Col. R. N. Chopra, Director,\* School of Tropical Medicine. They and the artists staff of Br.-Col. Chopra were given full facilities and help in consulting herbarium materials, literature and plates. Especial arrangements had been made for their work at night and during the holidays.

4. **Publications.**—Amongst the publications of the Garden the following may be noted—(1) "Two New Flowering Plants" (*Diospyros Kika* Debbarman et Biswas and *Cortal-aria Kotaiensis* Debbarman et Biswas), *Cardamine Smithiana* Biswas, *Convolvulus Bahtchistanefiis* Biswas, (2) "Studies on Indian Iron Bacteria" by Dr. K. Biswas (3) "Hand Book of Common Water and Marsh Plants of India and Burma" by K. Biswas and C. C. Calder was published as Health Bulletin No. 24 of the Government of India Publications, New Delhi. Mr. C. C. Calder contributed an article on "The Vegetation of India" to the Field

Sciences of India, published by the Indian Science Congress Association. The following were in the press: —

- (1) Banausadhi Parichaya, a treatise on Indian medicinal plants, in Bengali, by K. Biswas and E. Ghosh, to be published by the University of Calcutta;
- (2) (i) Flora of the Lushai Hills by C. E. C. Fischer; and  
(ii) Some New North-West Himalayan Mosses by H. N. Dixon and R. L. Badhwar, in the Records of the Botanical Survey of India, Volume XII, No. 2.

The present Superintendent while in London took the opportunity to discuss with Sir David Prain, the author of the well-known "Bengal Plants," and settled the final plan of rewriting a new Flora of the Presidency of Bengal as suggested sometimes since by Sir David. The work is being continued on the principles agreed.

Volume XIV, Part II of the Annals of the Royal Botanic Garden, "An Account of the Genus *Dioscorea* in the East—the species which twine to the right" by David Prain and I. H. Burkill was in the press.

One hundred and twenty-two copies of the Annals of the Royal Botanic Garden, Calcutta, Volume XIV, Part I, "An Account of the Genus *Dioscorea* in the East"—the species which twine to the left, by David Prain and I. H. Burkill with 85 plates were distributed to the different institutions of foreign countries. Names of thirty-one institutions have been added to the distribution list of the annals this year. This new distribution list was drawn up by Mr. I. H. Burkill and the writer in consultation with others at Kew. Names of some of the minor institutions were eliminated.

Allotment for the library was fully spent. Thirty-five journals and 3 books were purchased, 62 journals were received on exchange, 21 reports and 7 books were presented. Seventy-nine books were received back from loan and 39 books were still on loan at the end of the year. Eighty-five books were bound and many have been repaired.

5. Finance.—Out of a total budget allotment of Rs. 54,433 for staff and permanent establishment, Rs. 50,418 were spent, and under all other heads the expenditure amounted to Rs. 48,710 against the total allotment of Rs. 48,805. A sum of Rs. 3,980 was surrendered under the head "Pay of officers—Charged." There was a net saving of Rs. 130 under all heads during the year. Receipt of the department during the year amounted to Rs. 1,857.

6. Staff.—Mr. C. C. Calder, Superintendent, held the charge till 28th October 1937, when he went on leave preparatory to retirement. The writer held the charge *txpm* 29th October 1937 till the end of the financial year, in addition to his own duties as Curator of the herbarium. Mr. V. Narayanaswami officiated as Curator of the herbarium till the 29th October 1937, when the substantive holder of the post relieved him on return from study leave.

Messrs. N. Mitxa and Md. Quasem Ali were Curator and Assistant Curator, Royal Botanic Garden, respectively, throughout the year.

Mr. Gholam Mohiuddin was Overseer of the Garden throughout the year.

Mr. A. T. Banerjee was Head Clerk throughout the year.

## CALCUTTA GARDENS.

The display of winter annuals this year was a complete success, despite belated planting due to adverse weather conditions prevailing at the time of sowing seeds. It has been the custom of these Gardens to maintain a prolonged period of flowering of these popular winter annuals. Apart from the favourable weather conditions, the success of annual flower shows depends much on raising the seedlings earlier and planting them out in the open beds soon after the rains. Necessary control over the germination of the seeds in the nursery stage coupled with the amount of care taken when sowing is an important factor for the production of better quality of cold weather flowers. In this respect the Garden is much handicapped. The improvised arrangement of covering seed pans to protect them from wind and rain is very unsatisfactory, and suitable glass frames should be provided in the nursery. The beauty of the magnificent plant, the giant Amazon Lilies (*Victoria regia*) in the lakes of the Eden Gardens, grown so successfully during the last few years, attracting special attention of the Calcutta visitors, was marred by the cyclone that Calcutta experienced last September. Considerable havoc was also done to the trees of the Garden. The usual routine work was well and efficiently carried out. About one hundred plants from this Garden formed part of the exhibition arranged during the celebration of the 150th Anniversary of the Royal Botanic Garden, Calcutta. Special mention may be made of the success achieved in growing *Digitalis* in this Garden from seeds received from Mr. C. C. Calder, but no spike developed before the advent of the hot weather. Two other species of economic importance—one a *Passiflora* sp., and the other *Ilex zihethinus*—introduced for the first time to the Garden—were kindly presented by a visitor. The fruit of the latter commonly known as "Durian" is much prized in Burma and Malaya. These are valuable acquisitions to the Eden Gardens and are doing quite well in this Calcutta climate.

The wheels are breeding grounds for mosquitoes and should be reexcavated.

It is still a baffling problem how to keep off the crowds from the lawns in the Calcutta Gardens during the football season. All possible attempts towards protection of garden beds and hedges have proved so far futile. No hedge of any kind will prove of any use so long as a strong iron railing is not provided along the entire south end wall of the Eden Gardens to prevent the enormous football crowds from **damaging the hedges, lawns and beds.**

**Dalhousie Square and Curzon Gardens were selected for the erection** of the statues of the late Sir R. N. Mukerjee and Sir H. Goenka—two of the leading citizens and philanthropists of the country. The former facing the General Post Office was unveiled by His Excellency the Right Hon'ble Lord Brabourne, G.C.S.I., G.C.I.E., M.C., Governor of Bengal, and the latter at the west end of the Curzon Park was unveiled by Sir John Anderson, P.c, G.C.B., G.C.S.I., the late Governor of Bengal.

**Finance.**—Out of a total budget allotment of Rs. 32,191 under all heads, Rs. 32,177 were spent, leaving a small saving of Rs. 14. Receipts during the year from the Dalhousie Square Garden amounted to Rs. 4 only.

**Staff.**—Mr. Merlin Jones was Assistant Curator, Government Gardens, Calcutta, except for a very short period from 1st to 13th April 1937, when he was on leave.

Mr. J. A. Hulbert was Overseer throughout the year, and in addition to his own duties held the charge of the Calcutta Gardens during the period of absence of Mr. Jones on leave.

### LLOYD BOTANIC GARDEN, DARJEELING.

The plants of the Lloyd Botanic Garden, Darjeeling, have to face somewhat inclement weather every year. The hardier species and those which have acclimatised themselves survive the vagaries of nature, but many of the introduced species do not show signs of healthy growth until they have adapted themselves to the local climatic conditions. The annuals which play an important part in the aesthetic aspect of the Garden are particularly sensitive to the weather conditions. The success of staging flowers and decorative delicate plants depends considerably on how much nature favours them. The average rainfall during the year was 102.15 inches, rather below the normal. Such a low rainfall than the average led to a drier condition which affected the summer annuals. On the other hand, continuous rain damaged to a certain extent the autumn annuals. This entailed extra labour due to replacement of the seedlings several times. The usual routine work of the Garden continued and attempts were made to complete some of the new works taken in hand. The rock garden is gradually taking shape. The maintenance of such a highly specialised garden necessitates yearly introduction of new plants replacing the dead or overgrown ones. The following species were added during the year:—

*Alyssum saxatile*, *Alyssum serpyllifolium*, *Androsace Hookeriana*, *Arenaria capillaris*, *Arenaria alpestra*, *Arenaria laricifolia*, *Anchusa visotidiflora*, *Haplonaria cerastoides*, *Aster rotundifolius*, *Avbrieffia Campbellei*, *Arabis alpina*, *Arabis mura*, *Achillea filipendulina*, *Artemisia splendens*, *Berberis* sp., *Spergula pilifera*, *Statice puberula*, *Alonsoa Warscewiczii*, *Aloe* sp., *Phyllanthus reticulatus*, *Saxifraga purpurascens*, *Saxifraga hispidula*, *Saxifraga diversifolia*, *Lilium Wallichianum*, *Lilium nepalense*, *Ajuga macrospora*, *Nicotiana glauca*, *Impatiens arguta*, *Impatiens Jurpeana*, *Impatiens tripetala*, *Diascia lamarckii*, *Dianthus albobaccus*, *Erigeron glaberrimus*, *Erigeron aurantiacus*, *Epilobium parviflorum*, *Epilobium alpinum*, *Erica* sp., *Gentiana tibetica*, *Gentiana barbata*, *Meconopsis paniculata*, *Meconopsis Hatleyi*, *Meconopsis nepalensis*, *Meconopsis Wallichii*, *Meconopsis rambrica*, *Cathcartia villosa*, *Erigeron alpinus*, *Polygonum capitatum*, *Polygonum orientale*, *Polygonum amplifolium*, *Dimorphotheca pluvialis*, *Globularia trichosantha*, *Lychnis alpina*, *Verbena erinoides*, *Verbena officinalis*, *Iberis gibraltarica*, *Genista Daisy Hill*, *Cytisus scoparius*, *Primula capitata*, *Primula petiolaris*, *Primula denticulata*, *Iris Clarkei*, *Antirrhinum violaceum*, *Digitalis ferruginea*, *Ephedra vulgaris*, *Cynoglossum furcatum*, *Veronica* sp., *Calamintha alpina*, *Cortia Hookeri*, *Aster sikkimensis*, *Senecio diversifolius*, *Strobilanthes Wallichii*, *Adenophora Tjulcyana*, *Hypericum cernuum*, *Chrysanthemum macrophyllum*, *Doronicum caucasicum*, *Calanthe odora*, *Gentiana sikkimensis*, *Erodium cicutarium*.

Annual requirements for seeds and plants for this Garden demand keeping up proper exchange relation with the overseas temperate gardens. The Superintendent during his stay, in Great Britain came into contact with the authorities of many leading botanical gardens, horticultural institutions and various nursery-men. He is receiving prompt response from them for exchanging seeds and plants. This Garden situated, as it is, in a unique floral region of the Eastern Himalayas forms a centre for distributing the Himalayan plants, and also for studying the particular types of plant associations which command the keen interest of botanists all over the world.

During the year only one tour was undertaken by the Curator for a short time which resulted in incorporating a few local species to the collection. Funds will have to be provided to carry on the field work in a proper manner. The Curator sent a collection of some of the interesting species of Himalayan Orchids to the Royal Botanic Garden, Calcutta, this year to display them for the inspection of the overseas visitors at the exhibition of the 150th Anniversary Celebration of the Royal Botanic Garden, Calcutta. One thousand and thirty-five herbarium specimens, representing 1,118 local genera with provisional names were sent to the headquarters for distribution. Eighty-three packets of seeds were kindly presented by different correspondents. Twelve bulbs collected from the higher ranges of Tibet were presented by Captain F. Kingdon Ward. The bulbs were not in a suitable state of preservation, but as desired by Captain Kingdon Ward, attempts are being made to revive them. Three thousand two hundred and seventy-eight packets of seeds, 119 plants, 10,964 seedlings were distributed to various botanical and other scientific institutions of the world. Many Indian botanical institutions received as usual plant materials for study.

Seeds of the undernoted species received from different correspondents germinated: —

*Erodium cicutarium*, *Erodium gritritium*, *Saponaria cerastoides*, *Scutellaria albida*, *Solatum sisymbriifolium*, *recarmigerum*, *Dipsacus laciniatus*, *Phleutn pratense*, *Erigeron glchellus*, *Phalaris canariensis*, *Sarpiurus*, *Astragalus hamosus*, *Trifolium*, *scabrum*, *Artemisia splendens*, *Aira capillaris*, *Silene schnfta*, *Phytevma Otites*, *Acacia tieriifolia*, *Arenaria setyullifolia*, *Campanula lactiflora*, *Jlelianthemum canadense*, *Buddleia alter HI'folia*, *Acacia notahilis*, *Vicia erecta*, *Cotoneaster angvistifolia*, *Strtchyx iberica*, *Digitalis ferruginia*.

Two hundred and fifteen plants were planted as a result of the recent attempt to increase the general stock of the Garden plants and thereby utilising the more open space of the Garden which might in future develop—in suitable places—small arboretum composed of assorted local species. *Larijf Griffith it* (a rather difficult plant to tackle with) and *Colqnhonna vestita* are the two new additions. The flowering plants in pots were in full bloom and some of them seeded. These attracted usual admiration of the visitors—

*Meconopsis Wallichii*, *Meconopsis simplicifolia*, *Meconopsis cambrica*, *Meconopsis nepalensis*, *3feconojs sinuata*, *Mecconopsis paniculata*, *Primula denticlata*, *Primula obtusifolia*, *Primula silMmensis*, *Primula petiolaris*, *Primula jloribunda*^ *Primula capitata*, *Saaifraga hispidula*, *Samfraga purpurescens*, *Samfraga diversifolia*, *Polygonum amplexicaule*, *Polygonum speciosum*, *Caltha palustris*, *Lychnis*



*alpina*, *Alyssum Saxatile*, *Alyssum serpyllifolium*, *Arabis alpina*, *Arabis muralis*, *Aubrietia Campbeli*, *Asphodel in e lutea*, *Cotula barbata*, *Genista Dasy Hill*, *Cytisus candidans*, *Cytisus scoparius*, *Lilium nepalense*, *Lilium Wallichii*, *Iris Clarkei*, *Iris Germanica*, *Iris ensata*, *Sedum coeruleum*, *Aster tricephalus*, *Aster diplostephioides*, *Nirumburgia Hippomanica*, *Smilacina fusca*, *Smilacina oleracea*, *Disporum calcaratum*, *Globularia trichosantha*, *Impatiens tripetala*, *Aster (rotundifolius)*, *Senecio diversifolia*, *Gentiana ornata*, *Gentiana elliptica*, *Potentilla Mooniana*, *Potentilla fulgens*, *Potentilla Kleiniana*, *Anaphalis triplinervis*, *Cymbidium giganteum*, *Cymbidium grandiflora*, *Cymbidium eburneum*, *Cymbidium Devonianum*, *Cypripedium Fairieanum*, *C. venustum*, *Calanthe brevicornu*, *odora*, *Phajus maculatus*.

On the constructive side necessary repairs of glass houses, fountains, conservatory, etc., were done. A tablet was erected in the rock garden which has been named "Sir John Anderson Bock Garden" after the late Governor of Bengal who took particular interest in the development of this portion of the Garden.

The herbarium, as noted in previous years, continued to prove to be a valuable acquisition to the Garden. Such a handy collection of the local flora offers excellent opportunity for provisional study of the East Himalayan plants on the spot. Proper attention to this collection is imperative and further incorporation of species is also essential for making the herbarium materials more useful. Need for exploration in the higher ranges and less known parts is indispensable both for horticultural operations and floristic work. Explorers and botanists from various parts of the world are making laudable attempts to acquaint themselves with the wonderful treasures of Sikkim plants which should better be thoroughly explored in a proper manner by the people of this country. The importance of a local flora of the Sikkim Himalayas cannot be over-emphasised. Steps are being taken for preparation of such a flora at the headquarters. There is much field also for the interested public to utilise in a profitable manner the vegetable resources of this part of the Himalayas.

Fifty-nine thousand eight hundred and five persons visited the Garden during the year. This includes some of the distinguished visitors from overseas who came to India as delegates to the Silver Jubilee Session of the Indian Science Congress Association held jointly with the British Association in Calcutta. This is the first occasion when Sir Arthur Hill, Director, Lloyd Botanic Garden, Kew, visited the Garden on the 30th and 31st December 1937. He was much interested in some of the species growing in this Garden.

The Curator and the staff of the Lloyd Botanic Garden as usual spared no pains to make the Darjeeling Flower Show a success. The Curator's co-operation with the writer in the preparation of a "Guide Book" of the Lloyd Botanic Garden, Darjeeling, is much to be appreciated.

**Finance.**—Out of an allotment of Es. 15,678 under all heads, Us. 15,285 were spent, leaving a saving of Us. 393.

**Staff.**—Mr. S. N. Basu was Curator throughout the year.

K. BISWAS,  
Superintendent,  
Royal Botanic Garden, Calcutta.

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# Annual Report of the Royal Botanic Garden and the Gardens *h* Calcutta and of the Lloyd Botanic Garden, Darjeeling, for 1939-40.

## ROYAL BOTANIC GARDEN.

**General.**—The Garden records indicate growing interest in horticulture among the general public. Year after year there is an increasing demand for the supply of economic, medicinal, garden and road\* side plants. Opportunities are taken by a large section of the public of <sup>a</sup> utilising the services of the scientific officers and horticulturists of this department in the solution of many a problem of taxonomy, <sup>l</sup> arboriculture, gardening, plant breeding and crossing experiments. During the course of a few years marked improvements have been made in hybridisation and propagation of plants. Much light has also lately been thrown on plant genetics, plant physiology, plant pathology, algology and ecology by recent investigators. The present method of circulating the results of experiments through scientific journals enables workers in different parts of the world to keep themselves in touch with the progress of science and to undertake studies of plants in newer aspects under conditions suitable to their respective countries. The Royal Botanic Garden, Calcutta, has been taking its full share in the advance made in the various directions of botanical and horticultural activities. The garden thus continues to be the centre for disseminating authentic information on Indian flora and gardening in India and abroad and contributes considerably to the widespread development of horticulture and to the promotion of <sup>o</sup> knowledge of the vast vegetation of India. It is gratifying that ordinary cultivators <sup>#</sup> are also becoming conscious of the possibilities <sup>oi</sup> horticulture. It is hoped that at no distant date, with the progress in education in the villages, our agriculturists will not hesitate to adopt the latest scientific methods of growing economic plants and marketable flowers.

Failure or success in raising annuals, particularly during the cold season, depends much on the weather conditions. Prolonged rains during the year made many experts rather sceptical about the prospect of this year's season flowers. In spite of this drawback there has been an all-round good result in the production of flowers. In this garden the standard and the quality of the flowers reached a very high order. The exhibits that were shown this year in the garden and in the flower shows of the Royal Agricultural and Horticultural Society of India well merited the appreciation of competent authorities, and the judges were unanimously of opinion that the ornamental plants and the flowers exhibited by this garden were the best this year. The garden, therefore, rightly deserved to be the recipient of the first prizes in almost all the sections at the annual shows. Dahlias, Asters, Sweet peas, Salvias, Phlox, Pansy, Gerberas, Hollyhocks, Cornflowers, Verbinas, Heliotropes and others were of record size and excellent quality. Their Magnificent colour and the luxuriance of the blooms won the admiration of all. The judicious display of flowers this year too in advantageous spots and along the edges of the lakes enhanced enormously the

beauty of the garden in the cold weather. The garden thus attracted an unprecedented number of visitors this year. Numerous picnic parties at this time of the year entailed an extra amount of labour on the staff in maintaining general tidiness. It is hoped that the picnickers will adhere to the garden rules and throw refuse in the wire-netted bins provided for the purpose and thus co-operate with the garden officers towards keeping the garden in proper order.

In addition to the attention paid to the routine work of the garden improvements have been effected in the various sections. The most noteworthy and far-reaching step is the attempt towards replacing the old system of watering plants in the important areas of the garden. The system of watering plants by manual labour which has hitherto been followed is antiquated, expensive and cumbrous. The quantity of the water given by means of man handling process is insufficient for maintaining the healthy growth of plants. Experiments made so far in watering the plants according to the new system yielded very promising results and it is obvious that when a motor and a pump are installed the arrangement of watering now adopted will be much more efficient. This watering system will prove to be extremely useful for rearing and acclimatising plants in the houses, flower gardens, shade rockery and nurseries and will thus be a great acquisition to the garden.

The garden was kept more clean and tidy than in the previous years by increasing the efficiency of the labour force and by stricter supervision of their work. Special attention has been paid this year to making the garden more interesting not only to the casual visitors to the garden out for recreation and enjoyment, but also for the students of botany and gardeners by enriching its collections in the various sections of the garden. About twenty species of interesting orchids have been imported from the Phillipines and Java and are doing well. The two rare desert plants—*Farocactus* sp. and the African *Mesevibrayanthemum* which have been introduced this year—are of considerable botanical interest. The beds in the Palm houses and the Orchid house have been rearranged and some were relaid with richer soil. This had the desired result on the growth of plants. Of the plants of medicinal value introduced this year are the *Cinchona* species—*Cinchona calsaya*, *Cinchona succirubra* and several species of *Eucalyptus*. The following species were planted in addition to those replaced during the year: —

*Aphelandra nitens* Hk.f., *Arsucaria brasilia.na* A. Rich., *Bauhinia tomentosa* Linn., *Boungainvillaea glabra* Chois. var. *Cypheri* Hort., *Boungainvillaea glabra* Chois. var. *Sanderiana* Hort., *Boungainvillaea glabra* Chois. var. *Traillii*, *Boungainvillaea Louis* Wathen., *Boungainvillaea Maharaja* of Mysore, *Boungainvillaea Maud* Chettleburgh. *Boungainvillaea Mrs. Fraser*., *Boungainvillaea refulgens* Bull. *Boungainvillaea spectabilis* Willd., *Boussingaultia basselloides* H.B.K. *Casuarina mnntana* Leschen. ex Miq., *Cinchona Calisaya* Wedd. *Cinchona succirubra* Pav. ex Kolt., *Clerodendron ugandense* Prain. *Cupressus Lindleyi* Klot., *Erythrina indica* Linn. var. *alba*., *Erythrina indica* Linn. var. *Blacki*., *Erythrina lihosperma* Bl., *Erythrina Parcellii* Hort., *Erythrina suberosa* Roxb., *Eucalyptus citriodora* Hook., *Eucalyptus crebra* F. Muel., *Eucalyptus ficifolia* F.-Muel., *Eucalyptus globulpus* Labill., *Fatsia papyrifera* Bth. ex Hk.f., *fasminum tortuosum* Willa., *Juniperus procera* Hochst. ex Lindl., *Melia Azedarach* Linn, var. *iaponica*., *Passiflora stipulata* Aubl., *Pereskia aculeata* Mill. var.

*Godsefiana.*, *Pinus masoniana* D. Don., *Rhus semialta* Murr., *Solamim cornigerum* Andre., *Terminalia alia* D. Don. var. *tomentosa.*, *Thunbergia mysorensis* T. Anders.

Of special interest this year is the flowering of "Century plants" *Corypha umbraculifera* (a palm tree) and the Agaves. The *Corypha* palm, commonly known as "talipot palm," flowers once in its life time after a period of 40 or 50 years when it attains full height of about 60-80 feet. The flowering stalk bursts out of the huge spathe with a loud explosion and gradually unfurls itself into a gigantic branched inflorescence 21 feet high which terminates the life of the palm (Photo I). The leaves and the seeds of this palm are used for various economic purposes. The Agaves yield a useful fibre known as "Sisal hemp." These plants also flower once in their life time. A tall terminal inflorescence about 20 feet high comes out of the centre of the rosette of large fleshy leaves coated with wax. The plants reproduce both by suckers and by bulbils in the place of many of the flowers. There is a great accumulation of sap, about 1,000 litres being found in the young flower heads of some of the species of this genus. The Mexicans cut off the young heads, collect the juice and prepare a national drink out of it after fermentation. Some of the Agaves may last many years if the flowering scape is cut off as soon as four feet high, when the axillary branches continue the growth of the plant; which is thus kept long alive by being prevented from flowering. This method of prolonging life of the plant is of much commercial importance because of the larger yield of fibres from the leaves (Photo II).

Some plants of the lower Himalayas have been introduced in the shade rockery which has been extended this year. The plants acclimatised in this section of the garden offer a splendid opportunity for studying many interesting hill plants which are not generally seen in the plains.

The great Banyan tree also received due attention and new shoots are spreading along the wooden platform forming a canopy over the roads as it was hoped it would be. The cleaning of the lakes was carried on in the usual manner and the rapid growth of submerged weeds has been kept under control by introducing a Brazilian water fern—*Salvinia auriculata*. This interesting floating fern by its rapid vegetative reproduction like that of the water hyacinth chokes up completely the surface of the water and thus shuts off light and oxygen from the submerged and rooted water plants in a lake or a pond. The aquatic plants below the surface of the water gradually die off in the absence of light for their assimilation and oxygen for their respiration. This exotic water fern, although it grows in dense masses, can easily and quickly be removed from the surface of the water after the desired result is obtained. The rooted aquatics and also the submerged water plants which create an insanitary state of the water can be kept under control by this biological means. It is doubtful, however, whether this rather delicate fern is strong enough to fight with water hyacinth and check its growth or replace the more powerful aquatic pest by a more speedy growth on the surface of the water.

It is gratifying that garden roads are now much improved by steady progress in road work. Some of the arterial roads and some paths too have been renovated and macadamised this year. Considerable progress has been made in writing labels for the plants, names of



avenues and signboards. Scientific labels for plants are essential adjuncts to a botanic garden of this standard and particular attention has been paid to this part of the work. A little over 1,500 labels have been written during the year.

2. **Plant and seed exchange.**—Thirteen thousand five hundred and twenty-five plants, 243 packets and 19 pounds of seeds were distributed in India and different parts of the world. Four hundred and forty-four plants and 200 packets of seeds were received from India and abroad.

3. **Herbarium and library.**—The work of the herbarium proceeded on the usual lines. The total number of specimens identified was 2,843 for various institutions and correspondents in India and abroad. The majority, about 800 sheets, were received from the Imperial Forest Research Institute, Dehra Dun. A collection of about 702 sheets of Burmese plants was received from Mr. E. D. Merrill, Director and Administrator of Botanical Collections of Harvard University, Arnold Arboretum, Mass, Jamaica Plain, Tj. S. A., for naming and confirmation of those determined at Harvard University. The loaning of specimens has to be curtailed on account of the war. The total number of specimens sent on loan was 118. These herbarium specimens were sent to well-known workers whose opinion on the examination of the specimens sent prove valuable to other workers. Mr. A. D. Cotton, O.B.E., Curator of the Herbarium, Royal Botanic Garden, Kew, revised 29 sheets of *Lilium (Notholirion)*. Dr. A. A. Pulle, Director, Botanical Museum and Herbarium, Utrecht, Netherlands, received 40 sheets of *Burseraceae* for examination in connection with his researches on the family. Dr. N. L. Bor, Forest Botanist, Forest Research Institute, Dehra Dun, studied critically 32 sheets of grasses. Mr. A. Das received a large number of Assam plants for his scrutiny in connection with the preparation of the Flora of Assam. The Forest Manager, Sikkim State, Gangtok, took an interest in *Prunus Padus* Linn, and *Acer caesium* Wall. Mr. A. D. Cotton returned 1,156 sheets after revising the names. One hundred and seventy-nine sheets sent to Dr. Pulle and Dr. Jonker in the Herbarium, Utrecht, Netherlands, in 1934, have all been received back safely. Dr. T. R. Holttum, Director, Botanic Garden, Singapore, Straits Settlements, returned 936 sheets of *Eugenia* after his critical study of the materials sent. A set of 867 specimens collected by Reverend Dickson in Burma on behalf of Dr. Merrill of Harvard University proved to be a valuable acquisition to the Herbarium. Fifty-one sheets of American Orchids, all duly named, have been received from Mr. L. O. Williams of Harvard University, Mass, U. S. A. Professor R. R. Stewart, Principal, Gordon College, Rawalpindi, was kind enough to present 108 sheets of N. W. Himalayan plants. Sir Arthur Hill sent us a duplicate specimen of the new species—*Androsace graminifolia* Fischer. A yellow-flowered specimen of *Holmskioldia sanguinea* Retz., belonging to the Shillong Herbarium, has been received from Professor S. R. Bose. One sheet of *Primula pudibunda* W. W. Smith was a new acquisition from the Chandra Nursery, Sikkim. The total number of specimens distributed from this herbarium was 629. A set of 298 duplicate sheets of Dr. Henry's collections from Central China made from 1885-88 was presented to Professor H. H. Hu as a valuable contribution towards building up the herbarium of the Fan Memorial Institute of Biology, Peiping, China. Professor R. R. Stewart received 128 sheets of the East



**Pheto I.**

*Corypha umbrata* Linn, (the Talipot Palm) in full bloom  
with a portion of the forest in the background.

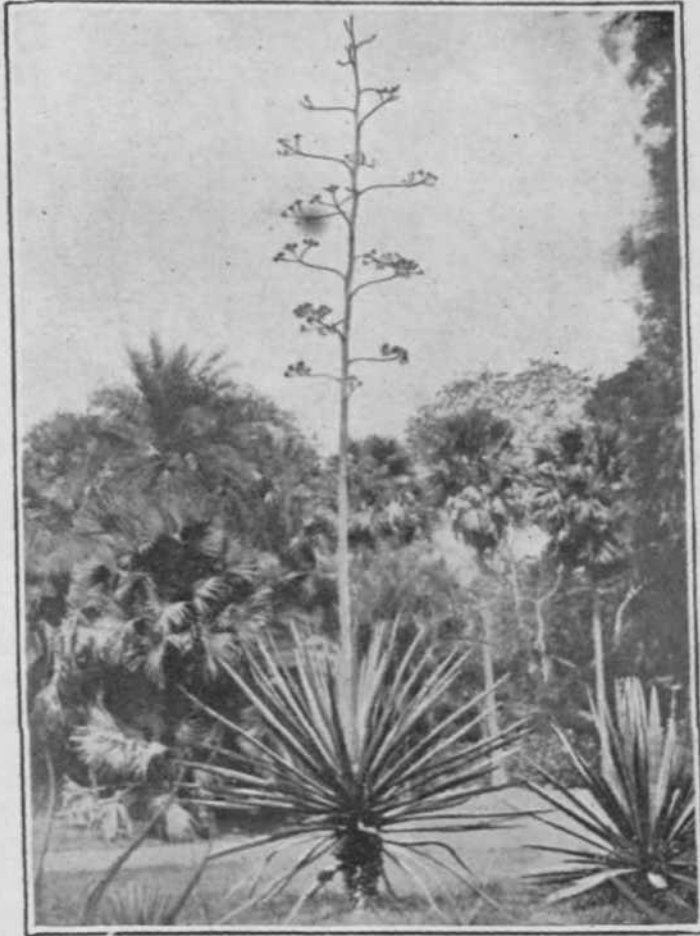


Photo II.

*Agave sisalana* Perrine in the foreground with flowers and bulbils developing higher up on the floral axis.

Himalayan specimens. One hundred sheets were sent to the new Botanical Department of Dacca University for teaching purposes. Professor Dixon, the well-known plant physiologist of Trinity College, Dublin, greatly appreciated a gift of 52 sheets of East Himalayan plants. Six sheets of tea-plants (*Camelliaiked*) were sent to Professor Mrs. L. Newton, University College of Wales, Aberstwyth, for the College Museum. Three duplicate sheets of *Notholirion macrophylla* filled up a gap in the Indian section of the Kew Herbarium. Two sheets—one of *Aryza sativa* and another of *Ficus elastica*—were given to the South African Museum, Cape Town. Dr. Handel Mazzetti of Vienna, Austria, was presented with two duplicate sheets—one each of *Sibbaldia perpusiloides* and *Sibbaldia sikkimensis*. A gift of four sheets of *Thyrsostachys oliveri* were made to the Herbarium, Forest Research Institute, Dehra Dun. Two cotype sheets of the new species of *Eugenia* discovered by Dr. E. E. Holttum from the materials of this herbarium were presented to him for the herbarium of the Royal Botanic Garden, Singapore\* Thirty herbarium specimens of selected timber trees of India with short notes on their distribution, quality of wood and uses were given to the Government Industrial Museum, Calcutta, for the purpose of exhibiting them in the gallery, the specimens of hard fungus collected by the Curator of the Herbarium in the Jubbulpore & Hill Tracts were presented to Professor S. R. Bose of the Jubbulpore Medical College for his study of these fungi so much destructive to the timbers. Mr. E. H. Walker of Smithsonian Institute, Washington, sent 14 photographs of sheets of the different insufficiently represented species of *Myrsinaceae* and in return he received from us 8 photographs of Kurz's type sheets of species belonging to the same family. Two photographs of sheets of *Desmodium Karenium* were also sent to Dr. F. P. Metcalf of the Arnold Arboretum. Pen and ink sketches, one of *Ephedra Gerardiana* and one of *Nardostachys Jatamansi* were supplied to Mr. R. C. Richardson of British Mission at Lasha. A sketch of *Aconitum Balfouris* was sent to Dr. H. Chowdhury of the Punjab University. Informations on various botanical questions were supplied to many correspondents.

Notes on the cultivation of *Pyrethrum* in India were furnished to Mr. S. C. Sen of Mungpoo, and to Mr. K. M. P. Tripathi of Badampahar, Tatanagar. Similar notes on the cultivation of the Ivory palm and Eucalyptus were supplied to other correspondents. A detailed account on the history and distribution of wild roses in India, was sent to Mr. E. M. Shipley, California. Rai Bahadur Dr. G. C. Chatterjee received information on the introduction of fodder crops in reclaimed areas. The Chief Chemist, Savan Sugar and Gur Refining Co., was instructed on the control of a parasitic flowering plant *Orobanchaeegyptiaca* which proved to be a pest. Instruction was also given to the Superintending Engineer, Public Works Department, Bannu, about the eradication of some aquatic weeds choking up the canals. The suggestions given proved effective in tackling the complicated problem of irrigation there. A note on the systematic position of *Etdophia cullinii* was sent to the Director, Royal Botanic Garden, Kew, while Botanical information about *Indigofera Dosua* has been supplied to Koloniale Bank, Soerabaia, Netherlands, East Indies. Among others who were furnished with authentic information on various important botanical questions are Dr. R. Salgues, President of the Foundation Salgues de Brignoles (yar.) France; the Locust Research Entomologist to the Imperial Council of Agricultural

Research; the Millets Specialist and Geneticist, Lawley Road, Coimbatore; the Director, Malaria Institute of India, Kasauli; Reverend F. E. Peter, Gnadenberg b<sup>1</sup>, Bunzlau, Germany; The Chief Commercial Manager, East Indian Railway, Calcutta; Dr. S. Hedayetullah, Economic Botanist to the Government of Bengal; The Chemical Adviser to the Department of Industries, Science College, Patna; Messrs. Mitsui Busan Kaisha, Fort Bombay; Dr. R. E. Holtum, Director, Botanic Gardens, Singapore; and the Imperial Mycologist, Imperial Agricultural Research Institute, New Delhi. Information about literature connected with research work and data and suggestions related thereto have been given to a large number of botanists in India and elsewhere. The Excise Department and the Chemical Examiner to the Government of Bengal were furnished with necessary information relating to poisonous plants and drugs.

Mr. V. Narayanaswami, Systematic Assistant, Botanical Survey of India, discharged ably, under the supervision of the Superintendent, his duties relating to the above *work* as far as the Government of India is concerned.

- Sheets incorporated in the herbarium during the year amounted to 4,626. These include the old collection of over 530 specimens of Heifer made a little over a century ago from places round about Calcutta, which<sup>^</sup> were received from Dr. Ivan Klastersky, Narodi Museum, Botanicke Oddel, Praha, Prague. These were all named by the Superintendent and finally incorporated in the herbarium as a present from Dr. Klastersky who was duly furnished with the list of the plants identified here. This year 3,430 genus and species covers were changed and more than 2,000 specimens mounted. Repairing and cleaning of sheets continued throughout the year in the usual manner.

A botanical tour was undertaken by the Superintendent in the Darjeeling district. The specimens collected were put in the local herbarium which needs further enriching with unrecorded and more complete materials. Another botanical excursion was made by him to Jhargram in the Midnapore district. His collection includes a number of important medicinal plants. The ecology of the deciduous community of plants of this part of the province is also receiving his attention with a view to a further study of the vegetation in this area along the boundary of Bengal. Towards the end of the year Curator of the Herbarium botanised in the Kassalong forests of Chittagong Hill Tracts and collected about 1,000 specimens. Some of the species collected from this place are likely to prove new records. A joint excursion was made by the Superintendent, the Curator of the Herbarium, Dr. N. L. Bor of the Forest Research Institute, Dehra Dun, Dr. S. R. Bose, Professor of Botany, Carmichael Medical College, and Dr. J. C. Sen Gupta, Professor of Botany, Presidency College, Calcutta, to Port Canning in order to studying the littoral vegetation in the neighbourhood. It is a pity that this interesting relic of the mangrove flora found so close to Calcutta and offering a splendid opportunity for the study of botany by students of Bengal in particular and of India in general is fast disappearing like that of the Salt-lakes, Calcutta.

**4. Publications!**—During this year the Superintendent published three articles on "Science and Culture," viz.: (1) Vegetables—The sustainer of Life—Science and Culture, Volume V, No. 1, 1940; (2) Peculiar behaviour of a Banana Plant at the Royal Botanic Garden—Science and Culture, Volume V, No. 2, 1940; (3) Abstract of "The

Western Isles through the mists of Ages by Sir A. C. Seward," Science and Culture, Volume 4, 1940. In collaboration with Mr. Narayanaswami, Dr. Biswas published a "Review on the Ferns of Mussorie by P. N. Mehra" published in Current Science, Volume 9, No. 1, 1940.

The proofs have been corrected of "Plants of the Llyod Botanic Garden, Darjeeling, by Dr. K. Biswas" and "A Revision of the Labiate of the Indian Empire by Dr. S. K. Mukerjee." Both the papers have gone for final printing. "Flora of the Akha Hills," a paper by Dr. K. Biswas, was handed to Dr. N. L. Bor for its publication in the Indian Forest Records. "Bharatia Banaushadi" by Dr. Biswas and E. Ghose, a treatise on medicinal plants in Bengali, is making steady progress in the Calcutta University Press.

The Annals of the Royal Botanic Garden, Calcutta, Volume XIV, Part 2, has been published. The set of plates printed by (Messrs. Spottiswoode Ballantyne are lying with them in London. These plates could not be brought to India on account of the international situation. Steps for circulating this valuable publication in spite of the present difficulties has, however, been taken at the suggestion of Sir David Prain and Mr. I. H. Burkill, the authors. Two sets have therefore been distributed in London—one to "Nature" and one to the Linnean Society, London, and two in India—one to the Royal Asiatic Society of Bengal and one to the Royal Botanic Garden, Peradeniya, Ceylon.

A number of botanists and research workers from India and abroad worked in the herbarium from time to time. All of them were given every facility and assistance for their work. Dr. N. L. Bor and his assistant Mr. M. B. Raizada of Dehra Dun consulted the herbarium materials in connection with the identification of their specimens and the collecting of data for other botanical investigations. The work on poisonous plants and medicinal plants of Brevet.-Colonel R. N. Chopra continued in the herbarium. Necessary co-operation was given to his botanists Messrs. R. L. Badhwar and N. C. Goswami and their assistants who worked satisfactorily throughout the year. Other visiting botanists were Messrs. R. N. De and A. Das, Dr. D. Chatterjee, Messrs. Sunil Mookerjee, P. N. Mehra, G. Mitra, Miss S. Meyer, Professor of Botany, Bethune College, Mr. A. K. Chakravarty, Assistant at the Rice Research Farm, Chinsura, Dr. A. H. Hallen, M.D., New Zealand, Professor C. A. Rylands, Professor of Sanskrit, London University.

Sir Mirza M. Ismail, Dewan of Mysore, the Hon'ble Khan Bahadur M. Azizul Haque, C.I.E., Speaker Legislative Assembly, and the Vice-Chancellor of Calcutta University, Mr. Kamal Tar Jung, Dewan of Hyderabad, were amongst the distinguished visitors to the garden during the year.

Library—The usual routine work of the library was carried on. Books sent on loan were 81 in number and those received back during the year numbered 95. This year 283 copies of books have been bound; of these, 200 copies were bound by the Superintendent, Government Printing, Bengal. Journals and periodicals purchased throughout the year were 26, and 68 were received in exchange or as presentations. A hundred copies of miscellaneous publications, a gift from Sir David Prain, were sent by Sir Arthur Hill from Kew. Best thanks are due to Sir David and Sir Arthur for this gift. Fourteen books were

purchased and nine were received as gifts. The preparation of the catalogue of the library was renewed along with the checking of the books. Dr. D. M. Bose, Director, Bose Research Institute, Calcutta, sent in exchange the new and the missing volumes of "The Transactions of the Bose Institute", and the set has now been completed.

5. Finance.—Rs. 49,550 was allotted for staff and permanent establishment, out of which Rs. 49,564 was spent. Under all other heads the expenditure amounted to Rs. 49,451 against the total allotment of Rs. 49,708. Receipt of the department during the year amounted to Rs. 1,450.

6. Staff.—The post of the Superintendent was held by Dr. K. Biswas throughout the year. Dr. S. K. Mukerjee held the post of the Curator of the Herbarium and Mr. N. Mitra, the Curator of the Royal Botanic Garden, Calcutta, throughout the year.

Mr. Quasem Ali held the post of the Assistant Curator, Royal Botanic Garden, Calcutta, during the year except for a short period of leave of 1 month and 23 days from the 30th October 1939 to the 22nd December 1939 when Mr. J. A. Hulbert, Overseer, officiated as Assistant Curator. Mr. Rabindra Nath Das Gupta, an outsider, acted as a temporary overseer from the 20th November to the 32nd December 1939.

Mr. A. T. Banerjee was Head Clerk throughout the year and discharged his duties efficiently. All the other staff worked satisfactorily.

### CALCUTTA GARDENS.

The work in the Eden, Dalhousie Square and Curzon Gardens was mainly of a routine type. The display of winter annuals was satisfactory in spite of the prolonged rains and the advent of the cold weather rather later than usual. The Dahlias and Asters grown from the acclimatised seeds proved very good and most of the flowers as large as those grown from imported seeds. The Victoria regia has acclimatised itself in the lakes of the Eden Gardens much better than in the Botanic Garden probably due to the better arrangement of water-supply in the former. The leaves of this giant water lily reached an enormous size and created considerable interest and admiration among the public. The plants flowered well and freely from August to October and became favourite objects for photographic purposes. A sufficient number of acclimatised seeds and seedlings of this plant are available for distribution.

Special attention was paid to increasing the standard of aesthetic and horticultural aspects, and also the improvement of sanitary conditions in the three gardens as far as limited funds would permit. Many flowering shrubs and trees were planted in suitable places and special attempts were made to maintain the hedges in proper shape and to refill the sections through which short cuts across the lawns are made. Necessary repairs were done to the Orchid house. The stock of rare and delicate Orchids, Ferns, Arums, Maranta, and others were enlarged by adopting scientific method of propagation. Species of Vanda, Dendrobium, Cattleya, Phalsenopsis, Renathefa and other Orchids in the shade houses flowered freely and with perfection. Four species of Orchids from Kalimpong presented by Master Humprey Jones were added to the collection this year. The lawn in front of the Pagoda was

dug up, relevelled and returfed with Dhub grass and a low red border was made all round by planting *Aerua sangvonioides*. The flower beds were also rearranged in this portion of the lawn. The clear cut beds here and those on the west of the Canna gardens though smaller in number were laid out in geometrical symmetry and this alteration in the laying out of the new flower beds enhanced the beauty of the garden and was much admired by the general public. The roads adjacent to this area were improved by a surface coating of "hotfix" and stone chips. Protection of the Calcutta gardens during the football seasons from the vast crowds that pass through them has become a problem. Provision of spiked iron railings on the walls of some portions of the Eden Gardens has become imperative.

The sanitary conditions of the lakes of the Eden Gardens cannot be improved without re-excavation. Weeding and surface cleaning, however, were carried on as far as possible. This year too some fish were caught from the lakes of the Eden Gardens and transferred to the Dalhousie Square tank. It is desirable to increase the stock of fish in this tank by letting in some good fry. This will attract anglers in sufficient number to recoup the money invested.

Finance.—Out of the total budget allotment of Es. 31,169 under all heads Rs. 31,161 was spent. The receipt from the Dalhousie Square Garden amounted to Rs. 20 only.

Staff.—Mr. Merlin Jones held the post of the Assistant Curator, Government Gardens, Calcutta, and Mr. G. Mohiuddin was Overseer throughout the year.

### LLOYD BOTANIC GARDEN, DARJEELING.

The rainfall at this garden was 123 inches being slightly less than the average. This, however, did not affect the growth of the plants. But prolonged rains followed by severe hailstorms towards the later part of the year damaged the annuals which had to be replaced in beds more than once. In addition to the routine work of the garden improvements were effected in many directions. The Sir John Anderson rock garden (Photo III) was extended and rearranged in order to raise the standard of this scientific garden to the level maintained in the other gardens of the temperate region of the world. The progress is slow but steady and it is hoped that in the near future it will be a centre of rare high altitude herbaceous and shrubby alpine flora which can be seen here to their best advantage blooming in the different seasons of the year. The value of this portion of the garden from the standpoint of botanical investigation need not be emphasised. The species added this year to this section of the garden are:—

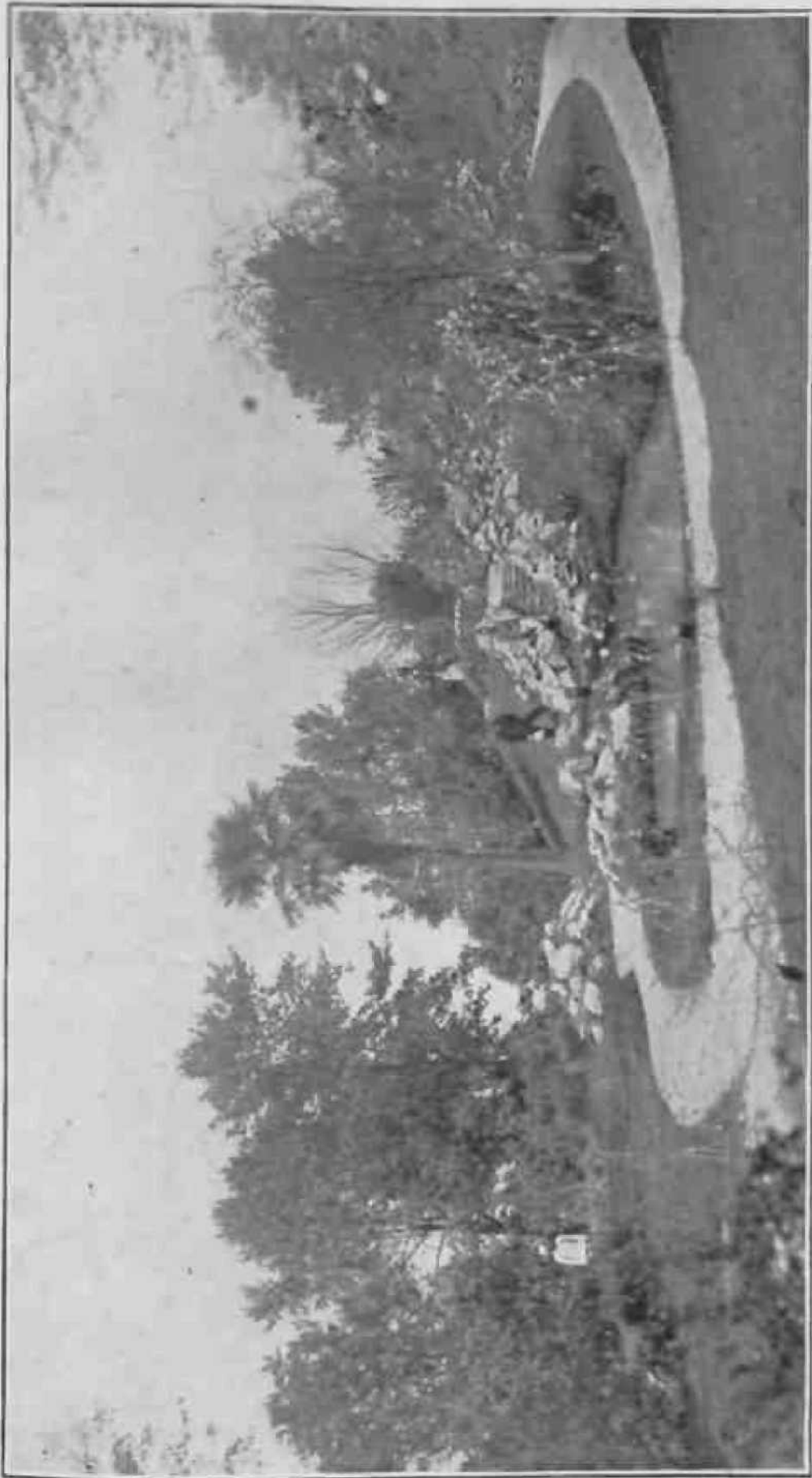
*Abies Webbia* Lindl., *Aconitum palmatum* Don., *Agapetes migna* Hook.f., *Allium Victorialis* Linn., *Armeria mauritanica* Wallr. (Syn. *A. formosa* Heyn.), *Armeria vulgaris* Willd. var. *Lancheana* Voss., *Aster Sikkimensis* HooJef., *Aster tricephalus* Clarke, *Aster trinervius* Roxb., *Callitris* sp., *Campanula latifolia* Linn., *Conium maculatum* Linn., *Cortia Hookeri* Clarke., *Cupressus Benthami* EndL., *Cupressus pisifera* Koch., *Cynoglossum zeylanicum* (Vahl) Thunb., (Syn. *C. furcatum* Wall), *Daphne papyracea* Wall ex Steud. (Syn. *D. cannabina* Wall), *Dianthus deltoides* Linn., *Engeron glabellus* Nutt. (Syn. *E. asper* Nutt.), *Eryngium planum* Linn., *Gaultheria*



*trichophylla* Royle., *Gentiana ornata* Wall., *Gentiana quadrifaria* Bl., *Gentiana septemfida* Pull., *Gentiana thianschanica* Rupr. (var.) (Syn. *G. decumbens* Clarke.), *Impatiens puberula* DC, *Impatiens spirifer* Hook.f. & T., *Impatiens tripetala* Roxb., *Juniperus recurva* Buch. Ham., *Lobelia syphititica* Linn., *Lychnis alpina* Linn., *Napeta nervosa* Royle ex Benth., *Onosma Emodi* Wall., *Parnassia nubicola* Wall., *Pentapterygium Hookeri* Clarke., *Picea morinda* Link., *Polygonum amplexicaule* Don., *Polygonum capitatum* Buch. Ham., *Potentilla fulgens* Wall., *Potentilla fruticosa* Linn., *Primula acaulis* Hill., *Primula capitala* Hook., *Primula denticulata* Smith., *Primula floribunda* Wall., *Primula Helenas* Auct., *Primula petiolaris* Wall., *Rhododendron anthopogon* Don., *Rhododendron campylocarpum*\* Hook.f., *Rhododendron ciliatum* Hk.f. & T., *Rhododendron cinnabarinum* Hook.f., *Rhododendron Dalhousiae* Hook.f., *Rhododendron Edgeworthii* Hook.f., *Rhododendron lepidotum* Wall., *Rhododendron vaccinoides* Hook.f., *Salvia glutinosa* Linn., *Verbascum Thapsus* Linn.

Necessary alterations to the laying out of the beds and to the displaying of green house pot plants in the conservatory resulted in better colour effects and were highly appreciated by the general public. Of particular interest is the flowering of the following plants of delicate beauty and of considerable horticultural value:—

*Adenophora Bulleyana* Diels., *Androsace Hookeriana* Klatt., *Androsace lactiflora* Hort. (Syn. *A. coronopifolia* Andr.), *Androsace Poissonii* Kunth., *Anemone Falconeri* Thorns., *Arabis pterospermata* Edgw. (Syn. *A. alpina* Hk.f. & T.), *Arctotis acaulis* Linn., (Syn. *A. scapigera* Thunb.), *Armeria mauritanica* Wallr. (Syn. *A. formes*\* Heyn.), *Armeria vulgaris* Willd., var. *Lancheana* Voss., *Arenaria laricifolia* Linn., *Arenaria montana* Linn., *Aster diplostiphoides* Benth. & Hook. f. *Aster rotundifolius* Thunb. (Syn. *Anathaea caelestis* Cass.), *Aster sikkimensis* Hook.f., *Aster tricephalus* Clarke., *Brodiaea grandiflora* Sm., *Calanthe brevicornu* Lindl., *Calanthe herbacea* Lindl. > *Calanthe masuca* Lindl., *Campanula latifolia* Linn., *Caltha villosa* Hook.f., *Cenia barbata* Benth. & Hook.f. (Syn. *Cotula barbata* DC.), *Cheiranthus Kewensis* Hort., *Cortia Hookeri* Clarke., *Dianthus deltoideus* Linn., *Dianthus plumarius* Linn. (var. *Scotch Pink*.), *Disporum pullum* Salisb., *Dracocephalum Ruyschiana* Linn., *Epilobium parviflorum* Schreb., *Erimus alpinus* Linn., *Erodium circuitarium* UHer., *Eryngium planum* Linn., *Eupatorium urticaefolium* Rich., *Francoa appendicixilo*\* Cav., *Gaultheria trichophylla* Royle., *Genista Dasy* Hill., *Gentiana ornata* Wall., *Gentiana septemfida* Pall., *Gentiana thianschanica* Rupr. > var (Syn. *G. decumbens* Clarke.), *Heliophila linerifolia* Burch ex DC\* *Homeria collina* Vent., *Lapeyrousia cruenta* Benth., *Libertia formosa* Graham., *Lilium cordifolium* Thunb. (Syn. *L. giganteum* Wall.) *Lilium nepalense* D. Don., *Lychnis alpina* Linn., *Lythrum hyssopifolia* Linn., *Meconopsis Baileyi* Prain., *Meconopsis cambrica* Vig., *Meconopsis nepalensis* DC, *Meconopsis paniculata* (Don) Prain., *Meconopsis Wallichii* Hook.f., *Napeta nervosa* Royle ex Benth., *Nierembergia frutescens* Dur., *Nierembergia hippomanica* Miers., *Oenothera speciosa* Nutt., *Onosma Emodi* Wall., *Parnassia nubicola* Wall., *Primula acaulis* Hill., *Primula Bulleyana* Forest., *Primula capitata* Hook., *Primula denticulata* Smith., *Primula floribunda* Wall., *Primula Helenae* Aurf., *Primula petiolaris* Wall., *Primula rotundifolia* Wall., *Primula sikkimensis* Hook.f., *Ranunculus aji* Unis R.Br., *Sagina subulata* Wimm. (Syn. *Spergula pilifera* Hort.), *Saxifraga hispidula* D. Don., *Smilacina fusca* Wall., *Smilacina oleracea* Hk.f. & T., *Thalictrum Chelidonii*



4 Sir John A. ...  
East Himala ...

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... ears very large crop of ... later.

*olyphilla* D. Don., *Verbascum thapsus* Linn., *Veronica luzianskya selaginoides* Walp. (Syn. *Nycteria selaginoides* Benth.)

Several species of local orchids grown on large trees flowered profuse- Professor White den expressed his admiration of the garden in these words. the finest spot in the Eastern Himalayas t centre for the study of the temperate flora of India.' forts were made to maintain the general tidiness of the lawns along the hillside by regular combing and thus the growth of moss was restricted. Top dressings and necessary repairs kept the roads and pathways in order. J ^ 8 1 ^ ^ roads according to the new map of the garden enable the visitors to have quicker access to any desired spot of the garden. The map is now published and available for sale at annas 4 per copy.

A student's garden with beds containing economic and medicinal plants of the Himalayas arranged in classified order has been designed by the Superintendent. It is being laid out under the special care of the Curator. This section of the garden, when properly developed, will be an asset to the garden and will prove to be of great educational and medicinal value.

The replacing of old trees and shrubs and the introduction of new ones continued. Two hundred and sixty-three plants were planted and 56 species of plants of economic value were added to the new student's garden in their respective family beds. Some new seats under the trees and rose bower with slight modification in their construction afforded much comfort to the visiting public. Necessary repairs to the houses, nurseries and durwans' shelters were carried out as far as funds permitted. During the monsoon there was a slip at the bottom of the malis' shed and it was necessary to erect the new rivetment wall to protect the shed from further damage. There were several cracks in the floor of the shed as well as in the plant house which were repaired with ferro concrete. About 58 packets of seeds were received on exchange from a large number of institutions in different parts of the world. Of these seeds the following species germinated successfully:—

*Royena lucida*, *Omalanthus populifolius*, *Iris Kashmiriana*, *Lilium Lowii*, *Lilium ochraceum*, *Lilium Wallichianum*, *Pinus rigida*, *Pinus echinata*, *Pinus strobus*, *Pinus sylvestris*, *Sambucus canadensis*, *Picea abies*, *Aquilegia eximea*, *Sedum spaihulifolium*, *Sedum coccineum*, *Linaria cymbelina*, *Lilium longiflorum*, *Ephedra gerardiana*.

Two thousand, six hundred and forty-two packets of seeds, 207 plants, 8,952 seedlings and 30 bulbs were distributed in India and abroad. In addition to these various botanical institutions and botanical departments of colleges in India and outside received plant materials for their study. The demand for such materials is increasing year by year evidently due to the advancement of knowledge and interest in the flora of our country. Famous botanists, research workers, college and school students and others interested in the Himalayan vegetation, visiting this garden and the herbarium, were taken round by the Curator and furnished with necessary information on various botanical and horticultural matters.

The Curator undertook a tour in October in the Singalela range in the region of Tonglo, Sandakphu and Phalute for his yearly collection of seeds and plants with a view to acclimatising them in Darjeeling.

The herbarium and the library were kept in better condition than last year and some additions were also made. It is expected that with the opening of the botanical departments in various colleges and with the growing interest in the vegetation of the Himalayas this local herbarium like that of the Calcutta herbarium will be more and more utilised. The Curator will be pleased to give all facilities and place the collection at the disposal of any botanist wishing to compare specimens collected from this most fine and rich floristic region of the Himalayas, with those collected from the Assam Hills in the East, the Nepal ranges in the West and Tibet in the North. If botanists fail to get all their specimens named here on the spot, the staff at the Calcutta Herbarium will gladly add their help in this direction at headquarters.

"The Plants of the Lloyd Botanic Garden" with a map is in the final stages of printing. The writer appreciates the ungrudging help rendered by Mr. S. N. Basu, the Curator, and Babu Jogendra Nath Nasker, the Herbarium Assistant, in the preparation of the book.

The garden register records 67,888 visitors to the garden during the year. This figure surpasses all previous records.

**Finance.**—Out of an allotment of Rs. 16,111 under all heads, Rs. 16,085 was spent.

**Staff.**—Mr. S. N. Basu was Curator, Lloyd Botanic Garden, Darjeeling, throughout the year.

K. BISWAS,

*Superintendent,*

*Royal Botanic Garden, Calcutta.*

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# Annual Report of the Royal Botanic Garden and the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling, for 193940.

## ROYAL BOTANIC GARDEN.

**General.**—The Garden records indicate growing interest in horticulture among the general public. Year after year there is an increasing demand for the supply of economic, medicinal, garden and roadside plants. Opportunities are taken by a large section of the public of utilising the services of the scientific officers and horticulturists of this department in the solution of many a problem of taxonomy, arboriculture, gardening, plant breeding and crossing experiments. During the course of a few years marked improvements have been made in hybridisation and propagation of plants. Much light has also lately been thrown on plant genetics, plant physiology, plant pathology, algology and ecology by recent investigators. The present method of circulating the results of experiments through scientific journals enables workers in different parts of the world to keep themselves in touch with the progress of science and to undertake studies of plants in newer aspects under conditions suitable to their respective countries. The Royal Botanic Garden, Calcutta, has been taking its full share in the advance made in the various directions of botanical and horticultural activities. The garden thus continues to be the centre for disseminating authentic information on Indian flora and gardening in India and abroad and contributes considerably to the widespread development of horticulture and to the promotion of OUT knowledge of the vast vegetation of India. It is gratifying that ordinary cultivators are also becoming conscious of the possibilities of horticulture. It is hoped that at no distant date, with the progress in education in the villages, our agriculturists will not hesitate to adopt the latest scientific methods of growing economic plants and marketable flowers.

Failure or success in raising annuals, particularly during the cold season, depends much on the weather conditions. Prolonged rains during the year made many experts rather sceptical about the prospect of this year's season flowers. In spite of this drawback there has been an all-round good result in the production of flowers. In this garden the standard and the quality of the flowers reached a very high order. The exhibits that were shown this year in the garden and in the flower shows of the Eoyal Agricultural and Horticultural Society of India well merited the appreciation of competent authorities, and the judges were unanimously of opinion that the ornamental plants and the flowers exhibited by this garden were the best this year. The garden, therefore, rightly deserved to be the recipient of the first prizes in almost all the sections at the annual shows. Dahlias, Asters, Sweet peas, Salvias, Phlox, Pansy, Gerberas, Hollyhocks, Cornflowers, Verbinas, Heliotropes and others were of record size and excellent quality. Their magnificent colour and the luxuriance of the blooms won the admiration of all. The judicious display of flowers this year too in advantageous spots and along the edges of the lakes enhanced enormously the

beauty of the garden in the cold weather. The garden thus attracted an unprecedented number of visitors this year. Numerous parties at this time of the year entailed an extra amount of the staff in maintaining general tidiness. It is hoped that picnickers will adhere to the garden rules and throw refuse in the netted bins provided for the purpose and thus co-operate with the garden officers towards keeping the garden in proper order.

In addition to the attention paid to the routine work of the garden improvements have been effected in the various sections. The noteworthy and far-reaching step is the attempt towards replacing the old system of watering plants in the important areas of the garden. The system of watering plants by manual labour which has been followed is antiquated, expensive and cumbrous. The quantity of the water given by means of man handling process is insufficient for maintaining the healthy growth of plants. Experiments made so far in watering the plants according to the new system yielded very promising results and it is obvious that when a motor and a pump are installed the arrangement of watering now adopted will be much more efficient. This watering system will prove to be extremely useful in rearing and acclimatising plants in the houses, flower gardens, rockery and nurseries and will thus be a great acquisition to the garden.

The garden was kept more clean and tidy than in the previous year by increasing the efficiency of the labour force and by stricter supervision of their work. Special attention has been paid this year to making the garden more interesting not only to the casual visitor to the garden out for recreation and enjoyment, but also for the students of botany and gardeners by enriching its collections in the various sections of the garden. About twenty species of interesting orchids have been imported from the Phillipines and Java and are doing well. The two rare desert plants—*Farocactus* sp. and the *Mesemhrayanihemum* which have been introduced this year are of considerable botanical interest. The beds in the Palm house and the Orchid house have been rearranged and some were relaid with rich soil. This had the desired result on the growth of plants. The plants of medicinal value introduced this year are the *Cinchona* species—*Cinchona calisaya*, *Cinchona succirubra* and several species of *Eucalyptus*. The following species were planted in addition to those replaced during the year:—

*Aphelandra nitens* Hk.f., *Arsucaria brasiliensis* A. Rich., *Bauhinia tomentosa* Linn., *Bougainvillea glabra* Chois. var. *Cypheredula*, *Bougainvillea glabra* Chois. var. *Sandriana* Hort., *Bougainvillea glabra* Chois. var. *Trillii*, *Bougainvillea Louis Wahlen.*, *Bougainvillea Maharaja of Mysore*, *Bougainvillea Maud Chettleburgi*, *Bougainvillea Mrs. Fraser*, *Bougainvillea reflexa*, *Bougainvillea spectabilis* Willd., *Boussingaultia besseloides*, *Casuarina montana* Leschen. ex Miq., *Cinchona Calisaya*, *Cinchona succirubra* Pav. ex Kolt., *Clerodendron ugandense*, *Cupressus Lindleyi* Klot., *Erythrina indica* Linn. var. *alba*, *Erythrina indica* Linn. var. *Blackii*, *Erythrina lithosperma* BL, *Erythrina Parcellii* Hort., *Erythrina suberosa* Roxb., *Eucalyptus citriodora* HOOK., *Eucalyptus crebra* F. Muel., *Eucalyptus ficifolia* F. Muel., *Eucalyptus globulus* Labill., *Fatsia papyrifera* Bth. ex Hk.f., *Jasminum tortuosum* Willd., *Juniperus procera* Hochst. ex Lindl., *Melia Azedarach* Linn. var. *japonica*, *Passiflora stipulata* Aubl., *Pereskia aculeata* Mill. var.

*Godseficma.*, *Pinus masoniana* D. Don., *JRhus semialta* Murr., *Solanum cornigerum* Andre., *Terminalia alta* D. Don. var. *tomentosa.*, *Thunbergia mysorensis* T. Anders.

Of special interest this year is the flowering of "Century plants" *Corypha umbraculifera* (a palm tree) and the Agaves. The *Corypha* palm, commonly known as "talipot palm," flowers once in its life time after a period of 40 or 50 years when it attains full height of about 60-80 feet. The flowering stalk bursts out of the huge spathe with a loud explosion and gradually unfurls itself into a gigantic branched inflorescence 21 feet high which terminates the life of the palm (Photo I). The leaves and the seeds of this palm are used for various economic purposes. The Agaves yield a useful fibre known as "Sisal hemp." These plants also flower once in their life time. A tall terminal inflorescence about 20 feet high comes out of the centre of the rosette of large fleshy leaves coated with wax. The plants reproduce both by suckers and by bulbils in the place of many of the flowers. There is a great accumulation of sap, about 1,000 litres being found in the young flower heads of some of the species^ of this genus. The Mexicans cut off the young heads, collect the juice and prepare a national drink out of it after fermentation. Some of the Agaves may last many years if the flowering scape is cut off as soon as four feet high, when the axillary branches continue the growth of the plant; which is thus kept long alive by being prevented from flowering. This method of prolonging life of the plant is of much commercial importance because of the larger yield of fibres from the leaves (Photo II).

Some plants of the lower Himalayas have been introduced in the shade rockery which has been extended this year. The plants acclimatised in this section of the garden offer a splendid opportunity for studying many interesting hill plants which are not generally" seen in the plains.

The great Banyan tree also received due attention and new shoots are spreading along the wooden platform forming a canopy over the roads as it was hoped it would be. The cleaning of the lakes was carried on in the usual manner and the rapid growth of submerged weeds has been kept under control by introducing a Brazilian water fern—*Salvinia auriculata*. This interesting floating fern by its rapid vegetative reproduction like that of the water hyacinth chokes up completely the surface of the water and thus shuts off light and oxygen from the submerged and rooted water plants in a lake or a pond. The aquatic plants below the surface of the water gradually die off in the absence of light for their assimilation and oxygen for their respiration. This exotic water fern, although it grows in dense masses, can easily and quickly be removed from the surface of the water after the desired result is obtained. The rooted aquatics and also the submerged water plants which create an insanitary state of the water can be kept under control by this biological means. It is doubtful, however, whether this rather delicate fern is strong enough to fight with water hyacinth and check its growth or replace the more powerful aquatic pest by a more speedy growth on the surface of the water.

It is gratifying that garden roads are now much improved by steady progress in road work. Some of the arterial roads and some paths too have been renovated and macadamised this year. Considerable progress has been made in writing labels for the plants, names of

avenues and signboards. Scientific labels for plants are essential adjuncts to a botanic garden of this standard and particular attention has been paid to this part of the work. A little over 1,500 labels have been written during the year.

2. **Plant and seed exchange.**—Thirteen thousand five hundred and twenty-five plants, 243 packets and 19 pounds of seeds were distributed in India and different parts of the world. Four hundred and forty-four plants and 200 packets of seeds were received from India and abroad.

3. **Herbarium and library.**—The work of the herbarium proceeded on the usual lines. The total number of specimens identified 2,843 for various institutions and correspondents in India and abroad. The majority, about 800 sheets, were received from the Imperial Forest Research Institute, Dehra Dun. A collection of about 702 sheets of Burmese plants was received from Mr. E. D. Merrill, Director and Administrator of Botanical Collections of Harvard University, Arnold Arboretum, Mass, Jamaica Plain, U. S. A., for naming and confirmation of those determined at Harvard University. The loaning of specimens has to be curtailed on account of the war. The total number of specimens sent on loan was 118. These herbarium specimens were sent to well-known workers whose opinion on the examination of the specimens sent prove valuable to other workers. Mr. A. D. Cotton, O.B.E., Curator of the Herbarium, Royal Botanic Garden, Kew, revised 29 sheets of *Lilium (Notholirion)*. Dr. A. A. Pulle, Director, Botanical Museum and Herbarium, Utrecht, Netherlands, received 40 sheets of *Burseraceae* for examination in connection with his researches on the family. Dr. N. L. Bor, Forest Botanist, Forest Research Institute, Dehra Dun, studied critically 32 sheets of grasses. Mr. A. Das received a large number of Assam plants for his scrutiny in connection with the preparation of the Flora of Assam. The Forest Manager, Sikkim State, Gangtok, took an interest in *Prunus Padus* Linn, and *Acer caesium* Wall. Mr. A. D. Cotton returned 1,156 sheets after the names. One hundred and seventy-nine sheets sent to Dr. P. and Dr. Jonker in the Herbarium, Utrecht, Netherlands, in 1934, have all been received back safely. Dr. T. R. Holttum, Director, Botanic Garden, Singapore, Straits Settlements, returned 936 sheets of *Eugenia* after his critical study of the materials sent. A set of 867 specimens collected by Reverend Dickson in Burma on behalf of Dr. Merrill of Harvard University proved to be a valuable acquisition to the Herbarium. Fifty-one sheets of American Orchids, all duly named, have been received from Mr. L. O. Williams of Harvard University, Mass. U. S. A. Professor R. R. Stewart, Principal, Gordon College, Rawalpindi, was kind enough to present 108 sheets of N. W. Himalayan plants. Sir Arthur Hill sent us a duplicate specimen of the new species—*Androsace graminifolia* Fischer. A yellow-flowered specimen of *Holmskioldia sanguinea* Retz., belonging to the Shillong Herbarium, has been received from Professor S. R. Bose. One sheet of *Primula pudibunda* W. W. Smith was a new acquisition from the Chandra Nursery, Sikkim. The total number of specimens distributed from this herbarium was 629. A set of 298 duplicate sheets of Dr. Henry's collections from Central China made from 1885-88 was presented to Professor H. H. Hu as a valuable contribution towards building up the herbarium of the Fan Memorial Institute of Biology, Peiping, China. Professor R. R. Stewart received 128 sheets of the East



**Photo I-**

*Corypha tinnhracultfor.i li&o.* (Tint Tulipot Palm) in MI bloom  
with a jturtun iii Piltm-Tum fflrmini: thv background.



**Photo IL.**

Agave siittUiw Porrinr in tht\* frefirmuwJ with **QowtCi** and  
tmlliibi cki'C1'Hiin»l higher up on the lb\*txt\ ttxK

Himalayan specimens. One hundred sheets were sent to the new Botanical Department of Dacca University for teaching purposes. Professor Dixon, the well-known plant physiologist of Trinity College, Dublin, greatly appreciated a gift of 52 sheets of East Himalayan plants. Six sheets of tea-plants (*Camellia ihea*) were sent to Professor Mrs. L. Newton, University College of Wales, Aberstwyth, for the College Museum. Three duplicate sheets of *Notholirton macrophylla* filled up a gap in the Indian section of the Kew Herbarium. Two sheets—one of *Aryza sativa* and another of *Fious elastica*—were given to the South African Museum, Cape Town. Dr. Handel Mazzetti of Vienna, Austria, was presented with two duplicate sheets—one each of *Sibbaldia perpusiloides* and *Sibbaldia sikhimensis*. A gift of four sheets of *Thyrsostachys oliveri* were made to the Herbarium, Forest Research Institute, Dehra Dun. Two cotype sheets of the new species of *Eugenia* discovered by Dr. R. E. Holttum from the materials of this herbarium were presented to him for the herbarium of the Royal Botanic Garden, Singapore. Thirty herbarium specimens of selected timber trees of India with short notes on their distribution, quality of wood and uses were given to the Government Industrial Museum, Calcutta, for the purpose of exhibiting them in the gallery. The specimens of hard fungus collected by the Curator of the Herbarium in the Chittagong Hill Tracts were presented to Professor S. R. Bose of the Carmichael Medical College for his study of these fungi so much destructive to the timbers. Mr. E. H. Walker of Smithsonian Institute, Washington, sent 14 photographs of sheets of the different insufficiently represented species of *Myrsinaceae* and in return he received from us 8 photographs of KUTZ'S type sheets of species belonging to the same family. Two photographs of sheets of *Desmodium Karensium* were also sent to Dr. F. P. Metcalf of the Arnold Arboretum. Pen and ink sketches, one of *Ephedra Gerardiana* and one of *Nardostachys Jatamansi* were supplied to Mr. R. C. Richardson of British Mission at Lasha. A sketch of *Aconitum Balfouris* was sent to Dr. H. Chowdhury of the Punjab University. Informations on various botanical questions were supplied to many correspondents.

Notes on the cultivation of *Pyrethrum* in India were furnished to Mr. S. C. Sen of Mungpoo, and to Mr. K. M. P. Unithan of Badampahar, Tatanagar. Similar notes on the cultivation of the Ivory palm and Eucalyptus were supplied to other correspondents. A detailed account on the history and distribution of wild roses in India, was sent to Mr. E. M. Shipley, California. Rai Bahadur Dr. G. C. Chatterjee received information on the introduction of fodder crops in reclaimed areas. The Chief Chemist, Savan Sugar and Gur Refining Co., was instructed on the control of a parasitic flowering plant *Orobanche aegyptiaca* which proved to be a pest. Instruction was also given to the Superintending Engineer, Public Works Department, Bannu, about the eradication of some aquatic weeds choking up the canals. The suggestions given proved effective in tackling the complicated problem of irrigation there. A note on the systematic position of *Eulophia cullinii* was sent to the Director, Royal Botanic Garden, Kew, while Botanical information about *Indigofera Dosua* has been supplied to Koloniale Bank, Soerabaia, Netherlands, East Indies. Among others who were furnished with authentic information on various important botanical questions are Dr. R. Salgues, President of the Foundation Salgues de Brignoles (var.) France; the Locust Research Entomologist to the Imperial Council of Agricultural

Research; the Millets Specialist and Geneticist, Lawley Road, Coimbatore; the Director, Malaria Institute of India, Kasauli; Bejeranu F. E. Peter, Gnadenberg b<sup>1</sup>, Bunzlau, Germany; The Chief Commercial Manager, East Indian Railway, Calcutta; Dr. S. Hedayetunan, Economic Botanist to the Government of Bengal; The Chemical Adviser to the Department of Industries, Science College, Patna; Messrs. Mitsui Bussan Kaisha, Fort Bombay; Dr. R. E. Holttum, Director, Botanic Gardens, Singapore; and the Imperial Mycologist, Imperial Agricultural Research Institute, New Delhi; Information about literature connected with research work and data and suggestions related thereto have been given to a large number of botanists, in India and elsewhere. The Excise Department and the Chemical Examiner to the Government of Bengal were furnished with necessary information relating to poisonous plants and drugs.

Mr. V. Narayanaswami, Systematic Assistant, Botanical Survey of India, discharged ably, under the supervision of the Superintendent, his duties relating to the above work as far as the Government of India is concerned.

Sheets incorporated in the herbarium during the year amounted to 4,626. These include the old collection of over 530 specimens of Heifer made a little over a century ago from places round about Calcutta, which were received from Dr. Ivan Klastersky, Narodi Museum, Botanicke Oddel, Praha, Prague. These were all named by the Superintendent and finally incorporated in the herbarium as a present from Dr. Klastersky who was duly furnished with the list of the plants identified here. This year 3,430 genus and species covers were changed and more than 2,000 specimens mounted. Repairing and cleaning <sup>o\*</sup> sheets continued throughout the year in the usual manner.

A botanical tour was undertaken by the Superintendent in the Darjeeling district. The specimens collected were put in the local herbarium which needs further enriching with unrecorded and more complete materials. Another botanical excursion was made by him to Jhargram in the Midnapore district. His collection includes a number of important medicinal plants. The ecology of the deciduous community of plants of this part of the province is also receiving his attention with a view to a further study of the vegetation in this area along the boundary of Bengal. Towards the end of the year Curator of the Herbarium botanised in the Kassalong forests of Chittagong HiU Tracts and collected about 1,000 specimens. Some of the species collected from this place are likely to prove new records. A joint excursion was made by the Superintendent, the Curator of the Herbarium, Dr. N. L. Bor of the Forest Research Institute, Dehra Dun, Dr. S. R. Bose, Professor of Botany, Carmichael Medical College, and Dr. J. C. Sen Gupta, Professor of Botany, Presidency College, Calcutta, to Port Canning in order to studying the littoral vegetation in the neighbourhood. It is a pity that this interesting relic of the mangrove flora found so close to Calcutta and offering a splendid opportunity for the study of botany by students of Bengal in particular and of India in general is fast disappearing like that of the Salt-lakes, Calcutta.

**4. Publications.**—During this year the Superintendent published three articles on "Science and Culture," viz.: (1) "Vegetables—The sustainer of Life—Science and Culture, Volume V, No. 1, 1940; (2) <sup>LA<sup>2</sup>l ?<sup>ecu</sup></sup>har behaviour of a Banana Plant at the Royal Botanic Garden—Science and Culture, Volume V, No. 2, 1940; (3) Abstract of "The



Western Isles through the mists of Ages by Sir A. C. Seward," Science and Culture, Volume 4, 1940. In collaboration with Mr. Narayanaswami, Dr. Biswas published a "Review on the Ferns of Mussorie by P. N. Mehra" published in Current Science, Volume 9, No. 1, 1940.

The proofs have been corrected of "Plants of the Llyod Botanic Garden, Darjeeling, by Dr. K. Biswas" and "A Revision of the Labiatse of the Indian Empire by Dr. S. K. Mukerjee." Both the papers have gone for final printing. "Flora of the Akha Hills," a paper by Dr. K. Biswas, was handed to Dr. N. L. Bor for its publication in the Indian Forest Records. "Bharatia Banaushadi" by Dr. Biswas and E. Ghose, a treatise on medicinal plants in Bengali, is making steady progress in the Calcutta University Press.

The Annals of the Royal Botanic Garden, Calcutta, Volume XIV, Part 2, has been published. The set of plates printed by (Messrs. Spottiswoode Ballantyne are lying with them in London. These plates could not be brought to India on account of the international situation. Steps for circulating this valuable publication in spite of the present difficulties has, however, been taken at the suggestion of Sir David Prain and Mr. I. H. Burkill, the authors. Two sets have therefore been distributed in London—one to "Nature" and one to the Linnean Society, London, and two in India—one to the Royal Asiatic Society of Bengal and one to the Royal Botanic Garden, Peradeniya, Ceylon.

A number of botanists and research workers from India and abroad worked in the herbarium from time to time. All of them were given every facility and assistance for their work. Dr. N. L. Bor and his assistant Mr. M. B. Raizada of Dehra Dun consulted the herbarium materials in connection with the identification of their specimens and the collecting of data for other botanical investigations. The work on poisonous plants and medicinal plants of Brevet.-Colonel R. N. Chopra continued in the herbarium. Necessary co-operation was given to his botanists Messrs. R. L. Badhwar and N. C. Goswami and their assistants who worked satisfactorily throughout the year. Other visiting botanists were Messrs. R. N. De and A. Das, Dr. D. Chatterjee, Messrs. Sunil Mookerjee, P. N. Mehra, G. Mitra, Miss S. Meyer, Professor of Botany, Bethune College, Mr. A. K. Chakravarty, Assistant at the Rice Research Farm, Chinsura, Dr. A. H. Hallen, M.D., New Zealand, Professor C. A. Rylands, Professor of Sanskrit, London University.

Sir Mirza M. Ismail, Dewan of Mysore, the Hon'ble Khan Bahadur M. Azizul Haque, C.I.E., Speaker Legislative Assembly, and the Vice-Chancellor of Calcutta University, Mr. Kamal Tar Jung, Dewan of Hyderabad, were amongst the distinguished visitors to the garden during the year.

**Library**—The usual routine work of the library was carried on. Books sent on loan were 81 in number and those received back during the year numbered 95. This year 283 copies of books have been bound; of these, 200 copies were bound by the Superintendent, Government Printing, Bengal. Journals and periodicals purchased throughout the year were 26, and 68 were received in exchange or as presentations. A hundred copies of miscellaneous publications, a gift from Sir David Prain, were sent by Sir Arthur Hill from Kew. Best thanks are due to Sir David and Sir Arthur for this gift. Fourteen books were

purchased and nine were received as gifts. The preparation of the catalogue of the library was renewed along with the checking of books. Dr. D. M. Bose, Director, Bose Research Institute, sent in exchange the new and the missing volumes of "The Transactions of the Bose Institute", and the set has now been completed.

5. **Finance.**—Rs. 49,550 was allotted for staff and establishment, out of which Rs. 49,564 was spent. Under all heads the expenditure amounted to Rs. 49,451 against the total allotment of Rs. 49,708. Receipt of the department during the year amounted to Rs. 1,450.

6. **Staff.**—The post of the Superintendent was held by Dr. Biswas throughout the year. Dr. S. K. Mukerjee held the post of Curator of the Herbarium and Mr. N. Mitra, the Curator of the Botanic Garden, Calcutta, throughout the year.

Mr. Quasem Ali held the post of the Assistant Curator, Botanic Garden, Calcutta, during the year except for a short period of leave of 1 month and 23 days from the 30th October 1939 to the 31st December 1939 when Mr. J. A. Hulbert, Overseer, officiated as Assistant Curator. Mr. Rabindra Nath Das Gupta, an outsider, acted as temporary overseer from the 20th November to the 32nd December 1939.

Mr. A. T. Banerjee was Head Clerk throughout the year and discharged his duties efficiently. All the other staff worked satisfactorily.

### CALCUTTA GARDENS.

The work in the Eden, Dalhousie Square and Curzon Gardens mainly of a routine type. The display of winter annuals was satisfactory in spite of the prolonged rains and the advent of the weather rather later than usual. The Dahlias and Asters grown from the acclimatised seeds proved very good and most of the flowers as large as those grown from imported seeds. The Victoria regia acclimatised itself in the lakes of the Eden Gardens much better in the Botanic Garden probably due to the better arrangement of water supply in the former. The leaves of this giant water lily enormous size and created considerable interest and admiration among the public. The plants flowered well and freely from August to October and became favourite objects for photographic purposes; a sufficient number of acclimatised seeds and seedlings of this plant available for distribution.

Special attention was paid to increasing the standard of horticultural aspects, and also the improvement of sanitary conditions in the three gardens as far as limited funds would permit. Flowering shrubs and trees were planted in suitable places and attempts were made to maintain the hedges in proper shape and to refill the sections through which short cuts across the lawns are necessary. Necessary repairs were done to the Orchid house. The stock of delicate Orchids, Ferns, Arums, Maranta, and others were increased by adopting scientific method of propagation. Species of Dendrobium, Cattleya, Phalsenopsis, Renanthera and other Orchids in the shade houses flowered freely and with perfection. Four species of Orchids from Kalimpong presented by Master Humprey Jones were added to the collection this year. The lawn in front of the Pagoda was

dug up, relevelled and returfed with Dhub grass and a low red border was made all round by planting *Aerua sanguinioides*. The flower beds were also rearranged in this portion of the lawn. The clear cut beds here and those on the west of the Canna gardens though smaller in number were laid out in geometrical symmetry and this alteration in the laying out of the new flower beds enhanced the beauty of the garden and was much admired by the general public. The roads adjacent to this area were improved by a surface coating of "hotfix" and stone chips. Protection of the Calcutta gardens during the football seasons from the vast crowds that pass through them has become a problem. Provision of spiked iron railings on the walls of some portions of the Eden Gardens has become imperative.

The sanitary conditions of the lakes of the Eden Gardens cannot be improved without re-excavation. Weeding and surface cleaning, however, were carried on as far as possible. This year too some fish were caught from the lakes of the Eden Gardens and transferred to the Dalhousie Square tank. It is desirable to increase the stock of fish in this tank by letting in some good fry. This will attract anglers in sufficient number to recoup the money invested.

**Finance.**—Out of the total budget allotment of Es. 31,169 under all heads Es. 31,161 was spent. The receipt from the Dalhousie Square Garden amounted to Es. 20 only.

**Staff.**—Mr. Merlin Jones held the post of the Assistant Curator, Government Gardens, Calcutta, and Mr. G. Mohiuddin was Overseer throughout the year.

### LLOYD BOTANIC GARDEN, DARJEELING.

The rainfall at this garden was 123 inches being slightly less than the average. This, however, did not affect the growth of the plants. But prolonged rains followed by severe hailstorms towards the later part of the year damaged the annuals which had to be replaced in beds more than once. In addition to the routine work of the garden improvements were effected in many directions. The Sir John Anderson rock garden (Photo III) was extended and rearranged in order to raise the standard of this scientific garden to the level maintained in the other gardens of the temperate region of the world. The progress is slow but steady and it is hoped that in the near future it will be a centre of rare high altitude herbaceous and shrubby alpine flora which can be seen here to their best advantage blooming in the different seasons of the year. The value of this portion of the garden from the standpoint of botanical investigation need not be emphasised. The species added this year to this section of the garden are:—

*Abies Webbia* Lindl., *Aconitum palmatum* Don., *Agapetes saligna* Hook.f., *Allium Victorialis* Linn., *Armeria mauritonica* Wallr. (Syn. *A. formosa* Heyn.), *Armeria vulgaris* Willd. var. *Lancheana* Voss., *Aster Sikkimensis* Hook.f., *Aster tricephalus* Clarke, *Aster trinervis* Roxb., *Callitris* sp., *Campanula latifolia* Linn., *Conium maculatum* Linn., *Cortia Hookeri* Clarke., *Cupressus Benthami* Endl., *Cupressus pisifera* Koch., *Cynoglossum zeylanicum* (Vahl) Thunb., (Syn. *C. furcatum* Wall), *Daphne papyracea* Wall ex Steud. (Syn. *D. cannabina* Wall.), *Dianthus deltoides* Linn., *Erigeron glabellus* Nutt. (Syn. *E. asper* Nutt.), *Eryngium planum* Linn., *Gaultheria*

*trichophylla* Royle., *Gentiana ornata* Wall., *Gentiana quadrifaria* Bl->  
*Gentiana septemfida* Pall., *Gentiana thianschanica* Rupr. (var.) (Syn\*  
*G. decumbens* Clarke.), *Impatiens puberula* DC, *Impatiens spinifw*  
Hook.f. fy T., *Impatiens tripetala* Roxb., *Juniperus recurva* Buch.  
Ham., *Lobelia syphititica* Linn., *Lychnis alpina* Linn., *Napeta nervosa*  
Royle ex Benth., *Onosma Emodi* Wall., *Parnassia nubicola* WaU->  
*Pentapterygium Hookeri* Clarke., *Picea morinda* Link., *Polygonum*  
*amplexicaule* Don., *Polygonum capitatum* Buch. Ham., *Potentilla*  
*fulgens* Wall., *Potentilla fruticosa* Linn., *Primula acaulis* HjUy  
*Primula capitata* Hook., *Primula denticulata* Smith., *Priviula pg-*  
*bunda* Wall., *Primula Helenas* Auct., *Primula petiolaris* wait.,  
*Rhododendron anthopogon* Don., *Rhododendron campylocarpum*  
Hook.f., *Rhododendron ciliatum* Hk.f. \$ T., *Rhododendron cinnaban-*  
*num* Hook.f., *Rhododendron Dalhousiae* Hook.f., *Rhododendron*  
*Edgeworthii* Hook.f., *Rhododendron lepidotum* Wall., *Rhododendron*  
*xaccinoides* Hook.f., *Salvia glutinosa* Linn., *Verbascum Thapsus* Linn.

Necessary alterations to the laying out of the beds and to the displaying of green house pot plants in the conservatory resulted in better colour effects and were highly appreciated by the general public. Of particular interest is the flowering of the following plants of delicate beauty and of considerable horticultural value:—

*Adenophora Bulleyana* Diels., *Androsace Hookeriana* Klatt.,  
*Androsace lactiflora* Hort. (Syn. *A. coronopifolia* Andr.), *Androsace*  
*Poissonii* Kunth., *Anemone Falconeri* Thorns., *Arabis pterosperrna*  
Edgw. (Syn. *A. alpina* Hk.f. # T.), *Arctotis acaulis* Linn., (Syn. *A-*  
*scapigera* Thunb.), *Armeria mauritanica* Wallr. (Syn. *A. formosa*  
Heyn.), *Armeria vulgaris* Willd., var. *Lancheana* Voss., *Arenaria*\*  
*laricifolia* Linn., *Arenaria montana* Linn., *Aster diplostiphoides* Benin  
\$ Hook.f., *Aster rotundifolius* Thunb. (Syn. *Agathaea coelestis* Cass. h  
*Aster sikkimensis* Hook.f., *Aster tricephalus* Clarke., *Brodiaea grandiflora*\*  
Sm., *Calanthe brevicornu* Lindl., *Calanthe herbacea* Lindl.,  
*Calanthe masuca* Lindl., *Campanula Latifolia* Linn., *Cathcartia vMi<sup>s</sup>?*  
Hook.f., *Cenia barbata* Benth \$ Hook.f. (Syn. *Cotula barbata* <sup>^</sup> <sup>nf</sup>  
*Cheiranthus Kewensis* Hort., *Cortia Hookeri* Clarke., *Dianthus deltoides*  
Linn., *Dianthus plumarius* Linn. (var. *Scotch Pink*.), *Disporum pullum*  
Salisb., *Dracocephalum Ruyschiana* Linn., *Epilobium parviflorum*  
Schreb., *Erimus alpinus* Linn., *Erodium circuitarium* UHer., *Eryngium*  
*planum* Linn., *Eupatorium urticaefolium* Rich., *Francoa appendiculata*  
Cav., *Gaultheria trichophylla* Royle., *Genista Dasy* Hill., *Gentiana*  
*ornata* Wall., *Gentiana septemfida* Pall., *Gentiana thianschanica* Rug?'  
rar (Syn. *G. decumbens* Clarke.), *Heliophila linerifolia* Burch ex DC  
*Homeria collina* Vent., *Lapeyrousia cruenta* Benth., *Libertia formosa*  
Graham., *Lilium cordifolium* Thunb. (Syn. *L. giganteum* Wall),  
*Lilium nepalense* D. Don., *Lychnis alpina* Linn., *Lythrum hyssopifolia*  
Linn., *Meconopsis Baileyi* Prain., *Meconopsis cambrica* Vig., *Meconop-*  
*sis nepalensis* DC., *Meconopsis paniculata* (Don) Prain., *Meconopsis*  
*Wallichii* Hook.f., *Napeta nervosa* Royle ex Benth., *Nierembergia*  
*frutescens* Dur., *Nierembergia hippomanica* Miers., *Oenothera speciosa*  
Nutt., *Onosma Emodi* Wall., *Parnassia nubicola* Wall., *Primula acaulis*  
Hill., *Primula Bulleyana* Forest., *Primula capitata* Hook., *Primula*  
*denticulata* Smith., *Primula floribunda* Wall., *Primula Helenae* Auct.,  
*Primula petiolaris* Wall., *Primula rotundifolia* Wall., *Primula sikki-*  
*mensis* Hook.f., *Ranunculus affinis* R.Br., *Sagina subulata* Wimrn.  
(Syn. *Spergula pilifera* Hort.), *Saxifraga hispidula* D. Don., *Smilacina*  
*fusca* Wall., *Smilacina oleracea* Hk.f. \$ T., *Thalictrum Chelidonii*

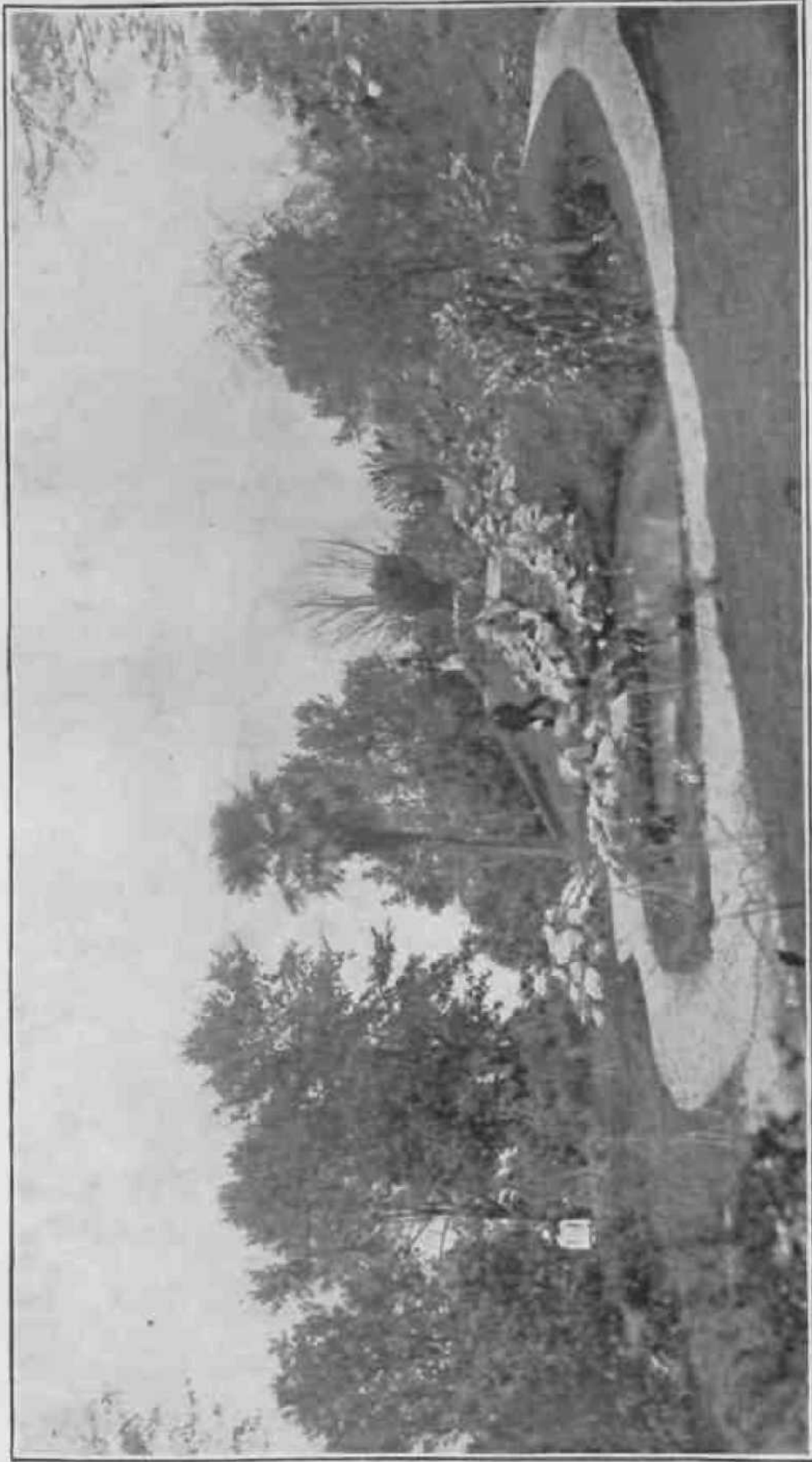


Photo II.

The Sir John And... as recently reconstructed. In its background... it is seen through a... crop of fruit... East Himalayan... artianus H. Wendl. It flows... profuse...

11

12

13

14

15

*C. Tiarella polyphilla* D. Don., *Verbascum thapsus* Linn., *Veronica inpana* Less., *Zaluzianskya selaginoides* Walp. (Syn. *Nycterinia selaffinoides* Benth.)

Several species of local orchids grown on large trees flowered profusely and attracted due appreciation from the public. Professor White of Iitliaca, New York, who happened to visit the garden expressed his admiration of the garden in these words: "This is the finest spot in the Eastern Himalayas and the best centre for the study of the temperate flora of India." Special efforts were made to maintain the general tidiness of the lawns along the hillside by regular combing and the growth of moss was restricted. Top dressings and necessary repairs kept the roads and pathways in order. The naming of the roads according to the new map of the garden enable the visitors to have quick access to any desired spot of the garden. The map is now published and available for sale at annas 4 per copy. A student's garden with beds containing economic and medicinal plants of the Himalayas arranged in classified order has been designed by the Superintendent. It is being laid out under the special care of the Curator. This section of the garden, when properly developed, will be an asset to the garden and will prove to be of great educational and medicinal value.

The replacing of old trees and shrubs and the introduction of new ones continued. Two hundred and sixty-three plants were planted and 100 species of plants of economic value were added to the new student's garden in their respective family beds. Some new seats under the trees and rose bower with slight modification in their construction afforded much comfort to the visiting public. Necessary repairs to the houses, nurseries and durwans' shelters were carried out as far as funds permitted. During the monsoon there was a slip at the bottom of the Biaius' shed and it was necessary to erect the new rivetment wall to prevent the shed from further damage. There were several cracks in the roof of the house which were repaired with ferro concrete. About 58 packets of seeds were received on exchange from a large number of institutions in different parts of the world. Of these seeds the following species germinated successfully:—

*Royena lucida*, *Omalanthus populifolius*, *Iris Kashmiriana*, *Lilium Lowxi*, *Lilium ochraceum*, *Lilium Wallichianum*, *Pinus rigida*, *Pinus echinata*, *Pinus strobus*, *Pinus sylvestris*, *Sambucus canadensis*, *Picea abies*, *Aquilegia eximea*, *Sedum spaihulifolium*, *Sedum coccineum*, *Limaria cyinbelina*, *Lilium longiflorum*, *Ephedra gerardiana*.

Two thousand, six hundred and forty-two packets of seeds, 207 Plants, 8,952 seedlings and 30 bulbs were distributed in India and abroad. In addition to these various botanical institutions and botanical departments of colleges in India and outside received plant materials for their study. The demand for such materials is increasing year by year evidently due to the advancement of knowledge and interest in the flora of our country. Famous botanists, research workers, college and school students and others interested in the Himalayan vegetation, visiting this garden and the herbarium, were taken round by the Curator and furnished with necessary information on various botanical and horticultural matters.

The Curator undertook a tour in October in the Singalela range in the region of Tonglo, Sandakphu and Phalute for his yearly collection of seeds and plants with a view to acclimatizing them in Darjeeling.

The herbarium and the library were kept in better condition than last year and some additions were also made. It is expected that with the opening of the botanical departments in various colleges and with the growing interest in the vegetation of the Himalayas this local herbarium like that of the Calcutta herbarium will be more and more utilised. The Curator will be pleased to give all facilities and place the collection at the disposal of any botanist wishing to compare specimens collected from this most fine and rich floristic region of the Himalayas, with those collected from the A'ssam Hills in the East, the Nepal ranges in the West and Tibet in the North. If botanists fail to get all their specimens named here on the spot, the staff at the Calcutta Herbarium will gladly add their help in this direction at headquarters.

"The Plants of the Lloyd Botanic Garden" with a map is in the final stages of printing. The writer appreciates the ungrudging help rendered by Mr. S. N. Basu, the Curator, and Babu Jogendra Nath Nasker, the Herbarium Assistant, in the preparation of the book.

The garden register records 67,888 visitors to the garden during the year. This figure surpasses all previous records.

**Finance.**—Out of an allotment of Es. 16,111 under all heads, Rs. 16,085 was spent.

**Staff.**—Mr. S. N. Basu was Curator, Lloyd Botanic Garden, Darjeeling, throughout the year.

K. BISWAS,

*Superintendent,*

*Royal Botanic Garden, Calcutta.*

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# Annual Report of the Royal Botanic Garden and the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling, for 1940-41.

## ROYAL BOTANIC GARDEN

**General.**—*Staff.*—Dr. K. P. Biswas, M.A., D.Sc. (Edin.), F.R.S.E., held the charge of the Superintendent throughout the year. The posts of the Curator of the Herbarium and the Curator, Royal Botanic Garden, were held by Dr. S. K. Mukerjee, M.Sc, Ph.D. (Edin.), and Mr. N. Mitra, B.Sc, R.D.H., N.D.H., F.L.S., respectively. Mr. Quasem Ali was the Assistant Curator of the Royal Botanic Garden throughout the year. Mr. J. A. Hulbert was the overseer throughout the year except for a short absence on leave from the 17th to the 29th October 1940. Mr. A. T. Banerjee discharged the duties as the Head Clerk efficiently throughout the year.

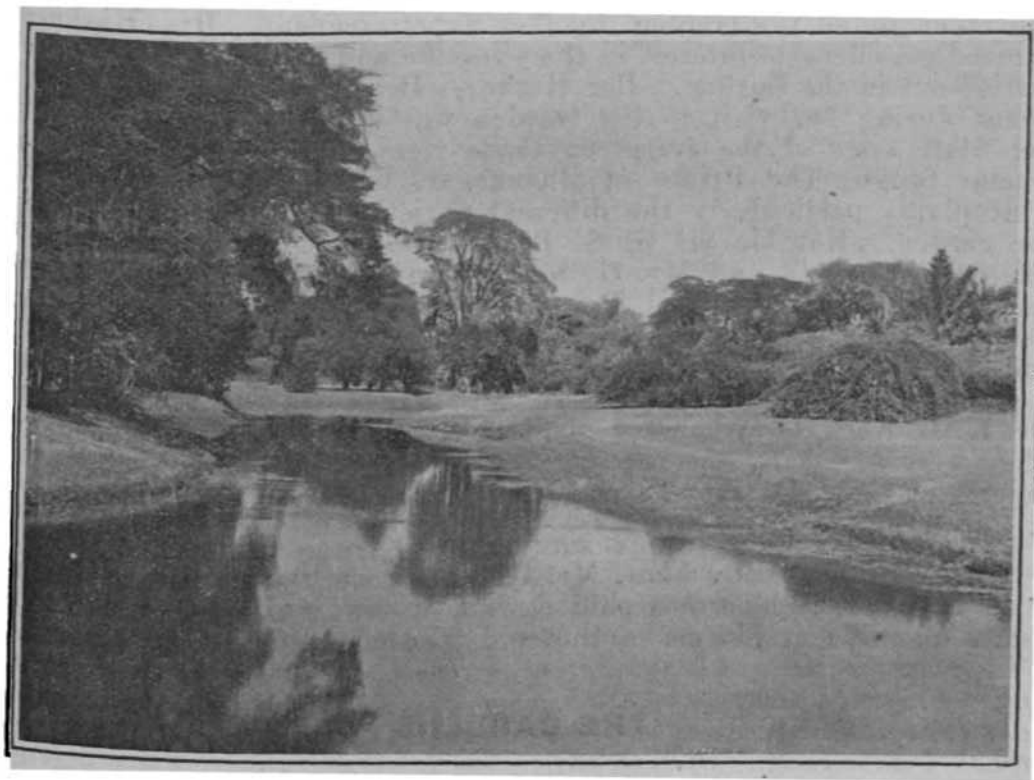
The Superintendent visited Munsong and Mungpoo plantations during October and undertook a preliminary ecological study of the weed vegetation there with special reference to the cinchona cultivation. He submitted his report to Government during the year under review. A syllabus for the M.Sc. degree in Agricultural Botany was also drawn up by him for Professor J. N. Mukerjee, Professor of Chemistry, Calcutta University. The Records of the Botanical Survey of India, the publication on the Indian Medicinal Plants, the 150th Anniversary volume of the Royal Botanic Garden, Calcutta, and various other botanical papers were edited by him as usual. The Superintendent delivered a course of lectures on Algology to the Post Graduate students in Botany of the University of Calcutta as an honorary lecturer. He was re-elected to serve in the Council of the Royal Asiatic Society as its Natural History Secretary (Biology) and acted as the honorary correspondent in Botany of the Himalayan Club. He continued his algological investigation also as a member of the Water Supply Technical Board, Calcutta Corporation.

Thousands of sheets of grasses from the province of Assam in the local herbarium have been revised and classified according to the modern system adopted by Dr. N. L. Bor in his recent monograph on Graminae. This work completes the series of publications on the Flora of Assam in which the Superintendent and the Systematic Assistant, Botanical Survey of India, assisted the authors to their utmost ability. Dr. D. Chatterjee, M.Sc, Ph.D. (Lond.), F.L.S., F.R.H.S., who officiated as Systematic Assistant, Botanical Survey of India, from 25th May 1940\* to 11th August 1940, during the absence on leave of Mr. V. Narayanaswami, helped in the classification of some of these specimens. Dr. Chatterjee rearranged also several hundreds of sheets in proper order after revising the nomenclature of the major portion of the collection of Euphorbiaceae which was lying hitherto in confusion. The laborious and valuable work of Dr. Chatterjee is very much appreciated. Mr. V. Narayanaswami, Systematic Assistant, Botanical Survey of India, critically examined many of Dr. Bor's grasses and other sheets received from various correspondents. He also assisted the Superintendent in scrutinising difficult specimens and tackling complicated

questions on Systematic Botany and nomenclature received from the taxonomists in India and the overseas institutions. The Superintendent brought some specimens from the forest areas in Mungpoo and Munsong during his ecological survey there for augmenting the collection in the local herbarium and for distributing the spare sets to the different institutions in India and outside. A joint trip to Port Canning was made with Professor S. P. Agharkar, Head of the Department of Botany, Calcutta University, in company with the Post Graduate students of Calcutta University in the neighbouring area of Port Canning for discussing the relic mangrove vegetation with special reference to their ecological conditions. A botanical excursion was also made by the Superintendent with Mr. A. P. Benthall, Member of the Board of Economic Enquiry, Bengal, and Dr. S. R. Bose, M.A., Ph.D., Professor of Botany, Carmichael Medical College, Calcutta, to Falta by road with a view to adding new records to the Prain's Flora of Hooghly, Howrah and 24-Parganas.

**Scientific workers.**—Many scientists and research workers from India and abroad during their visit to the garden consulted the herbarium and discussed with the Superintendent various botanical, horticultural, arboricultural and biological problems. Of these may be mentioned Dr. Pasino Nayaratte who was deputed by the Government of Mexico to study the quinine yielding plants cultivated in India and Java. Dr. Navaratte devoted his time in the investigation of the life-history of the various species of cinchona plants and paid special attention to the different methods of cultivation of the quinine plants followed in India and Java. Mr. M. B. Raizada, Assistant Botanist, Forest Research Institute, Dehra Dun, solved his doubts regarding identification and correct systematic position of several species by matching his specimens with the authentic materials of the Calcutta Herbarium. Dr. B. C. Kundu, Lecturer, Presidency College, Calcutta, who is engaged in the study of the genus *Trichosanthes*, received full facilities and guidance during his work at the Herbarium. Dr. S. Ramanujam, Second Economic Botanist to the Government of India, consulted the old literature and the herbarium materials of Indian *Brassicm* (the mustard plant) in connection with his cytological investigation on this important economic plant. Dr. Ramanujam was supplied with necessary information on the previous works on this genus done by Sir David Prain and the Superintendent and others on this subject. Mr. K. Jacob of the Geological Survey of India made an attempt to determine some fossil specimens by comparing them with the dried specimens at the Herbarium. Messrs. R. L. Badhwar and N. C. Goswami, the two botanists under Sir Ram Nath Chopra, Director, School of Tropical Medicine, worked in the Herbarium throughout the year in connection with the preparation of treatises on poisonous and medicinal plants of India. The scientific staff and the artists offered, as in the previous years, their help and co-operation to the best of their abilities for the successful prosecution of Sir Ram Nath's work. Mr. R. M. Dutta, Botanist (Sericulture) in the Department of Agriculture; Mr. A. Das Gupta, Professor of Botany, Bangabasi College; Dr. S. N. Das Gupta, Reader in Botany, Lucknow University; Rai Bahadur G. C. Chatterjee, Director, Anti-malarial Association; Mr. A. Sanyal, Ranger in the Forest Department, Bihar, and others were given full help and facilities for their work in the Herbarium. Mr. R. N. De, Silviculturist and Forest Botanist, Assam, worked for a few days in the Herbarium and

got most of his doubtful Assam plants determined and taxonomical queries answered. Dr. K. S. Thomas, Director of Agriculture and Botanical Gardens, Uganda, South Africa, visited the Garden and the Herbarium. He had a long consultation with the Superintendent on the subject of introducing into South Africa various Indian plants of economic, horticultural and medicinal importance. Dr. Thomas was furnished with all available information on the cultivation of cinchona plants, tung oil yielding trees and shade trees. Suggestions were also offered with regard to the development of the Botanical Garden in Uganda. Dr. G. W. Padwick, Imperial Mycologist, Imperial Agricultural Research Institute, Dr. E. Roding, Director of Agriculture, Ceylon, and Dr. D. Rhind, Economic Botanist, Burma, discussed many botanical and horticultural questions with the Superintendent and the Curator of the Herbarium during their visit to the Herbarium and the Garden. Mr. E. C. Mobb, Principal, Imperial Forest Research Institute, Dehra Dun, came here with his students to acquaint themselves with the different sections of the Garden and the scientific arrangement of botanical specimens in the Herbarium. He was taken round the Garden by the Superintendent and the Curator. His students were also given necessary instructions on the various floristic composition of the Garden.



*Photo by Dr. A\*. Biswas.*

THK JANAHDAN LAKK.

The water pumped up from this lake with the new motor pump, is stored in the overhead galvanised tanks installed on the roof of the Herbarium Curator's quarters adjoining the lake on its western side. The water is then distributed by means of jupes and spread over the plants in the Orchid house on the right, the Palm houses on the left

and the flower gardens behind the background of trees with *Albizzia litchardiana* in the centre. On the right foreground the two bushes of *Bougainvillea* when in full bloom in the spring display gorgeous colour. On the left foreground is seen the Rain tree with its branches overhanging the lake. Bunch of the pink flowers of the climbing *Bougainvillea* hanging like festoons from the ends of the branches of the Rain tree presents a charming picture in the beginning of hot weather.

**Distinguished visitors.**—The Chinese Goodwill Mission headed by His Excellency Tai Chi Toa visited the Garden and the Herbarium with Messrs. T. G. Shen, Ango Tai, T. T. Shen, T. K. Tseng and C C. Huang. His Excellency and party spent a long time in the Garden and laid particular stress on reviving the exchange relation between the Royal Botanic Garden, Calcutta, the "mother institution in Asilt," and the leading botanical, agricultural and forest institutions in China. His Excellency sent the following telegram from Rangoon to the Superintendent on the eve of his departure from India: "Please accept my heartfelt thanks for your kind hospitality. I shall always cherish a happy memory of the few pleasant hours spent in your gardens." His Highness the Maharaja of Kapurthala with his personal staff spent a day in the Garden last cold weather. He was shown the Herbarium and taken round the Garden by the Superintendent. His Highness evinced considerable interest in the scientific and the horticultural work carried out in the Garden. Her Highness Dowager Maharani of Cooch Behar during her visit to the Garden was keen on introducing into her State some of the evergreen shade trees. Kumar R. K. Nirmal Kumar Singh, The Prince of Bhavnagar, took keen interest in the fruit plants particularly the different varieties of mangoes grown in the garden. Hon'ble Sir G. S. Bajpai, Member, Governor-Generars Executive Council, and Mr. G. S. Bozman, i.c.s., Joint Secretary to the Government of India, Department of Education, Health and Lands, inspected the precious collection of dried specimens of plants and botanical literature in the Herbarium and went round the different sections of the Garden. Dr. H. M. Wageworth, President, and Pr. K. L. Kock, Ornithologist, paid a visit to the Garden in February. They were struck by the beauty of the flowers of tropical trees particularly of *Brownias* and *Amherstia nobilis* which just burst into bloom at that time.

Sir David and Lady Ezra, Mr. C. S. Sassoon of Bombay and many other distinguished persons paid a visit to the Garden to witness this year's magnificent blooms of the cold weather annuals.

## THE GARDENS

The cyclonic nor'wester storm was severe enough during the year to cause some irreparable damage to the Garden by blowing down several old trees. The pair of *Casuarinas*, commonly known as Jhau, which stood majestically on the projected bend of the river in front of the Superintendent's quarters serving as a landmark for the last 120 years, had the full brunt of the storm. They were uprooted, removed and replaced by two young plants. The two old *Casuarina* trees were the object of great beauty. They, used to be highly admired by the navigators and all those passing through the river when masses of long

pendent foliage of the two species of the Bougainvilleas covering the trees burst into gorgeous red and pink flowers in the early spring every year. These trees are also of historical importance as they, in their young stage, were shown in a sketch by Sir J. D. Hooker in 1849 when he visited the Garden on his way to and return from Sikkim where he was arrested with Dr. Campbell and detained for some time. His arrest subsequently led to the annexation of part of the Sikkim State to the British territory.

The display of the flowering annuals at vantage points in different Parts of the Garden was of such fine quality as to warrant repeated visits by a record number of visitors this year too. Nevertheless, it must be admitted that the standard of the bloom was not so high as that of the last year. This is due evidently to the late arrival of fresh foreign seeds and bulbs on account of the war conditions. The difficulty and the delay in obtaining foreign stock will be felt still more in the next and the following years. The growing of the annual flowers in many gardens in this country will thus be adversely affected until the end of the war. India should, therefore, take steps to become self-sufficient in her horticultural needs as well. She should grow common annuals in suitable localities and produce sufficient quantity of acclimatised seeds, bulbs, cuttings, etc., of fairly high standard in order to meet at least her own internal demands. \* The Royal Botanic Garden and the Lloyd Botanic Garden Darjeeling, have been devoting attention in this direction as far as possible. Some of the bulbs and seeds raised from local stocks proved satisfactory. Unfavourable conditions and want of sufficient response from the private nursery men and amateur gardeners prevented the authorities of the Boyal Agricultural and Horticultural Society of India from holding this year the annual agri-horticultural show in their gardens at Alipur. This yearly exhibit of the best local flowers and fruits was a source of encouragement and information to many horticulturists, fruit growers and interested persons. It is hoped that such an annual flower show in a town like Calcutta will be continued with the co-operation and support, in the Past, of the professionals, private nursery men and all lovers of flowers.

Normal routine work of the gardens was duly attended to. Better gaining and reorganisation of the labour force led to marked progress in the general cleaning operation and many other indispensable items of work in the different sections of the Garden. An outstanding improvement accomplished in the Royal Botanic Garden in the year 1942 was the installation of an up-to-date electric motor pump for efficient watering of the plants in the Palm houses, Orchid house, flower gardens and shade rockery where the plants require profuse water. The old method of watering the plants by means of ordinary watering cans and earthen pots has thus been partly given up. The introduction of this new system of watering the plants proved a boon towards successfully cultivating many delicate plants. Suitable temperature, moisture and humidity required for the plant houses can now be maintained. This change in the physical conditions of the Palm houses and Orchid house has already proved particularly beneficial to the health of the plants grown in these houses. Want of an electric power in the garden prevented the previous officers in charge of the garden from introducing such modern methods which had now been possible after a period of one hundred and fifty-four years. One of the hand pumps



used for watering plants has been dislodged and converted into a portable pump. It has thus been possible to use this pump profitably for various purposes. The carts for removing refuse have been fitted with old motor tyres. The roads and lawns have thus been spared from damage. The motor tractor\*, a very indispensable adjunct to the garden requisites is, as I have already stated in the last year's report, aging fast. It needs replacement at an early date. This motor tractor is being used for cutting grass, rolling roads and lawns, pumping water, pulling and transporting logs and many other means of useful garden work. It is hoped that when the international situation improves it will be possible to purchase a new one. The macadamised roads of the Garden used to be damaged by the sharp iron spikes attached to the wheels of the gang mower. A separate wooden trailer has therefore been built to convey the gang mower to the place where the tractor is employed for cutting grass. This arrangement has prevented the spikes from getting blunt and at the same time lengthened the life of the roads. The road work was in full swing during the favourable seasons. More than a dozen roads were attended to during the current year. An improvised portable boiler has been constructed for boiling tar. This has been found very useful in repairing timely ruts, holes and depressions in the roads. An open iron chamber mounted on a cart has been constructed to burn dry leaves on the spot where cleaning operation goes on. The leaves had to be carried and dumped here and there presenting so many ugly sights. This difficulty in disposing of heaps of dry leaves in the spring season has thus been obviated by means of a simple apparatus devised this year. An attempt is being made to demarcate the boundary line of the Garden along the river front on the south-eastern side with a view to developing a mangrove garden representing estuarian and riparian flora. More than a lakh of bricks have been burnt in the Garden this year with a view to economise expenditure on this material.

The following species planted in the open and in the rockery are new additions:—

*Garcinia Morella* Desr., *Acacia Suma* Kurz., *Colebrookia oppositifolia* Sin., *Vernonia divergens* Edgew., *Ormocarpum trichocarpum* Birtt-Davy, *Vangueria infausta* Burch., *Bauhinia reticulata* VC, *Cardiospermum canescens* Wall., *Terminalia sericea* Burch., *Ficus Carica* Linn., *Prosopis strombulifera* Benth., *Zizyphus Mistle* Griseb., *Leucaena peltata* Benth., *Anona montana* Mac/ad., *Centrosema* sp., *Oncocarpus Panawanus*, *Mimosa Spegazzinii* Pirota., *Actinophloeus angustifolius* Hort, ex Bailey, *Coccothrinax argentea* K. Schum., *Lra* (New variety, white flowered), *Dioclea* sp. Two rare plants of considerable economic interest were successfully grown this year. These were *Hedychium* of different sorts and *Ephedra Gerardiana*, indigenous to Tibet. Seeds of the latter were received from Mr. Richardson, i.c.s., British Mission, Lhasa, Tibet, to whom our thanks are due for the gift of the seeds of this rare plant. Many old plants destroyed by storm or decayed were removed and replaced by healthier species. Since the garden labels are often removed by a set of mischievous people, the renovation and the replacement of the garden labels have become a rather laborious task. Labels for one thousand six hundred and twenty garden plants, 119 sign boards, 87 plants and sheet labels and 361 small labels for Green Houses and Nurseries were written. Addresses on 259 boxes of plants and seeds

were written for despatching them to the different parties in various Parts of India and abroad. The beds in the plant houses were rearranged and renovated and some ornamental species were newly planted in the different plant houses. The lakes in the Garden were attended to in the usual manner.\* Those in divisions Nos. 25, 12 and 2 were cleaned and silt from the shallower portion of the latter was removed during the year by diverting major portion of the labour wee for about a month.

Experiments on acclimatisation of some of the fibre plants, paper mulberry and fodder grasses were carried out in the economic garden, seeds of *Linum usitatissimum* were received from the Netherlands through the Agriculture Department, Bengal. A few seeds from Nepal were also presented by Mr. N. T. Williams, an Attorney at Law. The seeds received with thanks from both these sources germinated, and the plants yielded seeds about six times of the seeds sown. Paper mulberry—*Broussonettia papyrifera*—was easily propagated by different methods. It was discovered that the best method of quick propagation of this important paper yielding plant was by cuttings which should be inserted during the rains. Ganja plant—*Cannabis sativa*—was successfully grown under proper protection for the instruction of the students and for comparison of the doubtful species with the fresh specimen when such plants are sent by the Excise Department to this department for correct determination. The carpet grass—*Arthropus compressus*—introduced from America some years ago in the Garden, is now spreading fast in the lawns, meadows and fallow lands in many parts of Bengal. This grass was grown in the experimental ground with different kinds of manure. Ammonia and cowdung proved favourable to its growth. This important fodder grass of soft texture is liked very much by cattle. The other fibre plants grown were *Hibiscus* (laniflorus), *Crotalaria juwea* and *Mussa sapientium*. The fibres of these species tested by the Fibre Expert proved to be of good quality. Attempts have been made during the year to grow different kinds of edible aroids. Cuttings of the different varieties of mulberry tree, both foreign and indigenous, which have been under cultivation for years by Miss Cleghorn and her father, were planted in the Gardens. Some of these are valuable addition to our stock of mulberry trees grown in the garden from a very early period.

**Plant and seed exchange.**—Six hundred and fifty-four plants were received from different sources. Twelve thousand nine hundred and sixty-seven plants were despatched to the different provinces in India and various countries abroad. Three hundred and fifty-four packets of seeds were received from Java, South Africa, Surrey (England) as well as from the different parts of India. Four hundred and sixty-eight packets and 62 lbs. of seeds were despatched to such countries as Australia, British North Borneo, Egypt, East Africa, California and also different parts of India. Some difficulties are at present felt in the despatch of plants to foreign countries on account of the war. It is hoped that such obstacles will be removed with the restoration of Peace.

f. **The Herbarium.**—The scientific work in the Herbarium was satisfactorily carried out throughout the year. During the year under review the total number of specimens identified was 3,472. \* More than 200 specimens were received in batches from each of the following institutions namely, Forest Research Institute, Dehra Dun, Forest

Manager, Sikkim State; Professor of Botany, the Punjab Agricultural College, Layallpur, and others. One hundred and sixty-eight specimens of medicinal plants received from Mr. B. Singh were identified for the Benares Hindu University. Identifications were also done of a large number of specimens received from Messrs. A. P. Floyd, S. Krishnaswamy, H. Chakravarty of the Presidency College, Calcutta; A. K. Chakravarty of the Rice Research Institute, Chinsura; Miss S. Meyer, Professor of Botany, Bethune College, Calcutta; Dr. R. R. Stewart, Principal, Gordon College, Rawalpindi; Dr. S. R. Sen Gupta, Professor of Botany, Ripon College, Calcutta, and Dr. D. Rhind, Economic Botanist, Burma. Investigation of water plants, chiefly Algae, was carried out by the Superintendent in connection with the research work on pisciculture undertaken by Dr. H. K. Mukerjee, Head of the Department of Zoology, Calcutta University, under the auspices of the Imperial Council of Agricultural Research. Seventy-seven samples of gut contents of fishes were examined microscopically and the result of the examination of these algal materials was embodied in a report which was submitted to Dr. Mukherjee for incorporation in his general report on the subject.

Distribution of specimens was curtailed due to the present disturbed conditions of the world. The total number of specimens distributed to the various recipients in different parts of India and America this year was 1,075. A representative collection of the parasitic fungi growing on the palms and other decorative herbs in the Palm houses, the Orchid house and the Nurseries of this Garden were collected and presented to Dr. G. W. Padwick, Imperial Mycologist, New Delhi, for investigation. The largest number of plants distributed to America during the year under review was 664. The recipient of these plant materials was Dr. E. D. Merrill, S.C.D., Director and Administrator of the Botanical Collections of the Harvard University, Arnold Arboretum, Jamaica Plain, Mass., U.S.A. Dr. Merrill sent valuable specimens of Burmese plants to this Herbarium for determination. A set of these Burmese specimens presented by him is a valuable acquisition to the Herbarium for which our grateful thanks are due to Professor Merrill. One hundred and fifty-three specimens were presented to Dr. B. Sahni, D.Sc, S.C.D., F.R.S., for the Herbarium of the University of Lucknow. Dr. S. R. Bose, Professor of Botany, Carmichael Medical College, and Dr. S. R. Sen Gupta, Professor of Botany, Ripon College, were also recipients of a batch of 100 specimens each for their College herbaria. Mr. A. P. Benthall received a duplicate set of specimens collected during a joint tour by the Superintendent and Mr. Benthall in the neighbourhood of Calcutta. The Biology Department of the Dacca University received also a few selected specimens. Specimens of fruits of *Erythrina indica* were sent to the Botanist, Tocklai Experimental Station, Cinnamara, Assam, for the investigation of the insecticidal properties of this plant. The Officer in charge of the Commercial Museum, Calcutta Corporation, received specimens of the well-known paper yielding plant *Broussonetia papyrifera*. Specimens of the breathing roots of *Avicennia* were sent to Professor S. N. Das Gupta of the Lucknow University for anatomical work. Dr. P. K. Bose, Department of Chemistry, University of Calcutta, received leaves of *Clausena Wampi* for chemical analysis. Spikelets and mature leaves of *Lopholepis ornithocephala* and *Fingerhuthia affghanica* were sent to Dr. G. H. Schweickerdt of the Durban Botanic Garden, South Africa, for his agrostological researches.

Lea known twig of *Ficus Krishnae* sent to Dr. Agnes Arbor, the well-known morphologist of the University of Cambridge, proved to be of her preliminary interest in connection with her research work. The result of the preliminary investigation of this plant confirms to a certain extent the conclusions already communicated by the Superintendent in his letter on *Ficus Krishnae*. A representative set of the collections of the garden was presented to Dr. N. L. Bor, Forest Botanist, Forest Research Institute, Dehra Dun. Four photographs of the type sheets of *Garcinia mangostana* were supplied to Dr. E. H. Walker, Smithsonian Institution, Washington. Dr. Claud L. Horn, Associate Horticulturist, United States Department of Agriculture, was furnished with a photograph of Roxburgh's coloured illustration of *Garcinia mangostana*.

The loan of specimens, much restricted during the year, was confined mainly within the country. One hundred and fifty-seven sheets were sent on loan. One hundred and thirteen sheets consisting of ferns and grasses went to Dr. N. L. Bor of the Forest Research Institute, Dehra Dun, for critical examination. Forty-four sheets of ferns were borrowed by Professor Luthra, Professor of Botany, Punjab Agricultural College, Lyallpur, for his study. One hundred and sixty fern materials lent out in the previous year were returned in good condition. One sheet of *Carex Moorcroftiana* sent to Professor, Royal Botanic Garden, Kew, London, proved to be of special interest in the investigation of the genus *Carex* by M. E. Jones, Assistant Botanist, Kew. A large number of specimens as much as they reached the Herbarium safely in spite of the present transport difficulties. The major portion of this gift was received from Professor Merrill of the Harvard University. Five hundred and seven ferns from Burma and Indo-China in Merrill's collection are of special interest in connection with the writer's study on the Flora of Indo-China. Two hundred sheets consisting chiefly of Thailand (Siam) plants were presented by Sir Arthur W. Hill, Director, Royal Botanic Garden, Kew, to the Herbarium. It is a valuable asset to our collection and we are indebted to Sir Arthur for his help and cooperation in this direction. Forty-two sheets of Labiatae, some of which are rare, were presented by Dr. R. R. Stewart, Principal, Gordon College, Rawalpindi. Some of the marine algae of Mr. S. to whom they were presented to the Superintendent as personal gift proved to be of special interest in connection with the algal collection of the Herbarium. Ferns received from the Honorary Secretary, Agricultural Society, Madras, and the yellow variety of *Holmskioldia tinctoria* received from Mr. R. N. De, Silviculturist, Assam, are new acquisitions. One hundred and four packets of seeds were received during the year and 107 packets were distributed to the different parties to whom they were sent and distributed by the Curator direct from the office.

Improvement and repair of the herbarium sheets proceeded on a regular basis throughout the year. Two thousand one hundred and sixty fern sheets were incorporated during the year and a little over 1,000 fern species covers were changed. One thousand six hundred and thirty-three specimens were mounted during the year.

A large number of queries have been answered and notes on various forest questions to botanical, horticultural, arboricultural and forest researches were supplied freely to the numerous correspondents in India and abroad. Miscellaneous information on botanical and

allied subjects was also furnished to many scientists and interested persons. Scientific information on the complicated question of nomenclature, systematic position of species, distribution, cultivation and acclimatisation of indigenous and foreign plants of medicinal and economic importance were furnished to various correspondents. Researches on industrial development with special reference to the supplies of war materials demanded information on many a plant product. The manufacture of Agar Agar and Iodine from the sea weeds have recently engaged the attention of several industrial chemists. Notes on the possibilities of the manufacture of Agar Agar and Iodine from the sea weeds available along the coast line of India were furnished by the Superintendent to Sir S. S. Bhatnagar, Director, Scientific and Industrial Research and Dr. B. S. Guha, Professor of Applied Chemistry, Calcutta University. Suggestions were invited from the Superintendent on the question of removing widespread black and brown patches on the canvas sheets supplied in large quantities for war purposes. The spots were found to be due to fungi attacking the canvas. Such canvas" infected with mould when used in the battle field presented a difficult problem to tackle with as these organisms not only deteriorate the canvas but proved to be unhealthy for the occupants. Examination showed that the mould was composed of the common fungi belonging to the two genera—*AstpergiUus* and *Mucor* which occur in great abundance everywhere during the moist weather. Investigation was carried on by Dr. S. R. Bose, Mr. A. Bose and the Superintendent with a view to discover an antiseptic treatment. Results of prolonged experiments, study of the nature of the canvas and the life-history of fungi enabled the workers to formulate several prescriptions for antiseptic treatment of the fibrous material at the different stages of the preparation of the canvas. Notes on this subject were submitted to Messrs. Bird & Co. The cultivation and manufacture of tung oil have been engaging the attention of the Directors of many large firms and tea planters during the last few years. Information on the successful cultivation of the several species of the tung oil yielding trees were freely supplied to all who are concerned in the cultivation and manufacture of the Chinese wood oil in India. Some of the tea planters, on account of the recent laws regulating the extension of tea plantations, rightly intend to utilise spare lands for the cultivation of medicinal and other economic plants. Necessary information was supplied to all those who are endeavouring to open up a new line for utilising Indian plants in a profitable manner. Information was also supplied on Bhilwanol supposed to be contained in the plant *Semicarpus anacardium*. Eradication of *Lantana* and *Euphorbia* from the vast areas invaded by these obstinate weeds presents a difficult problem with the Punjab Government. Necessary information on the life-history of these plants and different methods of eradication of the weeds were embodied in a report sent to Mr. J. C. Sind, Forest Publicity Officer, Lahore. Similar notes were also supplied to the Executive Engineer, Damodar Canal, who has been attempting to eradicate another weed known as *Eupn-torivvi odonim* which has spread like wild-fire, particularly in the lower hilly districts of Assam and Bengal. Notes on *Lemna oligorrhiza* were furnished to Mr. C. McCann, Curator, Natural History Society of Bombay. The Managing Agents, Setabganj Sugar Mills, Calcutta, and Dr. C. A. Kloppenburgh, (Jopalpur, Rajshahi, obtained information on the distribution of *Derris eHiptica*. Necessary instructions on the cultivation of *Derris- species*, the well-known insecticidal plants

were also of *Kh* *Wigiveria zizanioides*—was supplied to the National Cement, Lines and Industries, Daltanganj. *Gyneria sylvestre*, a plant which makes sugar tasteless, formed the subject of a correspondence between Mr. S. N. Chatterjee of Patna, and this department. Observations on the control and eradication of water hyacinth were supplied to Mr. C. N. Sarkar, Bengal-Nagpur Railway, and the Deputy Commissioner, Gurdaspur, Punjab. Information on water plants with special reference to malariological survey was supplied to Mr. Senior White, Director of Malaria Survey, Beilgaon-Nagpur Railway. Information on aquatic plants associated with the malariological work was supplied to the Assistant Director of Public Health, Bengal. Mr. K. T. Sen, Superintendent, Cinchona, Bengal, was furnished with notes on the medicinal properties of *Holarrhena antidysenterica*. Report on the distribution and uses of *Periploca aphylla*, *Artemisia* *Artemisia scoparia* and *Peiowskia abrotanoides* supposed to be supplied to Messrs. G. E. Glenn and Company, Fruit Specialist, Lyallpur, Punjab, was specially interesting. The *Citrus* specimens and he was furnished with the materials and necessary literature on the subject for his investigation. Systematic position of *Falcourtia*, *Gynostemma*, *Ocimum*, *Microtropis* and *Peperomia heyoniwfoliun* was discussed in a note forwarded to Dr. E. D. Tillet in connection with his researches on these genera. A note on the Indian curry powder was supplied to Dr. F. Chen of the Fan Institute of Biology, China. Information on *Vetiveria zizanioides*, *Atropa Belladonna* and *Ephedra sp.*, *Boswellia serrata*, *Diospyros discolor*, and the two oil yielding grasses—*Cymbopogon uncus* and *C. schoenanthus*—and a short note on the cultivation of *Tantalum album*—were supplied to Messrs. Devanport Co., Professor R. N. Ghagwat, Head of the Chemistry Department, Xavier's College, Bombay; Dr. S. Neogy, Chemistry Department, G. S. University; Dr. P. K. Sen, Fruit Research Station, Sabour, Information on the vernacular names and cultivation of *Morinda tinctoria* (which yields a good vegetable dye) was furnished to the Bengal Textile Institute, Serampore. Suggestions and opinions on a proposed marine biological station in India were presented by the Superintendent to Dr. Gravely of the Government of Madras. Notes on the suitable shade trees for plantation in Munsong were forwarded to Mr. Thomas, Professor P. Maheswari, Head of the Department of Botany, Dacca University, received information on the Herbarium p. l. systematic position of a few species. Professor Bojani, Professor of Botany, Royal Institute of Science, was supplied with particulars of the systematic work on the Flora and the arrangements and classification of the Sibpur Herbarium. Dr. W. Burns, C.I.E., Agricultural Commissioner with the Government of India, was furnished with notes on *TUPha elephantina*. Mr. Arvid Dalby, Los Angeles, California, containing observations on the systematic distribution of *Kyllinga brevifolia*. Similar scientific advice on many more correspondents. Botanical work on the hybridization of the hybrids under the guidance of a Scientific Committee of which the Superintendent is the Chairman, is proceeding on scientific lines. The work is of far-reaching importance not only to

the horticulturists and the gardeners in India, but it is also of considerable international value in the horticultural trade in general.

**The Library.**—The activities in the library have, to a certain extent, also been curtailed due to the foreign journals not arriving on due dates. The journals and periodicals purchased during the year are 25. Forty journals and pamphlets relating to various botanical questions were received in exchange. Some of these were presented to the library. The number of books purchased during the year was 32, and 7 books and 18 leaflets were received as gifts. The total number of books sent out on loan during the year was 109. About 60 books were returned during the year. Seventy-one old and torn books were bound by the appointment of an additional book repair. These books are irreplaceable volumes lying unattended for years and their protection is long overdue. There are some precious manuscripts as well which require immediate attention. More than a century and a half old Roxburgh's *Icones* consisting of 2,382 magnificent coloured illustrations, perhaps the only complete set of its kind in the world, were accommodated in a steel cabinet this year for proper preservation and protection from damage by insects and fungi, and by frequent handling. The cataloguing of the library books proceeded on modern lines and about 3,000 books were entered systematically in the register.

**Publications.**—In the year under review, more than a dozen important papers contributed from this department were published in different journals or read before the scientific meetings. "Plants of the Lloyd Botanic Garden, Darjeeling" by Dr. K. Biswas was published in the *Records of the Botanical Survey of India*, Volume V, No. 5. Separate maps of this mountain garden are now available for sale at a moderate price of annas four each. They can be had from the library of the Royal Botanic Garden or the office of the Lloyd Botanic Garden, Darjeeling. Limnological investigation was carried on by the Superintendent at Palta Water Works. A paper entitled "Limnological Investigation and Improvement of Villages," written by the Superintendent, was published in "Science and Culture," Volume VI, 1940. Another paper on "Systematic position of a little known flowering plant from South Burma" by him was printed in the *Journal of the Indian Botanical Society*, Volume XI, Nos. 1-3, 1940. The Superintendent was invited by the Trustees of Indian Museum to deliver a public lecture in the Indian Museum on the 15th February, 1940. The lecture was subsequently published in "Nature" (London), "Current Science" and "Science and Culture," Volume VI, 1940, and in the "Bengal Weekly," May, 1940, and elsewhere under the title of "The Royal Botanic Garden at Sibpur, its origin and aim." He delivered another lecture on the "Romance of Flowers" on the 2nd March at Chakra Baithak. In addition to these he wrote two more papers: (1) "A Report on the possibilities of cultivation and acclimatisation of tung oil yielding trees in India" which formed the subject of a communication by him before a monthly meeting of the Royal Asiatic Society of Bengal and (2) the other "Marine algae along the Bombay Coast" which was contributed to the Botanical Section of the 8th session of the Indian Science Congress held at Benares. A revision of the Labiatae of the Indian Empire" by Dr. S. K. Mukerjee, Curator of the Herbarium, was published in the "Records of the Botanical Survey of India," Volume XIV No. 1, 1940. Some new plants from India and Burma by Dr. D. Chatterjee and V. b. Ji. Mukerjee came out in the *Journal of the Indian Botanical*

Society, Volume XIX, Nos. 1-3, 1940, and "Two new Indian species" by Mr. R. N. Dey, Dr. G. K. Mukerjee and Mr. V. Narayanaswami was published in the Indian Forester, Volume LXVI, No. 6, 1940. "A note on *Cassia javanica* Linn, and *Cassia nodosa* Ham. with a key to the cultivated tree *Cassias*" by Mr. V. Narayanaswami, was published in the Journal of the Royal Asiatic Society of Bengal, Volume VI, No. 1, 1940. "Two new Annonaceae from Assam and Burma" by Dr. D. Ujatterjee, Officiating Systematic Assistant, appeared in the Journal of the Indian Botanical Society, Volume XIX, Nos. 1-3, 1940. "The Bharatiya Banāusadhi Parichaya," a voluminous work on the medicinal plants of India, "The Hundred and Fiftieth Anniversary Volume," and "The Flora of the Aka Hills" by the Superintendent are passing through the press.

**Finance.**—Out of a total budget allotment of Us. 51,388 for staff and permanent establishment, Es. 51,307 was spent and under all other heads the expenditure amounted to Es. 46,688 against the total allotment of Rs. 48,022. There was a net saving of Es. 1,415 under all heads during the year. Receipt of the department during the year amounted to Es. 1,782.

### CALCUTTA GARDENS

The display of the winter annuals this year in the Calcutta Gardens was quite satisfactory in spite of the belated cold weather. The dahlias and Carnations proved particularly good and flowers attained record size. Decorative pot plants with attractive flowers were staged at selected spots in the gardens and also along the edges of the lakes, and as it was expected, enhanced the beauty of the gardens. The flower beds in the lawn near the band stand in the Eden Garden were arranged and extended round the whole length of the boundary wall of the garden running from north to south. The Giant Amazon Water-lily—*Victoria regia*—as usual won the admiration of the general public. The leaves attained as large a size as in the former years. Seedlings of this plant were distributed to many interested persons and horticulturists. Some of the good varieties of *Nymphaeas* were planted in the pool and they are thriving well. The stock of the flowering shrubs and trees was increased during the year in addition to the replacement of the old and dead ones. The Mangosteen (*Garcinia mangostana*) planted outside in the garden is doing very well and attained a height of three feet. The Agar yielding plant (*Acquilaria stricta*) is still alive and special care is being taken to acclimatise this valuable economic plant. Particular attention has been paid towards the maintaining of the hedges in proper shape especially in the Eden Gardens and Dalhousie Square Gardens. These hedges diminished to some extent the number of short cuts through the lawns. The lawn in the band stand could not be kept at a very high standard on account of the large number of members of the public walking up and down it every day on daily morning and evening. Special attempts are however being made towards introducing good type of grass. In the hot house stock of rare and delicate orchids, ferns, arums and others was greased. These ornamental plants were re-potted with richer soil and this had the desired result on the growth of the plants and quality of flowers.



In the Curzon Garden the road leading from the eastern gate to the centre of the garden as well as the outer circle of the centre has been repaired and treated with hot-fix, while the inner circle has been converted into a concrete platform. This improvement has added much to the tidiness of the garden and it has become the favourite spot for the children. The lawn in front of the High Court gate in the Eden Garden was dug up, levelled and replanted with the best variety of Dhub grass. This lawn is surrounded by a red border consisting of *Aerua sanguinioides*. New beds have been constructed along the banks close to the edges of the water of the Dalhousie Square tank all round. These beds were planted with assorted colours of Phlox which produced the desired beautifying effect due to the reflection of the colours in the water. The *Bougainvilleas* planted at the corners of the tank have done very well indeed. They were quite decorative when in full bloom last winter.

The condition of the existing coolie line in the Eden Gardens is far from satisfactory. It is hoped that when funds will be available the coolies will be better accommodated in a pucca building.

The tanks in the Eden Gardens have all along presented a difficult problem. Re-excavation of the tank is the only remedy. The southern corner and other shallower portions often get silted up and reach the water level. These areas at least need re-excavation without delay. The insanitary condition of the tank due to death and decay of the submerged vegetation has however been avoided as far as possible by careful weeding and surface cleaning with the help of the existing labour force.

Repairing and painting of the benches of all the gardens were carried out as in the former years.

**Finance.**—Out of the total budget allotment of Rs. 32,096 under all heads Rs. 32,064 were spent leaving a small saving of Rs. 32. Receipts during the year from the Dalhousie Square Garden amounted to Rs. 13.

**Staff.**—Mr. Merlin Jones discharged his duties as Assistant Curator, Government Gardens, Calcutta, throughout the year and Mr. G. Mohiuddin was the overseer in charge of these gardens.

## LLOYD BOTANIC GARDEN, DARJEELING

Rainfall during the year under report was 98.25 inches. The highest rainfall was recorded in July when it was 34.95 inches. It is, however, a little below the average, but this slight deficiency in the rainfall did not affect much the health of the plants. Autumn annuals in the open beds were however damaged to a certain extent on account of continuous rain which lasted for a few days necessitating replacement of the seedlings several times. Routine work in the different sections of the garden was carried out with efficiency. Sir John Anderson rock garden which is becoming a beauty spot of the garden was extended to about 900 square feet further higher up along the adjoining hill sides. The high altitude plants inserted in this new area are progressing well. It will take some time before the sensitive alpine species will be at home

in their more (or less) different surroundings. This year's additions to the garden are the following:—

*Anaphalu* triplinerris, *Androsace Hooheriana*, *Androsace Poisonii*, *Anemone demissa*, *Anemone obtusifolia*, *Anemone rivularis*, *Aster sikkimensis*, *Aster tricephalus*, *Aconitum spicatum*, *Arabis alpina*, *Allium anjulum*, *Berberis Darwinii*, *Bupleurum Candolii*, *Vathcartia villosa*, *Lowwelina sikkimensis*, *Cortia Hookeri*, *Cortia Lindleyi*, *Cyclalis chaerophylla*, *Coton easier microphylla*, *Cotoneaster turbinata*, *Cyrtanthodiarfi reinforme*, *Cupressus Lindleyi*, *Picea excelsa*, *Veronica*, *Nepeta nervosa*, *Nepeta macrantha*, *Disporum pullum*, *Francoa appendiculata*, *Inula heleneum*, *Ligustrum obtusifolium*, *Hypericum vullatn*, *Olearia odorata*, *Hypericum citrinum*, *Hypericum orientale*, *Oenothera fruticosa*, *Rosa Soulieana*, *Lilium nepalense*, *Lilium nepalense*, *Meconopsis Baileyi*, *Meconopsis eambriea*, *Meconopsis Meconopsis Prattii*, *Cotula barbata*, *Alyssum saxatile*, *Saxifraga hispidida*, *Saxifraga purpurascens*, *Saxifraga Rosy Queen*, *Gaultheria trichophylla*, *Kaidfussia ameloides*, *Nolana grandiflora*, *Primula rotundifolia*, *Gentiana tibetica*, *Senecio foliosus*, *Polygonum campanulatum*, *Rhododendron Aucilandii*, *W Mi Portugal*, *Sedum coeruleum*, *Calanthe alpina*, *Valanthe leuconata*, *Tillictrum japonicum*, *Epilobium tetragynum*, *Gaultheria pyrolaefolia*, *Cynanchum vincetoxicum*, *Juniperus virginiana*.

The display of the flowers in the conservatory was admirable and attracted a large crowd of visitors to the conservatory and rockery as high as 94,289. This is a very large increase over the last year's number which was then considered to be a record number.

The plants which flowered during the year are:—

*Aconitum*, *Aquilegia eximia*, *Alyssum saxatile*, *Aster sikkimensis*, *Auricula*, *Asphodelites luteus*, *Androsace Hooheriana*, *Androsace Poisonii*, *Arabis alpina*, *Anemone demissa*, *Anemone obtusifolia*, *Anemone rivularis*, *Anemone vitifolia*, *Allium anyuhmim*, *Calamintha alpina*, *Cathcartia villosa*, *Cynanchum vincetoxicum*, *Clintonia alpina*, *Calanthe alpina*, *Calanthe odora*, *Cremanthodium reniforme*, *Disporum calcaratum*, *Cypripedium yenustum*, *Cypripedium fairyanum*, *Cypripedium Charlsworthii*, *Cypripedium hirsutissimum*, *Cypripedium villosum*, *Dracocephalum speciosum*, *Dianthus rigidus*, *Dendrobium spathaceum*, *Dendrobium rotundatum*, *Dendrobium moschatum*, *Dendrobium Thyrsiflorum*, *Erica*, *Francoa appendiculata*, *Gaultheria pyrolaefolia*, *Geranium polyanthes*, *Hoineria collina*, *Kennedyia*, *Lonicera Maackii*, *Lilium nepalense*, *Ligustrum obtusifolium*, *Meconopsis Wallivhii*, *Meconopsis Prattii*, *Meconopsis Nepeta nervosa*, *Nepeta macrantha*, *Saxifraga purpurascens*, *Tin glutinosa*, *Vanda coerulea*, *Vanda cristata*, *Vanda Kimballiana*.

mention may be made of *Erica* and *Salix glutinosa* for the first time in the garden during the year. The stock of orchids was increased by the collection made by the Curator and the Sun

"Penntendent during their trips to the different parts of the district.

Lawns and slopes were properly tackled by combing and other manipulations which restricted the growth of moss and other undesirable weeds. Roads and pathways now all named and properly labelled

according to the map of the garden were dressed and kept in tiptop condition by necessary repairs. The pruning, manuring of shrubs and ornamental trees were carried on as usual in time. Two hundred and eighty-four plants of different species were planted in the respective divisions during the year. Two hundred and forty four packets of seeds were received from various correspondents and the following seeds of horticultural and economic importance were successfully germinated in the nursery:—

*Berberis vulgaris*, *Buddleia alternifolia*, *Buddleia Davidiij*, *Callistemon speciosus*, *Cytisus albus*, *Dianthus deltoides*, *Hypericum Androsaemum*, *Hypericum citrinum*, *Hypericum orientale*, *Hypericun patulum*, *Iris sp. Aff. Bulleyena*, *Iris Clarkei*, *Iris chrysographis*, *Iris chrysographis X Delavayi*, *Iris dichotoma*, *Iris orientalis*, *Iris Xiphioides*, *Laburnum alpinum*, *Lilium regale*, *Lupinus polyphyUus*, *Oenothera fruticosa*, *Oenothera Lamarckiana*, *Paeonia pubens*, *Rosa blanda var. michiganensis*, *Rosa calocarpa*, *Rosa Forrestiana*, *Rosa multibracteata*, *Rosa myriadena*, *Rosa nutkana*, *Rosa Nuttalliana Vancouver ens is*, *Rosa pisocarpa*, *Rosa rugosa*, *Rosa Soulieanfl*, *Rosa virginiana*, *Albizzia julibrissin*, *Callistemon rigidus*, *Celtis occidentals*, *Celtis reticulata*, *Cercis siliquastrum*, *Cupressus arizonica*, *Dodonea arizonica*, *Elaeagnus angustifolia*, *Eucalyptus corynocalyx*, *GlycyrrhizQ lepidota*, *Ilex sibirica*, *Melia Candollei*, *Pinus echinata*, *Pinus hale\* pemis*, *Pinus muricata*, *Pinus ponderosa*, *Pinus resinosa*, *Pinus rigida*, *Pinus taeda*, *Pinus Thunbergii*, *Prunus cerasifera x divericata*, *Rhus ovata*, *Rosa palustris*, *Salvia leucophylla*, *Spartium junceum*, *Teucrium flavum*, *Eucalyptus ficifolia x Venidium*.

Three thousand three hundred and thirty-four packets of seeds, 8,170 seedlings, 242 plants and 18 bulbs were supplied to the various botanical and other horticultural institutions during the year. In addition to these, botanical materials were sent to many workers in the different universities in India and abroad for demonstration purposes and research work particularly in connection with the cytological, the genetical and the anatomical investigations. Advanced College students from different parts of India wishing to see the gardens and the herbarium were taken round by the Curator. The students' garden proved of particular interest from the point of education and medicinal investigation. This new section was started last year. Here in a small plot of land some of the common Himalayan medicinal and economic plants were laid out in classified order for the study of the students of Botany and others interested in the subject. Selected species are being added year after year in the different family beds and attempts are being made to develop it into a miniature physique garden after the model of Chelsea Physique Garden in London. The Curator undertook during autumn a tour to Phalut *via* Raman for gathering fresh viable seeds and rare plants from higher elevations with a view to acclimatising them in the garden situated at a lower level and within the reach of all persons in Darjeeling. In the Annual Darjeeling Flower Show the garden maintained its high standard in staging ornamental flowering plants and rare Himalayan plants of assorted species. Although the Lloyd Botanic Garden exhibit of the group of flowering and foliage plants were marked "not for competition" the effect was so picturesque that it proved to be of outstanding merit and The Lady Mary Herbert was pleased to award the special prize of the Darjeeling Flower Show Silver Gilt Medal to the Lloyd Botanic Garden.

Rs. 1,19,000 out of an allotment of Rs. 16,248 under all heads, were spent leaving a small saving of Rs. 10.

**Staff.** Mr. Bahadur Singh, the clerk, retired after rendering 32 years service. Bahadur Singh's interest in the Lloyd Botanic Garden, Jeeling, and his conscientious work in this garden deserve special mention. Mr. S. N. Basu, F.R.H.S., and all the members of the staff discharged their duties well throughout the year.

K. BISWAS,  
*Superintendent,*  
*Royal Botanic Garden, Calcutta.*

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# Annual Report of the Royal Botanic Garden and the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling, for 1940-41.

## ROYAL BOTANIC GARDEN

**General.—Staff.**—Dr. K. P. Biswas, M.A., D.Sc. (Edin.), F.R.S.E., held the charge of the Superintendent throughout the year. The posts of Curator of the Herbarium and the Curator, Royal Botanic Garden, were held by Dr. S. K. Mukerjee, M.Sc, PH.D. (Edin.), and W. Mitra, B.Sc, R.D.H., N.D.H., F.L.S., respectively. Mr. Quasemut was Assistant Curator of the Royal Botanic Garden throughout the year. J. A. Hulbert was the overseer throughout the year except for a short absence on leave from the 17th to the 29th October 1940. Mr. A. T. Banerjee discharged the duties as the Head Clerk efficiently throughout the year.

The Superintendent visited Munsong and Mungpoo plantations during October and undertook a preliminary ecological study of the weed vegetation there with special reference to the cinchona cultivation. He submitted his report to Government during the year under review. A syllabus for the M.Sc. degree in Agricultural Botany was also drawn up by him for Professor J. If. Mukerjee, Professor of Botany, Calcutta University. The Records of the Botanical Survey of India, the publication on the Indian Medicinal Plants, the 150th Anniversary volume of the Royal Botanic Garden, Calcutta, and various other botanical papers were edited by him as usual. The Superintendent delivered a course of lectures on Algology to the post Graduate students in Botany of the University of Calcutta as an honorary lecturer. He was re-elected to serve in the Council of the Royal Asiatic Society as its Natural History Secretary (Biology) and acted as honorary correspondent in Botany of the Himalayan Journal. He continued his algological investigation also as a member of the Water Supply Technical Board, Calcutta Corporation.

Thousands of sheets of grasses from the province of Assam in the local herbarium have been revised and classified according to the Oakes system adopted by Dr. N. L. Bor in his recent monograph on Graminae. This work completes the series of publications on the Flora of Assam in which the Superintendent and the Systematic Assistant, Botanical Survey of India, assisted the authors to their utmost ability. Mr. D. Chatterjee, Ar.sc., PH.D. (Lond.), F.L.S., F.B.H.S., who officiated as Systematic Assistant, Botanical Survey of India, from 25th May 1940 to 14th August 1940, during the absence on leave of Mr. V. Narayanaswami helped in the classification of some of these specimens. Mr. Chatterjee rearranged also several hundreds of sheets in proper order. Revising the nomenclature of the major portion of the collection of Phorbiaeae which was lying hitherto in confusion. The thorough and valuable work of Dr. Chatterjee is very much appreciated. Mr. V. Narayanaswami, Systematic Assistant, Botanical Survey of India, examined many of Dr. Bor's grasses and other sheets received from various correspondents. He also assisted the Superintendent in scrutinising difficult specimens and tackling complicated

questions on Systematic Botany and nomenclature received from the taxonomists in India and the overseas institutions. The Superintendent brought some specimens from the forest areas in Mungpoo and Munsong during his ecological survey there for augmenting the collection in the local herbarium and for distributing the spare sets to the different institutions in India and outside. A joint trip to Port Canning was made with Professor S. P. Agharkar, Head of the Department of Botany, Calcutta University, in company with the Post Graduate students of Calcutta University in the neighbouring area of Port Canning for discussing the relic mangrove vegetation with special reference to their ecological conditions. A botanical excursion was also made by the Superintendent with Mr. A. P. Benthall, Member of the Board of Economic Enquiry, Bengal, and Dr. S. R. Bose, M.A., Ph.D., Professor of Botany, Carmichael Medical College, Calcutta, to Falta by road with a view to adding new records to the Prain's Flora of Hooghly, Howrah and 24-Parganas.

**Scientific workers.**—Many scientists and research workers from India and abroad during their visit to the garden consulted the herbarium and discussed with the Superintendent various botanical, horticultural, arboricultural and biological problems. Of these may be mentioned Dr. Pasino Navaratte who was deputed by the Government of Mexico to study the quinine yielding plants, cultivated in India and Java. Dr. Navaratte devoted his time in the investigation of the life-history of the various species of cinchona plants and paid special attention to the different methods of cultivation of the quinine plants followed in India and Java. Mr. M. B. Raizada, Assistant Botanist, Forest Research Institute, Dehra Dun, solved his doubts regarding identification and correct systematic position of several species by matching his specimens with the authentic materials of the Calcutta Herbarium. Dr. B. C. Kundu, Lecturer, Presidency College, Calcutta, who is engaged in the study of the genus *Trichosanthes*, received full facilities and guidance during his work at the Herbarium. Dr. S. Ramanujam, Second Economic Botanist to the Government of India, consulted the old literature and the herbarium materials of Indian *Brasxirax* (the mustard plant) in connection with his cytological investigation on this important economic plant. Dr. Ramanujam was supplied with necessary information on the previous works on this genus done by Sir David Prain and the Superintendent and others on this subject. Mr. K. Jacob of the Geological Survey of India made an attempt to determine some fossil specimens by comparing them with the dried specimens at the Herbarium. Messrs. R. L. Badhwar and N. C. Goswami, the two botanists under Sir Ram Tfath Chopra, Director, School of Tropical Medicine, worked in the Herbarium throughout the year in connection with the preparation of treatises on poisonous and medicinal plants of India. The scientific staff and the artists offered, as in the previous years, their help and co-operation to the best of their abilities for the successful prosecution of Sir Ram Tfath's work. Mr. R. M. Dutta, Botanist (Sericulture) in the Department of Agriculture; Mr. A. Das Gupta, Professor of Botany, Bangabasi College; Dr. S. N. Das Gupta, Reader in Botany, Lucknow University; Rai Bahadur G. C. Chatterjee, Director, Anti-malarial Association; Mr. A. Sanyal, Ranger in the Forest Department, Bihar, and others were given full help and facilities for their work in the Herbarium. Mr. R. N. De, Silviculturist and Forest Botanist, Assam, worked for a few days in the Herbarium and

got most of his doubtful Assam plants determined and taxonomical queries answered. Dr. K. S. Thomas, Director of Agriculture and Botanical Gardens, Uganda, South Africa, visited the Garden and the Herbarium. He had a long consultation with the Superintendent & the subject of introducing into South Africa various Indian plants of Economic, horticultural and medicinal importance. Dr. Thomas was furnished with all available information on the cultivation of cinchona Plants, tung oil yielding trees and shade trees. Suggestions were also offered with regard to the development of the Botanical Garden in Uganda. Dr. G. W. Padwick, Imperial Mycologist, Imperial Agricultural Research Institute, Dr. E. Roding, Director of Agriculture, Nylons, and Dr. D. D. Khilji, Economic Botanist, Burma, discussed many botanical and horticultural questions with the Superintendent and the Curator of the Herbarium during their visit to the Herbarium and the Garden. Mr. E. C. Hobb, Principal, Imperial Forest Research Institute, Dehra Dun, came here with his students to acquaint themselves with the different sections of the Garden and the scientific arrangement of botanical specimens in the Herbarium. He was taken round the Garden by the Superintendent and the Curator. His Mys were also given necessary instructions on the various floristic composition of the Garden.



*Photo by Dr. K. Biswas.*

#### THE JANAHDAJ LAKE.

The water pumped up from this lake with the new motor pump, is stored in the overhead galvanised tanks installed on the roof of the Curator's quarters adjoining the lake on its western side. The water is then distributed by means of pipes and spread over the plants in the Orchid house on the right, the Palm houses on the left

and the flower gardens behind the background of trees with *Albizia Kichardiajia* in the centre. On the right foreground the two bushes of *Uougainvillea* when in full bloom in the spring display gorgeous colour. On the left foreground is seen the Rain tree with its branches overhanging the lake. Bunch of the pink flowers of the climbing *Uougainvillea* hanging like festoons from the ends of the branches of the tree presents a charming picture in the beginning of hot

**Distinguished visitors.**—The Chinese Goodwill Mission headed by Mr. Tai Chi Toa visited the Garden and the Herbarium with Messrs. T. G. Shen, Ango Tai, T. T. Shen, T. K. Tseng and C. O. Huang. His Excellency and party spent a long time in the Garden and laid particular stress on reviving the exchange relation between the Royal Botanic Garden, Calcutta, the "mother institution in Asia," and the leading botanical, agricultural and forest institutions in China. His Excellency sent the following telegram from Rangoon to the Superintendent on the eve of his departure from India: "Please accept my heartfelt thanks for your kind hospitality. I shall always cherish a happy memory of the few pleasant hours spent in your gardens." His Highness the Maharaja of Kapurthala with his personal staff spent a day in the Garden last cold weather. He was shown the Herbarium and taken round the Garden by the Superintendent. His Highness evinced considerable interest in the scientific and the horticultural work carried out in the Garden. Her Highness Dowager Maharani of Cooh Behar during her visit to the Garden was keen on introducing into her state some of the evergreen shade trees. Kumar R. K. Nirroal Kumar Singh, The Prince of Bhavnagar, took keen interest in the fruit plants particularly the different varieties of mangoes grown in the garden. Hon'ble Sir G. S. Bajpai, Member, Governor-General's Executive Council, and Mr. G. S. Bozman, i.c.s., Joint Secretary to the Government of India, Department of Education, Health and Lands, inspected the precious collection of dried specimens of plants and botanical literature in the Herbarium and went round the different sections of the Garden. Dr. H. M. Wageworth, President, and Dr. K. L. Kock, Ornithologist, paid a visit to the Garden in February. They were struck by the beauty of the flowers of tropical trees particularly of *Browntas* and *Amherstia nobilis* which just burst into bloom at that time.

Sir David and Lady Ezra, Mr. C. S. Sassoon of Bombay and many other distinguished persons paid a visit to the Garden to witness this year's magnificent blooms of the cold weather annuals.

## THE GARDENS

The cyclonic nor'wester storm was severe enough during the year to cause some irreparable damage to the Garden by blowing down several old trees. The pair of Casuarinas, commonly known as Jhau, which stood majestically on the projected bend of the river in front of the Superintendent's quarters serving as a landmark for the last 120 years, had the full brunt of the storm. They were uprooted, removed and replaced by two young plants. The two old Casuarina trees\* were the object of great beauty. They, used to be highly admired by the navigators and all those passing through the river when masses of long

Pendent foliage of the two species of the Bougainvilleas covering the trees burst into gorgeous red and pink flowers in the early spring every year. These trees are also of historical importance as they, in their young stage, were shown in a sketch by Sir J. D. Hooker in 1849 when he visited the Garden on his way to and return from Sikkim where he was arrested with Dr. Campbell and detained for some time. His arrest subsequently led to the annexation of part of the Sikkim State to the British territory.

The display of the flowering annuals at vantage points in different Parts of the Garden was of such fine quality as to warrant repeated Visits by a record number of visitors this year too. Nevertheless, it ~~must~~ be admitted that the standard of the bloom was not so high as that of the last year. This is due evidently to the late arrival of fresh foreign seeds and bulbs on account of the war conditions. The difficulty and the delay in obtaining foreign stock will be felt still more in the next and the following years. The growing of the annual flowers in many gardens in this country will thus be adversely affected until the end of the war. India should, therefore, take steps to become self-sufficient in her horticultural needs as well. She should grow common annuals in suitable localities and produce sufficient quantity of acclimatised seeds, bulbs, cuttings, etc., of fairly high standard in order to meet at least her own internal demands. The Royal Botanic Garden and the Lloyd Botanic Garden Darjeeling, have been devoting attention in this direction as far as possible. Some of the bulbs and seeds raised from local stocks proved satisfactory. Unfavourable conditions and want of sufficient response from the private nursery men and amateur gardeners prevented the authorities of the Royal Agricultural and Horticultural Society of India from holding this year the annual agri-horticultural show in their gardens at Alipur. This yearly exhibit of the best local flowers and fruits was a source of encouragement and information to many horticulturists, fruit growers and interested persons. It is hoped that such an annual flower show in a town like Calcutta will be continued with the co-operation and support, as in the past, of the professionals, private nursery men and all lovers of flowers.

Normal routine work of the gardens was duly attended to. Better ~~travk~~ <sup>ug an</sup> <sup>reor</sup> <sup>an</sup> <sup>sa</sup> <sup>ti</sup> <sup>on</sup> of the labour force led to marked progress in the general cleaning operation and many other indispensable items of work in the different sections of the Garden. An outstanding improvement accomplished in the Royal Botanic Garden in the year under review was the installation of an up-to-date electric motor pump for efficient watering of the plants in the Palm houses, Orchid house, Flower gardens and shade rockery where the plants require profuse water. A crude method of watering the plants by means of ordinary watering cans and earthen pots has thus been partly given up. The introduction of this new system of watering the plants proved a boon towards successfully cultivating many delicate plants. Suitable temperature, moisture and humidity required for the plant houses can now be maintained. ~~ai~~ <sup>8</sup> change in the physical conditions of the Palm houses and Orchid house has already proved particularly beneficial to the health of the plants grown in these houses. Want of an electric power in the garden ~~idently~~ <sup>e</sup> prevented the previous officers in charge of the garden from ~~in~~ <sup>tr</sup> <sup>o</sup> <sup>l</sup> <sup>u</sup> <sup>c</sup> <sup>i</sup> <sup>n</sup> <sup>g</sup> such modern methods which had now been possible after a Period of one hundred and fifty-four years. One of the hand pumps

used for watering plants has been dislodged and converted into a portable pump. It has thus been possible to use this pump profitably for various purposes. The carts for removing refuse have been fitted with old motor tyres. The roads and lawns have thus been spared from damage. The motor tractor, a very indispensable adjunct to the garden requisites is, as I have already stated in the last year's report, aging fast. It needs replacement at an early date. This motor tractor is being used for cutting grass, rolling roads and lawns, pumping water, pulling and transporting logs and many other items of useful garden work. It is hoped that when the international situation improves it will be possible to purchase a new one. The macadamised roads of the Garden used to be damaged by the sharp iron spikes attached to the wheels of the gang mower. A separate wooden trailer has therefore been built to convey the gang mower to the place where the tractor is employed for cutting grass. This arrangement has prevented the spikes from getting blunt and at the same time lengthened the life of the roads. The road work was in full swing during the favourable seasons. More than a dozen roads were attended to during the current year. An improvised portable boiler has been constructed for boiling tar. This has been found very useful in repairing timely ruts, holes and depressions in the roads. An open iron chamber mounted on a cart has been constructed to burn dry leaves on the spot where cleaning operation goes on. The leaves had to be carried and dumped here and there presenting so many ugly sights. This difficulty in disposing of heaps of dry leaves in the spring season has thus been obviated by means of a simple apparatus devised this year. An attempt is being made to demarcate the boundary line of the Garden along the river front on the south-eastern side with a view to developing a mangrove garden representing estuarian and riparian flora. More than a lakh of bricks have been burnt in the Garden this year with a view to economise expenditure on this material.

The following species planted in the open and in the rockery are new additions:—

*Garcinia Morella* Desr., *Acacia Suma* Kurz., *Colebrookia oppositifolia* Sin., *Vernonia divergent* Edgew., *Ormocarpum trichocarpum* Burt-Davy, *Vangueria infausta* Burch., *Bauhinia reticulata* DC., *Cardiospermum canescens* Wall., *Terviinalia sen'cea* Burch., *Ficus Carica* Linn., *Prosopis stvombvlifera* Benth., *Zizyplws Mistol* Griseh., *Leucaena pulverulenta* Benth., *Anona montana* Macfad., *Centrosema* sp., (*hicocarpus Panawanus*, *Mimosa Speggazzinii* Pirotta., *Actinophloeus angustifolius* Hort, ex Bailey, *Coccothrinax argentea* K. Schum., *Lrora* (New variety, white flowered), *Dioclea* sp. Two rare plants of considerable economic interest were successfully grown this year. These were *Hedychium* of different sorts and *Ephedra Gerardiana*, indigenous to Tibet. Seeds of the latter were received from Mr. Eichardson, i.c.s., British Mission, Lhasa, Tibet, to whom our thanks are due for the gift of the seeds of this rare plant. Many old plants destroyed by storm or decayed were removed and replaced by healthier species. Since the garden labels are often removed by a set of mischievous people, the renovation and the replacement of the garden labels have become a rather laborious task. Labels for one thousand six hundred and twenty garden plants, 119 sign boards, 87 plants and sheet labels and 361 small labels for Green Houses and Nurseries were written. Addresses on 259 boxes of plants and seeds

were written for despatching them to the various Parts of India and abroad. The beds in the P<sup>TM</sup> n J J £ T M G rearranged and renovated and some ornainenta -spenes T M \* T M J B Planted in the different plant houses. The W ^ u t J ? ^ den w J B attended to in the usual manner. T X e r t i o n of the latter was and 2 were cleaned and silt from the shallower po of the labour force for about a mdnth.

Experiments on acclimatisation of some of the fibre plants, paper mulberry and fodder grasses were carried a ut in the economic garden. Seeds of *Linum vsitinUssinuv*, were T ^ m e d i r o m the T M \* T M J B through the Agriculture Department, Be gal. A t e \* seeds from Nepal were also presented by Mr. N. T. Williams, an Attorney at Law. T h e seeds received with thanks from both these sources germinated, and the slants yielded seeds about six times oi. the seeds sown. Paper

successfully grown under, proper B ^ f ^ J l \* ^ ^ ^ the fresh students and for comparison of J ^ b v - ? h - E x c T s e D e p l S m e n t to this ^ p e r i m e n when such plah s are sent by, the ^ x c i s e i s ^ ^ A ^ o n o p u s Department for correct determination, i n e c a r p e x ^ h i n the Garden, e o ^ e m . - i n t r o d u c e d from Amemia. some j e n . a . j . is now spreading fast in the lawns, meadows and fall w lands in many parts of Bengal. This grass was grown in the experimental ground with different kinds of manure. Ammonia and cowdung proved favourable to its growth. This important fodder grass of soft texture is liked very much by cattle. The other fibre plants grown were *Hibiscus subdariffa*, *Crotalaria juncea* and *Musa sapientium*. The fibres of these species tested by the fibre Expert proved to be of good quality. Attempts have been made during the year to grow different kinds of edible aroids. Cuttings of the different varieties of mulberry t both foreign and indigenous, which have been under cultivation for 2 rs by were planted in t e G a r i e n s . Some the stock of mulberry trees of

**fcWSIS? JESS** <<

Garden from a very early period  
**Pant and seedseed** ^ ^ ^ ^ T ^ ^ I ^ received from different <>un-efl. lw-elje l ^ u s in India << l x t y . s e y e n plants were clejatched to the << n e ^ t r o e P in India and various countries abroad. T t o e w g w e d a t t y - f o u r p a c k e t s r f (England) as well seeds were received from Java, South Africa, h u n d r e d I ^ ^ t y - e i g h t as from the different parts of India; i n s u c h countries as Packets and G2 lbs. of seeds were despatcnea w California and

tch of plants to foreign countries that such obstacles will be removed with the restoration of

peace

f The Herbarium-The scientific work in the He^ariuir was satisfactorily carried out throughout the yea^ D u n f , ^ e a y u r review the total number of specimens i << e n M << l j << 8 4 ^ More^ than 100 specimens were received in batches I r o m e ^ , k o l l o w i n g institutions, namely, Forest Eesearch Institute, Uehra J J u n , J j o r e s t

Manager, Sikkim State; Professor of Botany, the Punjab Agricultural College, Layallpur, and others. One hundred and sixty-eight specimens of medicinal plants received from Mr. B. Singh were identified for the Benares Hindu University. Identifications were also done of a large number of specimens received from Messrs. A. P. Floyd, S. Krishnaswamy, H. Chakravarty of the Presidency College, Calcutta; A. K. Chakravarty of the Eice Research Institute, Chinsura; Miss S. Meyer, Professor of Botany, Bethune College, Calcutta; Dr. R. R. Stewart, Principal, Gordon College, Rawalpindi; Dr. S. R. Sen Gupta, Professor of Botany, Ripon College, Calcutta, and Dr. D. Rhind, Economic Botanist, Burma. Investigation of water plants, chiefly Algae, was carried out by the Superintendent in connection with the research work on pisciculture undertaken by Dr. H. K. Mukerjee, Head of the Department of Zoology/Calcutta University, under the auspices of the Imperial Council of Agricultural Research. Seventy-seven samples of gut contents of fishes were examined microscopically and the result of the examination of these algal materials was embodied in a report which was submitted to Dr. Mukherjee for incorporation in his general report on the subject.

Distribution of specimens was curtailed due to the present disturbed conditions of the world. The total number of specimens distributed to the various recipients in different parts of India and America this year was 1,075. A representative collection of the parasitic fungi growing on the palms and other decorative herbs in the Palm houses, the Orchid house and the Nurseries of this Garden were collected and presented to Dr. G. W. Padwick, Imperial Mycologist, New Delhi, for investigation. The largest number of plants distributed to America during the year under review was 664. The recipient of these plant materials was Dr. E. D. Merrill, SC.D., Director and Administrator of the Botanical Collections of the Harvard University, Arnold Arboretum, Jamaica Plain, Mass., U.S.A. Dr. Merrill sent valuable specimens of Burmese plants to this Herbarium for determination. A set of these Burmese specimens presented by him is a valuable acquisition to the Herbarium for which our grateful thanks are due to Professor Merrill. One hundred and fifty-three specimens were presented to Dr. B. Sahni, D.S.C., SC.D., F.R.S., for the Herbarium of the University of Lucknow. Dr. S. R. Bose, Professor of Botany, Carmichael Medical College, and Dr. S. R. Sen Gupta, Professor of Botany, Itipon College, were also recipients of a batch of 100 specimens each for their College herbaria. Mr. A. P. Benthall received a duplicate set of specimens collected during a joint tour by the Superintendent and Mr. Benthall in the neighbourhood of Calcutta. The Biology Department of the Dacca University received also a few selected specimens. Specimens of fruits of *Erythrina indica* were sent to the Botanist, Tocklai Experimental Station, Cinnamara, Assam, for the investigation of the insecticidal properties of this plant. The Officer in charge of the Commercial Museum, Calcutta Corporation, received specimens of the well-known paper yielding plant *Broussonetia papyrifera*. Specimens of the breathing roots of *Avicennia* were sent to Professor S. N. Das Gupta of the Lucknow University for anatomical work. Dr. P. K. Bose, Department of Chemistry, University of Calcutta, received leaves of *Clausena Wampi* for chemical analysis. Spikelets and mature leaves of *Lopholepis ornithocephala* and *Fingerhuthia affghanica* were sent to Dr. G. H. Schweickerdt of the Durban Botanic Garden, South Africa, for his agrostological researches.



Leafy twigs of *Ficus Krishnae* sent to Dr. Agnes Arbor, the well-known morphologist of the University of Cambridge, proved to be of particular interest in connection with her research work. The result of her preliminary investigation of this plant confirms to a certain extent the inclusions already communicated by the Superintendent in his Paper on *Ficus Krishnae*. A representative set of the collections of our garden was presented to Dr. N. L. Bor, Forest Botanist, Forest Research Institute, Dehra Dun. Four photographs of the type sheets of *Myrsine* were supplied to Dr. E. H. Walker, Smithsonian Institute, Washington. Dr. Claud L. Horn, Associate Horticulturist, Puerto Rico, U.S.A., was furnished with a photograph of Roxburgh's coloured illustration of *Garcinia mangostana*.

The loan of specimens, much restricted during the year, was confined mainly within the country. One hundred and fifty-seven sheets were sent on loan. One hundred and thirteen sheets consisting of specimens of grasses went to Dr. N. L. Bor of the Forest Research Institute, Dehra Dun, for critical examination. Forty-four sheets of *Vicia* were borrowed by Professor Luthra, Professor of Botany, Punjab Agricultural College, Lyallpur, for his study. One hundred and sixty sheets of the herbarium materials lent out in the previous year were returned in good condition. One sheet of *Carex Moorcroftiana* sent to the Director, Royal Botanic Garden, Kew, London, proved to be of particular interest in the investigation of the genus *Carex* by M. E. Nelson, Assistant Botanist, Kew. A large number of specimens as well as 772 reached the Herbarium safely in spite of the present transport difficulties. The major portion of this gift was received from Professor Merrill of the Harvard University. Five hundred and seven sheets from Burma and Indo-China in Merrill's collection are of particular interest in connection with the writer's study on the Flora of North Burma. Two hundred sheets consisting chiefly of Thailand (Siamese) plants were presented by Sir Arthur W. Hill, Director, Royal Botanic Garden, Kew, to the Herbarium. It is a valuable asset to our collection and we are indebted to Sir Arthur for his help and cooperation in this direction. Forty-two sheets of Labiateae, some of which are rare, were presented by Dr. R. R. Stewart, Principal, Gordon College, Rawalpindi. Some of the marine algae of Mr. S. Krishnaswamy presented to the Superintendent as personal gift proved to be a good addition to the algal collection of the Herbarium. *Solanum comigerum* received from the Honorary Secretary, Agricultural Society, Madras, and the yellow variety of *Holmskioldia sanguinea* received from Mr. R. N. De, Silviculturist, Assam, are new acquisitions. One hundred and four packets of seeds were received in the year and 100 packets were distributed to the different parties in the country those received and distributed by the Curator direct from the office.

Reparation and repair of the herbarium sheets proceeded on foot throughout the year. Two thousand one hundred and sixty-seven sheets were incorporated during the year and a little over 1,000 and 100 species covers were changed. One thousand six hundred and thirty-three specimens were mounted during the year.

A large number of queries have been answered and notes on various questions relating to botanical, horticultural, arboricultural and forestal searches were supplied freely to the numerous correspondents in India and abroad. Miscellaneous information on botanical and

allied subjects was also furnished to many scientists and interested persons. Scientific information on the complicated question of nomenclature, systematic position of species, distribution, cultivation and acclimatisation of indigenous and foreign plants of medicinal and economic importance were furnished to various correspondents. Researches on industrial development with special reference to the supplies of war materials demanded information on many a plant product. The manufacture of Agar Agar and Iodine from the sea weeds have recently engaged the attention of several industrial chemists. Notes on the possibilities of the manufacture of Agar Agar and Iodine from the sea weeds available along the coast line of India were furnished by the Superintendent to Sir S. S. Bhatnagar, Director, Scientific and Industrial Research and Dr. B. S. Guha, Professor of Applied Chemistry, Calcutta University. Suggestions were invited from the Superintendent on the question of removing widespread black and brown patches on the canvas sheets supplied in large quantities for war purposes. The spots were found to be due to fungi attacking the canvas. Such canvas infected with mould when used in the battle field presented a difficult problem to tackle with as these organisms not only deteriorate the canvas but proved to be unhealthy for the occupants. Examination showed that the mould was composed of the common fungi belonging to the two genera—*Aspergillus* and *Mucor* which occur in great abundance everywhere during the moist weather. Investigation was carried on by Dr. S. R. Bose, Mr. A. Bose and the Superintendent with a view to discover an antiseptic treatment. (Results of prolonged experiments, study of the nature of the canvas and the life-history of fungi enabled the workers to formulate several prescriptions for antiseptic treatment of the fibrous material at the different stages of the preparation of the canvas. Notes on this subject were submitted to Messrs. Bird & Co. The cultivation and manufacture of tung oil have been engaging the attention of the Directors of many large firms and tea planters during the last few years. Information on the successful cultivation of the several species of the tung oil yielding trees were freely supplied to all who are concerned in the cultivation and manufacture of the Chinese wood oil in India. Some of the tea planters, on account of the recent laws regulating the extension of tea plantations, rightly intend to utilise spare lands for the cultivation of medicinal and other economic plants. Necessary information was supplied to all those who are endeavouring to open up a new line for utilising Indian plants in a profitable manner. Information was also supplied on Bhilwanol supposed to be contained in the plant *Semicarpus anacardium*. Eradication of *Lav tana* and *Euphorbia*, from the vast areas invaded by these obstinate weeds presents a difficult problem with the Punjab Government. Necessary information on the life-history of these plants and different methods of eradication of the weeds were embodied in a report sent to Mr. J. C. Sincl, Forest Publicity Officer, Lahore. Similar notes were also supplied to the Executive Engineer, Damodar Canal, who has been attempting to eradicate another weed known as *Eupatorium odoruvi* which has spread like wild-fire, particularly in the lower hilly districts of Assam and Bengal. Notes on *Lemna oligorrhiza* were furnished to Mr. .O. McCann, Curator, Natural History Society of Bombay. The Managing Agents, Retahganj Sugar Mills, Calcutta, and Dr. C. A. Kloppenburgh, (Jopalpur, Itajshahi, obtained, information on the distribution of *Derris elliptica*. Necessary instructions on the cultivation of *Derris species*, the well-known insecticidal plants

were also given to them. Information on *Rosa damascena* and the roots of a Khas grass—*Vetiveria zizanioides*—was supplied to the National Institute of Horticulture and Industries, Daltanganj. *Gymnema sylvestre*, a plant which makes sugar tasteless, formed the subject of a correspondence between Mr. S. N. Chatterjee of Eajgir, Patna, and this department. Observations on the control and eradication of water hyacinth were reported to Mr. C. N. Sarkar, Bengal-Nagpur Railway, and the Deputy Commissioner, Gurdaspur, Punjab. Information on water plants with special reference to malariological survey was supplied to Mr. Senior White, Director of Malaria Survey, Bengal-Nagpur Railway. Information on 31 aquatic plants associated with the malariological work was also supplied to the Assistant Director of Public Health, Bengal. Mr. S. C. Sen, Superintendent, Cinchona, Bengal, was furnished with the notes on the medicinal properties of *Holarrhena antidysenterica*. Report on the distribution and uses of *Periploca aphylla*, *Artetnesia iKaritima*, *Artemesia scopana* and *VerovsUa ahrotanoides* supposed to contain santonin were supplied to Messrs. G. E. Glenn and Company, Calcutta. The Fruit Specialist, Lyallpur, Punjab, was specially interested in the *Citrus* specimens and he was furnished with the materials and necessary literature on the subject for his investigation. Systematic position of *Falcourtia*, *Gynostemma*, *Odina*, *Microtropis* and *Alaniophlegoniwfoliuv* was discussed in a note forwarded to Dr. E. D. Merrill in connection with his researches on these genera. A note on the Indian curry powder was supplied to Dr. F. Chen of the Fan Memorial Institute of Biology, China. Information on *Vetiveria zizanioides*, *Atropa Belladonna* and *Ephedra* sp., *Beswellia serrata*, *Cymbopogon discolor*, and the two oil yielding grasses—*Cymbopogon Javanicus* and *C. Schoenanthus*—and a short note on the cultivation of Sandal—*Santahn album*—were supplied to Messrs. Devanport Co., U Professor R. N. Ghagwat, Head of the Chemistry Department, St. Xavier's College, Bombay; Dr. S. Neogy, Chemistry Department, Alkutta University; Dr. P/K. Sen, Fruit Research Station, Sabour, Wiar, Principal, H. B. Technical Institution, Cawnpore, respectively. Information on the vernacular names and cultivation of *Morinda lactoria* which yields a good vegetable dye was furnished to the Principal, Bengal Textile Institute, Serampore. Suggestions and opinion on a proposed marine biological station in India were supplied by the Superintendent to Dr. Gravely of the Government Museum, Madras. Notes on the suitable shade trees for a cinchona plantation in Munsong were forwarded to Mr. Thomas, Manager. Professor P. Maheswari, Head of the Department of Botany, Dacca University, received information on the Herbarium notes on the systematic position of a few species. Professor R. Barucha, Professor of Botany, Royal Institute of Science, Bombay, was supplied with particulars of the systematic work on the Indian Flora and the arrangements and classification of the specimens followed in the Sibpur Herbarium. Dr. W. Burns, C.I.E., Agricultural Commissioner with the Government of India, was furnished with notes on *Typha elephantina*. Mr. Arvid Dady, Los Angeles, California, received a note containing observations on the systematic position and distribution of *Kyllinga hrevifolia*. Similar scientific information was offered to many more correspondents. Botanical work on the cultivation of the medicinal plants under the guidance of a Scientific Committee, of which the Superintendent is the Chairman, is proceeding on scientific lines. The work is of far-reaching importance not only to

the horticulturists and the gardeners in India, but it is also of considerable international value in the horticultural trade in general.

**The Library.**—The activities in the library have, to a certain extent, also been curtailed due to the foreign journals not arriving on due dates. The journals and periodicals purchased during the year are 25. Forty journals and pamphlets relating to various botanical questions were received in exchange. Some of these were presented to the library. The number of books purchased during the year was 32, and 7 books and 18 leaflets were received as gifts. The total number of books sent out on loan during the year was 109. About 60 books were returned during the year. Seventy-one old and torn books were bound by the appointment of an additional book repair. These books are irreplaceable volumes lying unattended for years and their protection is long overdue. There are some precious manuscripts as well which require immediate attention. More than a century and a half old Roxburgh's *Icones*\* consisting of 2,382 magnificent coloured illustrations, perhaps the only complete set of its kind in the world, were accommodated in a steel cabinet this year for proper preservation and protection from damage by insects and fungi, and by frequent handling. The cataloguing of the library books proceeded on modern lines and about 3,000 books were entered systematically in the register.

**Publications.**—In the year under review, more than a dozen important papers contributed from this department were published in different journals or read before the scientific meetings. "Plants of the Lloyd Botanic Garden, Darjeeling" by Dr. K. Biswas was published in the Records of the Botanical Survey of India, Volume V, No. 5. Separate maps of this mountain garden are now available for sale at a moderate price of annas four each. They can be had from the library of the Royal Botanic Garden or the office of the Lloyd Botanic Garden, Darjeeling. Limnological investigation was carried on by the Superintendent at Palta Water Works. A paper entitled "Limnological Investigation and Improvement of Villages," written by the Superintendent, was published in "Science and Culture," Volume VI, 1940. Another paper on "Systematic position of a little known flowering plant from South Burma" by him was printed in the Journal of the Indian Botanical Society, Volume XI, Nos. 1-3, 1940. The Superintendent was invited by the Trustees of Indian Museum to deliver a public lecture in the Indian Museum on the 15th February, 1940. The lecture was subsequently published in "Nature" (London), "Current Science" and "Science and Culture," Volume VI, 1940, and in the "Bengal Weekly," May 1940, and elsewhere under the title of "The Royal Botanic Garden at Sibpur, its origin and aim." He delivered another lecture on the "Romance of Flowers" on the 2nd March at Chakra Baithak. In addition to these he wrote two more papers: (1) "A Report on the possibilities of cultivation and acclimatisation of tung oil yielding trees in India" which formed the subject of a communication by him before a monthly meeting of the Royal Asiatic Society of Bengal, and (2) the other "Marine algae along the Bombay Coast" which was contributed to the Botany section of the last session of the Indian Science Congress held at Benares. "A revision of the Labiatae of the Indian Empire" by Dr. S. K. Mukerjee, Curator of the Herbarium, was published in the "Records of the Botanical Survey of India," Volume XIV, No. 1, 1940. Some new plants from India and Burma by Dr. D. Chatterjee and Dr. S. K. Mukerjee came out in the Journal of the Indian Botanical

Society, Volume XIX, Nos. 1-3, 1940, and "Two new Indian species" by Mr. R. y m j) e> j) r g JJ, Mukerjee and Mr. V. Narayanaswami was Published in the Indian Forester, Volume LXVI, No. 6, 1940. "A note on Ussia javanica Linn, and Cassia nodosa Ham. with a key to the fl of the Cassias" by Mr. V. Narayanaswami, was published in the Journal of the Botanical Society of Bengal, Volume VI, No. 1, 1940. "Two new Annonaceae from Assam and Burma" by Dr. D. P. Mukerjee, Officiating Systematic Assistant, appeared in the Journal of the Indian Botanical Society, Volume XIX, Nos. 1-3, 1940. "The Bharatiya Banausadhi Parichaya," a voluminous work on the medicinal Plants of India, "The Hundred and Fiftieth Anniversary Volume," and "The Flora of the Aka Hills" by the Superintendent are passing through the press.

**Finance.**—Out of a total budget allotment of Es. 51,388 for staff and permanent establishment, Es. 51,307 was spent and under all other heads the expenditure amounted to Es. 46,688 against the total allotment of Es. 48,022. There was a net saving of Rs. 1,415 under all heads during the year. Receipt of the department during the year counted to Es. 1,782.

### CALCUTTA GARDENS

The display of the winter annuals this year in the Calcutta Gardens was satisfactory in spite of the belated cold weather. The Dahlias and Carnations proved particularly good and flowers attained record size. Decorative pot plants with attractive flowers were staged in selected spots in the gardens and also along the edges of the lakes. The display, as it was expected, enhanced the beauty of the gardens. The flower beds in the lawn near the band stand in the Eden Garden were arranged and extended round the whole length of the boundary wall of the garden running from north to south. The Giant Amazon Water-lily—*Victoria regia*—as usual won the admiration of the general Public. The leaves attained as large a size as in the former years. Seedlings of this plant were distributed to many interested persons and horticulturists. Some of the good varieties of *Nymphaeas* were planted in the jheel and they are thriving well. The stock of the flowering shrubs and trees was increased during the year in addition to the replacement of the old and dead ones. The Mangosteen (*Garcinia Wangostana*) planted outside in the garden is doing very well and attained a height of three feet. The Agar wood yielding plant (*Acquilaria affallacha*) is still alive and special care is being taken to acclimatise this valuable economic plant. Particular attention has been paid towards the maintaining of the hedges in proper shape especially in the Eden Gardens and Dalhousie Square Gardens. These hedges diminished to some extent the number of short cuts through the lawns. The lawn near the band stand could not be kept at a very high standard on account of the large number of members of the public walking up and down the lawn daily morning and evening. Special attempts are however being made towards introducing good type of grass. In the hot house stock of rare and delicate orchids, ferns, arums and others was increased. These ornamental plants were re-potted with richer soil and this had the desired result on the growth of the plants and quality of flowers.

In the Curzon Garden the road leading from the eastern gate to the centre of the garden as well as the outer circle of the centre has been repaired and treated with hot-fix, while the inner circle has been converted into a concrete platform. This improvement has added much to the tidiness of the garden and it has become the favourite spot for the children. The lawn in front of the High Court gate in the Eden Garden was dug up, levelled and replanted with the best variety of Dhub grass. This lawn is surrounded by a red border consisting of *Aerua sanguinioides*. New beds have been constructed along the banks close to the edges of the water of the Dalhousie Square tank all round. These beds were planted with assorted colours of Phlox which produced the desired beautifying effect due to the reflection of the colours in the water. The *Bougainvilleas* planted at the corners of the tank have done very well indeed. They were quite decorative when in full bloom last winter.

The condition of the existing coolie line in the Eden Gardens is far from satisfactory. It is hoped that when funds will be available the coolies will be better accommodated in a pucca building.

The tanks in the Eden Gardens have all along presented a difficult problem. Re-excitation of the tank is the only remedy. The southern corner and other shallower portions often get\* silted up and reach the water level. These areas at least need re-excitation without delay. The insanitary condition, of the tank due to death and decay of the submerged vegetation has however been avoided as far as possible by careful weeding and surface cleaning with the help of the existing labour force.

Repairing and painting of the benches of all the gardens were carried out as in the former years.

**Finance.**—Out of the total budget allotment of Rs. 32,096 under all heads Rs. 32,064 were spent leaving a small saving of Rs. 32. Receipts during the year from the Dalhousie Square Garden amounted to Rs. 13.

**Staff.**—Mr. Merlin Jones discharged his duties as Assistant Curator, Government Gardens, Calcutta, throughout the\* year and Mr. G. Mohi-uddin was the overseer in charge of these gardens.

### LLOYD BOTANIC GARDEN, DARJEELING

Rainfall during the year under report was 98.25 inches. The highest rainfall was recorded in July when it was 34.95 inches. It is, however, a little below the average, but this slight deficiency in the rainfall did not affect much the health of the plants. Autumn annuals in the open beds were however damaged to a certain extent on account of continuous rain which lasted for a few days necessitating replacement of the seedlings several times. Routine work in the different sections of the garden was carried out with efficiency. Sir John Anderson rock garden which is becoming a beauty spot of the garden was extended to about 900 square feet further higher up along the adjoining hill sides. The high altitude plants inserted in this new area are progressing well. It will take some time before the sensitive alpine species will be at home

in their more or less different surroundings. This year's additions to the garden are the following:—

*Anaphalis triplinervis*, *Androsace Hookeriana*, *Androsace Poisonii*,  
*Anemone demissa*, *Anemone obtusiloba*, *Anemone rivularis*, *Aster*  
*sikkimensis*, *Aster tricephalus*, *Aconitum spicatum*, *Arabis alpina*,  
*Humulus angulosus*, *Berberis Darwinii*, *Bupleurum Candollii*, *Vathrartia*  
*fillosa*, *Habenaria sikkimensis*, *Cortia Hookeri*, *Cortia Lindleyi*,  
*Orchidochloa chaerophylla*, *Cotoneaster microphylla*, *Cotoneaster turbinata*,  
*Cremanthodium reinforme*, *Cupressus Lindleyi*, *Picea excelsa*, *Veronica*  
*caucanica*, *Nepeta nervosa*, *Nepeta viacrantha*, *Disporum pulchellum*,  
*Pinus appendiculata*, *Inula heleneum*, *Ligustrum obtusifolium*,  
*Hypericum b-hata*, *Olearia odorata*, *Hypericum citrinum*, *Hypericum*  
*crenatum*, *Oenothera fruticosa*, *Rosa Soulieana*, *Lilium giganteum*,  
*Lilium nepalense*, *Meconopsis Baileyi*, *Meconopsis cambrica*, *Meconopsis*  
*Wallichii*, *Meconopsis Prattii*, *Cotula barbata*, *Alyssum saxatile*,  
*Saxifraga hispidula*, *Saxifraga purpurascens*, *Saxifraga Rosy Queen*,  
*Gaultheria trichophylla*, *Kaulfussia ameloides*, *Qlolana grandiflora*,  
*Primula sikkimensis*, *Primula rotundifolia*, *Gentiana tibetica*, *Senecio*  
*Bifolius*, *Polygonum campanulatum*, *Rhododendron Aucklandii*  
*White Portugal*, *Sedum coeruleum*, *Calanthe alpina*, *Calanthe*  
*odora*, *Potentilla leuconata*, *Thalictrum japonicum*, *Epilobium tetra-*  
*num*, *Gaultheria pyrolaefolia*, *Cynanchum vincetoxicum*, *Juniperus*  
*virginiana*.

The display of the flowers in the conservatory was admirable and attracted the glorious spring flowers in the conservatory and rockery to attract this year unprecedented crowd inflating the number of visitors as high as 94,289. This is a very large increase over the last year's number which was then considered to be a record number.

The plants which flowered during the year are:—

*Aquilegia eximea*, *Alyssum saxatile*, *Aster*  
*sikkimensis*, *Auricula*, *Asphodelus luteus*, *Androsace Hookeriana*,  
*Poisonii*, *Arabis alpina*, *Anemone demissa*, *Anemone*  
*obtusifolia*, *Anemone rivularis*, *Anemone vitifolia*, *Allium angulosum*,  
*Androsace alpina*, *Cathcartia villosa*, *Cynanchum vincetoxicum*,  
*Androsace alpina*, *Calanthe alpina*, *Calanthe odora*, *Cremanthodium*  
*reinforme*, *Disporum calcaratum*, *Cypripedium yonustum*, *Cypripedium*  
*yanum*, *Cypripedium Charlsworthii*, *Cypripedium hirsutissimum*,  
*Dracocephalum villosum*, *Dracocephalum speciosum*, *Uianthus ngidus*,  
*Dendrobium spathaceum*, *Dendrobium rotundatum*, *Dendrobium*  
*moschatum*, *Dendrobium Thyrsiflorum*, *Erica Francoa appendiculata*,  
*Gaultheria pyrolaefolia*, *Geranium polyanthes*, *Homeria collina*,  
*Kennedyia rubicanda*, *Lonicera Maackii*, *Lilium nepalense*, *Ligustrum*  
*obtusifolium*, *Meconopsis Wallichii*, *Meconopsis Prattii*, *Meconopsis*  
*cambrica*, *Nepeta nervosa*, *Nepeta viacrantha*, *Saxifraga purpurascens*,  
*Salvia glutinosa*, *Vanda coerulea*, *Vanda cristata*, *Vanda KimhalUava*.

Particular mention may be made of *Erica* and *Salvia glutinosa* flowering for the first time in the garden during the year. The stock of *Su* orchid was increased by the collection made by the Curator and the Penntendent during their trips to the different parts of the district.

The steep slopes were properly tackled by combing and other weeding operations which restricted the growth of moss and other undesirable plants. Roads and pathways now all named and properly labelled

according to the map of the garden were dressed and kept in tiptop condition by necessary repairs. The pruning, manuring of shrubs and ornamental trees were carried on as usual in time. Two hundred and eighty-four plants of different species were planted in the respective divisions during the year. Two hundred and forty four packets of seeds were received from various correspondents and the following seeds of horticultural and economic importance were successfully germinated in the nursery: —

*Berberis vulgaris*, *Buddleia alternifolia*, *Buddleia Davidii*, *Callistemon speciosus*, *Cytisus albus*, *Dianthus deltoides*, *Hypericum Androsaemum*, *Hypericum citrinum*, *Hypericum orientale*, *Hypericum patulum*, *Iris sp. Aff. Bulleyena*, *Iris Clarkei*, *Iris chrysographis*, *Iris chrysographis X Delavayi*, *Iris dichotoma*, *Iris orientalis*, *Iris Xiphioides*, *Laburnum alpinum*, *Lilium regale*, *Lupinus polyphyllus*, *Oenothera fruticosa*, *Oenothera Lamarckiana*, *Paeonia pubens*, *Rosa blanda var. michiganensis*, *Rosa calocarpa*, *Rosa Forrestiana*, *Rosa multibracteata*, *Rosa myriadena*, *Rosa nuthana*, *Rosa Nuttalliana Vancouverensis*, *Rosa pisocarpa*, *Rosa rugosa*, *Rosa Soulieana*, *Rosa virginiana*, *Albizia julibrissin*, *Callistemon rigidus*, *Celtis occidentalis*, *Celtis reticulata*, *Cercis siliquastrum*, *Cupressus arizonica*, *Dodonea arizonica*, *Elaeagnus angustifolia*, *Eucalyptus corynocalyx*, *Glycyrrhiza lepidota*, *Ilex sibirica*, *Melia Candollei*, *Pinus echinata*, *Pinus halepensis*, *Pinus muricata*, *Pinus ponderosa*, *Pinus resinosa*, *Pinus rigida*, *Pinus taeda*, *Pinus Thunbergii*, *Prunus cerasifera x divericata*, *Rhus ovata*, *Rosa palustris*, *Salvia leucophylla*, *Spartium junceum*, *Teucrium flavum*, *Eucalyptus ficifolia x Venidium*.

Three thousand three hundred and thirty-four packets of seeds, 8,170 seedlings, 242 plants and 18 bulbs were supplied to the various botanical and other horticultural institutions during the year. In addition to these, botanical materials were sent to many workers in the different universities in India and abroad for demonstration purposes and research work particularly in connection with the cytological, the genetical and the anatomical investigations. Advanced College students from different parts of India wishing to see the gardens and the herbarium were taken round by the Curator. The students' garden proved of particular interest from the point of education and medicinal investigation. This new section was started last year. Here in a small plot of land some of the common Himalayan medicinal and economic plants were laid out in classified order for the study of the students of Botany and others interested in the subject. Selected species are being added year after year in the different family beds and attempts are being made to develop it into a miniature physique garden after the model of Chelsea Physique Garden in London. The Curator undertook during autumn a tour to Phalut *via* Raman for gathering fresh viable seeds and rare plants from higher elevations with a view to acclimatising them in the garden situated at a lower level and within the reach of all persons in Darjeeling. In the Annual Darjeeling Flower Show the garden maintained its high standard in staging ornamental flowering plants and rare Himalayan plants of assorted species. Although the Lloyd Botanic Garden exhibit of the group of flowering and foliage plants were marked "not for competition" the effect was so picturesque that it proved to be of outstanding merit and The Lady Mary Herbert was pleased to award the special prize of the Darjeeling Flower Show Silver Gilt Medal to the Lloyd Botanic Garden.



Out of an allotment of Rs. 16,248 under all heads, Rs. 10,000 were spent leaving a small saving of Rs. 10.

Mr. Babu Bahadur Singh, the clerk, retired after rendering 32 years of faithful service. Bahadur Singh's interest in the Lloyd Botanic Garden, Darjeeling, and his conscientious work in this garden deserve special mention. Mr. X. Basu and all the members of the staff discharged their duties well throughout the year.

K. BISWAS,  
*Superintendent,*  
*Royal Botanic Garden, Calcutta.*

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**Annual Report of the  
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Superintendent, Government Printing  
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1942

Price—Indian, annas 4; English, 6d.

Annual Report of the Royal Botanic Garden, Darjeeling, and of the Lloyd Botanic Garden, Calcutta, for 1941-42.

ROYAL BOTANIC GARDEN

**General Staff**  
 The Superintendent and carried on the duties of the Survey of India at the Herbarium, Dr. S. X. Mr. N. Mitra, B.M., the Curator of the Herbarium and throughout the year. Mr. Quasm. Ah was the Mr. J. Hulbert, Overseer, throughout the year. the Head Clerk throughout the year.

The Superintendent has been the President of the Botany of the Thirtieth Session of the Indian Science Congress at Lucknow in January 1943. He has been elected Vice-President of the Bengal Botanical Society and the Committee of the Fruit and Vegetable Exhibition which was opened by His Excellency the Governor of Bengal, Mr. A. B. Mallick, in January 1942. The exhibition was held at the Hon'ble Nawab's Bazaar, Calcutta. The Superintendent has been nominated to serve in the Council of the Royal Asiatic Society of Bengal and as a Correspondent in Botany, of this year too and continued to be the Secretary of the Himalayan Club and worked for the post of the Honorary Secretary, W.C.C. Department in Science, University

**Important botanical work**  
 The Superintendent, accompanied by Mr. A. J. Das, of Tripura State, made a botanical investigation in the hill tract bordering Bengal and Lushai Hills, Assam, where over 2,500 specimens were collected during this tour and a number of medicinal plants and plants of economic importance were explored. A preliminary report on the tour was submitted by Mr. A. J. Das to the Government of Tripura and the Superintendent's autumn inspection of the hill tract was made by him in company with Dr. S. P. Agarkar, Head of the Department of Botany, Calcutta University, and the Post Graduate student, as the Manibhanj State. The route followed was an elevation of 2,000 specimens were gathered during these botanical tours. Seeds and plants from high altitude

and some important medicinal plants were brought and introduced to the Lloyd Botanic Garden, Darjeeling, and the Royal Botanic Garden, Calcutta. Some of these plants are doing well. A local botanical excursion was also made by the Superintendent accompanied by Mr. A. P. Bantai in connection with the preparation of local and district floras. Dr. S. Mukerjee studied the vegetation of the reserve forests of the Cooch Behar State early in spring and collected about 1,320 specimens. The State authorities rendered necessary facilities and assistance to Dr. Mukerjee in his botanical studies of their State forests for which our thanks are due to them. A Plant Collector, Rabial Kazi, brought an interesting lot of specimens to the Herbarium from Mayurbhanj State where he collected under the guidance of Mr. A. Das.

**Scientific workers.**—There were very few overseas workers during the year under review due to serious war situation in the Far East. Mr. Weston of Cambridge, England, paid a visit to the Herbarium and the Garden on his way to Indo-Burmese frontiers as a Military Officer. He was given all help and assistance by the Superintendent in his prospective studies of the Indo-Burmese Primulas. Mr. Raizada was again deputed to the Herbarium by Dr. N. L. Bor, M.A., D.Sc. (Edin.), Forest Botanist, Imperial Forest Research Institute, Dehra Dun, in order to solve some of the intricate problems concerning the systematic position of some of the doubtful Dehra Dun specimens and confirm the identification of some of the sheets in comparison with the authentic ecotypes and cotypes of this Herbarium. Messrs R. L. Bhadwar and N. C. Goswami continued their studies on the medicinal plants at the Herbarium and were given all facilities and assistance by the Curator of the Herbarium and the Systematic Assistant of the Botanical Survey of India. Mr. R. N. De, I.F.S., Botanical Officer and Silviculturist, Assam, studied some of the plant sheets of the Herbarium in connection with his investigation of Assam flora. Dr. S. Rai of the office of the Director, Public Health (Nutrition Scheme); Josef Troka of the International Managing Co., Ltd.; Mr. J. Sirkar, Economic Botanist, Government of Bombay; Dr. B. C. Kundu, Lecturer in Botany of the Presidency College, Calcutta; Mr. A. Khan of the office of the Director of the Industrial and Scientific Research; Mr. R. M. Dutt, Botanical Officer (Sericulture) in the Department of Industries, Bengal; Mr. S. K. Mukherjee, Research Scholar, Calcutta University; Mr. H. F. Mooney, Forest Adviser, Eastern States, Sambalpur; Mr. Nirode Kumar Sen of the Intermediate College, Dacca; Mr. A. Das, Forest Officer, Mayurbhanj State, and others consulted the Herbarium and the Library of the Royal Botanic Garden, Calcutta, in connection with their respective botanical, agricultural, forestal, medicinal and similar other investigations. All these workers received due co-operation, help and attention by the Scientific officers of the Herbarium.

**Distinguished visitors.**—Marie Stelle Roxburgh (Mrs. I. S. Galvin), a descendant of Sir William Roxburgh, the first official Superintendent of the then East India Company's Garden—now the Royal Botanic Garden, Calcutta, well-known as "The father of Indian Botany" and the famous author of the "Flora Indica" and the renowned "Roxburgh's Icones", visited the Garden. Dr. and Mrs. D. A. A. Ingales of the Harvard University, Cambridge, Massachusetts, U.S.A., during their visit to the Garden, showed keen interest in the Indian plants used for religious purposes. Mrs. J. L. Hydrick of the Rockefeller Institutions inspected the "Roxburgh's Icones" as directed by the Government of India in connection with the proposal for the preparation of several coloured duplicate sets of the magnificent portfolio water colour paintings of about 2,500 Indian plants. These copies are to be exhibited in the well-known scientific institutions of the most important countries of the world to rouse in the minds of the

public sufficient interest in the Indian plants and facilitate transaction of  
 Indian Wants of commercial, economic, horticultural, arboricultural and  
 botanical importance.

His Excellency Sir John Arthur Herbert, G.C.I.B., Governor of Bengal,  
 Went to the Garden during his visit to the Bengal Engineering College,  
 Sibpur.

### THE GARDEN

The display of the cold weather annuals this year was restricted due to  
 shortage of labour and although they were not quite up to the mark, the  
 size and quality of the flowers were of sufficient high order to invite  
 the attention of the visiting public. The *Victoria regia* bloomed profusely  
 in the lakes of the Royal Botanic Garden where they appeared  
 to have been acclimatised after repeated trials. The giant water lily  
 and other water plant to the visitors of Royal Botanic Garden, Calcutta  
 Lakshmi Gardens where it grows extremely well as the water of the  
 fact of Lakshmi Gardens can be regulated to a certain extent—an essential  
 condition for the development to its proper size and luxuriance of this rather  
 sensitive water plant. This year the coolie quarters have been completed  
 in modern lines with provision of necessary sanitary arrangements by the  
 Public Works and Works Department. This is one of the most noteworthy  
 improvements to this Garden. The photo shows the past and the new coolie  
 lines.



PORTION OF ONE OF THE WINGS OF THE OLD COOLIE QUARTERS JUST DEMOLISHED IN THE  
 FOREGROUND AND PORTIONS OF ONE OF THE BLOCKS OF THE NEW COOLIE QUARTERS IN  
 THE BACKGROUND.

The quarters just occupied by the labour forces relieved the distress and  
 suffering of the coolies. Normal routine work of the Garden was  
 continued in the usual manner. Five avenues were thoroughly renovated  
 and nine other roads were repaired.

The undernoted additional plants were planted either in the rockery or in the open:—

2. *Tupidanthus calyptratus*, Hook. /., 1. *Anacardium occidentale* Linn., 2. *Myristica fragrans* Houtt, 1. *Ficus elastica* Roxb. (Variegata), 1. *Buddies asiatica* Linn., 1. *Hibiscus collinus* Roxb., 1. *Clerodendron Colebrookianum* Walp., 1. *Lantana creamy-white*, 2. *Salvadora persica* Linn., 6. *Cassia Absus* Linn., 3. *Zizyphus mauritiana* Lam., 6. *Jasminum Wallichianum* Lindl., 6. *Derris elliptica* Benth., 2. *Garcinia mangostana* Linn., 3. *Pithecolobium Janghuhnianum* Benth., 1. *Gardenia Double Dwarf*, 1. *Hibiscus Star of Alipore*, 1. *Hibiscus Blue Double*, 1. *Hibiscus Emperor*, 1. *Hibiscus Sp.*, 1. *Olea fragrans* Thunb., 1. *Caryopteris Mastacanthus* Schau, 6. *Acacia Adansonii* Guill fy Perr., 6. *Aleurites montana* Wilson, 1. *Ixora fulgens* Roxb., 1. *Plumeria Beauty*, 1. *Plumeria Contorta*, 1. *P. Rainbow*, 1. *P. aurea*, 1. *P. Butter-Cup*, 1. *P. Rane Spott.*, 1. *P. Rem*, 1. *P. Viceroy*, 1. *Strobilanthes Sp.*, 1. *Arora CW\** Hance., 1. *Saraca thipigenis* Cantley., 3. *Albizia odoratissima* Benth., 1 c, 2. *Artocarpus incisfl* Linn. /., 3. *Sclerocarya caffra* Sond., 1. *Tephrosia grandiflora* Per\*, 3. *Milletia Suiherlandi* Harv., 5. *Barleria alata* S. Moore., 1. *Barlena spinosa* Wall., 1. *Lobelia Sp.*, 1. *Tecoma capensis* Lindl., 1. *Hibiscus Hum\* blotii* Baill., 6. *Ceto reticulata* Torr., 2. *Rhus typhinu* Linn., 2. *Pithecolobium brevifolium* Benth., 2. *Prosopis juliflora* DC. var *glandulosa*.; 1. *Plumeria rubra* Linn., 2. *Brownea grandiceps* Jacq., 1. *Asclepias curas-incisa* Linn. /., 2. *Cochlospermuvi vitifolium* Spreng., 3. *Acacia lutea* Leavenw., 2. *Erythrina flabeliformis* Ream., 2. *Dodonoza arizonica* A. Nelson, 1. *Arenga ambong* Becc, 1. *Jatropha pandurozfolia* Andr., 1. *Vernonia macrocephala* Less., 2. *Ficus brevifolia* Nutt., 1. *Adoniaia Merrillii* Becc, 1. *Plumeria lutea* Ruiz fy Pav., 1. *Brugmansia arborea* Stend., 1. *Plumeria bicolor* Ruiz \$ Pav. (*Oculata*), 1. *Plumeria bicolor superba*., 2. *Eucalyptus rudis* Endl., 6. *Eucalyptus lanuginosa*., *Eucalyptus erythrocalyx* F. Muell., 3. *Eucalyptus drepanophylla* F. Muell., 1. *Eucalyptus rostrata* Schlecht.

About eighty dead or old plants were replaced in their respective divisions. Four hundred and fourteen plants were received from different parts of India and abroad and 8,059 plants were distributed to various institutions in the different provinces in India and foreign countries; 312 packets of seeds were received from China, Range Officer, Barpetta, Dehra Dun, Dacca University, and other parts of India. About 285 packets of seeds were despatched to Dehra Dun, Delhi, Punjab, Kashmir, Dacca, Madras, Annamalainagar, Indore, Gujrat, Ceylon, Rangoon, Burma, South Africa, Western Australia, China and United States of America and other overseas countries.

Fern house No. 2 was overhauled and provided with ferro-concrete stages. The old ghat of one of the large lakes has been reconstructed and many minor constructions were done in connection with the A.R.P. work in the garden. About one thousand labels of plants were replaced or newly-written and numerous addresses on the outgoing cases were written.

Activities in acclimatisation and experimental work in the economic section of the Garden on several useful plants received from outside have been revived. Successful crops of Flax-Linum usitatissimum was raised from the seeds obtained from Netherland and Nepal stock. This P]a£t did very well indeed and yielded almost cent, per cent. Attempts will be made to grow a second crop from the seeds of this stock with a view of seeing if the plants show signs of deterioration or not as a result of continued local cultivation. Some medicinal and insecticidal plants, such as *Derns elliptica*, edible *Colocasia* and *Alocasia*, and *Acorus calamus*, collected by the Superintendent from Nepal border, have successfully been^ raised. Several varieties of potatoes have also been experimented upon with good results. The fibre-yielding plants, such as *Sansevierias*, *Agave* and *Furcrcea*;

Were &r stand ar. The 940 stock. The fibres yielded from these are of high standard. The fibres yielded from these are of high standard. The display of the rare botanical, horticultural, economic and medicinal plants at the annual meeting of the Eoyal Asiatic Society of Bengal and the ... were highly appreciated and admired by the members and His Excellency the Governor of Bengal, ... included His Excellency the Governor of Bengal, ... showed particular interest in the fibres grown from the plants at the Gardens. *Victoria regia* the giant water lily of the other plants at the Gardens also received his attention along with many plants of horticultural importance.

**Finance.**—Out of a total budget allotment of Es. 51,727 for staff and permanent establishment, Es. 51,582 were spent and under all other heads the expenditure amounted to Es. 52,771 against the total allotment of Es. 337. There was a net saving of Es. 337 under all heads during the year. Receipt of the department during the year amounted to Es. 1,604.

**Herbarium.**—The work of this Scientific Section was also much affected by the war. Overseas correspondence was confined mainly to the United States of America, Great Britain, South Africa, China and Australia. The officers of this Section—the Superintendent, Curator of the Herbarium and the Systematic Assistant Botanical Survey of India, the Assistant and the entire mental staff, were engaged in taking care of the irreplaceable collections of botanical specimens and rare literature of international importance. Both Government and Bengal decided that the collection should be removed to Darjeeling. The collections of the local herbarium consisting of duplicate sheets of the General Herbarium will, however, be retained in such a vulnerable area of the suburb of Calcutta. It may be noted that there are 40,000 sheets of Eoxburgh and Wallich including the precious 2,382 magnificent coloured sketches of Indian plants entitled "Eoxburgh's Plantje Asiaticse" embodied in 35 volumes, 3 volumes of Wallich's *Plantje Asiaticse* and similar paintings of Indian plants have already been removed to the Lloyd Botanic Garden, Darjeeling.

**The** number of specimens identified during the year was 3,895, of which 86 were received from Mr. A. K. Ghose, Lecturer in Botany, University of Calcutta. The other specimens for determination came from the Government Central Farm, Gwalior; Manager, Agri-Horticulture, Madras; Forest Manager, Sikkim State; Forest Adviser, Sambalpur and others. The war again curtailed the activity of exchange, loan and distribution of specimens. The total number of specimens sent on loan was 79. Most of these went to the Forest Botanist, Research Institute, Dehra Dun. Of these 66 specimens have been returned. Six hundred and forty-five specimens were distributed to five recipients: (1) Principal, Gordon College, Rawalpindi; (2) Professor of Botany, University of Lucknow (131); (3) Honorary Secretary, Gujerati Natural History Society (2); (4) Head of the Department of Botany, Eipon College, Calcutta; and (5) Professor of Botany, Carmichael Medical College, in connection with his Anthropological and Zoological materials collected by the Superintendent during his tour in the Tripura State were presented to the Department of Anthropology and Zoology of the Calcutta University for their investigation. Photographs and sketch of *Vitis Cayratia papillata* (Hans) Merr and Chun were presented to Mr. W. P. Metcalf of the Arnold Arboretum of the Harvard University, Plain, Massachusetts, U. S. A., for his taxonomical researches. This



material led to the discovery of an interesting new Indian plant which Dr. Metcalf named as *Tetrasstigma Biswasiana Metcalf* in honour of Dr. Biswas who furnished him with necessary information on the systematic positions of the allied species. The photographs of the Herbarium sheets of *Panax pseudoginseng Wall.* were presented as gift to Dr. Fenghwi Chen of the Yunnan Botanical Institution, Kunming, China. Two packets of seeds were supplied to Director of Medical Services, Hongkong, for an important investigation.

During the year 1,272 specimens from different correspondents were received as gifts to the Herbarium. A generous contribution, consisting of 887 Malayan specimens, was received from Dr. R. E. Holttum, Director, Koyal Botanic Gardens, Singapore. Another lot of 230 specimens was presented by the Principal, Gordon College, Rawalpindi. Forest Manager, Bikkim Btate, gave 151 interesting specimens of Sikkim plants. The Forest Adviser, Eastern States, and the Botanical Forest Officer, Assam, each contributed a few sheets to the Herbarium. Samples of edible aroids were received for experimental cultivation in the Garden from the District Agricultural Officer, Howrah, and the Agricultural Assistant, Bilaspur, Central Provinces. Fruits and seeds of *Zanonia indica, Linn.* were kindly supplied by the Head of the Department of Biology, University of Dacca.

Numerous queries relating to both the lower and higher plants were supplied to various correspondents. The Superintendent as a member of the Board of Calcutta Waterworks investigation examined many samples of filter water sent by the Health Officer, Calcutta Corporation. Algal contamination of the drinking water of Darjeeling was also investigated by the Superintendent who received samples of the Senchal Lake through the Director of Public Health, Bengal. He examined the water on the spot as well and submitted his report on the results of this investigation to the Director of Public Health, Bengal, and gave necessary instructions to the Health Officer, Darjeeling Municipality, for checking the growth of the plankton organisms which appeared in the lake last autumn. Many samples of gut contents of the fishes of the Teesta river sent by Dr. S. L. Hora of the Zoological Survey of India, were examined microscopically by the Superintendent in connection with the investigation of scarcity of game fishes in the Teesta river. Results of his investigation were embodied in a comprehensive report submitted to the correspondent. Notes on the systematic position of *Mallotus nepalensis* and on the *Sabia* specimens of this Herbarium were sent to Dr. Leo Croizat and Dr. E. D. Merrill of Arnold Arboretum, Harvard University, U. S. A. Descriptions of plants were furnished to Dr. Fenghwi Chen of Yunnan Botanical Institution, Kunming, China, to Mr. H. G. Acharya of Gujrat Natural History Society, Mr. A. P. Benthall, Mr. (\* Upadhyaya and others. Notes on the cultivation of different economic plants, eradication of weeds, etc., were supplied to different correspondents. Several families and genera were rearranged according to the classification adopted in the latest monographs with the help of the Systematic Assistant, Botanical Survey of India. About 2,000 specimens and genus covers were changed, 3,000 sheets repaired and 539 new sheets mounted and laid in the racks.

**Publications.**—The printing of the 150th Anniversary Volume with a foreword by His Excellency Sir John Arthur Herbert, G.C.I.E., Governor of Bengal, is nearing completion. About 350 pages of "Banousodhi Parichaya," a treatise on medicinal plants in Bengali, have been printed off. "A Revision of the Indo-Malaya Specimens of Glycosmis," by V. Narayanaswami, with a foreword by Dr. K. Biswas, has been published in the Records of the Botanical Survey of India, Volume XIV, No. 2, 1942. The "Flora of the Aka Hills," by Dr. K. Biswas, has been published in the Indian Forest Records, Volume III, No. 1, 1941. Other publications by the Superintendent are: "The Role of Foreign Plants in the Economic

Life of Bengal"—*Science and Culture*, Volume VII, pages 279-284, 1941-42. Classification of fruit plants in India published in the "Brochure" on the Fruit and Fruit Exhibition Committee, 1942.

**Library section.**—During the year 27 different journals and periodicals have been purchased and only 15 received as presents or in exchange. In addition to these 7 reports, 11 leaflets and many reprints were received as presentations to the Library.

Twenty-one books were purchased and only two have been received as gifts. Thirty books were sent on loan and 129 were received back. Total number of old books and journals bound was 108. Cataloguing of books according to the modern library system progressed fairly. About 2,000 books were entered in the New Accession Register and author's cards of 200 books were prepared and incorporated in card index cases.

### LLOYD BOTANIC GARDEN, DARJEELING

The rainfall during the year under report was 106.33 inches. The highest record was reached in July and August when it was 30 inches—a figure slightly less than that of last year's record, but the total rainfall was 8.08 inches more than last year. Although the rainfall was rather continuous it did not affect the general growth of the annuals which attained perfection in their blooms. The flowers and ornamental plants were displayed as usual at the Darjeeling Flower Show. The group of alpine and foliage plants of particular horticultural interest were much appreciated by the public and distinguished visitors. The Superintendent who was one of the judges took His Excellency Sir John Arthur Herbert, G.C.I.E., the Governor of Bengal, round the show and His Excellency took much interest in the Himalayan Orchids. The first volume of the "Orchids of the Sikkim Himalaya" by George King and Robert Pantling, pages 342, with 448 coloured paintings of Sikkim Orchids, was presented by the Superintendent to His Excellency's Library at Government Palace, Darjeeling. This gift was very much appreciated by His Excellency.

Normal work of the Garden was carried on satisfactorily. Sir John Anderson Rock Garden was further extended on the lines suggested by the superintendent, on the northern and southern sides of the hill slopes. The following sub-alpine and temperate species were either added to or replaced:—

*Androsace Hookeriana*, *A. cordifolia*; *Anemone rivularia*, *A. demissa*, *A. obtusiloba*, *A. Falconeri*, *Armeria mauritanica*, *Arisaema nepenthoides*, *A. speciosum*, *A. tortuosum*, *Aster sikkimensis*, *A. diplostephioides*, *A. tricephalus*, *Anaphalis trilipnervis*, *A. Royleana*, *Aubrietia Campbelli*, *Arenaria montana*, *Adenophora Bulleyana*, *Aconitum Napellus*, *A. spicatum*, *Atropa belladonna*, *Asperula azurea setosa*, *Anihemis montana*, *Adonis aestivalis*, *Ajuga macrostyperma*, *A. lobata*, *Allium victorialis*, *A. angulosum*, *Bupleurum Candollii*, *Brunella vulgaris*, *Cerastium tomentosum*, *Cynanchum vincetoxicum*, *Calaviiniha alpina*, *Calandrina grandiflora*, *Conium maculatum*, *Emilia flaminea*, *Commelina sikkimensis*, *Dianthus deltoides*, *D. Allwoodii*, *D. Scotch (Pink)*, *Deutzia gracittis*, *Disporum calcaratum*, *Eryngium ferra*, *E. planum*, *Erysimum linifolium*, *Erica*, *Erodium cicutarium*, *Eriogonum alabellus*, *Erinus alpinus*, *Epilobium roseum*, *Eupatorium utricosifolium*, *Gentiana ornata*, *G. stylosa*, *G. decumbens*, *Globularia trichocarpa*, *Hypericum cernuum*, *H. orientale*, *H. citrinum*, *Horminum pynaenacum*, *Hygrophylla polysperma*, *Homeria collina*, *Ionopsidium acaule*, *Iberis gibraltarica*, *Iris hispanica*, *I. clarkei*, *I. sibirica*, *I. Kaempferi*, *Kenekeya rubicunda*, *Lonicera Maackii*, *Lapeyrousia cruenta*, *Lobelia siphilitica*, *Lychnis foresta*, *Mesembryanthemum trichosperum*, *M. criniflorum*, *Meconopsis Baileyi*, *M. Wallachii*, *M. nepalensis*, *M. cambrica*, *M. Prattii*, *Microglossa albescens*, *Nierembergia frutescens*, *N. hippomanica*, *Nepata*

*nervosa*, *Polygonum emodi*, *P. amplexicaule*, *P. capitatum*, *P. chinese*, *P. molle*, *Potentilla fulgens*, *P. leuconota*, *P. Mooniana*, *Pamassia nubicola*, *Paris polyphylla*, *Primula capitata*, *P. denticulata*, *P. floribunda*, *Primula petiolaris*, *P. rotundifolia*, *P. Stuartii*, *Rhododendron lepidotum*, *R. Dalhousioz*, *R. Edgeworthii*, *Rosa sericea*, *Rosa macrophylla*, *Sarifragti purpurascens*, *S. fimbriata*, *Statice puberula*, *Senecio diversifolius*, *Salvia glutinosa*, *Verbascum thapsus*.

A terrace garden on the eastern side of the Anderson Eoad near the large conservatory and a small rockery on its northern side were newly constructed. These are thoughtful additions to the Garden and such a modern terrace garden is instructive too for the lovers of the Gardens in the hilly region. It is hoped that when all the plants will develop to their proper size and will flower simultaneously in alternate bands of colour along the terraced slope this part of the Garden will then undoubtedly present a charming spectacle much to the enjoyment for the visting public. The Students' Garden has been extended further and a strong wooden fence has been provided all round this portion of the Garden in order to protect the visitors slipping down the steep hillside.

Roads and pathways were repaired and lawns attended to in the usual manner. The glass houses, small conservatory, ferneries and other structures were repaired and garden seats, durwan shelters, railings, etc., were painted.

Two hundred and sixty-three young plants and seedlings were planted and dead and decaying ones replaced in their proper positions.. One hundred and thirty-two new additions were made to the Students' Garden in the respective family beds. Special care was taken to grow in this section of the garden indigenous Himalayan plants of medicinal and economic importance which should prove instructive to the students of Botany and others interested in the subject.

The staging of flowers in the large conservatory which included some new and rare varieties this year were much admired by a large number of visitors. The total number of visitors recorded at the gate was 89,725 which is less by 4,564 than that of the previous year. This was evidently due to war conditions. The plants that flowered and seeded this year in the Garden are the following:—

*Androsace lactiflora*, *Arenaria montana*, *Aubrietia Campbelli*, *Arabis alpina*, *Allium victorialis*, *Anemone demissa*, *A. diplostephioides*, *Aconitum Napellus*, *Atropa Belladonna*, *Asperula azurea setosa*, *Cerastium tomentosurn*, *Calanthe herbacea*, *Campanula parscifolia*, *C. pyramidalis*, *Emilia flaminia*> *Caldrinia umbellata*, *Cheiranthus Allionii*, *Chelone barbata*, *Cathcartia villosa*, *Clematis Hybrida*, *Crepis rubra*, *Conium maculatum*, *Dianthus deltoides*, *Diascia Barberoe*, *Disporum calcaratum*, *Exacum affine*, *Echium vulgare*, *Erinus alpina*, *Francoa appendiculata*, *Freesia refracta*, *Gentiana ornata*, *G. stylosa*, *G. decumbens*, *Gesneria Hybrids*, *Gerbera Jamesonn*, *Hypericum cernuum*, *H. orientate*, *H. dtrinum*, *Homeria collina*. *Iris Kaemp\** *feri*, *I. sibirica*, *I. Clarkei*, *I. hispanica*, *Impatiens Sultanii*, *I. Holstiit Kennedya rubicunda*, *Lilium gigantum*, *L. nepalense*, *L. triginium*, *L-Lowii*, *L. sulphureum*, *L. orchraceum*, *L. Wallichianum*, *L. longifioruTn*, *L. speciosum*, *Lapeyrousia cruenta*, *Meconopsis Baileyi*, *M. Wallichii*, *M\* nepalensis*, *M. cambrica*, *M. Prattii*, *Nierembergia frutescens*, *N. hippomanica*, *Primula capitata*, *P. denticulata*, *P. floribunda*, *P. petiolaris*, *P' rotundifolia*, *P. Stuartii*, *P. obconica*, *P. sinensis*, *Pyreihrum roseum hybridum*, *Stokesia cyanea*, *Salvia glutinosa*, *Tydaea grandiflora*, *Tetra- gonia expansa*, *Verbascum thapsus*.

The work of exchange and distribution and acquisition of seeds and plants could not be undertaken due to difficulties in communication after the outbreak of the war in the Far East. Five hundred and seventy-seven packets

of seeds, 8 bulbs, 6,118 seedlings and 533 plants were, however, distributed throughout the year. It is gratifying indeed that a consignment of Alpine seeds reached the Royal Botanic Garden, Edinburgh, safely and Sir William Wright Smith, the Regius Keeper, Royal Botanic Garden, Edinburgh, has expressed his grateful thanks for the gift from this Garden. Several species and varieties of local orchids and sub-alpine plants collected by the Superintendent during his tour to Sandakphu and Mirik were added to the Garden stock. Many plant materials were supplied to the University institutions and colleges in India for their museums, teaching purposes and research work.

**Finance.**—Out of the total budget allotment of Rs. 14,970 under all heads Rs. 14,897 were spent leaving a small saving of Rs. 73.

**Staff.**—The post of Curator was held by Rai Sahib S. N. Basu, F.R.H.S., throughout the year and Babu Jnanbahadur Rai succeeded Babu Bahadur Singh as clerk in the office of the Lloyd Botanic Garden, Darjeeling, with effect from the 22nd June 1941 and discharged his duties till the end of the year.

### CALCUTTA GARDENS

No improvement of the Gardens was possible on account of diminished Garden labourers. Routine work was, however, carried on satisfactorily.

The display of the winter annuals was quite successful this year. Some of the flowers grown from acclimatised seeds did very well. In fact, the high standard of this year's flowering in cold weather attracted more attention and admiration from the visiting public than the last year. Their appreciation found expression in the press as well. The *Victoria regia* spread almost wild in the lakes of the Eden Gardens, and it was again a thing of joy to all the sections of the visiting public. The leaves and flowers attained enormous size as in the former years. The dead and decaying trees and shrubs were replaced in all the Gardens and quite a fair number of shrubs and trees were newly planted. Some of the lawns in the Eden Gardens were dug up, levelled and replanted with *dhoob* grass. The orchid house at the Eden Gardens were repaired and some of the introduced orchids powered with charming perfection. Some of the old roads were repaired during the year as far as funds permitted. Special mention may be made of the anti-malarial work which were taken over by the Garden staff. The work done was satisfactory. Shallow portions of the jheels were attended to by clearing up the rapidly growing aquatic weeds and removing large quantity of silt. Re-excavation is the only remedy to render the jheels into proper sanitary condition. The rockery which has recently been constructed in front of the High Court Gate of the Eden Gardens was renovated and formal repair and painting of benches and other garden structures were carried out as usual. This year too the Garden officers had much strain in controlling the large crowd on the occasion of the festival cricket matches played in the Eden Gardens.

**Finance.**—Out of the total budget allotment of Rs. 35,614 under all heads Rs. 35,554 were spent leaving a small saving of Rs. 60. Receipt during the year from the Calcutta Gardens amounted to Rs. 69.

**Staff.**—Mr. Merlin Jones held the post of the Assistant Curator, Government Gardens, Calcutta, throughout the year and Mr. G. Mohiuddin was the overseer of these Gardens. Both the officers and staff of these Gardens worked satisfactorily.

K. BISWAS,

*Superintendent,*

*Royal Botanic Garden, Sibpur.*



Government of Bengal

**Annual Report of the  
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# Annual Report of the Royal Botanic Garden and the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling, for 1942-43.

## ROYAL BOTANIC GARDEN

General Staff.—Dr. K. Biswas, M.A., D.Sc. (Edin.), F.R.S.E., held the post of the Superintendent throughout the year. Dr. S. K. Mukherjee, M.Sc., Ph.D., and Mr. N. Mitra, B.Sc., N.D.H., held the posts of the Curator of the Herbarium and the Garden, respectively. Mr. Quasem Ali was the Assistant Curator throughout the year except for a short period of leave from 2nd July to the 8th August. Mr. J. A. Hulbert was Overseer throughout the year excepting the period from the 2nd July to the 8th August when he acted as Assistant Curator in addition to his own duties. Mr. A. T. Banerjee was the Head Clerk throughout the year.

The Superintendent presided over the Botany section of the 30th Session of the Indian Science Congress Association which was held in Calcutta during the first week of January. He continued to hold the post of the Honorary Lecturer in Botany of the Post Graduate Department of the Calcutta University and delivered a course of lectures on Algology to the sixth year M.A. and M.Sc. students. He served in the Committees of several scientific bodies under the auspices of the Governments of India and Bengal and other unofficial societies. The Superintendent and the Curator of the Herbarium also co-operated with the Universities of the Punjab and Calcutta as members of the boards of examiners.

The present war emergency and consequential measures taken to protect, against air raid, botanical treasures of the famous Herbarium of the Royal Botanic Garden, Calcutta, prevented the officers from devoting their usual attention towards botanical collections and floristic studies in the field. The Superintendent, however, made a brief survey of the forest flora of the unfrequented parts of some of the native states in Orissa such as Angul, Nayagarh and Daspala. The vegetation of these forests need careful study not only from the point of exploiting their rich arboreal grasses and some valuable timber yielding trees required for the manufacture of paper, rope and charcoal used in these days for production of gas for motor vehicles in order to reduce petrol consumption but also for the use of various medicinal herbs and shrubs forming undergrowth inside the forests. About 1,000 specimens were collected in this trip. Of these plants one appeared to be a new variety of *Alluzia* (cf.) *A. odoratissimo*. This plant is now under investigation and seedlings have already been raised from the seeds collected. The success of this botanical expedition over such a vast area within a period of fortnight was due entirely to the help and facilities offered by Mr. A. P. Ben Thai, senior partner and the forest officer, Mr. S. Smart of Bird & Co., Calcutta. The growth of the bamboos of the two species—*Dendrocalamus strictus* and *Bambusa arundinacea* was studied with a view to extending their cultivation on a much wider scale and production of better types and larger number of sticks in each clump annually. This is of vital importance to the paper industry as bamboos form practically the main source of raw materials for the manufacture of paper in India as very little paper pulp is available at present. The Sabai grass (*Eulaliopsis binata*) is also good but stimulation of better growth of this grass as well over a large area is required before this good material suitable for paper and rope industry is fully utilised.

**Scientific workers.**—War condition prevented many overseas visitors and workers either to pay a visit to the garden or to carry on their investigations regarding tropical plants in the herbarium. Nevertheless a number of scientist\* and others interested in Indian flora visited the herbarium and the garden and were given all help and facilities for their work. Of these may be mentioned Major A. R. Tainsley who was given all information regarding forest plants which can be used as food during emergency and scarcity. Dr. B. C. Guha was furnished with materials and advice regarding his investigation as to the vitamin "C" contents in the hips of roses. Mr. N. C. Goswami of the School of Tropical Medicine, Calcutta, continued his work on medicinal and poisonous plants at the herbarium before he was transferred to Kashmir. Mr. K. Singh consulted the herbarium in connection with his work on fruit trees. Lt. J. Sinclair of B.A.F., who is particularly keen in the study of the Indian plants collected a number of plants from Baluchistan, Comilla and other areas while engaged in the military expeditions. All these plants have been examined at the herbarium and he was given necessary information on them when he consulted the herbarium during his short leave from military duties. Mr. A. Ben Thai paid frequent visits to the herbarium in connection with the preparation of his book on the common flowering trees of Calcutta and its neighbourhood. Professors, lecturers and research scholars of the Calcutta University and different colleges in Bengal and other provinces consulted the herbarium as usual, and studied the garden plants also. Of these may be mentioned Messrs. S. K. Mukherjee, M. Chakravarty, N. M. Sircar, S. Ghosh, S. N. Banerjee, S. R. Sen Gupta, Dr. S. II. Bose and Dr. J. Sen Gupta.

**Distinguished visitors.**—Dr. E. Gordon Agnew, M.Sc, D.D.S., &—»" F.I.C.D., of West China, Yunan University, had a lengthy discussion regarding the possibilities of growing dye yielding plants and manufacturing vegetable dye which is urgently required for military and civil purposes in China during the present emergency on account of the stoppage of <sup>SC</sup>ERY of aniline dye. A detailed note on the subject was sent to China. A Chinese Military Mission headed by His Excellency General Ho, Minister of War, China, visited the herbarium and the garden, Dr. C. J. Pao, Consul General, China and Dr. C. H. Lowe, Director, Chinese Ministry of Information, accompanied His Excellency. Mr. Choudhury Moazzen Hossain, M.L.C, paid several visits to the herbarium and took keen interest in the scientific work of the department.

### The Garden.

In spite of the great handicap on account of dislocation of the labour force due to bombing in the vicinity of the garden routine work was carried on somehow. The display of the cold weather flowers was also affected as very few fresh seeds of high standard could be imported from abroad. The garden, therefore, had to depend mainly upon its own stock of acclimatized seeds. The flowers from these seeds come out quite up to our expectation. The annual flower show in the Nursery, Flower garden, Orchid House, Kyd monuments, River gate and at other suitable spots of the garden received much appreciation by the public of Calcutta and particularly by His Majesty's forces who paid frequent visits while in Calcutta. The well-known water lily *Victoria Regia* developed to its full grandeur in the lake where it has been acclimatized after prolonged experiments.

Very few new items of work could be taken in hand during the year. Minor improvements such as construction of concrete stages in some of the glass houses for proper cultivation of rare Ferns and Insectivorous plant-3



have been completed during the year. The moat and the ground adjoining the new coolie lines were in a highly insanitary state for years. To bring this area under proper sanitary condition by re-excavation of the moat is, of course, expensive. A successful attempt of cleaning up this area has, however, been made by lifting the slit from the moat and dressing up the land along the north eastern corner of the coolie lines and thus this portion of the garden has been rendered tidy. The following species have been planted in the various divisions of the garden:—

*Cassia laevigata* Wild., 11. *Pyrethrum roseum* Lindl., 2. *Aconitum Nepallus* Linn., 3. *Sambucus racemosa* Linn., *Myristica fragrans* Houtt., *Artocarpus incisa* Linn., *Amygdalops persica* Linn., *Morus indica* Linn., 5. *Lonicera trichosantha* Bureau et Franch., 5. *Solanum nudiflorum* Jacq., 3. *Zanonia indica* Linn., *Vitex peduncularis* Wall., *Elaeocarpus serratus* Linn., *Aquilaria Agallocha* Roxb., 2. *Berberis nepalensis* Spreng., 2. *Amomum subulatum* Roxb., 2. *Elettaria Cardamomum* Maton., *Nepenthes khasiana* Hook., 3. *Atropa Belladonna* Linn., *Vitis vinifera* Linn., *Cassia* sp., 2. *Markhamia platycalyx*, 5. *Hibiscus Huegelli* Endl., *Acacia juncifolia* Benth., 2. *Acacia linearis* Sims., 5. *Convolvulus tricolor* Linn., *Acacia auriculaeformis* A.Cunn., *Sterculia platanifolia* Linn., *Ginkgo biloba* Linn., 5. *Deutzia grandiflora* Bynge., 5. *Buddleia albiflora* Hemsl., 5. *Buddleia Davidi* Franch., 5. *Buddleia nivea*, 3. *Buddleia Forrestii*, 3. *Deutzia Schneideniana* var *laxiflora*, 5. *Deutzia reflexa*, 5. *Deutzia scabra* Thunb., 3. *Passiflora edulis* Sims., 5. *Eupatorium glandulosum* H.B. et K., 3. *Asclepias linteifolia* Lag., *Pentstemon acuminatus* Dougl., 5. *Pentstemon pinetorum*, *Cinchona succirubra* Pav., 2. *Psychotria Ipecacuanlia* Stokes., *Pachira rosea*, *Brownea grandiceps*, *Schizolobium* sp., *Solanum pyracanthum* Jacq., *Ephedra Gerardiana* Wall., 4. *Digitalis purpurea* Linn., 9. *Matricaria chamomilla* Linn., *Prunus Armeniaca* Linn., *Pyrus communis* Tsinn.

A heavy cyclone passed over the garden during the year under review and caused devastation among the plants cultivated in the garden. Serious damage has been caused to many existing trees apart from those which have been uprooted or badly damaged. Attempts are being made to replace many of these, but it will take some years before some of the rare species which have completely been destroyed can be obtained from the overseas countries and again acclimatised and grown in the garden to their suitable size.

Exchange relation by exporting and importing plants from the Botanical gardens in the different parts of the world has nearly ceased on account of the difficulties in transport during the present war conditions. About 1,162 plants were received from different provinces in India and 3,472 plants were supplied to different gardens in this country. 97 packets of seeds were received from the Royal Botanic Garden, Edinburgh, and the Botanic Garden, Cambridge, England. A few packets were sent from Ootacamund and other provinces in India. 243 packets and several pounds of seeds were despatched to America, England, New South Wales and other countries. The gardens in Lahore, New Delhi, Dacca, Darjeeling, Mayurbhanj, Madras, Bangalore and other towns received their shares. 456 small new labels for nursery and green houses and 210 garden labels for the trees in the open were rewritten. More than 100 signboards and addresses for 570 boxes were written during the year.

Not much experimental work could be done in the economic garden as this and other suitable portions of the gardens were utilised for growing rice, wheat, barley, sweet potato, etc., and thus this department took active part in the "Grow More Food" campaign during the present emergency. All these crops did very well. Samples of medicinal plants of different species cultivated in the garden on an experimental basis were supplied

to various applicants all over India. Large number of plants were supplied to various colleges in Bengal and universities all over India for teaching purposes as usual. Large quantities of plants suitable for camouflaging military objects were supplied to the Military authorities and necessary instructions were given to the Army Headquarters by the Superintendent. The administration of the garden was carried under the most difficult conditions due to the military occupying different portions of the garden. Nevertheless cordial relations between the garden staff and the troops of the Indian Coastal Battalion and the Royal Artillery was hitherto maintained.

**Finance.**—Out of the total budget allotment of Ks. 49,321 for staff and permanent establishment Its. 49,287 were spent and under all other heads the expenditure amounted to Rs. 59,720 against the allotment of Ks. 59,000. The receipts of the department during the year amounted to Rs. 593.

**The Herbarium.**—Considerable difficulty has been experienced during the year in carrying on the work of this section too on account of the removal of the entire collections of the general herbarium and the Library to Darjeeling as a result of the air raids over Calcutta. The routine work, however, was managed with the help of the specimens of the local herbarium and a few books of reference still left at Shibpur. All complicated scientific matters had/therefore, to be referred to the Superintendent and dealt with by him direct from his office at the Lloyd Botanic Garden, Darjeeling, during his prolonged stay there in connection with making necessary arrangements for the transfer of the huge collection there. The serious difficulty of housing the valuable materials temporarily in Darjeeling at that time was solved to a great extent by His Excellency graciously offering his outhouses to accommodate a little more than two hundred large boxes. About 700 other boxes were kept partly in a temporary shed erected for the purpose and partly in the office building and a glass house whose collections had to be removed to the nursery. Consequently this house for exhibiting rare and delicate ferns, orchids and other plants had to be closed to the public.

Considerable research work was required to be done during the year with a view to supplying scientific advice and submitting reports concerning many a question connected directly and indirectly with the war efforts such as camouflaging, supplying of vegetable food during scarcity, referring literature about Vitamin contents of edible plants, supplying samples of poisonous plants to be used as insecticides and so on. Apart from supplying suitable plants for camouflaging purposes necessary instructions were also given to the military officers in charge of this work regarding selection and cultivation of some of the wild plants in the area required for camouflaging. They were also furnished with detailed information about the life history of the different species of plants, their distribution, methods, of reproduction, etc. It has been experienced that the fighting forces need food which should not lack in proper Vitamin contents. Information on different parts of plants containing Vitamin C from which tablets and powders can be manufactured were supplied to those engaged in the investigation of the Vitamin contents in different species of plants. Dr. Krukoff of the Botanic Garden, New York, T.J.S.A., who is engaged at present in tracing different types of alkaloids which can be used as insecticides or as insect repellants was supplied with samples of different parts of plants of selected Indian trees and shrubs together with notes on them for his investigation. The investigation on the removal of the Fungi from Canvas sheets used for Military purposes undertaken by the Superintendent in collaboration with Dr. S. H. Bose proved successful. The company concerned with the supply of Canvas was furnished with several prescriptions for removing effectively three common species of Fungi generally found attacking Canvas

and other similar material in the form of mould. Detailed information was supplied to the Eastern Drug Co. and the Biochemical Standardisation Laboratory in answer to their queries on the sources and the methods of manufacturing essential oils, e.g., Geranium, Palmarosa, Lavender, Lemon, grass, Wintergreen, etc. Messrs. 1\ Cook & Co. and the Himalayan Drug Co. were furnished with necessary information on two African Medicinal plants, viz.:—*Pausinistalia yohimha* and *U mekaloabo* (*Rumex crisp us* L). A note about the Kola nuts (*Cola acuminata*) another African plant product was sent to the Glacier Products. A detailed note was sent to Mr. E. M. Steinberg on Hops (*Humulus tribulus*) and Spruce (*Picea excelsa*) from which beer is manufactured in Europe. Various enquiries on medicinal plants received from Messrs. S. N. De & Co., Ltd., The Eastern Drug Co., Batligait & Co., The Biochemical Standardisation Laboratory, The Drug Research Laboratory, etc., were replied to. The Chief Chemist, Indian Jute Mill Association, was furnished with a note on the sago and starch yielding plants of India. Samples of several sago yielding plants were also supplied. Information was supplied to Mr. B. Bhattacharya of the Empress Jubilee Garden, Deoghar, about the gum of *Gardenia lucida* Roxb. which is used as a substitute for Asafoetida. A note on the manufacture of rose water was furnished to Rai N. H. Mazumdar Bahadur of Burdwan. Cultivation of celery formed the subject of another report which was sent to B. L. Narayana Rao of Coconada. Dr. C. A. Caldevia of **Immunity Chemical Co.** received information about the Cassava, its nepalese name, the process of cultivation and the place of occurrence. Mr. S. K. Basu of Krishnamigur received information about the method of cultivation of **Tung Oil yielding plants in India.** Detailed note was furnished to **Mr. W. B. Hayes of Agricultural Institute, Allahabad, about the cultivation of Citrus species in India.** Mr. Brown of Plant City Florida U.S.A. received some useful hints on the cultivation of *Hydrocotyle asiatica* Linn. Information on the cultivation and distribution of plants, description, relationships of a large number of species, their correct nomenclature and systematic position together with reference to literature, etc., were supplied to Dr. W. Burns, Agricultural Commissioner to the Government of India, Director, Indian Army Ordnance Corps, Director, Scientific and Industrial Research, Prof. S. R/Bose of Carmichael Medical College, Calcutta; Mr. G. H. Fothergill, Manager, Government Cinchona Plantation, Jalpaiguri; Mr. K. Lall Gupta of Jubbulpore; Mr. S. P. Roy Choudhury of Dacca; Messrs. Indian Balm Pharmacy; Rai Sahib J. N. Rakstit; Dr. K. Mitra, Officer-in-charge, Nutrition Scheme, Government of Bihar and others. Mr. Jnananjan Niyogi, Publicity Officer of the Commercial Museum, Calcutta Corporation, was furnished with a note on the cultivation of peppermint plant in India and the distribution of Iodine yielding sea weeds growing along the Indian coast. Instructions for controlling Algae in tanks were furnished to Mr. S. C. Niyogi of Aluminium Corporation, Ltd., of Burdwan. Many samples of drinking water of Calcutta were examined by the Superintendent as a member of the Water Supply Technical Advisory Board, Calcutta Corporation, and advices were given for the control of Algae in the filter beds and thereby purifying the drinking water of Calcutta.

**Identification!**—870 specimens of plant sent by Professor of Botany, the Punjab Agricultural College, Lyalpur; Forest Botanist, Forest Eesearch Institute, Dehra Dun; Mr. J. Sinclair of R.A.F.; Mr. A. P. Benthall and others were identified during the year.

**Distribution and Acquisition.**—Distribution of herbarium specimens were confined this year only to Indian Institutions. The total number of specimens sent out was 464, of which 212 specimens collected at Darjeeling and Cooch Bihar were presented to the Principal, Gordon College, Eawalpindi; 131 Cooch Bihar specimens went to the Head of the Department of

Botany, University of Lucknow; 21 specimens to Mayurbhanj State and 100 specimens of miscellaneous economic plants were given as gift to the Curator of Baroda Museum. In addition to these 15 specimens of hard fungi, collected by the Superintendent from his recent tour in the Onssa forests were presented to Prof. S. R. Bose of Carmichael College. Four bottles containing preserved materials of Podostemonaceæ, and a bundle of Sphagnum sp. were given to Prof. S. P. Agarkar and Mr. S. N. Banerji, respectively, of the Department of Botany of the University of Calcutta. A few seeds of *Nicandra physaloides* were sent to Dr. E. K. Janaki in London in connection with her cytological work at the John Innes Horticultural Institute, London, under the direction of Dr. C. Darlington, the Director.

Specimens received as gift to the herbarium are only seven. Mr. K. C. Jacob was kind enough to present 5 mounted sheets of aroids, viz., 1 sheet of *Cochlosia antiquorum* Schott, 2 sheets of *Amorphophalus camulatus* Bl. and 2 sheets of *Xanthosonia sagittifolia* Schott. Our thanks are due to the Assistant Garden Superintendent, Peshwar Cantonment, and to the proprietor, Chandra Nursery, Sikkim, who contributed a specimen each to the herbarium.

**Loan.**—Only one sheet of *Mantisia xpathulata* Schult. was sent on loan to Mr. R. N. De, B.L.S., Forest Botanist and Silviculturist, Assam. The sheet has been received back.

About 2,000 genus and species covers of Bengal, Assam and N-Himalaya were replaced in the local herbarium. During the preparation of a list of Bengal plants from the local herbarium it has been found that not even half of the species are represented in our collection of E. plants. A little over 500 sheets were repaired and about 900 new sheets were mounted.

**Publications.**—The much-longed-for "The 150th Anniversary, Volume of the Royal Botanic Garden, Calcutta", has just come out of the press. The foreword to this volume His Excellency Sir John Arthur Herbert, G.C.I.B., Governor of Bengal, states, "The sesqui-centenary anniversary of the Royal Botanic Garden, Calcutta, which fell on the 6th day of January, 1938, was indeed a red-letter day in the history of the Garden". The good wishes of renowned institutions and personalities all over the world who are interested in the welfare of this garden and its value has been greatly enhanced by the inclusion in it of many mounting contributions, which range over the various aspects of botanical science and have emanated from the pens of a number of eminent botanists.

"I associate myself whole-heartedly with the sentiments which have been expressed in appreciation of the continued services rendered by the Royal Botanic Garden, Calcutta, for a period of over 150 years. I hope that many more years of useful service and prosperity, and I confidently expect that when peace and goodwill are once more restored to the world, the garden and its famous Herbarium will make a still greater contribution to our knowledge of the botanical, horticultural and arboricultural sciences.

The work which has been edited by Dr. K. Biswas, the Superintendent, Royal Botanic Garden, Calcutta, contains in Part I—(1) Foreword by His Excellency Sir John Arthur Herbert, G.C.I.E., Governor of Bengal; (2) Proceedings; (3) Address of Welcome by Dr. K. Biswas; (4) Speech delivered by Sir A. W. Hill; (5) Felicitation offered by Sir James H. Jefferies; (6) Presidential Address by the Hon'ble Nawab Khwaja Habibullah Bahadur of Dacca; and (7) Messages. In Part III are embodied twenty-eight contributions in different branches of Botany relating to the Flora of India made by ten renowned botanists in India and abroad.

The work containing valuable botanical papers and records of brilliant achievements of the only botanical institutions of its kind in India for an unbroken period of 150 years is of International importance. This work will strengthen the happy relationship of the Royal Botanic Garden, Calcutta, with similar leading botanical institutions of the world. The garden truly looks forward, as expressed by all the personalities and scientific institutions of the world, to maintain its friendship in the future and hopes to be able to work for many more centuries, for the good of India and the progress of science true to its long and distinguished record.

Illustrations and printing of the volume are of a very high standard much to the credit of the Bengal Government Press where the work has so ably been printed.

Other papers published during the years are (1) Algal Flora and Mosquito Larvae by K. Biswas in *Science and Culture*, Vol. 8, No. 4, 1942; (2) Systematic and Taxonomic Studies on the Flora of India and Burma by Dr. K. Biswas; (3) Presidential Address of the 30th Session of the Indian Science Congress; (4) A new plant from South Burma by Dr. E. L. Biswas in *Journ. Ind. Bot. Society*, Vol. 21, Nos. 5 & 6, 1942, and (5) The Genus *Chelonopsis* Miq. by Dr. S.K. Mukerjee in *Journ. Ind. Bot. Society*, Vol. XXI, Nos. 5 & 6, 1942. About 400 pages of "Banaushadhi Parichaya" a treatise on medicinal plants in Bengali has already been printed.

**Library Sections.**—During the year 35 different journals and periodicals have been purchased and 21 received as presents to the library. Annual reports and reprints of many papers were received from different institutions and authors as presents to the Library.

Total number of books purchased during the year is 17 and only two were acquired as gifts. Total number of books and journals bound is 278 of which 252 were bound by the Superintendent, Government Printing, Bengal. Books sent on loan are 41, of which 5 have been received back.

## LLOYD BOTANIC GARDEN, DARJEELING

During the year under review the total rainfall was 104.51 inches. This is slightly less than that of the last year. The highest was recorded in July when it reached to 25.31 inches. The rainfall was somewhat contiguous but did not affect the plants in general. The hail-storm in April, however, damaged the seedlings of the annuals resulting in their stunted growth. No flower show could be arranged this year on account of the present emergency. Consequently the show of the Summer flowers in this garden attracted more visitors than last year. The garden proved to be the most attractive spot for recreation, study and inspiration of the local school children and the various orders of His Majesty's forces and our allies. In spite of the present adverse conditions of the labour force the garden coolies were handled tactfully and the routine work of the garden was carried on satisfactorily throughout the year. Particular attention was paid to the improvement of the Sir John Anderson Rock Garden where some rare sub-alpine and temperate plants were introduced. A number of decorative plants and shrubs were also planted in the area which was extended last year. Sickly and dead plants were replaced by new and healthier plants.

Construction of a new type of garden in the shape of a Sunken Garden somewhat on the model of those seen in some of the continental gardens has been taken in hand. Some suitable plants for this Sunken Garden have been procured and planted in symmetrical order. This Sunken Garden has been constructed adjoining the Terrace Garden which is also developing according to the designs and schemes drawn up by the Superintendent. Two

new plants of *Carvinus viminea* have been planted on either sides of the Terrace Garden. These additions when brought to their proper stages will, undoubtedly, raise the standard of the garden.

The following plants have been planted in the Kock Garden :—

*Aconitum Napellus*, *A. palmatum*; *Aster sikkimensis*; *Astilbe Davidi*<sup>h</sup>  
*Anaphalis contorta*, *A. Roylea*?<sup>ia</sup>, *A. cinnamomea*, *A. triplinerves*; *Arabif*  
*alpina*, *Ajuga macrosperma*, *A. lobata*; *Arenaria montana*; *Anchusa myosoti-*  
*diflora*; *Anthemis nobilis*, *Armorica formosa*, *Asphodelus luteus*, *Arisaema*  
*WaUu'lii*, *A. speciosum*, *A. tortuosum*, *A. nepalensis*, *Aubrietia Campbell*\*  
*Achillea philipendula*, *Acorus calamus*, *Androsace coronopifolia*, *Androsace*  
*Hookeri*, *Berberis Darwinii*, *B. nnnbellata*, *B. insignis*, *B. vuh*/<sup>aris</sup>, *ton-*  
*vielina bengalensis*, *C. sikkimensis*, *C. obliqua*; *Cotula barbata*, *CampoMia*  
*jtarsicifolia*, *Begonia sikkimensis*, *B. Cathcartii*; *Cheiranthus Allioii*,  
*Catananche coerula*, *Calanthe herbacea*, *Calandrinia umbellata*, *Coni*<sup>v</sup>  
*maculatum*, *Cortia Hookeri*, *Cynanchium vincetoxicum*, *Dianthus deltoides*,  
*D. Allwoodii*; *Daphne cannabina*, *D. svriel*, *D. involucrata*; *Vupoff*<sup>l</sup><sup>^</sup>  
*pullum*; *Davellia stricta*, *Elysimum linifolium*, *Erica sp.*, *Erodium*  
*circutarium*, *Erinus alpinus*, *Epilobium roseum*, *Eryngium planum*, *Gentiano*\*  
*quadrifaria*, *G. ornata*; *Hypericivi Andersonianum*, *H. polyphylhim*; *Ionop*\*  
*sidium acaule*, *Iris Kaempferi*, *I. hispanica*, *I. Clarkei*; *Iberia gibralterico*>>  
*Impatiens Jurpia*, *I. puberula*, *I. longipes*; *Kaitlfussia aineloides*, *Lychnis*  
*foresta*. *Lobelia pyramidalis*, *L. rosea*, *L. syphilitica*; *Lapeyrouisia cruen*<sup>w</sup>\*  
*Lonicem Mackii*, *Lilivm gigantium*. *L. nepalensis*; *Meconopsu* 'Ca?nbrica»  
*M. nepalensis*, *M. Wallichii*, *M. Bailcyi*; *Cathcartia Villosa*, *Mentha pty*<sup>er</sup>  
*rita*, *Matricaria Chamomilla*, *Mesembryanthevnnn criniflorum*, *Nolama*  
*grandiflora*, *Nepeta nervosa*, *Naricissus tazetta*, *Nirombergia Hipomanica*,  
*N. frutescens*; *Polygonxim Emodi*, *P. ampleaicaule*; *Polygonatum opposi*<sup>e</sup>  
*folium*, *Potentilla fruticosa*, *Ceropegia pubescens*, *Parnassia nubusola*,  
*Pyrethrum roseuvi*, *Primula rotundifolia*, *P. petiolaris*, *P. chinensis*,  
*P. capata*, *P. Smithii*, *P. pulverulent*<sup>^</sup>; *Rhodendendron Edgeworthii*, &  
*Dalhousiae*, *R. lepodatum*, *R. vaccinoides*; *Rosa asericca*, *R. macrophylla*,  
*Rubia cordifolia*, *Ranunculus diffusus*, *Reinwardtia tetragyna*, *Salvia glut*<sup>i</sup>-  
*nosa*, *Sanfraga purpurescens*, *S. sermentosa*, *S. hispiduia*, *S. fimbriat*<sup>u</sup>  
*Sedum cochinium*, *Senecio scandens*, *S. diversiflorus*; *Solinum tennifoliu*<sup>W</sup>>  
*Swertia bimaculata*, *Scilla sp.*, *Saponaria ocimoides*, *Spergula piUf*<sup>er</sup><sup>n</sup>,  
*Spiraea micraniha*, *Tiarella polyphylla*, *Vaccinimn retusum*, *V. serratum*\*  
*Veronica repens*, *Verbascum Thapsus*.

The following flowering and ornamental foliage plants have been plante<sup>d</sup>  
for acclimatising in the Terrace and the Sunken Gardens:—

*Agave americana*, *Arundinaria Hindsii*, *Aucuba himalaica*, *Berberis*  
*umbellata*, *B. Darwinii*, *B. fortunei*, *B. vulgaris*; *Bambusa fortunei*; *Beschor-*  
*neria bracteata*, *Cirrhopetalum guttulatum*, *Callistemon speciosuvi*,  
*Eotoneaster microphylla*, *Crataegus cuneata*, *Cytisus albus*, *Daphniphy*<sup>W</sup><sup>1</sup><sup>^</sup>  
*himalaica*, *Dianthus deltoides*, *Eucnymus europaeus*, *Forsythia*\* *susyensa*,  
*Geranium Grevilleanovi*, *Hydrangea sp.*, *Hypericum Avdrosaemunh*  
*Jasminum humile*, *Ophiopogon Clarkei*, *Phormium tenax*, *P. Cookianu*<sup>7</sup><sup>1</sup>,  
*Pinus Taeda*, *Muehlenheckia platycladoz*, *Melaleuca hypericifou*\*<sup>1</sup>\*  
*Nierembergia frutescens*, *Phlox decussata (grandiflora)*, *Libertia forinosdi*  
*Luculia gratissima*, *Linaria alba*, *Juniperus virginiana*, *Leptospern*<sup>7</sup><sup>1</sup>  
*scoparianum*, *Buxux sempervirens*, *Rhodotyphos kerrioides*, *Spiraea belw*\*  
*Spartium junceum*, *Veronica solid folia*, and roses.

Another scheme which will be of considerable importance from <sup>^e</sup>  
educational and botanical aspects has been taken in hand. It has been  
felt for some time that a portion of the garden should be set apart i<sup>o</sup><sup>r</sup>  
growing the common indigenous species. This portion of the garden  
representing common weeds of the Sikkim Himalaya grown, as far »<sup>8</sup>

possible, under their natural conditions should offer splendid opportunity for the study of the students of Botany. Preliminary steps have been taken to convert the portion of the garden lying to the eastern slope of the George King Eoatġ into a Wild Garden.

The Students<sup>1</sup> Garden received due attention and it is developing according to plan. About 70 selected species were planted in this spot of the Garden in their respective family beds. The following plants of economic and medicinal value were also introduced to widen the applied aspect of the knowledge of the Botany students:—

*Atropa Belladonna*, *Amomum dealbatum* > *Aconitum NapeUus*, *A. palvium*, *Acorus Calamus*, *Anthemis nobilis*, *Digitalis purpurea*, *Mentha piperita*, *Matricaria Chamomilla*, *Lobelia pyrainidalis*, *R. rosea*, *Polygala urillata*, *Rubia cordifolia*, *R. Sikkimensis*, *Saxifraga purpurescens*.

Some of the following plants of horticultural importance flowered and some of them produced viable seeds during the year:—

*Androsace Hookeriana*, *A. poisonii*; *Aconitum NapeUus*, *A. palmatum*; *Asphodelus luteus*, *Arabis alpina*, *Anemone demisa*, *A. rivularis*, *Aubrietia Campbelli*, *Berberis fortunei*, *B. Darwinii*, *B. vulgaris*; *Campanula parsidifolia*, *Catananche cerulea*, *Cathcartia Villosa*, *Cynanchum venceioxivum*, *Clintonia alpina*, *Calamintha alpina*, *Clematis Jackmanii*, *Eupatorium urticaefoliuvi*, *Disporum puUum*, *D. calcaratuvi*, *Erinus alpina*, *Exacum offline*, *Echium vulgare*, *Francoa appendiculata*, *Gentiana qvadrifaria*, *G. ornata*; *Geranium Grevilloanum*, *H. polyphyllum*, *Hibiscus Trlionum*, *Homeria collina*, *Hypericum orientale*, *Iris Delavayi*, *I. Douglasiana*, *I. Clarkei*, *I. hispanica*, *I. Kaempferi*; *Impatiens puberula*, *I. longipes*, *I. Sultanii*, *Kennodya rubicunda*, *Lilium nepalense*, *L. Wallichianum*, *L. sulphureum*, *L. longiflorum*, *L. giganteum*; *IANaria macedonica*, *Lobelia syphilitica*, *Lapeyrousia cruenta*, *Lychnis foresta*, *Libertia forviosa*, *Lonicera Mackii*, *Matricaria Chamomilla*, *Mesembryanthemum criniflorum*, *Mecopopsis Wallichii*, *M. nepalensis*, *M. Baileyi*, *M. Cambrica*, *Narcissus Tazetta*, *Nolana grandiflora*, *Nierembergia frutescens*, *N. Hippomanica*, *Genothera fruticesa*, *Gerbera Jamesonii*, *Papaver nudicaule*, *P. alpinum*, *Pyrethrum roseum*, *Phlox decussata*, *Polygonum orientale*, *Primula capitata*, *P. floribunda*, *P. denticulata*, *P. rotundifolia*, *P. petiolaris*, *P. obcenica*, *P. sikkimensis*, *Cerepegia pubescens*, *Parnassia nubicola*, *Ranunculus asiatica*, *Rhodanthe maculata*, *R. Manglesii*, *Rhododendron lepidotum*, *R. Edgeworthii*, *R. Dalhousiae*; *Schizanthus tcisetononsis*, *Caxifraga hispidula*, *S. purpurescens*, *Statice Suworowi*, *Stokesia cyanea*, *Scilla sp.*, *ThaUctrum dipterocarpum*, *Verenica teucrium*, *Strelitzia reginae*.

**Orchids.**—*Cymbidium giganteum*, *C. grandiflorum*, *C. longifolium*<sup>9</sup>, *C<sup>^</sup> Devonianuin*, *C. Lowianum*, *C. densiflorum*, *C. lancifolium*, *C. ebumeum*, *C. K<sup>1</sup>/peri folium*; *Cypripedium Fairisanum*, *C. venustuin*, *C. hirsutissimum*, *C. villosum*, *C. insigne*, *C. Charlesworthii*; *Dendrobium clavatum*, *D. thyrsoflorum*, *D. Pieradi*, *D. nobile*, *D. densiflorum*, *D. fimbriatum*; *Phajuji albus*, *P. maculatus*; *Masdevallia Harosonii*, *Renanthera imschoiana*, *Vanda Kimballiana*, *V. coerulea*.

Twenty-one packets of seeds were received from different correspondents. 174 packets of seeds, 183 plants, 4,705 seedlings and 7 bulbs were distributed to the different botanical gardens and institutions. A large number of local specimens and materials collected sent from schools, colleges and forest and other departments in the districts were identified and large quantities of botanical specimens from this part of the Himalayas were sent to various Universities and Colleges all over India and abroad for study practical examinations and in connection with the research work of specialists.

The popularity of the garden has fully been established by the increase in the number of visitors. The total number of persons counted at the

gates reached 89,740. Among the visitors were many high officials and distinguished men who did not fail to pay a visit to this garden in spite of the present war conditions and difficulty in conveyance.

A special work caused by the war emergency devolved on the shoulders of the Superintendent and his staff in this garden as well when hundreds of boxes containing valuable botanical materials and thousands of books arrived at Darjeeling. These cases required to be removed from the station at once. Scarcity of labour in removing these boxes immediately from the railway station, rainy and damp weather, characteristic of this part of the Hills and want of accommodation in the garden all complicated the question of safely transferring and housing them. Nevertheless the difficulty was solved by the direct guidance of the Superintendent who had to be on the spot most of the time during their transfer. The ungrudging assistance of the Curator, the Clerk in charge, the Herbarium Assistant recently posted in Darjeeling and last but not least the Sirdars and the coolies who had to work overtime, is much appreciated.

**Finance.**—Out of the total budget allotment of Es. 17,397 under all heads Rs. 17,394 were spent.

**Staff.**—The post of the Curator was ably held by Rai Sahib S. N. Basu, F.E.H., throughout the year.

## CALCUTTA GARDENS

Considerable difficulty has been experienced in carrying on the work in the garden on account of the unrest among the labour force due to bombing in Calcutta and posting of the troops in and about the garden. Evacuees from Burma pouring in Calcutta who were temporarily given shelter in a part of Eden Garden made not only the labour force a little nervous and restive but also caused additional work for the staff. In spite of such happenings the display of winter annuals in the year under review was quite good. The flowering pots were staged out at vantage points of the gardens like previous years. The idea of effecting new improvement of the gardens had to be suspended for the time being and purely routine work was carried on during the year. Dahlias of this season proved to be a success. Some individual blooms attained the size of a quarter plate.

The effect of the cyclone over this garden as well was by no means less than that of the Royal Botanic Garden, Calcutta. Much damage was done to a quite number of trees and it took several days to remove the broken branches of trees and bring the garden to a tidy state. Cleaning the jheel of the Eden Garden is long overdue and the condition of this tank has already been recorded in the previous year's report. Excavation of this lake is the only remedy. Attempts, have, however, been made to keep the surface of the jheel of the Eden Garden and the tank of Dalhousie Square sufficiently clean. A portion of the southern end of the jheel was completely silted up this year and extra labour had to be employed in removing the silt to a depth of 2 feet in order to maintain sufficient flow of water which is necessary from sanitary point of view.

A good number of flowering shrubs and trees were planted in suitable places and the dead and decaying ones were duly replaced.

This year an exhibition of enemy aeroplanes brought down in Assam by the fighters was held in the Cjirzon Garden for three days. This attracted huge crowds of people and it was difficult to prevent the crowds from damaging the beds of winter annuals. These beds were, however, replaced as soon as the exhibition was over.



The Anti-malarial scheme was successfully tackled this year. Suggestions and advice of Military experts in dealing with this matter was taken into consideration. The roads of the Curzon Garden which were in a bad state was repaired this year. The roads of the Dalhousie Square Garden are daily deteriorating due to large crowds of people walking across the lawns of the garden from any direction they choose on account of the removal of the fencing round the garden. The activities of the Calcutta Fire Brigade led to further deterioration of the garden. They have constructed large platforms on the steps of the four ghats of the Dalhousie Square garden tank. In addition to this they have also erected two pucca sheds for keeping their accessories and sheltering their staff. The staff is, however, trying their best to keep the garden in a proper tidy condition <sup>as</sup> far as possible under the present abnormal conditions.

The stock of orchids and other delicate plants in the Glass House were increased. These were re-potted as usual with the desired results and about a dozen orchids brought by Mr. M. Jones from Kalimpong are fresh additions to the garden.

Finance.—Out of the total budget allotment of Hs. 41,628 under all heads Rs. 41,600 were spent leaving a very small saving of Rs. 28.

**Staff.**—Mr. Merlin Jones held the post of the Assistant Director, Government Gardens, Calcutta, throughout the year and Mr. G. Mohiuddin, the overseer of these Gardens. Both the officers and staff of these Gardens worked satisfactorily.

X. BISWAS,  
*Superintendent,*  
*Royal Botanic Garden, Calcutta.*



Government of Bengal

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# Annual Report of the Royal Botanic Garden and the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling, for 1942-43.

## ROYAL BOTANIC GARDEN

General Staff.—Dr. K. Biswas, M.A., D.Sc. (Edin.), F.R.S.E., held the post of the Superintendent throughout the year. Dr. S. K. Mukherjee, M.Sc., rh.D., and Mr. N. Mitra, u.st., N.D.H., held the posts of the Curator of the Herbarium and the Garden, respectively. Mr. Quasem Ali was the Assistant Curator throughout the year except for a short period of leave from 2nd July to the 8th August. Mr. J. A. Hulbert was Overseer throughout the year excepting the period from the 2nd July to the 8th August when he acted as Assistant Curator in addition to his own duties. Mr. A. T. Banerjee was the Head Clerk throughout the year.

The Superintendent presided over the Botany section of the 30th Session of the Indian Science Congress Association which was held in Calcutta during the first week of January. He continued to hold the post of the Honorary Lecturer in Botany of the Post Graduate Department of the Calcutta University and delivered a course of lectures on Algology to the sixth year M.A. and M.S.J. students. He served in the Committees of several scientific bodies under the auspices of the Governments of India and Bengal and other unofficial societies. The Superintendent and the Curator of the Herbarium also co-operated with the Universities of the Punjab and Calcutta as members of the boards of examiners.

The present war emergency and consequential measures taken to protect, against air raid, botanical treasures of the famous Herbarium of the Royal Botanic Garden, Calcutta, prevented the officers from devoting their usual attention towards botanical collections and floristic studies in the field. The Superintendent, however, made a brief survey of the forest flora of the unexplored parts of some of the native states in Orissa such as Angul, Nayagarh and Daspula. The vegetation of these forests need careful study not only from the point of exploiting their rich prborial grasses and some valuable timber yielding trees required for the manufacture of paper, rope and charcoal used in these days for production of gas for motor vehicles in order to reduce petrol consumption but also for the use of various medicinal herbs and shrubs forming under-growth inside the forests. About 1,000 specimens were collected in this trip. Of these plants one appeared to be a new variety of *Albizzia* (cf.) *A. odomtissima*. This plant is now under investigation and seedlings have already been raised from the seeds collected. The success of this botanical expedition over such a vast area within a period of fortnight was due entirely to the help and facilities offered by Mr. A. P. Benthall senior partner and the forest officer, Mr. S. Smart of Bird & Co., Calcutta. The growth of the bamboos of the two species—*Dendrocalamus \*trictus* and *Bambusa arvdinacea* was studied with a view to extending their cultivation on a much wider scale and production of better types and larger number of sticks in each clump annually. This is of vital importance to the paper industry as bamboos form practically the main source of raw materials for the manufacture of paper in India as very little paper pulp is available at present. The Sabai grass (*Eulaliopsis binata*) is also good but stimulation of better growth of this grass as well over a large area is required before this good material suitable for paper and rope industries is fully utilised.

**Scientific workers.**—War condition prevented many overseas visitors and workers either to pay a visit to the garden or to carry on their investigations regarding tropical plants in the herbarium. Nevertheless a number of scientists and others interested in Indian flora visited the herbarium and the garden and were given all help and facilities for their work. Of these may be mentioned Major A. R. Tainsley who was given all information regarding forest plants which can be used as food during emergency and scarcity. Dr. B. C. Guha was furnished with materials and advice regarding his investigation as to the vitamin "C" contents in the hips of roses. Mr. N. C. Goswami of the School of Tropical Medicine, Calcutta, continued his work on medicinal and poisonous plants at the herbarium before he was transferred to Kashmir. Mr. K. Singh consulted the herbarium in connection with his work on fruit trees. Lt. J. Sinclair of B.A.F., who is particularly keen in the study of the Indian plants collected a number of plants from Baluchistan, Comilla and other areas while engaged in the military expeditions. All these plants have been examined at the herbarium and he was given necessary information on them when he consulted the herbarium during his short leave from military duties. Mr. A. Ben Thai paid frequent visits to the herbarium in connection with the preparation of his book on the common flowering trees of Calcutta and its neighbourhood. Professors, lecturers and research scholars of the Calcutta University and different colleges in Bengal and other provinces consulted the herbarium as usual, and studied the garden plants also. Of these may be mentioned Messrs. S. K. Mukherjee, M. Chakravarty, N. M. Sircar, S. Ghosh, S. N. Banerjee, S. R. Sen Gupta, Dr. S. H. Bose and Dr. J. C. Sen Gupta.

**Distinguished visitors.**—Dr. R. Gordon Agnew, M.Sc., D.D.S., Ph.D., P.I.C.D., of West China, Fudan University, had a lengthy discussion regarding the possibilities of growing dye yielding plants and manufacturing **vegetable dye which is urgently required for military and civil purposes in China during the present emergency on account of the stoppage of supply of aniline dye.** A detailed note on the subject **was sent to China.** The Chinese Military Mission headed by His Excellency General Ho, Minister of War, China, visited the herbarium and the garden, Dr. C. J. Pao, Consul General, China and Dr. C. H. Lowe, Director, Chinese Ministry of Information, accompanied His Excellency. Mr. Choudhury Moazzen Hossain, M.L.C., paid several visits to the herbarium and took keen interest in the scientific work of the department.

### The Garden.

In spite of the great handicap on account of dislocation of the labour force due to bombing in the vicinity of the garden routine work was carried on somehow. The display of the cold weather flowers was also affected as very few fresh seeds of high standard could be imported from abroad. The garden, therefore, had to depend mainly upon its own stock of acclimatized seeds. The flowers from these seeds "come out quite up to our expectation. The annual flower show in the Nursery, Flower garden, Orchid House, Kyd monuments, River gate and at other suitable spots of the garden received much appreciation by the public of Calcutta and particularly by His Majesty's forces who paid frequent visits while in Calcutta. The well-known water lily *Victoria Regia* developed to its full grandeur in the lake where it has been acclimatized after prolonged experiments.

Very few new items of work could be taken in hand during the year. Minor improvements such as construction of concrete stages in some of the glass house? for proper cultivation of rare Ferns and Insectivorous plants

have been completed during the year. The moat and the ground adjoining the new coolie lines were in a highly insanitary state for years. To bring this area under proper sanitary condition by re-excavation of the moat is, of course, expensive. A successful attempt of cleaning up this area has, however, been made by lifting the slit from the moat and dressing up the land along the north eastern corner of the coolie lines and thus this portion of the garden has been rendered tidy. The following species have been planted in the various divisions of the garden:—

*Cassia laevigata* Wild., 11. *Pyrethrum roseum* Lindl., 2. *Aconitum Nepellus* Linn., 3. *Sambucus racemosa* Linn., *Myristica fragrans* Houtt., *Artocarpus incisa* Linn., *Amygdalis persica* Linn., *Morus indica* Linn., 5. *Lonicera trichomantha* Bureau # Franch.\* 5. *Solarium nudiflorum* Jacq., 3. *Za?wnia indica* Linn., *Vitex peduncularis* Wall., *Elaeocarpus serratus* Linn., *Aquiluria Af/allocha* Ifo.xb., 2. *Berberis nepalensis* Spreng., 2. *Amomum subulatum* Boxb., 2. *Elettaria Cardamomum* Maton., *Nepenthes Hasiana* Hook., 3. *Atropa Belladonna* Linn., *Vitis vinifera* Linn., *Cassia*, sp., 2. *Markhamia platycalyx*., 5. *Hibiscus Huegelli* Endl., *Acacia juncifolia* Benth., 2. *Acacia Unearis* Sims., 5. *Convolvulus tricolor* Linn., *Acacia uuriculaeformis* A.Cunn., *Sterculia platanifolia* Linn., *Ginkgo biloba* Linn., 5. *Deutzia grandiflora* Bynge., 5. *Buddleia albiflora* Hemsl., 5. *Buddleia Davidi* Franch., 5. *Buddleia nivea*., 3. *Buddleia Forrestii*., 3. *Deutzia bchncidenana* var *laxiflora*., 5. *Deutzia reflexa*., 5. *Deutzia scabra* Thunb., *Passiflora edulis* Sims., 5. *Eupatorium glandulosum* H.B. & K., 3. *Asclepias Imifoha* Lag., *Pentstemon acuminatus* Dougl., 5. *Pentstemon [dnetorum*., *Cinchona succirubra* Pav., 2. *Psychotria Ipecacuanha* Stokes., *Pachira rosea*, *Brownea grandiceps*, *Schizolohium* sp., *Solanum pyracanthum* Jacq., *Ephedra Gerardiana* Wall., 4. *Digitalis purpurea* Linn., 9. *Matricaria chamomilla* Linn., *Prunus Armeniaca* Linn., *Pyrus communis* TAnn.

A heavy cyclone passed over the garden during the year under review and caused devastation among the plants cultivated in the garden. Serious damage has been caused to many existing trees apart from those which has been uprooted or badly damaged. Attempts are being made to replace many of these, but it will take some years before some of the rare species which have completely been destroyed can be obtained from the overseas countries and again acclimatised and grown in the garden to their suitable size.

Exchange relation by exporting and importing plants from the Botanical gardens in the different parts of the world has nearly ceased on account of the difficulties in transport during the present war conditions. About 1,162 plants were received from different provinces in India and 3,472 plants were supplied to different gardens in this country. 97 packets of seeds were received from the Royal Botanic Garden, Edinburgh, and the Botanic Garden, Cambridge, England. A few packets were sent from Ootacamund and other provinces in India. 243 packets and several pounds of seeds were despatched to America, England, New South Wales and other countries. The gardens in Lahore, New Delhi, Dacca, Darjeeling, Mayurbhanj, Madras, Bangalore and other towns received their shares. 456 small new labels for nursery and green houses and 210 garden labels for the trees in the open were rewritten. More than 100 signboards and addresses for 570 boxes were written during the year.

Not much experimental work could be done in the economic garden as this and other suitable portions of the gardens were utilised for growing rice, wheat, barley, sweet potato, etc., and thus this department took active part in the "Grow More Food" campaign during the present emergency. All these crops did very well. Samples of medicinal plants of different species cultivated in the garden on an experimental basis were supplied

to various applicants all over India. Large number of plants were supplied to various colleges in Bengal and universities all over India for teaching purposes as usual. Large quantities of plants suitable for camouflaging military objects were supplied to the Military authorities and necessary instructions were given to the Army Headquarters by the Superintendent. The administration of the garden was carried under the most difficult conditions due to the military occupying different portions of the garden. Nevertheless cordial relations between the garden staff and the troops of the Indian Coastal Battalion and the Royal Artillery was hitherto maintained.

**Finance.**—Out of the total budget allotment of Es. 49,321 for staff and permanent establishment Rs. 49,287 were spent and under all other heads the expenditure amounted to Rs. 59,720 against the allotment of Rs. 59,690. The receipts of the department during the year amounted to Rs. 593.

**The Herbarium.**—Considerable difficulty has been experienced during the year in carrying on the work of this section too on account of the removal of the entire collections of the general herbarium and the Library to Darjeeling as a result of the air raids over Calcutta. The routine work, however, was managed with the help of the specimens of the local herbarium and a few books of reference still left at Shibpur. All complicated scientific matters had, therefore, to be referred to the Superintendent and dealt with by him direct from his office at the Lloyd Botanic Garden, Darjeeling\* during his prolonged stay there in connection with making necessary arrangements for the transfer of the huge collection there. The serious difficulty of housing the valuable materials temporarily in Darjeeling\* at that time was solved to a great extent by His Excellency" graciously offering his outhouses to accommodate a little more than two hundred large boxes. About 700 other boxes were kept partly in a temporary shed erected for the purpose and partly in the office building and a glass house whose collections had to be removed to the nursery. Consequently this house for exhibiting rare and delicate ferns, orchids and other plants had to be closed to the public.

Considerable research work was required to be done during the year with a view to supplying scientific advice and submitting reports concerning many a question connected directly and indirectly with the war efforts such as camouflaging, supplying of vegetable food during scarcity, referring to literature about Vitamin contents of edible plants, supplying samples of poisonous plants to be used as insecticides and so on. Apart from supplying suitable plants for camouflaging purposes necessary instructions were also given to the military officers in charge of this work regarding selection and cultivation of some of the wild plants in the area required for camouflaging. They were also furnished with detailed information about the life history of the different species of plants, their distribution, methods of reproduction, etc. It has been experienced that the fighting forces need food which should not lack in proper Vitamin contents. Information on different parts of plants containing Vitamin C from which tablets and powders can be manufactured were supplied to those engaged in the investigation of the Vitamin contents in different species of plants. Dr. Krukoff of the Botanic Garden, New York, U.S.A., who is engaged at present in tracing different types of alkaloids which can be used as Insecticides or as insect repellants was supplied with samples of different parts of plants of selected Indian trees and shrubs together with notes on them for his investigation. The investigation on the removal of the Fungi from Canvas sheets used for Military purposes undertaken by the Superintendent in collaboration with Dr. S. R. Bose proved successful. The company concerned with the supply of Canvas was furnished with several prescriptions for removing effectively three common species of Fungi generally found attacking Canvas

and other similar material in the form of mould. Detailed information was supplied to the Eastern Drug Co. and the Biochemical Standardisation Laboratory in answer to their queries on the sources and the methods of manufacturing essential oils, e.g., Geranium, Palmarosa, Lavender, Lemon grass, Wintergreen, etc. Messrs. P. Cook & Co. and the Himalayan Drug Co. were furnished with necessary information on two African Medicinal plants, viz.:—*Pausinistalia yohhnba* and *Umekaloabo* (*Rum ex crispus* L). A note about the Kola nuts (*Cola acuminata*) another African plant product was sent to the Glacier Products. A detailed note was sent to Mr. E. M. Stemberg on Hops (*Humulus tribulus*) and Spruce (*Picca excelsa*) from which beer is manufactured in Europe. Various enquiries on medicinal plants received from Messrs. S. N. De & Co., Ltd., The Eastern Drug Co., Bath, Ga. & Co., The Biochemical Standardisation Laboratory, The Drug Research Laboratory, etc., were replied to. The Chief Chemist, Indian Jute Mill Association, was furnished with a note on the sago and starch yielding plants of India. Samples of several sago yielding plants were also supplied. Information was supplied to Mr. B. Bhattacharya of the Empress Jubilee Garden, Deoghar, about the gum of (*Jardenia lucida* Eoxb. which is used as a substitute for Asafoetida. A note on the manufacture of rose water was furnished to Eai N. N7 Mazumdar Bahadur of Burdwan. Cultivation of celery formed the subject of another report which was sent to B. L. Narayana Rao of Coconada. Dr. C. A. Caldevia of Immunity Chemical Co. received information about the Cassava, its nepalese name, the process of cultivation and the place of occurrence. Mr. S. K. Basu of Krishnanagar received information about the method of cultivation of Tung Oil yielding plants in India. Detailed note was furnished to Mr. W. B. Hayes of Agricultural Institute, Allahabad, about the cultivation of Citrus species in India. Mr. Brown of Plant City, Florida, U.S.A., received some useful hints on the cultivation of *Hydrouotyle asiatica* Linn. Information on the cultivation and distribution of plants, description, relationships of a large number of species, their correct nomenclature and systematic position together with reference to literature, etc., were supplied to Dr. W. Burns, Agricultural Commissioner to the Government of India, Director, Indian Army Ordnance Corps, Director, Scientific and Industrial Research, Prof. S. R/Bose of Carmichael Medical College, Calcutta; Mr. G. H. Fothergill, Manager, Government Cinchona Plantation, Jalpaiguri; Mr. K. Lall Gupta of Jubbulpore; Mr. S. P. Roy Choudhury of Dacca; Messrs. Indian Balm Pharmacy; Rai Sahib J. N. Rakshit; Dr. K. Mitra, Officer-in-charge, Nutrition Scheme, Government of Bihar and others. Mr. Jnananjan Niyogi, Publicity Officer of the Commercial Museum, Calcutta Corporation, was furnished with a note on the cultivation of peppermint plant in India and the distribution of Iodine yielding sea weeds growing along the Indian coast. Instructions for controlling Algae in tanks were furnished to Mr. S. C. Niyogi of Aluminium Corporation, Ltd., of Burdwan. Many samples of drinking water of Calcutta were examined by the Superintendent as a member of the -Water Supj>ly Technical Advisory Board, Calcutta Corporation, and advices were given for the control of Algae in the filter beds and thereby purifying the drinking water of Calcutta.

**Identification**—870 specimens of plant sent by Professor (t) of Botany, the Punjab Agricultural College, Lyalpur; Forest Botanist, Forest Research institute, Dehra Dun; Mr. J. Sinclair of R.A.F.; Mr. A. P. Benthall and others were identified during the year.

**Distribution and Acquisition.**—Distribution of herbarium specimens were confined this year only to Indian Institutions. The total number of specimens sent out was 404, of which 212 specimens collected at DarjeeHng and Cooch Bihar were presented to the Principal, Gordon College, Rawalpindi; 131 Cooch Bihar specimens went to the Head of the Department of

Botany, University of Lucknow; 21 specimens to ' Mayurbhanj State and 100 specimens of miscellaneous economic plants were given as gift to the Curator of Baroda Museum. In addition to these 15 specimens of hard fungi, collected by the Superintendent from his recent tour in the Orissa forests were presented to Prof. S. R. Bose of Carmichael College. Four bottles containing preserved materials of Podostemonaceae, and a bundle of Sphagnum sp. were given to Prof. S. P. Agarkar and Mr. S. J. Banerji, respectively, of the Department of Botany of the University of Calcutta. A few seeds of *Nicandra physaloides* were sent to Dr. E. K. Janaki Amnial in London in connection with her cytological work at the John Innes Horticultural Institute, London, under the direction of Dr. C. Darlington, the Director.

Specimens received as gift to the herbarium are only seven. Mr. K. C. Jacob was kind enough to present 5 mounted sheets of aroids, viz., 1 sheet of *Colocasia antiquorum* Schott, 2 sheets of *Aviophorphahts campanulatus* Bl. and 2 sheets of *Xanthosoma sagittifolia* Schott. Our thanks are due to the Assistant Garden Superintendent, Peshwar Cantonment, and to the proprietor, Chandra Nursery, Sikkim, who contributed a specimen each to the herbarium.

Loaili—Only one sheet of *Mantisia spathulata* Schult. was sent on loan to Mr. E. K. De, F.L.S., Forest Botanist and Silviculturist, Assam. The sheet has been received back.

About 2,000 genus and species covers of Bengal, Assam and N.-W. Himalaya were replaced in the local herbarium. During the preparation of a list of Bengal plants from the local herbarium it has been found that not even half of the species are represented in our collection of Bengal\* plants. A little over 500 sheets were repaired and about 900 new sheets were mounted.

Publications.—The much-longed-for "The 150th Anniversary Volume of the Royal Botanic Garden, Calcutta", has just come out of the press. <sup>^u</sup> the foreword to this volume His Excellency Sir John Arthur Herbert, G.C.I.E., Governor of Bengal, states, "The sesqui-centenary anniversary of the Royal Botanic Garden, Calcutta, which fell on the 6th day of <sup>^Jl</sup>uary 1938, was indeed a red-letter day in the history of the Garden". "In it are recorded the good wishes of renowned institutions and personalities from all over the world who are interested in the welfare of this garden, and its value has been greatly enhanced by the inclusion in it of many illuminating contributions, which range over the various aspects of botanical science and have emanated from the pens of a number of eminent botanists.

"I associate myself whole-heartedly with the sentiments which have been expressed in appreciation of the continued services rendered by the Royal Botanic Garden, Calcutta, for a period of over 150 years. I wish it many more years of useful service and prosperity, and I confidently hope that when peace and goodwill are once more restored to the world, the garden and its famous Herbarium will make a still greater contribution to our knowledge of the botanical, horticulture and arboricultural sciences."

The work which has been edited by Dr. K. Biswas, the Superintendent, Royal Botanic Garden, Calcutta, contains in Part I—(1) Foreword by His Excellency Sir John Arthur Herbert, G.C.I.E., "Governor of Bengal; (2) Proceedings; (3) Address of Welcome by Dr. K. Biswas; (4) Speech delivered by Sir A. W. Hill; (5) Felicitation offered by Sir James H. Jeans; (6) Presidential Address by the Hon'ble Nawab Khwaja Habibullah Bahadur of Dacca; and (7) Messages. In Part III are embodied twenty-eight contributions in different branches of Botany relating to the Flora of India made by renowned botanists in India and abroad.



The work containing valuable botanical papers and records of brilliant achievements of the only botanical institutions of its kind in India for an unbroken period of 150 years is of International importance. This work will strengthen the happy relationship of the Royal Botanic Garden, Lucknow, with similar leading botanical institutions of the world. The garden truly looks forward, as expressed by all the personalities and scientific institutions of the world, to maintain its friendship in the future and hopes to be able to work for many more centuries, for the good of India and the progress of science true to its long and distinguished record.

Illustrations and printing of the volume are of a very high standard much to the credit of the Bengal Government Press where the work has so ably been printed.

Other papers published during the year are (1) Algal Flora and Mosquito Larvae by K. Biswas in Science and Culture, Vol. 8, No. 4, 1942; (2) Systematic and Taxonomic Studies on the Flora of India and Burma by Dr. K. Biswas; (3) Presidential Address of the 30th Session of the Indian Science Congress; (4) A new plant from South Burma by Dr. K. Biswas in Journ. Ind. Bot. Society, Vol. 21, Nos. 5 & 6, 1942, and (5) The Genus *Chelonopsis* Miq. by Dr. S. K. Mukerjee in Journ. Ind. Bot. Society, Vol. XXI, Nos. 5 & 6, 1942. About 400 pages of "Banaushadhi Parichaya" a treatise on medicinal plants in Bengali has already been printed.

**Library Sections.**—During the year 35 different journals and periodicals have been purchased and 21 received as presents to the library. Annual reports and reprints of many papers were received from different institutions and authors as presents to the Library.

Total number of books purchased during the year is 17 and only two were acquired as gifts. Total number of books and journals bound is 278 of which 252 were bound by the Superintendent, Government Printing, Bengal. Books sent on loan are 41, of which 5 have been received back.

### LLOYD BOTANIC GARDEN, DARJEELING

During the year under review the total rainfall was 104.51 inches. This is slightly less than that of the last year. The highest was recorded in July when it reached to 25.31 inches. The rainfall was somewhat contiguous but did not affect the plants in general. The hail-storm in April, however, damaged the seedlings of the annuals resulting in their stunted growth. No flower show could be arranged this year on account of the present emergency. Consequently the show of the Summer flowers in this garden attracted more visitors than last year. The garden proved to be the most attractive spot for recreation, study and inspiration of the local school children and the various orders of His Majesty's forces and our allies. In spite of the present adverse conditions of the labour force the garden coolies were handled tactfully and the routine work of the garden was carried on satisfactorily throughout the year. Particular attention was paid to the improvement of the Sir John Anderson Rock Garden where some of the sub-alpine and temperate plants were introduced. A number of decorative plants and shrubs were also planted in the area which was extended last year. Sickly and dead plants were replaced by new and healthier plants.

Construction of a new type of garden in the shape of a Sunken Garden somewhat on the model of those seen in some of the continental gardens has been taken in hand. Some suitable plants for this Sunken Garden have been procured and planted in symmetrical order. This Sunken Garden has been constructed adjoining the Terrace Garden which is also developing according to the designs and schemes drawn up by the Superintendent. Two

new plants of *Carpinus viminea* have been planted on either sides of the Terrace Garden. These additions when brought to their proper stages will, undoubtedly, raise the standard of the garden.

The following plants have been planted in the Eock Garden:—

*Aconitum Napellus*, *A. palmatwni*; *Aster sikkimensis*; *Astilbe Davidii*, *Anaphalis contorta*, *A. Royleana*, *A. cinnamomea*, *A. triplinerves*; *Arabis alpina*, *Ajuga macrosperma*, *A. lobata*; *Arenaria montana*; *Anchusa myosodiflora*; *Anthemis nobilis*, *Armoracia formosa*, *Asphodelus luteus*, *Artsae*? *Wallichii*, *A. speciosum*, *A. tortuosum*, *A. nepalensis*, *Aubrietia Campoensis*, *Achillea philipendula*, *Acorus calamus*, *Androsace coronopifolia*, *Andraw Hookeri*, *Berberis Darwinii*, *B. umbellata*, *B. insifinis*, *B. vulgaris*; *B. melina bengalensis*, *C. sikkimensis*, *C. obliqua*; *Cotula barbata*, *C. parscifolia*, *Begonia sikkimensis*, *B. Cathcartii*; *Cheiranthus Allionii*, *Catananche coerula*, *Calanthe herhacea*, *Calandrinia vvhellata*, *Conium waculatum*, *Cortia Hookeri*, *Cynanchium vincetoxicum*, *Dianthus deltoides*, *D. Allwoodii*; *Daphne cannabina*, *D. suriel*, *D. involucrata*; *D. pullum*; *Davellia stricta*, *Elysimum linifolium*, *Erica sp.*, *Erigeron circuitarium*, *Erinus alpinus*, *Epilobium roseum*, *Eryngium planum*, *Gentiana quadrifaria*, *G. ornata*; *Hypericum Andersonianum*, *H. polyphyllum*; *Ionopsisium acaule*, *ins Aempfen*, *I. hispanica*, *I. Vlarkei*; *Ibena gio*? *Impatiens Jurpia*, *I. puberula*, *I. longipes*; *Kaulfussia ameloides*, *Lychnis foresta*, *Lobelia pyramidalis*, *L. rosea*, *L. syphUitica*; *Lapeyrousia Lonicera Mackii*, *Liliwm gigantium*, *L. nepalensis*; *Meconopsis Cr.*? *M. nepalensis*, *M. Wallichii*, *M. Baileyi*; *Cathcartia Villosa*, *Mentha rita*, *Matricaria Chamomilla*, *Mesembryanthemum criniflorum*, *grandiflora*, *Nepeta nervosa*, *Naricissus tazetta*, *Nirombergia Hopmanica*, *IV. frutescens*; *Polygonum Emodi*, *P. amplevicaule*; *Polygonatum oppositifolium*, *Potentilla frvticosa*, *Ceropegia pubescens*, *Parnassia bicolor*, *Pyrethrum roseum*, *Primula rotundifolia*, *P. petiolaris*, *P. chinensis*, *P. capata*, *P. Smithii*, *P. pulverulento*; *Rhododendron Edgeworthii*, *R. Dalhousiae*, *R. lepodatum*, *R. vaccinoides*; *Rosa asericca*, *R. flwr*? *Rubia cordifolia*, *Ranunculus diffusus*, *Reinwardtia tetragyna*, *nosa*, *Saxifraga purpurescens*, *S. sermentosa*, *S. hispidula*, *S. P.*? *Sedum cochiniwm*, *Senecio scandens*, *S. diversiflorvs*; *Solinum tenuifolJ*? *Swertia bimaculata*, *Scilla sp.*, *Saponaria ocimoides*, *Spergula V.*? *Spiraea micrantha*, *Tiarella polyphylla*, *Vaccinivrn retusum*, *V. serraw Veronica repens*, *Verbascum Thapsus*.

The following flowering and ornamental foliage plants have been planted for acclimatising in the Terrace and the Sunken Gardens:—

*Agave americana*, *Arundinaria Hindsii*, *Aucuba himalaica*, *BeryG*? *umbellata*, *B. Daryainii*, *B. fortunei*, *B. vulgaris*; *Bambusa fortunei*; *Beschneria bracteata*, *Cirrhopetalum guttulatum*, *Callistemon SP?*? *Cotoneaster microphylla*, *Crataegus cuneata*, *Cytisus albus*, *Daphniphyllum himajaica*, *Dianthus deltoides*, *Eucnymus europaeus*, *Forsythia sus*? *Geranium Grevillcanum*, *Hydrangea sp.*, *Hypericivi Androsaevi*, *Jasminum humile*, *Ophiopogon Clarkei*, *Phormium tenax*, *P. CookM*? *Pinus Taeda*, *Muehlenheckia platycladox*, *MeMeuca hypencijoi*? *Nierembergia frutescens*, *Phlox decussata (grandiflora)*, *Libertia f*? *Luculia gratissima*, *Linaria alba*, *Jtmiperus virginiana*, *Leptosf*? *scoparianum*, *Buxux sempervirens*, *Rhodotyphos kerrioides*, *Spiraea hellu*? *Spartium junceum*, *Veronica salicifolia*, and roses.

Another scheme which will be of considerable importance from the educational and botanical aspects has been taken in hand. It has been felt for some time that a portion of the garden should be set apart for growing the common indigenous species. This portion of the garden representing common weeds of the Sikkim Himalaya grown, as la

possible, under their natural conditions should offer splendid opportunity for the study of the students of Botany. Preliminary steps have been taken to convert the portion of the garden lying to the eastern slope of the George Ring Road into a Wild Garden.

The Students' Garden received due attention and it is developing according to plan. About 70 selected species were planted in this spot of the Garden in their respective family beds. The following plants of economic and medicinal value were also introduced to widen the applied aspect of the knowledge of the Botany students:—

*Atropa Belladonna*, *Amojnum dealbatum*, *Aconitum Napellus*, *A. palmatum*, *Acorus Calamus*, *Anthemis nobilis*, *Digitalis purpurea*, *Mentha Viperita*, *Matricaria Chamomilia*, *Lobelia pyramidalis*, *R. rosea*, *Polygala arillata*, *Rubia cordifolia*, *R. Sikkiviensis*, *Saxifraga purpurescens*.

Some of the following plants of horticultural importance flowered and some of them produced viable seeds during the year:—

*Androsace Hookcriana*, *A. poisonii*; *Aconitum Napellus*, *A. palmatum*; *Asphodelus luteus*, *Arabis alpina*, *Anemone demisa*, *A. rivularis*, *Aubrietia Canmpbelli*, *Berberis fortunei*, *B. Darwinii*, *B. vulgaris*; *Campanula parsicifolia*, *Catananche cerulea*, *Cathcartia Villosa*, *Cynanchum vinctodictmt*, *Clintonia alpina*, *Calaviintha alpina*, *Clematis Jackmanii*, *Eupatorium urticaefolium*, *Dtsporum pullum*, *D. calcaratum*, *Erinus alpina*, *Exacum cdfine*, *Echium vulgare*, *Francoa appendiculata*, *Gentiana quadrifaria*, *G. ornata*; *Geranium Grevilloanum*, *H. polyphyllum*, *Hibiscus Trlioniun*, *Homeria collina*, *Hypericum orientale*, *Iris Delavayi*, *I. Douglasiana*, *I. Clarkei*, *I. hispanica*, *I. Kaempferi*; *Impatiens puberula*, *I. longipes*, *I. Sultanii*, *Kennodya rubicunda*, *Iilium nepalense*, *L. Wallichianum*, *L. sulphureum*, *L. longiflorum*, *L. giganteum*; *Linaria macedonica*, *Lobelia syphilitica*, *Lapeyrotisia cruenta*, *Lychnis foresta*, *Libertia formosa*, *Lonicera blackii*, *Matricaria Chamomilla*, *Mesembryanthemum criniflorum*, *Mec-nopsis Wallichii*, *M. nepalensis*, *M. Baileyi*, *M. Cambrica*, *Narcissus Tazetta*, *Nolana grandiflora*, *Nieremhergia frutesce?is*, *N. Hipponianica*, *Genothera fruticesa*, *Gerbera Jamesonii*, *Papaver nudicaule*, *P. alpinum*, *P. floribunda*, *P. denticulata*, *P. rotundifolia*, *P. petiolaris*, *P. obcenica*, *Rhodanthe viaculata*, *R. Manglesii*, *Rhododendron lepidotum*, *R. Edgeworttii*, *R. Dalhousiae*; *Schizanthus wisetononsis*, *Caxifraga hispidula*, *S. purpurescens*, *Statice Suworowi*, *Stokesia cyanea*, *Scilla sp.*, *ThaUctrum dipterocarpum*, *Verenica teucrium*, *Strelitzia reginae*.

**Orchids.**—*Cymbidium giganteum*, *C. grandiflorum*, *C. longifolium*, *Devoniannm*, *C. Lowianum*, *C. densiflorum*, *C. lancifolium*, *C. eburneum*, *\*V xyperifolium*; *Cypripedium Fairisanum*, *C. venustum*, *C. hirsutissimum*, *V\* villosum*, *C. insigne*, *C. Charlesworthii*; *Dendrobium clavatum*, *Y thyriflorum*, *i D. Pieradi*, *D. nobile*, *D. densiflorum*, *D. finnbriatum*; *"hajvs albus*, *P. maculatus*; *Masdevallia Harosonii*, *Renanthera imschotiana*, *Vanda Kimballiana*, *V. coeralea*.

Twenty-one packets of seeds were received from different correspondents. 74 packets of seeds, 183 plants, 4,705 seedlings and 7 bulbs were distributed to the different botanical gardens and institutions. A large number of local specimens and materials collected sent from schools, colleges and forest and other departments in the districts were identified and large quantities of botanical specimens from this part of the Himalayas were sent to various Universities and Colleges all over India and abroad for study Practical examinations and in connection with the research work of specialists.

iii The popularity of the garden has fully been established by the increase the number of visitors. The total number of persons counted at the

gates reached 89,740. Among the visitors were many high officials and distinguished men who did not fail to pay a visit to this garden in spite of the present war conditions and difficulty in conveyance.

A special difficulty caused by the war emergency devolved on the shoulders of the Superintendent and his staff in this garden as well when hundreds of boxes containing valuable botanical materials and thousands of books arrived at Darjeeling. These cases required to be removed from the station at once. Scarcity of labour in removing these boxes immediately from the railway station, rainy and damp weather, characteristic of this part of the Hills and want of accommodation in the garden all complicated the question of safely transferring and housing them. Nevertheless the difficulty was solved by the direct guidance of the Superintendent who had to be on the spot most of the time during their transfer. The ungrudging assistance of the Curator, the Clerk in charge, the Herbarium Assistant recently posted in Darjeeling and last but not least the Sirdars and the coolies who had worked overtime, is much appreciated.

Finance.—Out of the total budget allotment of Rs. 17,397 under all heads Rs. 17,394 were spent.

Staff.—The post of the Curator was ably held by Rai Sahib S. N. Basu, F.R.H., throughout the year.

## CALCUTTA GARDENS

Considerable difficulty has been experienced in carrying on the work in the garden on account of the unrest among the labour force due to bombing in Calcutta and posting of the troops in and about the garden. Evacuees from Burma pouring in Calcutta who were temporarily given shelter in a Park Eden Garden made not only the labour force a little nervous and but also caused additional work for the staff. In spite of such the display of winter annuals in the year under review was quite good. flowering pots were staged out at vantage points of the gardens like years. The idea of effecting new improvement of the gardens had to be suspended for the time being and purely routine work was carried on during the year. Dahlias of this season proved to be a success, and individual blooms attained the size of a quarter plate.

The effect of the cyclone over this garden as well was by no means less than that of the Royal Botanic Garden, Calcutta. Much damage was done to a quite number of trees and it took several days to remove the broken branches of trees and bring the garden to a tidy state. The jheel of the Eden Garden is long overdue and the condition of the tank has already been recorded in the previous year's report. Excavation of this lake is the only remedy. Attempts, however, have been made to keep the surface of the jheel of the Eden Garden and the tank of Dalhousie Square sufficiently clean. A portion of the southern end of the jheel was completely silted up this year and extra labour had to be employed in removing the silt to a depth of 2 feet in order to maintain sufficient flow of water which is necessary from sanitary point of view.

A good number of flowering shrubs and trees were planted in suitable places and the dead and decaying ones were duly replaced.

This year an exhibition of enemy aeroplanes brought down in Assam by the fighters was held in the Curzon Garden for three days. It attracted huge crowds of people and it was difficult to prevent the crowd from damaging the beds of winter annuals. These beds were, however, replaced as soon as the exhibition was over.

The Anti-malarial scheme was suggested and advice of Military experts taken into consideration. The roads

removal of the fencing round the garden. The activities of the Calcutta Fire Brigade led to further deterioration of the garden. They have

«« far as possible under the present abnormal conditions. »»

The stock of orchids and other delicate plants in the Glass House were increased. These were re-potted as usual with the desired results and about a dozen orchids brought by Mr. M. Jones from Kahmpong are new additions to the garden.

Finance.—Out of the total budget allotment of Rs. 41,628 under all heads Rs. 41,600 were spent leaving a very small saving of Rs. 28.

Staff.—Mr. Merlin Jones held the post of the Assistant Curator, Government Gardens, Calcutta, throughout the year and Mr. G. Mohiuddm, the overseer of these Gardens. Both the officers and staff of these Gardens worked satisfactorily.

K. BISWAS,  
Superintendent,  
Royal Botanic Garden, Calcutta.



Government of Bengal

Annual Report of the  
**Royal Botanic Garden and the Gardens in**  
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Garden, Darjeeling, for 1943-44

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# Annual Report of the Royal Botanic Garden and the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling, for 1943-44.

## Royal Botanic Garden.

**General staff.**—Dr. K. Biswas, M.A., D.Sc. (Edin.), F.R.S.E., held the post of the Superintendent and carried on the duties of the Director of Botanical Survey of India at the Herbarium of the Royal Botanic Garden, Calcutta, throughout the year. Dr. S. K. Mukherjee, M.Sc., Ph.D., & Mr. N. Mitra, B.Sc., N.D.H., R.D.H., held the charges of the Curator of the Herbarium and the Curator of the Royal Botanic Garden, Calcutta, respectively, throughout the year. Maulvi Md. Quasem Ali held the charge of Assistant Curator, Royal Botanic Garden, till the 1st November 1943, being for a period from April to June 1943 when he was on leave. His services were transferred to the Calcutta Gardens from 2nd November 1943. Mr. J. A. Hulbert, Overseer, was promoted to officiate in the place of Maulvi Quasem Ali both for the period of his leave and transfer to the Calcutta Gardens.

Except for few short trips no botanical excursion on a large scale could be undertaken as both the Superintendent and the Curator of the Herbarium had to concentrate their attention on the protection of the gardens and the Herbarium collections removed to Darjeeling. The Curator of the Herbarium brought about 750 specimens from the Singalila range during his short tour there. The Superintendent made an excursion to Lepcha Jagat with Professor J. C. Sen Gupta, the Senior Professor, and students of the Presidency College and gave them the benefit of his knowledge of the flora of this area.

During the year Government learnt with regret the death of Sir L. Prain, C.M.G., C.I.E., M.A., M.B., I.M.S., D.Sc., LL.D., F.R.S., F.R.S.E., one of the most able and distinguished Superintendents of the Royal Botanic Garden, Calcutta. Sir David was appointed as the Curator of the Herbarium in 1887 and succeeded Sir George King, K.C.I.E., F.R.S., in 1898. He was also the Superintendent, Cinchona Cultivation, Bengal, and Director of Botanical Survey of India, in the same year. He retired in 1904.

**Scientific workers.**—The present war conditions prevented the scientific workers from consulting the Herbarium and studying plants of the Garden as they did during the pre-war period. There were only a few local botanists who consulted literature and examined the Herbarium specimens in connection with their botanical studies. Of these may be mentioned Mr. A. P. Benthall, partner of Messrs. Bird & Co., Professor S. P. Agharkar, Head of the Department of Botany, University of Calcutta, Professor S. R. Sen Gupta, Professor of Botany, Carmichael Medical College, Calcutta, Professor J. Sen Gupta, Senior Professor of Botany, Presidency College, Calcutta, Dr. S. Das Gupta of Lucknow University, Rev. J. C. Culshaw, Dr. J. Chandler, Miss S. Gregory, Mr. B. N. Ghosh of Ghosh Nursery, Darjeeling and others. Professor J. C. Sen Gupta and Professor A. C. Dutta, Senior Professor of Botany, Cotton College, Gauhati, visited the Herbarium at the Lloyd Botanic Garden, Darjeeling, each with a batch of students, for examining and naming their local collections of plants at the Herbarium.

Professor A. V. Hill, M.P., N.L., O.B.E., D.Sc., F.L.S., F.R.S., F.R.A.S.B., Secretary, Royal Society of London, visited the Royal Botanic Garden, Calcutta, and the Herbarium on the 7th February 1944. Professor Hill discussed with the Superintendent the question of future development of the Botanical Survey of India, the Herbarium and the Royal Botanic Garden, Calcutta. Professor M. N. Saha, D.Sc., F.R.S., and Dr. Shyama Prasa

Mukherjee, M.A., B.A., Bar.-at-Law, M.L.A., President, Post Graduate Department in Science and of the Royal Asiatic Society of Bengal, were also present on this occasion. His Excellency the Governor of Bengal paid a visit to the Garden on the 13th March 1944. During his visit His Excellency took keen interest in the plants introduced to the Garden from Australia and other parts of the world. His Excellency was interested to see the expanding growth of the famous Banyan tree of the Garden which is nearly two centuries old. The Hon'ble Sir B. P. Sing Roy, K.C.I.E., President, Bengal Legislative Council, Mr. Show-nom Hsü of the Forest Department, National Central University, Chungking, paid a visit to the General Herbarium at the Lloyd Botanic Garden, Darjeeling. V. I. Chianistchev, Sub Jetu ujel B. U., Comp. Asep. Akageum, Kayk, A. A. Kostylev, Agronomist-entomologist, K. C. Chatterjee, Industrial Planning Officer (Drugs and Dressings), and T. K. Wang, P. O. Box No. 42, Kunming, China, also visited the Royal Botanic Garden, Calcutta, and the Herbarium.

### THE GARDEN.

The storage of food materials in the Royal Botanic Garden, Calcutta, interfered with the display of the season flowers in suitable places of the Garden this year. For the same reason the task of beautifying the garden and the normal horticultural operations could not be carried out in the usual manner. The annual flower show had to be confined to the nursery, the flower garden, Orchid house, Kyd monuments and the river gate and other places where there was very little chance of damage of these delicate flowers due to traffic. There was considerable strain on the roads and lawns due to unprecedented heavy traffic. No major improvement could be carried out due to abnormal conditions. Some of the essential work however was carried out for the protection of the garden and for the betterment of plants cultivated in the open. About 30,000 sq. ft. of moat forming the boundary in the west, north and east of the Garden was re-excavated. This had the desired effect in protecting the Garden to some extent and at the same time improving the moisture condition and drainage system of the garden. 8,100 sq. ft. of pathways in and about the flower garden was relaid.

The following are the species in the various divisions of the Garden particularly in the rockery of the Garden which proved to be an attractive spot for the botanists interested in the Sub-tropical hill floras: —

1. *Castia laevigata* Willd., 11. *Pyrethrum roseum* Lindl., 2. *Aconitum Napellus* Linn., 3. *Sambucus racemosa* Linn., 1. *Myristica fragrans* Linn., 1. *Artocarpus incisa* Linn., 1. *Prunus Armeniaca* Linn., 1. *Pyrus communis* Linn., 1. *Amygdalis persica* Linn., 1. *Morus indica* Linn., 5. *Lonicera trichosantha* Bureau and Franch., 2. *Melia composita-dubini* Cav., 5. *Solanum nodiflorum* Jacq., 3. *Zanonia indica* Linn., 1. *Vitex peduncularis* Wall., 1. *Elacocarpus serratus* Linn., 1. *Aquilaria Agalocha* Ro&b., 2. *Berberis nepalensis* Spreng., 2. *Annonium subulatum* Purn Roatb., 2. *Elephantaria Cardujno-Turri* Maton., 1. *Nepenthes Ithysiana* Hook., 3. *Atropa Belladonna* Linn., 1. *Vitis vinifera* Linn., *Cassia* Sp., 12. *Baussurea candicans* C.B., Clarke., 4. *Ailanthus excelsa* Roxb., 1. *Albizia species*, 1. *Albizia stipulata* Boiv., 3. *Batiphania racemosa* Tjam., 2. *Acacia pennata* Willd., 1. *Acacia lenticularis* Buch-Hamilton., 2. *Terndalia myriocarpa* Henrck. f. Meull., 1. *Vitex peduncularis* Wall., 2. *Xylocarpus longifolia* Clos., 1. *Albizia Thomsonii* var., 2. *Markhamia platycalyx*, 5. *Hibiscus Hubgelii* Endl., 1. *Acacia juncea* Benth., 2. *Acacia linearis* Sims., 5. *Convolvulus tricolor* Linn., 1. *Acacia auriculiformis* A. Cunn., 2. *Eucalyptus drepamophylla* F. Muell., 1. *Sterculia platamifolia* Linn., 1. *Ginkgo biloba* Linn., 5. *Deutzia grandiflora*



Bunge., 5. *Buddleia albiflora* Hemsl., 5. *Buddleia Davidi* Franch. & Savat., 5. *Buddleia nivea*, 3. *Buddleia Forrestii*, 3. *Deutzia Schneidiana* var. *laxiflora*, & *Deutzia reflexa*, 5. *Deutzia scabra* Thunb., 3. *Zinnia edulis* Sims., 5. *Eupatorium glandulosum* H. B. & K., 3. *Asclepias limolia* Lag., 1. *Pentstemon acuminatus* Dougl., 5. *Pentstemon torwm.*, 1. *Cinchona succirubra* Pav., 2. *Psychotria Ipecacuanha* h *Pachira rosea*, 1. *Brownea grandiceps*, 1. *Schizolobium* sp., 3. *haena fchodes* Benth., 3. *Hivaea brasiliensis*, *Tabebuia rosea* *Spathelia simplex* Linn., 2. *Acacia lutea*-*N eptunia lutea* Benth., 1-*santhes speciosa*, *Solanum pyracanthum* Jacq., 1. *Ephedra Gerardo* Wall., 4. *Digitalis purpurea* Linn., 9. *Matricaria Chamomilla* Linn.

Several species of *Azaleas*, *Tibuchina semidicandra* and few other plants of the lower hills were acclimatised and successfully grown in the small palm house. These flowered in the plains and the beauty of the flowers attracted many overseas troops visiting the garden daily nowadays. garden operations in replacing the dead and decaying plants and snr were continued as usual.

Exchange of specimens had to be curtailed considerably due to difficulties in the transport of seedlings and younger plants by train or steamer. plants were, however, distributed to various applicants in different parts of India. 145 plants and 200 bulbs of *Gladiolus* were received. and 14 lbs. and 8 ozs. of seeds were sent out to America, Africa and Britain. Professor B. A. Krukoff, New York Botanical Institute, U.S.A. who is at present engaged in research work on poisonous and insect repellent plants in connection with finding out anti-malarial remedy for war purposes was supplied with bark and wood of various species. The Garden of the Royal Botanic Garden, Calcutta, was run efficiently and relieved distress of the labourers working inside the garden.

**Finance.**—Out of the total budget allotment of Rs. 47,267 permanent establishment Rs. 47,246 were spent and under all other the expenditure amounted to Rs. 73,791 against the allotment of Rs. The receipts of the department during the year amounted to Rs. 1,100.

**The Herbarium.**—In spite of certain inevitable disadvantages on account of present emergency, routine work was carried on at both the centres Sibpur and Darjeeling where the general Herbarium and the Library are now transferred. The most important work that devolved on this year was to attend to the specimens which were damaged either during transit or storage under improvised sheds. About 2,500 sheets were and 67 sheets were mounted and placed in their respective covers in racks of the new Herbarium shed in Darjeeling. About 500 genus species covers were changed.

Quite a large number of queries were answered and necessary information was supplied to numerous correspondents both on pure as well as applied botany as in previous years. Major R. C. Jackman, G.S.I.E. furnished with notes on some edible fruit trees of Burma. A list of Indian plants with their botanical and vernacular names was supplied to the Officer-in-charge, Camouflaging Department, Eastern Army Headquarters. Capt. E. P. Scott was given necessary information and advice with regard to plants which might be used for camouflaging purposes. Lt. J. A. Devny and the Divisional Forest Officer, Chittagong, were recipients of seeds and cuttings of plants suitable for camouflaging. Technical Officer, Fibre Development, Ordnance Laboratory, was furnished with information on distribution, availability and cultivation of *stemona tuberosa* *Phytelephas macrocarpa*. Short notes on *Hemandia sonora*, the betel nut and betel vine and on bamboo were sent to A. C. Clavelier, R.A.F., Chittagong. A list of Indian plants which have sedative and anaesthetic

properties was sent to Dr. B. A. Krukoff of New York Botanical Garden, T.J. S. A. Col. G. McClean, Director of Medical Services, Addis Ababa, received information on plants yielding chalmogra oil of commerce. A list of medicinal plants with notes on their cultivation for experimental purposes near Patna was supplied to Dr. B. N. Prosad, F.R.S.E. Dr. David Fairchild of New York, T.J. S. A., was recipient of information on the cultivation of *Terminalia iwyriocarpa*, an important timber yielding tree of the Eastern Himalayas. A list of 45 species of medicinal plants supposed to be good febrifuge was drawn up for Dr. B. Mukherjee, Acting Director, Biochemical Standardisation Laboratory, All-India Institute of Hygiene and Public Health, Calcutta. Mr. G. Upadhyaya of Benares, received information on *Aconites* and other medicinal plants. A note on the Jwaran kusha-grass *Cymbopogon Jwarancusa* Schult. was furnished to Messrs. Eastern Drug Co., Ltd. Similar note was sent to N. Mondal, Esq., on *Anacyclus pyrethrum* DC. A detailed list of edible plants of Assam was sent to Captain Kingdon Ward. Note on the edible *Dioscoreas* of India was furnished to the Secretary, Royal Agri-Horticultural Society of India, Alipore, Calcutta. Information regarding cultivation of Cajuput tree was sent to the Silviculturist, Bombay. Similar information about *Cryptostegia grandiflora*—a rubber yielding plant—was sent to (i) Conservator of Forests, Bengal, (ii) Controller of Rubber, Government of India, (iii) Director, Supply Department, Government of India, New Delhi. Detailed notes on the economic uses of 8 Indian plants were supplied to the Mycologist to the Government of Orissa. Information was furnished to Dr. K. Mitra, Officer-in-charge of Nutrition Scheme, Bihar, as well as that of Bengal on some plants considered as famine food. Detailed information about the number of Indian species, their distribution, etc., of the genus, *Derris*, was given to Dr. P. Bhaduri of Botany Department, University of Calcutta. Detailed notes on the distribution and identification of *Corypha elata* Roxb. and *C. Taliera* Roxb. were sent to (i) Mr. A. P. Benthall and (ii) Mr. J. M. S. Breiter. References and lists of literature on various subjects were sent to (i) Dr. Albert W. Herre of California, (ii) Mr. S. N. De, Calcutta, and (iii) Mr. A. P. Floyd of Saidpore, Bengal. Instructions for eradication and control of water plants pests were given to Rai J. O. Sen Bahadur, Presidency Magistrate, and to the Health Officer, Bankura Municipality. Similar scientific advice was offered to many other <sup>a</sup> correspondents.

**Identification!**—The total number of specimens identified for different correspondents was 1,704. Of these 347 specimens were received from Mr. J. Sinclair, R.A.F., 300 from the Principal, M. C. College, 275 from Professor and students of Presidency College, Calcutta. A large number of specimens was also received from and identified for (1) Fr. A. Santepau, Professor of Biology, St. Xavier's College, Bombay, (2) Fr. J. Bressers, Ranchi, (3) Botanical Forest Officer, Assam, (4) The Professor of Botany, Punjab Agricultural College, (5) Rev. J. C. Culshaw of Methodist Church, Bankura, (6) Acting Forest Botanist, Forest Research Institute, Dehra Dun, (7) Agricultural Commissioner to the Government of India, (8) Imperial Mycologist of the Imperial Agricultural Research Institute, New Delhi, (9) Economic Botanist to the Government of Bombay, (10) Mycologist to the Government of Gwalior, (11) Director of Scientific and Industrial Research, (12) Second Economic Botanist to the Government of Bengal, (13) Senior Assistant Mycologist, Bangalore, (14) Mycologist to the Government of Orissa and (15) the Professor and Head of the Department of Botany, University of Calcutta and many others.

**Distribution and acquisition.**—The work of distribution was also much hampered due to transit difficulties. Portions of about 25 authentic species of *Gymnosperms* were presented to Dr. Birbal Sahni of Lucknow University

for his investigation on fossil plants. The Herbarium of the University of Lucknow and of Gordon College each received a gift of 100 specimens of duplicates from our stock of Eastern Himalayan plants. Dr. S. R. Boge was recipient of 19 specimens of hard fungi, collected from the Eastern Himalayas. Mr. C. McCann of the Bombay Natural History Museum received pen and ink sketches of two species of *Ceropegia*. A sketch of *Globba bulbifera* was made for Dr. A. C. Joshi of Benares Hindu University in connection with his research work.

Two sheets of *Eacoecaria aboriana* R. N. De a new species recently described by him have been presented to the Herbarium. Mrs. Barnes sent as a gift to this Herbarium two specimens of *Covimelina*. One sheet of *Daedalacanthus strictus* was presented by the Principal, M. C. College\* Sylhet. The gift of all these specimens to the Herbarium is thankfully acknowledged.

**Loan.**—175 Herbarium sheets of *Ceropegia* were sent on loan to Mr. Charles McCann who is engaged in the revision of the genus. Specimens of Assam Orchids were received on loan by the Curator of the Herbarium from the Forest Herbarium, Shillong, and the Herbarium, Forest Research Institute, Dehra Dun.

**Publications.**—The papers published by the Scientific Officers during the year are—(1) The Systematic Position of a Common Tree Fern of the Eastern Himalayas with a note on the genus *Cyathea* by Dr. K. Biswas published in the journal of the Royal Asiatic Society of Bengal, (2 and 3) Balanced Vegetation and Pisciculture and Plant Life in Water by the same author published in Science and Culture, Vol. 9, No. 4, October, 1943, and Vol. 9, No. 10, April 1944, (4) Observations on the Marine Algae from the Coast of Bombay by Dr. K. Biswas and G. Mitra also published in the same journal in Vol. 9, No. 6, 1943.

**Library Sections.**—During the year under review some of the foreign journals, particularly the British and the American journals, have been received. Some important books have been purchased this year. Nine periodicals and 14 annual reports were received either in exchange or as gifts. Two books were presented to the library. 34 pamphlets and 8<sup>8</sup> were presented to the library by different authors. About 69 books were sent on loan of which 17 volumes have since been returned. 261 books were repaired and 8 volumes were bound during the year.

#### LLOYD BOTANIC GARDEN, DARJEELING.

The weather under report was satisfactory except for the heavy hailstorm on the 20th March 1944, which caused considerable damage to the annual plants. The total rainfall during the year was 108 inches and the highest rainfall was recorded in June when it was 25.60 inches much below the last year's record when it reached more than 30 inches in July which was rather too heavy and prolonged for healthy growth of annual flowering plants. A severe cyclone passed over the garden on the 25th July 1943, which caused great damage to a large number of plants among which there were several rare specimens represented in the garden by single specimen only such as *Caragava arborescens*, *Pinus pntula*, *Cupressus macrocarpa* and *Liriodendron tulipifera*. The difficulty of importing seeds from overseas countries continued due to war but the garden made up its deficiency as far as possible by using seeds acclimatised in the garden and the local nurseries. Many plants were also brought from the neighbouring mountains and were grown in the suitable sections of the garden. The annuals in the flower beds near the conservatory and different parts of the garden came out satisfactorily in spite of the set back caused by the hailstorm in the seedling stage. Special attention has been paid this year for restocking

Orchids by specimens collected from Buxa Duars area. The following species have been added to the nursery:—

*Dendrobium Hookerianum*, *D. Devonianum*. *D* aggregation, *D. heterocarpum*, *D. Gibsonii*, *D. Pieradi*, *D. ramosum*, *D. denudans*, *D. moschatum*, *D. transparens*, *D. crepidatum*, *Cymbidium Mastersii*, *C. grandiflora*, *Aerides Fieldingii*, *A. multiflorum*, *A. odoratum*, *Coelogyne barbata*, *C. humilis*, *C. flaccida*, *C. corymbosa*, *Arundina bambu si folia*, *Phajus maculata*, *P. mishmensis*, *P. Wallichii*, *Calanthe biloba*, *C. puberula*, *Goodyera hispida*, *Rynchosstylis return*, *Vanda alpina*, *V. cristata*, *V. pumila*, *Eria coronaria*, *Saccolabium acutifolium*, *S. calceolare* and *S. distichum*.

The students garden attracted much attention of the students of Botany from the different Universities and Colleges who visited the garden. This section of the garden was duly attended to and restocked by several species of medicinal and commercial value. Of these may be mentioned *Pyrethrum roseum*, *Saxifraga ligulata*, *Swertia chirata*, *Taraxacum officinale*, *Matricaria Chamomilla*, *Acorus calamus*, *Mentha piperita*, *Elettaria cardaiao-  
mum* and others.

Hundreds of boxes containing books and specimens which were so long kept in the small conservatory were taken over to the newly constructed Herbarium shed. After the removal of these boxes the conservatory was properly repaired and decorative pot plants and ferns well known for their beauty of flowers and foliage were re-arranged for display again after nearly a year. Nurseries, glass houses and frame boxes which were in a very bad state of repair were attended to as far as possible and brought to a serviceable condition. The main hot house was partly renovated and cleaned. The hot water pipes inside the hot houses had to be used constantly throughout the cold weather on account of the abnormal winter that prevailed during the year. Some of the roads were repaired as far as funds permitted. The total area repaired is 5,900 square feet.

One hundred and ninety plants were distributed to different parties. Collected seeds of *Atropa Belladonna*, *Digitalis purpurea* and *Swertia Chirata* from the acclimatised plants of the garden were despatched to the General Manager, The Pekin Syndicate, Ltd., New Delhi, in connection with the supply of seeds of medicinal plants to the National Health Administration of the Government of China. Requests for the supply of botanical specimens received from different colleges and botanical institutions for demonstration and practical examination were complied with. 21 specimens of *Gymnosperms* collected in the garden were supplied to Dr. Birbal Sahni, D.S.C, F.R.S., the Head of the Department of Botany, Lucknow University. Similar help was rendered to the students of local schools who occasionally visited the garden with their teachers for the study of the East Himalayan plants. One dozen plants and the same number of rootbarks of *Berberis umbellata* collected from Sandakphu were supplied to Dr. R. Prasad, Assistant Mycologist, Simla, for his investigation. About 2 lbs. of leaves and bark of *Skimmia laureola* were also collected from the local forest and supplied to Miss Ashima Mookherjee, P.R.S., University College of Science, Calcutta, for her research work on plant alkaloids.

Out of 81 packets of seeds received from the Superintendent, Royal Botanic Garden, Calcutta, on the 8th October 1943 and sown in the nursery on 10th October 1943 the following seeds germinated:—*Hibiscus Huegellii*, *Iris innotata*, *I. Wilsonii*, *Rosa rubrifolia* and *R. blanda*. 52 packets of seeds from the New York Botanical Garden, U. S. A., were received and sown in the nursery and the following germinated:—*Dianthus gratianopolitain*, *D. leburnica*, *D. plumerius* and *Salvia farinacea*.

Full advantage was taken of the presence of the Herbarium and its staff in this Garden in revising the names of many plants in the light of the

**International Ruled of Botanical Nomenclature.** Identification of local plants were made much more quickly than before and the students and teachers visiting the Herbarium made full use of the collections and the botanical literature in the library now housed in the Garden. The Superintendent, the Curator of the Herbarium/the Systematic Assistant and the Herbarium staff offered their usual help and co-operation to all those who approached them for information on botanical matters both in its pure and applied aspects.

The popularity of this Garden increased beyond expectation. There were over one lakh of visitors to the Garden this year as recorded at the gates. 66 maps of this Garden were sold to the visitors during the year. Among the unusually large number of visitors the majority were His Majesty's Forces and the American troops and those who were interested in the Himalayan plants were taken round the garden by the Officers and furnished with the necessary information regarding the plants cultivated in M<sup>e</sup> Garden and the neighbourhood. Some of them were also given full facilities for working in the Herbarium under the guidance of the Scientific Officers.

**Finance.**—Out of the total budget allotment of Rs. 26,179 under all heads Rs. 25,888 were spent leaving a balance of Rs. 291.

**Staff.**—Rai Sahib S. N. Basu held the charge of the Curator till the 1st November 1943, and his retirement took effect from the 2nd November 1943, when he was relieved by Mr. Merlin Jones. Mr. Jones held the charge till the end of the financial year\*.

#### CALCUTTA GARDENS.

These Gardens were the worst sufferers due to prevailing abnormal conditions. The Gardens are exposed to destruction due to want of protection since the fences around them were removed. These Gardens will have to be relaid in future and enormous work will devolve on the Officers of the Gardens during the reconstruction of the Gardens after the war is over.

In spite of certain disadvantages due to war conditions the annual flowering of the plants in the different flower beds and nurseries reached nearly the same high standard as in the previous years. In the Curzon Garden a motorable road is under construction. This road runs north to south across the centre of this Garden. This led to the removal of the large flower bed in the middle which was so long a beauty spot of the Garden.

The condition of the wheels in the Eden Garden and the Dalhousie Square tank could not be improved, because no major cleaning operation could be undertaken during the present emergency. Anti-malarial work was carried out efficiently in collaboration with the military as in the previous years.

**Finance.**—Out of the total budget allotment of Rs. 46,463 under all heads Rs. 46,118 were spent leaving a balance of Rs. 345.

**Staff.**—Mr. Merlin Jones was in charge of the Calcutta Garden till 1st November 1943. From the 2nd November his services were transferred to the Lloyd Botanic Garden, Darjeeling, where he became the Curator of the Garden after being relieved by Maulvi Md. Quasem Ali who held the charge of the Calcutta Gardens till the end of the year.

K. BISWAS,  
*Superintendent,*  
*Royal Botanic Garden, Calcutta.*



Government of Bengal

Annual Report of the  
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# Annual Report of the Royal Botanic Garden and the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling, for 1943-44.

## Royal Botanic Garden.

**General staff.**—Dr. E. Biswas, M.A., D.Sc. (Edin.), F.R.S.E., held the post of the Superintendent and carried on the duties of the Director of the Botanical Survey of India at the Herbarium of the Royal Botanic Garden, Calcutta, throughout the year. Dr. S. K. Mukherjee, M.Sc., Ph.D., Mr. N. Mitra, B.Sc., N.D.H., H.D.H., held the charges of the Curator of the Herbarium and the Curator of the Royal Botanic Garden, Calcutta, respectively.

Dr. E. Biswas was on leave from April to June 1943 when he was on leave. His services were transferred to the Calcutta Gardens from 2nd November 1943. Mr. J. A. Hulbert, Overseer, was promoted to officiate in the place of the Maulvi Quasem Ali both for the period of his leave and transfer to the Calcutta Gardens.

Except for few short trips no botanical excursion on a large scale could be undertaken as both the Superintendent and the Curator of the Herbarium had to concentrate their attention on the protection of the gardens and the Herbarium collections removed to Darjeeling. The Curator of the Herbarium brought about 750 specimens from the Singalila during his short tour there. The Superintendent made an excursion to Lepcha Jagat with Professor J. C. Sen Gupta, the Senior Professor, and students of the Presidency College and gave them the benefit of his knowledge of the flora of this area.

During the year Government learnt with regret the death of Sir L. Prain, C.M.G., C.I.E., M.A., M.B., I.M.S., D.Sc., LL.D., F.R.S., F.R.S.E., one of the most able and distinguished Superintendents of the Royal Botanic Garden, Calcutta. Sir David was appointed as the Curator of the Herbarium in 1887 and succeeded Sir George King, K.C.I.E., F.R.S., in 1898. He was also the Superintendent, Cinchona Cultivation, Bengal, and Director of the Botanical Survey of India, in the same year. He retired in 1904.

**Scientific workers.**—The present war conditions prevented the scientific workers from consulting the Herbarium and studying plants of the Garden as they did during the pre-war period. There were only a few local botanists who consulted literature and examined the Herbarium specimens in connection with their botanical studies. Of these may be mentioned Mr. A. Benthall, partner of Messrs. Bird & Co., Professor S. P. Agharkar, Head of the Department of Botany, University of Calcutta, Professor S. R. Bose, Professor of Botany, Carmichael Medical College, Calcutta, Professor J. C. Sen Gupta, Senior Professor of Botany, Presidency College, Calcutta, Dr. S. Das Gupta of Lucknow University, Rev. J. C. Culshaw, Dr. L. Chandler, Miss S. Gregory, Mr. B. N. Ghosh of Ghosh Nursery, Darjeeling, and others. Professor J. C. Sen Gupta and Professor A. C. Dutta, Senior Professor of Botany, Cotton College, Gauhati, visited the Herbarium of the Lloyd Botanic Garden, Darjeeling, each with a batch of students, examining and naming their local collections of plants at the Herbarium.

Professor A. V. Hill, M.P., N.L., O.B.E., D.Sc., F.L.S., F.R.S., Secretary, Royal Society of London, visited the Royal Botanic Garden, Calcutta, and the Herbarium on the 7th February 1944. Professor Hill discussed with the Superintendent the question of future development of the Botanical Survey of India, the Herbarium and the Royal Botanic Garden, Calcutta. Professor M. N. Saha, D.Sc., F.R.S., and Dr. Shyama Prasad

Mukherjee, M.A., LL.D., Bar.-at-Law, M.L.A., President, Post Graduate Department in Science and of the Royal Asiatic Society of Bengal, were also present on this occasion. His Excellency the Governor of Bengal paid a visit to the Garden on the 13th March 1944. During his visit His Excellency took keen interest in the plants introduced to the Garden from Australia and other parts of the world. His Excellency was interested to see the expanding growth of the famous Banyan tree of the Garden which is nearly two centuries old. The Hon'ble Sir B. P. Sing Roy, K.C.I.E., President, Bengal Legislative Council, Mr. Show-nom Hsii of the Forest Department, National Central University, Chungking, paid a visit to the general Herbarium at the Lloyd Botanic Garden, Darjeeling. V. I. Ulianistchev, Sub Jetu ujel B. T.J., Comp. Asep. Akageum, Kayk, A. A. Kostylev, Agronomist-entomologist, K. C. Chatterjee, Industrial Planning Officer (Drugs and Dressings), and T/K. Wang, P. O. Box No. 42, Kunming, China, also visited the Royal Botanic Garden, Calcutta, and the Herbarium.

### THE GARDEN.

The storage of food materials in the Royal Botanic Garden, Calcutta, interfered with the display of the season flowers in suitable places of the Garden this year. For the same reason the task of beautifying the garden and the normal horticultural operations could not be carried out in the usual manner. The annual flower show had to be confined to the nursery, the flower garden, Orchid house, Kyd monuments and the river gate and other places where there was very little chance of damage of these delicate flowers due to traffic. There was considerable strain on the roads and lawns due to unprecedented heavy traffic. No major improvement could be carried out due to abnormal conditions. Some of the essential work however was carried out for the protection of the garden and for the betterment of plants cultivated in the open. About 30,000 sq. ft. of moat forming the boundary in the west, north and east of the Garden was re-excavated. This had the desired effect in protecting the Garden to some extent and at the same time improving the moisture condition and drainage system of the garden. 8,100 sq. ft. of pathways in and about the flower garden was relaid.

The following are the species in the various divisions of the Garden particularly in the rockery of the Garden which proved to be an attractive spot for the botanists interested in the Sub-tropical hill floras: —

1. *Cassia laevigata* Willd., 11. *Pyrethrum rose urn* Ldndl., 2. *Aconitum Napellus* Linn., 3. *Sambucus racemosa* Linn., 1. *Myristica fragrans* Houtt., 1. *Artocarpus incisa* Linn., 1. *Prunus Armeniaca* Linn., 1. *Pyrus communis* Linn., 1. *Amygdalus persica* Linn., 1. *Morus indica* Linn., 5. *Lonicera trichosantha* Bureau and Franch, 2. *Melia composita-dubia* Vav., 5. *Solanum nodiflorum* Jacq., 3. *Zanonia indica* Linn., 1. *Vitex pedunculata* Wall., 1. *Elaeocarpus serratus* Linn., 1. *Aquilaria Agallocha* Roxb., 2. *Berberis nepalensis* Spreng., 2. *Amomum subulatum* Jioxb., 2. *Elettaria Cardamomum* Maton., 1. *Nepenthes khasiana* Hook., 3; *Atropa Belladonna* Linn., 1. *Vitis vinifera* Linn., *Cassia* Sp., 12. *Saussurea candicans* C.B., Clarke., 4. *Ailanthus excelsa* Roxb., 1. *Albizia species*, 1. *Albizia stipulata* Boiv., 3. *Bauhinia racemosa* Lam., 2. *Acacia pennata* Willd., 1. *Acacia lenticularis* Buch-Hamilton., 2. *Terminalia myriocarpa* Henrck. § Meull. 1. *Vitex pedunculata* Wall., 2. *Xylocarpus longifolia* Clos., 1. *Albizia Thomsonii* var., 2. *Markhamia platycalyx*., 5. *Hibiscus Huegelii* Endl., 1. *Acacia juncifolia* Benth., 2. *Acacia linearis* Sims., 5. *Convolvulus tricolor* Linn., 1. *Acacia auriculiformis* A. Cunn., 2. *Eucalyptus drepanophylla* F. Muell., 1. *Sterculia platanifolia* Linn., 1. *Ginkgo biloba* Linn., 5. *Deutzia grandiflora*



Bunge., 5. *Buddleia albiflora* Hemsl., 5. *Buddleia Davidi* Franch.,  
 5. *Buddleia nivea*, 3. *Buddleia Forrestii*, 3. *Deutzia Schneideriana*  
 var. *laxiflora*, 5. *Deutzia reflexa*, 5. *Deutzia scabra* Thunb., 3. *Passiflora*  
 /ford adwZiv Sim\*, 5. *Eupatorium glandulosum* H. B. f. if., 3. *Asclepias*  
*liniolia* Lag., 1. *Pentstemon acuminatus* Dough, 5. *Pentstemon* Vne-  
 to mm., 1. *Cinchona succirubra* Paw., 2. *Psychotria Ipecacuanha* ^ h e m  
 1. *Pachira rosea*, 1. *Brownea grandiceps*, 1. *Schizolobium* sp., 3. ^ e m  
*caena trichodes* Benth., 3. *Hivaea brasiliensis*, *Tabebuia rosea* I\*\* U  
*Spathelia simplex* Linn., 2. *Acacia lutea-Neptunia lutea* Benth., 1. *Bolu-*  
*santhes speciosa*, *Solatium pyracanthum* Jacq., 1. *Ephedra* Gerq^rdiana  
 Wall., 4. *Digitalis purpurea* Linn., 9. *Matricaria Chamomilla* Linn-

Several species of AzaZeas, *Tibuchina semidicandra* and few other plants  
of the lower hills were acclimatised and successfully grown in the small  
palm house. These flowered in the plains and the beauty of the flowers  
attracted many overseas troops visiting the garden daily nowadays. Usual  
garden operations in replacing the derfd and decaying plants and sii  
were continued as usual.

Exchange of specimens had to be curtailed considerably due to difficu  
ities  
in the transport of seedlings and younger plants by train or steamer. ^  
plants were, however, distributed to various applicants in different p. art  
of India. 145 plants and 200 bulbs of *Gladiolus* were received. 152 P\*?j f at  
and 14 lbs. and 8 ozs. of seeds were sent out to America, Africa and i\* A  
Britain. Professor B. A. Krukoff, New York Botanical Institute, U. O. ^ t  
who is at present engaged in research work on poisonous and insect repir  
plants in connection with finding out anti-malarial remedy for war Pur  
poses was supplied with bark and wood of various species. The C^ 1 1 hop  
of the Eoyal Botanic Garden, Calcutta, was run efficiently and relieved  
distress of the labourers working inside the garden.

**Finance.**—Out of the total budget allotment of Es. 47,267 for staff w r 1  
permanent establishment Es. 47,246 were spent and under all o t ^ er 7 z f eads  
the expenditure amounted to Es. 73,791 against the allotment of Es^ A ^ 970.  
The receipts of the department during the year amounted to Es. 3,100.

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of present emergency, routine work was carried on at both the ce n t r e in  
Sibpur and Darjeeling where the general Herbarium and the Library B u t a g  
are now transferred. The most important work that devolved on the s i n g  
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furnished with notes on some edible fruit trees of Burma. A list of An dia u  
plants with their botanical and vernacular names was supplied to t  
Officer-in-charge, Camouflaging Department, Eastern Army iHeadquart  
Capt. E. P. Scott was given necessary information and advice with reg a  
to plants which might be used for camouflaging purposes. Lt. J. A. 1) ^ v n y  
and the Divisional Forest Officer, Chittajyong, were recipients of see ^ L S n re  
cuttings of plants suitable for camouflaging. Technical Officer, \* i b o i l  
Development, Ordnance Laboratory, was furnished with information  
distribution, availability and cultivation of *stemona tuberosa* n d  
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**Identification!**—The total number of specimens identified for different correspondents was 1,704. Of these 347 specimens were received from Mr. J. Sinclair, R.A.F., 300 from the Principal, M. C. College, 275 from Professor and students of Presidency College, Calcutta. A large number of specimens was also received from and identified for (1) Fr. A. Santepau, Professor of Biology, St. Xavier's College, Bombay, (2) Fr. J. Bressers, Ranchi, (3) Botanical Forest Officer, Assam, (4) The Professor of Botany, Punjab Agricultural College, (5) Rev. J. C. Culshaw of Methodist Church, Bankura, (6) Acting Forest Botanist, Forest Research Institute, Dehra Dun, (7) Agricultural Commissioner to the Government of India, (8) Imperial Mycologist of the Imperial Agricultural Research Institute, New Delhi, (9) Economic Botanist to the Government of Bombay, (10) Mycologist to the Government of Gwalior, (11) Director of Scientific and Industrial Research, (12) Second Economic Botanist to the Government of Bengal, (13) Senior Assistant Mycologist, Bangalore, (14) Mycologist to the Government of Orissa and (15) the Professor and Head of the Department of Botany, University of Calcutta and many others.

**Distribution and acquisition.**—The work of distribution was also much hampered due to transit difficulties. Portions of about 25 authentic species of *Gymnosperms* were presented to Dr. Birbal Sahni of Lucknow University

for his investigation on fossil plants. The Herbarium of the University of Lucknow and of Gordon College each received a gift of 100 specimens of duplicates from our stock of Eastern Himalayan plants. Dr. S. B. Bose was recipient of 19 specimens of hard fungi, collected from the Eastern Himalayas. Mr. C. McCann of the Bombay Natural History Museum received pen and ink sketches of two species of *Ceropegia*. A sketch of *Globba bulbifera* was made for Dr. A. C. Joshi of Benares Hindu University in connection with his research work.

Two sheets of *Excoecaria aboriana* E. N. De a new species recently described by him have been presented to the Herbarium. Mrs. Barnes sent as a gift to this Herbarium two specimens of *Commelina*. One sheet of *Daedalacanthus strictus* was presented by the Principal, M. C. College, Sylhet. The gift of all these specimens to the Herbarium is thankfully acknowledged.

**Loan.**—175 Herbarium sheets of *Ceropegia* were sent on loan to Mr. Charles McCann who is engaged in the revision of the genus. Specimens of Assam Orchids were received on loan by the Curator of the Herbarium from the Forest Herbarium, Shillong, and the Herbarium\* Forest Research Institute, Dehra Dun.

**Publications.**—The papers published by the Scientific Officers during the year are—(1) The Systematic Position of a Common Tree Fern of the Eastern Himalayas with a note on the genus *Cyathea* by Dr. K. Biswas published in the journal of the Royal Asiatic Society of Bengal, (2 and 3) Balanced Vegetation and Pisciculture and Plant Life in Water by the same author published in Science and Culture, Vol. 9, No. 4, October, 1943, and Vol. No. 10, April 1944, (4) Observations on the Marine Algae from the Coast of Bombay by Dr. K. Biswas and G. Mitra also published in the same journal in Vol. 9, No. 6, 1943.

**Library Sections.**—During the year under review some of the foreign journals, particularly the British and the American journals, have been received. Some important books have been purchased this year. Nine periodicals and 14 annual reports were received either in exchange or as gifts. Two books were presented to the library. 34 pamphlets and reprints were presented to the library by different authors. About 69 books were sent on loan of which 17 volumes have since been returned. 261 books were repaired and 8 volumes were bound during the year.

### LLOYD BOTANIC GARDEN, DARJEELING.

The weather under report was satisfactory except for the heavy hailstorm on the 20th March 1944, which caused considerable damage to the annual plants. The total rainfall during the year was 108 inches and the highest rainfall was recorded in June when it was 25.60 inches much below the last year's record when it reached more than 30 inches in July which was rather too heavy and prolonged for healthy growth of annual flowering plants. A severe cyclone passed over the garden on the 25th July 1943, which caused great damage to a large number of plants among which there were several rare specimens represented in the garden by single specimens only such as *Caragana arborescens*, *Pinus patula*, *Cupressus wacrocarpa* and *Iriolindron tulipifera*. The difficulty of importing seeds from overseas countries continued due to war but the garden made up its deficiency as far as possible by using seeds acclimatised in the garden and the local nurseries. Many plants were also brought from the neighbouring mountains and were grown in the suitable sections of the garden. The annuals in the flower beds near the conservatory and different parts of the garden came out satisfactorily in spite of the set back caused by the hailstorm in the seedling stage. Special attention has been paid this year for restocking

Orchids by specimens collected from Buxa Duars area. The following species have been added to the nursery:—

*Dendrobium Hookeri*/mum, *D. Devoniarvum*. *D* aggregation,, *D. heterocarpum*, *D. Gibsonii*, *D. Pieradi*, *D. ramosum*, *D. denudans*, *D. moschatum*, *D. transparens*, *D. crepidatum*, *Cyribidiuin Mastersii*, *C. grandiflora*, *Aerides Fieldingii*, *A. multiflorum*, *A. odoratum*, *Coelogyne barbata*, *C. humilis*, *C. flaccida*, *C. corymbosa*, *Arundina bavibusifolia*, *Phajus maculata*, *P. mishviensis*, *P. Wallichii*, *Calanihe biloba*, *C. puberula*, *GoodyeraH hispida*, *Rynchosstylis retusa*, *Vanda alpina*, *V. cristata*, *V. pumila*, *Eria coronaria*, *Saccolabium acutifolium*, *S. calceolare* and *S. distichum*.

The students garden attracted much attention of the students of Botany from the different Universities and Colleges who visited the garden. This section of the garden was duly attended to and restocked by several species of medicinal and commercial value. Of these may be mentioned *Pyrethrum roseum*, *Saxifraga ligulata*, *Swertia chirata*, *Taraxacum officinale*, *Matricaria Chamamilla*, *Acorns calamus*, *Mentha piperita*, *Elettaria cardamo\* mum* and others.

Hundreds of boxes containing books and specimens which were so long kept in the small conservatory were taken over to the newly constructed Herbarium shed. After the removal of these boxes the conservatory was properly repaired and decorative pot plants and ferns well known for their beauty of flowers and foliage were re-arranged for display again after nearly a year. Nurseries, glass houses and frame boxes which were in a very bad state of repair were attended to as far as possible and brought to a serviceable condition. The main hot house was partly renovated and cleaned. The hot water pipes inside the hot houses had to be used constantly throughout the cold weather on account of the abnormal winter that prevailed during the year. Some of the roads were repaired as far as funds permitted. The total area repaired is 5,900 square feet.

One hundred and ninety plants were distributed to different parties. Collected seeds of *Atropa Belladonna*, *Digitalis purpurea* and *Swertia Chiratm* from the acclimatised plants of the garden were despatched to the General Manager, The Pekin Syndicate, Ltd., New Delhi, in connection with the supply of seeds of medicinal plants to the National Health Administration of the Government of China. Requests for the supply of botanical specimens received from different colleges and botanical institutions for demonstration and practical examination were complied with. 21 specimens of *Gymnosperms* collected in the garden were supplied to Dr. Birbal Sahni, D.S.C., I.R.S., the Head of the Department of Botany, Lucknow University. Similar help was rendered to the students of local schools who occasionally visited the garden with their teachers for the study of the \*East Himalayan plants. One dozen plants and the same number of rootbarks of *Berberis umbellata* collected from Sandakphu were supplied to Dr. R. Prasad, Assistant Mycologist, Simla, for his investigation. About 2 lbs. of leaves and bark of *Skimmia laureola* were also collected from the local forest and supplied to Miss Ashima Mookherjee, P.R.S., University College of Science, Calcutta, for her research work on plant alkaloids.

Out of 81 packets of seeds received from the Superintendent, Royal Botanic Garden, Calcutta, on the 8th October 1943 and sown in the nursery on 10th October 1943 the following seeds germinated:—*Hibiscus Huegellii*, *Iris innometa*, *I. Wilsonii*, *Rosa rubrifolia* and *R. hlanda*. 52 packets of seeds from the New York Botanical Garden, U. S. A., were received and sown in the nursery and the following germinated:—*Dianthus gratianopolitain*, *D. leburnica*, *D. plumerius* and *Salvia farinacea*.

Full advantage was taken of the presence of the Herbarium and its staff in this Garden in revising the names of many plants in the light of the

**International Rules of Botanical Nomenclature. Identification of local** plants were made much more quickly than before and the students and teachers visiting the Herbarium made full use of the collections and the botanical literature in the library now housed in the Garden. The Superintendent, the Curator of the Herbarium, the Systematic Assistant and the Herbarium staff offered their usual help and co-operation to all those who approached them for information on botanical matters both in its pure and applied aspects.

The popularity of this Garden increased beyond expectation. There were over one lakh of visitors to the Garden this year as recorded at the gates. 66 maps of this Garden were sold to the visitors during the year. Among the unusually large number of visitors the majority were His Majesty's forces and the American troops and those who were interested in the Himalayan plants were taken round the garden by the Officers and furnished with the necessary information regarding the plants cultivated in the Garden and the neighbourhood. Some of them were also given full facilities for working in the Herbarium under the guidance of the Scientific Officers.

**Finance.**—Out of the total budget allotment of Rs. 26,179 under all heads Rs. 25,888 were spent leaving a balance of Rs. 291.

**Staff.**—Rai Sahib S. N. Basu held the charge of the Curator till the 1st November 1943, and his retirement took effect from the 2nd November 1943, when he was relieved by Mr. Merlin Jones. Mr. Jones held the charge till the end of the financial year\*.

### CALCUTTA GARDENS.

These Gardens were the worst sufferers due to prevailing abnormal conditions. The Gardens are exposed to destruction due to want of protection since the fences around them were removed. These Gardens will have to be relaid in future and enormous work will devolve on the Officers of the Gardens during the reconstruction of the Gardens after the war is over.

In spite of certain disadvantages due to war conditions the annual flowering of the plants in the different flower beds and nurseries reached nearly the same high standard as in the previous years. In the Curzon Garden a motorable road is under construction. This road runs north to south across the centre of this Garden. This led to the removal of the large flower bed in the middle which was so long a beauty spot of the Garden.

The condition of the wheels in the Eden Garden and the Dalhousie Square tank could not be improved, because no major cleaning operation could be undertaken during the present emergency. Anti-malarial work was carried out efficiently in collaboration with the military as in the previous years.

**Finance.**—Out of the total budget allotment of Rs. 46,463 under-all heads Rs. 46,118 were spent leaving a balance of Rs. 345.

**Staff.**—Mr. Merlin Jones was in charge of the Calcutta Garden till 1st November 1943. From the 2nd November his services were transferred to the Lloyd Botanic Garden, Darjeeling, where he became the Curator of the Garden after being relieved by Maulvi Md. Quasem Ali who held the charge of the Calcutta Gardens till the end of the year.

K. BISWAS,  
*Superintendent,*  
*Royal Botanic Garden, Calcutta-*



Government of Bengal

Annual Report of the  
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# Annual Report of the Royal Botanic Garden and the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling, for 1943-44.

## Royal Botanic Garden.

**General Staff.**—Dr. K. Biswas, M.A., D.Sc. (Edin.), F.R.S.E., held the post of the Superintendent and carried on the duties of the Director of the Botanical Survey of India at the Herbarium of the Eoyal Botanic Garden, Calcutta, throughout the year. Dr. S. K. Mukherjee, M.Sc, Ph.D., and Mr. N. Mitra, B.Sc, N.D.H., B.D.H., held the charges of the Curator of the Herbarium and the Curator of the Royal Botanic Garden, Calcutta, respectively, throughout the year. Maulvi Md. Quasem Ali held the charge of Assistant Curator, Eoyal Botanic Garden, till the 1st November 1943, excepting for a period from April to June 1943 when he was on leave. His services were transferred to the Calcutta Gardens from 2nd November 1943. Mr. J. A. Hulbert, Overseer, was promoted to officiate in the place of Maulvi Quasem Ali both for the period of his leave and transfer to the Calcutta Gardens.

Except for few short trips no botanical excursion on a large scale could be undertaken as both the Superintendent and the Curator of the Herbarium had to concentrate their attention on the protection of the gardens and the Herbarium collections removed to Darjeeling. The Curator of the Herbarium brought about 750 specimens from the Singalila Range during his short tour there. The Superintendent made an excursion to Lepcha Jagat with Professor J. C. Sen Gupta, the Senior Professor, and students of the Presidency College and gave them the benefit of his knowledge of the flora of this area.

During the year Government learnt with regret the death of Sir David Prain, C.M.G., C.I.E., M.A., M.B., I.M.S., D.Sc, LL.D., F.B.S., F.R.S.E., F.L.S., one of the most able and distinguished Superintendents of the Eoyal Botanic Garden, Calcutta. Sir David was appointed as the Curator of the Herbarium in 1887 and succeeded Sir George King, K.C.I.E., F.H.S., in 1898. He was also the Superintendent, Cinchona Cultivation, Bengal, and Director, Botanical Survey of India, in the same year. He retired in 1904.

**Scientific workers.**—The present war conditions prevented the scientific workers from consulting the Herbarium and studying plants of the Garden as they did during the pre-war period. There were only a few local botanists who consulted literature and examined the Herbarium specimens in connection with their botanical studies. Of these may be mentioned Mr. A. Benthall, partner of Messrs. Bird & Co., Professor S. P. Agharkar, Head of the Department of Botany, University of Calcutta, Professor S. E. Bose, Professor of Botany, Carmichael Medical College, Calcutta, Professor J. C. Sen Gupta, Senior Professor of Botany, Presidency College, Calcutta, Dr. S. Das Gupta of Lucknow University, Rev. J. C. Culshaw, Dr. J. B. Chandler, Miss S. Gregory, Mr. B. N. Ghosh of Ghosh Nursery, Darjeeling and others. Professor J. C. Sen Gupta and Professor A. C. Dutta, Senior Professor of Botany, Cotton College, Gauhati, visited the Herbarium at the Lloyd Botanic Garden, Darjeeling, each with a batch of students, for examining and naming their local collections of plants at the Herbarium.

Professor A. V. Hill, M.P., N.L., O.B.E., D.Sc, F.L.S., F.R.S., F.R.A.S.B., Secretary, Eoyal Society of London, visited the Eoyal Botanic Garden, Calcutta, and the Herbarium on the 7th February 1944. Professor Hill discussed with the Superintendent the question of future development of the Botanical Survey of India, the Herbarium and the Eoyal Botanic Garden, Calcutta. Professor M. N. Saha, D.Sc, F.R.S., and Dr. Shyama Prasad

Mukherjee, M.A., LL.D., Bar.-at-Law, M.L.A., President, Post Graduate Department in Science and of the Eoyal Asiatic Society of Bengal, were also present on this occasion. His Excellency the Governor of Bengal paid a visit to the Garden on the 13th March 1944. During his visit His Excellency took keen interest in the plants introduced to the Garden from Australia and other parts of the world. His Excellency was interested to see the expanding growth of the famous Banyan tree of the Garden which is nearly two centuries old. The Hon'ble Sir B. P. Sing Eoy, K.C.I.E., President, Bengal Legislative Council, Mr. Show-nom Hsii of the Forest Department, National Central University, Chunking, paid a visit to the general Herbarium at the Lloyd Botanic Garden, Darjeeling. V. I. Ulianistchev, Sub Jetu ujel B. U., Comp. Asep. Akageum, Kayk, A. A. Kostylev, Agronomist-entomologist, K. C. Chatterjee, Industrial Planning Officer (Drugs and Dressings), and T. K. Wang, P. O. Box No. 42, Kunming, China, also visited the Royal Botanic Garden, Calcutta, and the Herbarium.

### THE GARDEN.

The storage of food materials in the Royal Botanic Garden, Calcutta, interfered with the display of the season flowers in suitable places of the Garden this year. For the same reason the task of beautifying the garden and the normal horticultural operations could not be carried out in the usual manner. The annual flower show had to be confined to the nursery, the flower garden, Orchid house, Kyd monuments and the river gate and other places where there was very little chance of damage of these delicate flowers due to traffic. There was considerable strain on the roads and lawns due to unprecedented heavy traffic. No major improvement could be carried out due to abnormal conditions. Some of the essential work however was carried out for the protection of the garden and for the betterment of plants cultivated in the open. About 30,000 sq. ft. of moat forming the boundary in the west, north and east of the Garden was re-excavated. This had the desired effect in protecting the Garden to some extent and at the same time improving the moisture condition and drainage system of the garden. 8,100 sq. ft. of pathways in and about the flower garden was relaid.

The following are the species in the various divisions of the Garden particularly in the rockery of the Garden which proved to be an attractive spot for the botanists interested in the Sub-tropical hill floras: —

1. *Cassia laevigata* Willd., 11. *Pyrethrum roseum* Lindl., 2. *Aconitum Napellus* Linn., 3. *Sambucus racemosa* Linn., 1. *Myristica fragrans* Houtt., 1. *Artocarpus incisa* Linn., 1. *Prunus Armeniaca* Linn., 1. *Pyrus communis* Linn., 1. *Amygdalus persica* Linn., 1. *Morus indica* Linn., 5; *Lonicera trichosantia* Bureau and Franch, 2. *Melia composita-dubia* Vav., 5. *Solanum nodiflorum* Jacq., 3. *Zanonia indica* Linn., 1. *Vitex peduncularis* Wall., 1. *Elaeocarpus serratus* Linn., 1. *Aquilaria Agalthea* Roxb., 2. *Berberis nepalensis* Spreng., 2. *Amorium subulabum* Roxb., 2. *Elebteria Cardimomum* Maton., 1. *Nepenthes khasiana* Hook., 3. *Atropa Belladonna* Linn., 1. *Vitis vinifera* Linn., *Cassia* Sp., 12. *Sussurea candicam* C.B., Clarke., 4. *Ailanthus eacelsa* Roxb., 1. *Albizia species*, 1. *Albizia stipulata* Boiv., 3. *Banhinia racemosa* Ijom., 2. *Acacia pennata* Willd., 1. *Acacia lenticularis* Buch-Hamilton., 2. *Terminalia myriocarpa* ~~etc k & Mill.~~ 1. *Vitex pedunculata* Will., 2. *Xylosma longifolia* Clos., 1. *Albizia Thomsonii* var., 2. *Markhamia platycalyx*, 5. *Hibiscus Huegelii* Endl., 1. *Acacia juncifolia* Benth., 2. *Acacia linearis* Sims., 5. *Convolvulus tricolor* Linn., 1. *Acacia auriculiformis* A. Cunn., 2. *Eucalyptus drepanophylla* F. Muell., 1. *Sterculia platemifolia* Linn., 1. *Ginkgo biloba* Linn., 5. *Deutzia grandiflora*



Bunge., 5. *Buddleia albiflora* HemsL, 5. *Buddleia Davidi* Franch.\*  
 5. *Buddleia nivea*., 3. *Buddleia Forrestii*., 3. *Deutzia Schneidenana*  
*var. laoiiflora*., 5. *Deutzia reflexa*., 5. *Deutzia scabra* Thunb., 3. *Passi-*  
*flora edulis* Sims., 5. *Eupatorium glandulosum* H. B. f. K., 3. *Asclep*<sup>^</sup>  
*liniolia* Lag., 1. *Pentstemon acuminatus* Dough, 5. *Pentstemon pM*<sup>e'</sup>  
*torwm.*, 1. *Cinchona succirubra* Pav., 2. *Psychotria Ipecacuanha* Stokes.\*  
 1. *Pachira rosea*., 1. *Brownea grandiceps*., 1. *Schizolobium* sp., 3. *JL*<sup>^</sup> "  
*caena trichodes* Benth., 3. *Hivaea brasiliensis*, *Tabebuia rosea* *ZL*<sup>^</sup> "#  
*Spathelia simplex* Linn., 2. *Acacia lutea-N eptunia lutea* Benth., 1. "#<sup>^</sup> "  
*santhes speciosa*, *Solanum pyracanthum* Jacq., 1. *Ephedra Gerardiana*  
 Wall., 4. *Digitalis purpurea* Linn., 9. *Matricaria Chamomilla* Linn.

Several species of *Azaleas*, *Tibuchina semidicandra* and few other plants of the lower hills were acclimatised and successfully grown in the small palm house. These flowered in the plains and the beauty of the flowers attracted many overseas troops visiting the garden daily nowadays. Us garden operations in replacing the dead and decaying plants and shrubs were continued as usual.

Exchange of specimens had to be curtailed considerably due to difficulties in the transport of seedlings and younger plants by train or steamer. 3,481 plants were, however, distributed to various applicants in different parts of India. 145 plants and 200 bulbs of *Gladiolus* were received. 152 packets and 14 lbs. and 8 ozs. of seeds were sent out to America, Africa and West Britain. Professor B. A. Krukoff, New York Botanical Institute, Tennessee, who is at present engaged in research work on poisonous and insect repellant plants in connection with finding out anti-malarial remedy for war purposes was supplied with bark and wood of various species. The grain stores of the Royal Botanic Garden, Calcutta, was run efficiently and relieved the distress of the labourers working inside the garden.

**Finance.**—Out of the total budget allotment of Rs. 47,267 for staff and permanent establishment Rs. 47,246 were spent and under all other heads the expenditure amounted to Rs. 73,791 against the allotment of Rs. 74,970. The receipts of the department during the year amounted to Rs. 3,100.

**The Herbarium.**—In spite of certain inevitable disadvantages on account of present emergency, routine work was carried on at both the centres in Sibpur and Darjeeling where the general Herbarium and the Library house are now transferred. The most important work that devolved on the staff this year was to attend to the specimens which were damaged either during transit or storage under improvised sheds. About 2,500 sheets were repaired and 67 sheets were mounted and placed in their respective covers in racks of the new Herbarium shed in Darjeeling. About 500 genus and species covers were changed.

Quite a large number of queries were answered and necessary information was supplied to numerous correspondents both on pure as well as applied botany as in previous years. Major R. C. Jackman, G.S.I.E., furnished with notes on some edible fruit trees of Burma. A list of Indian plants' with their botanical and vernacular names was supplied to the Officer-in-charge, Camouflaging Department, Eastern Army Headquarters. Capt. E. P. Scott was given necessary information and advice with reference to plants which might be used for camouflaging purposes. Lt. J. A. Jones and the Divisional Forest Officer, Chittajrong, were recipients of seeds and cuttings of plants suitable for camouflaging. Technical Officer, Development, Ordnance Laboratory, was furnished with information on distribution, availability and cultivation of *stemona tuberosa* and *Phytelephas macrocarpa*. Short notes on *Hernandia sonora*, the betel and betel vine and on bamboos were supplied to A. C. Gawalier, Officer, Chittagong. A list of Indian plants which have sedative and anaesthetic

properties was sent to Dr. B. A. Krukoff of New York Botanical Garden, U. S. A. Col. G. McClean, Director of Medical Services, Addis Ababa, received information on plants yielding chalmogra oil of commerce. A list of medicinal plants with notes on their cultivation for experimental purposes near Patna was supplied to Dr. B. N. Prosad, F.R.S.E. Dr. David Fairchild of New York, U. S. A., was recipient of information on the cultivation of *Terminalia myriocarpa*, an important timber yielding tree of the Eastern Himalayas. A list of 45 species of medicinal plants supposed to be good febrifuge was drawn up for Dr. B. Mukherjee, Acting Director, Biochemical Standardisation Laboratory, All-India Institute of Hygiene and Public Health, Calcutta. Mr. G. Upadhyaya of Benares received information on *Aconites* and other medicinal plants. A note on the Jwaran kusha-grass *Cymbopogon Jwarancusa* Schult. was furnished to Messrs. Eastern Drug Co., Ltd. Similar note was sent to N. Mondal, Esq., on *Anacyclus pyreihrmn* DC. A detailed list of edible plants of Assam was sent to Captain Kingdon Ward. Note on the edible *Dioscoreas* of India was furnished to the Secretary, Royal Agri-Horticultural Society of India, Alipore, Calcutta. Information regarding cultivation of Cajuput tree was sent to the Silviculturist, Bombay. Similar information about *Cryptostegia grandiflora*—a rubber yielding plant—was sent to (i) Conservator of Forests, Bengal, (Hi) Controller of Rubber, Government of India, (Hi) Director, Supply Department, Government of India, New Delhi. Detailed notes on the economic uses of 8 Indian plants were supplied to the Mycologist to the Government of Orissa. Information was furnished to Dr. K. Mitra, Officer-in-charge of Nutrition Scheme, Bihar, as well as that of Bengal on some plants considered as famine food. Detailed information about the number of Indian species, their distribution, etc., of the genus, *Derris*, was given to Dr. P. Bhaduri of Botany Department, University of Calcutta. Detailed notes on the distribution and identification of *Coryphn elata* Roxb. and *C. Taliera* Roxb. were sent to (?) Mr. A. P. Benthall and (ii) Mr. J. M. S. Breiter. References and lists of literature on various subjects were sent to (i) Dr. Albert W. Herre of California, (ii) Mr. S. N. De, Calcutta, and (Hi) Mr. A. P. Floyd of Saidpore, Bengal. Instructions for eradication and control of water plants pests were given to Rai J. C. Sen Bahadur, Presidency Magistrate, and to the Health Officer, Bankura Municipality. Similar scientific advice was offered to many other correspondents.

**Identification.**—The total number of specimens identified for different correspondents was 1,704. Of these 347 specimens were received from Mr. J. Sinclair, R.A.F., 300 from the Principal, M. C. College, 275 from Professor and students of Presidency College, Calcutta. A large number of specimens was also received from and identified for (1) Fr. A. Santepau, Professor of Biology, St. Xavier's College, Bombay, (2) Fr. J. Bressers, Ranchi, (3) Botanical Forest Officer, Assam, (4) The Professor of Botany, Punjab Agricultural College, (5) Rev. J. C. Culshaw of Methodist Church, Bankura, (6) Acting Forest Botanist, Forest Research Institute, Dehra Dun, (7) Agricultural Commissioner to the Government of India, (8) Imperial Mycologist of the Imperial Agricultural Research Institute, New Delhi, (9) Economic Botanist to the Government of Bombay, (10) Mycologist to the Government of Gwalior, (11) Director of Scientific and Industrial Research, (12) Second Economic Botanist to the Government of Bengal, (13) Senior Assistant Mycologist, Bangalore, (14) Mycologist to the Government of Orissa and (15) the Professor and Head of the Department of Botany, University of Calcutta and many others.

**Distribution and acquisition.**—The work of distribution was also much hampered due to transit difficulties. Portions of about 25 authentic species of *Gymnosperms* were presented to Dr. Birbal Sahni of Lucknow University

for his investigation on fossil plants. The Herbarium of the University of Lucknow and of Gordon College each received a gift of 100 specimens of duplicates from our stock of Eastern Himalayan plants. Dr. S. R. Bose was recipient of 19 specimens of hard fungi, collected from the Eastern Himalayas. Mr. C. McCann of the Bombay Natural History Museum received pen and ink sketches of two species of *Ceropegia*. A sketch of *Globba bulhifera* was made for Dr. A. C. Joshi of Benares Hindu University in connection with his research work.

Two sheets of *Excoecaria ahoriana* R. N. De a new species recently described by him have been presented to the Herbarium. Mrs. Barnes sent as a gift to this Herbarium two specimens of *Cmmelina*. One sheet of *Daedalacnthus strictus* was presented by the Principal, M. C. College\* Sylhet. The gift of all these specimens to the Herbarium is thankfully acknowledged.

**Loan.**—175 Herbarium sheets of *Ceropegia* were sent on loan to Mr. Charles McCann who is engaged in the revision of the genus. Specimens of Assam Orchids were received on loan by the Curator of the Herbarium from the Forest Herbarium, Shillong, and the Herbarium, Forest Research Institute, Dehra Dun.

**Publications.**—The papers published by the Scientific Officers during the year are—(1) The Systematic Position of a Common Tree Fern of the Eastern Himalayas with a note on the genus *Cyathea* by Dr. K. Biswas published in the journal of the Royal Asiatic Society of Bengal, (2 and 3) Balanced Vegetation and Pisciculture and Plant Life in Water by the same author published in Science and Culture, Vol. 9, No. 4, October, 1943, and Vol. 9, No. 10, April 1944, (4) Observations on the Marine Algae from the Coast of Bombay by Dr. K. Biswas and G. Mitra also published in the same journal in Vol. 9, No. 6, 1943.

**Library Sections.**—During the year under review some of the foreign journals, particularly the British and the American journals, have \*? received. Some important books have been purchased this year. Nine periodicals and 14 annual reports were received either in exchange or as gifts. Two books were presented to the library. 34 pamphlets and ^P^nts were presented to the library by different authors. About 69 books \*e re sent on loan of which 17 volumes have since been returned. 261 books were repaired and 8 volumes were bound during the year.

### LLOYD BOTANIC GARDEN, DARJEELING.

The weather under report was satisfactory except for the heavy hailstorm on the 20th March 1944, which caused considerable damage to the annual plants. The total rainfall during the year was 108 inches and the highest rainfall was recorded in June when it was 25.60 inches much below the last year's record when it reached more than 30 inches in July which y<sup>as</sup> rather too heavy and prolonged for healthy growth of annual flowering plants. A severe cyclone passed over the garden on the 25th July ^of which caused great damage to a large number of plants among which there were several rare specimens represented in the garden by single specimens **only such as *Caragana arborescens*, *Pinus patula*, *Cupressus macrocarpa* and *Liriodendron tulipifera*.** The difficulty of importing seeds from overseas countries continued due to war but the garden made \ip its deficiency as far as possible by using seeds acclimatised in the garden and the local nurseries. Many plants were also brought from the neighbouring mountains and were grown in the suitable sections of the garden. The annuals in the flower beds near the conservatory and different parts of the garden came out satisfactorily in spite of the set back caused by the hailstorm in the seedling stage. Special attention has been paid this year for restocking

Orchids by specimens collected from Buxa Duars area. The following species have been added to the nursery:—

*Dendrobium Hookerianum*, *D. Devonianum*, *D. aggregation*, *D. heterocarpum*, *D. Gibsonii*, *D. Pieradi*, *D. ramosum*, *D. denudans*, *D. moschatum*, *D. transparens*, *D. crepidatum*, *Cymbidium Mastersii*, *C. grandiflora*, *Aerides Fieldingii*, *A. multiflorum*, *A. odoratum*, *Coelogyne barbata*, *C. humilis*, *C. flaccida*, *C. corymbosa*, *Arundina bambusaefolia*, *Phajus maculata*, *P. mishmensis*, *P. Wallichii*, *Calanthe biloba*, *C. puberula*, *Goodyera hispida*, *Rynchostylis retusa*, *Vanda alpina*, *V. cristata*, *V. pumila*, *Eria coronaria*, *Saccolabium acutifolium*, *S. calceolare* and *S. distichum*.

The students garden attracted much attention of the students of Botany from the different Universities and Colleges who visited the garden. This section of the garden was duly attended to and restocked by several species of medicinal and commercial value. Of these may be mentioned *Pyrethrum roseum*, *Saxifraga ligulata*, *Swertia chirata*, *Taraxacum officinale*, *Matricaria Chamomilla*, *Acorus calamus*, *Mentha piperita*, *Elettaria cardamomum* and others.

Hundreds of boxes containing books and specimens which were so long kept in the small conservatory were taken over to the newly constructed Herbarium shed. After the removal of these boxes the conservatory was properly repaired and decorative pot plants and ferns well known for their beauty of flowers and foliage were re-arranged for display again after nearly a year. Nurseries, glass houses and frame boxes which were in a very bad state of repair were attended to as far as possible and brought to a serviceable condition. The main hot house was partly renovated and cleaned. The hot water pipes inside the hot houses had to be used constantly throughout the cold weather on account of the abnormal winter that prevailed during the year. Some of the roads were repaired as far as funds permitted. The total area repaired is 5,900 square feet.

One hundred and ninety plants were distributed to different parties. Collected seeds of *Atropa Belladonna*, *Digitalis purpurea* and *Swertia Chirata* from the acclimatised plants of the garden were despatched to the General Manager, The Pekin Syndicate, Ltd., New Delhi, in connection with the supply of seeds of medicinal plants to the National Health Administration of the Government of China. Requests for the supply of botanical specimens received from different colleges and botanical institutions for demonstration and practical examination were complied with. 21 specimens of *Gymnosperms* collected in the garden were supplied to Dr. Birbal Sahni, D.S.C., F.R.S., the Head of the Department of Botany, Lucknow University. Similar help was rendered to the students of local schools who occasionally visited the garden with their teachers for the study of the East Himalayan plants. One dozen plants and the same number of rootbarks of *Herberts umbellata* collected from Sandakphu were supplied to Dr. R. Prasad, Assistant Mycologist, Simla, for his investigation. About 2 lbs. of leaves and bark of *Schinus molle* were also collected from the local forest and supplied to Miss Ashima Mookherjee, P.R.S., University College of Science, Calcutta, for her research work on plant alkaloids.

Out of 81 packets of seeds received from the Superintendent, Royal Botanic Garden, Calcutta, on the 8th October 1943 and sown in the nursery on 10th October 1943 the following seeds germinated:—*Hibiscus Huegellii*, *Iris inornata*, *I. Wilsonii*, *Rosa rubrifolia* and *R. blanda*. 52 packets of seeds from the New York Botanical Garden, U. S. A., were received and sown in the nursery and the following germinated:—*Dianthus gratianopolitanus*, *D. leburnica*, *D. plumierus* and *Salvia farinacea*.

Full advantage was taken of the presence of the Herbarium and its staff in this Garden in revising the names of many plants in the light of the

International Rules of Botanical Nomenclature. Identification of local plants were made much more quickly than before and the students and teachers visiting the Herbarium made full use of the collections and the botanical literature in the library now housed in the Garden. The Superintendent, the Curator of the Herbarium, the Systematic Assistant and the Herbarium staff offered their usual help and co-operation to all those who approached them for information on botanical matters both in its pure and applied aspects.

The popularity of this Garden increased beyond expectation. There were over one lakh of visitors to the Garden this year as recorded at the gates. 66 maps of this Garden were sold to the visitors during the year. Among the unusually large number of visitors the majority were His Majesty's Forces and the American troops and those who were interested in the Himalayan plants were taken round the garden by the Officers and furnished with the necessary information regarding the plants cultivated in the Garden and the neighbourhood. Some of them were also given full facilities for working in the Herbarium under the guidance of the Scientific Officers.

**Finance.**—Out of the total budget allotment of Rs. 26,179 under all heads Rs. 25,888 were spent leaving a balance of Rs. 291.

**Staff.**—Rai Sahib S. N. Basu held the charge of the Curator till the 1st November 1943, and his retirement took effect from the 2nd November 1943, when he was relieved by Mr. Merlin Jones. Mr. Jones held the charge till the end of the financial year.

### CALCUTTA GARDENS.

These Gardens were the worst sufferers due to prevailing abnormal conditions. The Gardens are exposed to destruction due to want of protection since the fences around them were removed. These Gardens will be relaid in future and enormous work will devolve on the Officers of the Gardens during the reconstruction of the Gardens after the war is over.

In spite of certain disadvantages due to war conditions the annual watering of the plants in the different flower beds and nurseries reached nearly the same high standard as in the previous years. In the Curzon Garden a motorable road is under construction. This road runs north to south the centre of this Garden. This led to the removal of the large flower bed in the middle which was so long a beauty spot of the Garden.

The condition of the wheels in the Eden Garden and the Dalhousie tank could not be improved, because no major cleaning operation could be undertaken during the present emergency. Anti-malarial work was carried out efficiently in collaboration with the military as in the previous years.

**Finance.**—Out of the total budget allotment of Rs. 46,463 under all heads Rs. 46,118 were spent leaving a balance of Rs. 345.

**Staff.**—Mr. Merlin Jones was in charge of the Calcutta Garden till 1st November 1943. From the 2nd November his services were transferred to the Lloyd Botanic Garden, Darjeeling, where he became the Curator of the Garden after being relieved by Maulvi Md. Quasem Ali who held the charge of the Calcutta Gardens till the end of the year.

K. BISWAS,

*Superintendent,*

*Royal Botanic Garden, Calcutta.*



Government of Bengal

**Annual Report of the  
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# Annual Report of the Royal Botanic Garden and the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling, for 1945-46.

## ROYAL BOTANIC GARDEN.

**General.**—*Staff.*—Vv. K. Biswas, M.A., D.Sc. (Edin.), F.B.S.E., and Dr. S. K. Mukerjee, M.Sc, Ph.D., held the posts of the Superintendent and Curator of the Herbarium, respectively, throughout the year. Mr. N'. Mitra was the Curator of the Garden till the Kith of May and Mr. M. Jones took over charges of the post of Curator and Assistant Curator from him in the forenoon of that date. Mr. J. Hulbert was the Assistant Curator till 11th May, on which date he relinquished his charge to take over the duties of the Curator of the Lloyd Botanic Garden, Darjeeling. From 12th May 1945, till the end of the year, the post of the Assistant Curator, Royal Botanic Garden, Calcutta, remained vacant. Mr. S. N. Mitra was Overseer and Babu Ashutosh Banerjee was Head Clerk throughout the year.

The Superintendent undertook botanical expedition in the alpine regions of the Northern Sikkim Himalaya. A distance of more than 120 miles from Darjeeling up to Sibpu La beyond Thangu was covered during this exploration. The success of this botanical exploration is mainly due to the arrangements made by the Deputy Commissioner, Darjeeling, and particularly to Sir Basil J. Gould, the Political Officer, Sikkim, who took personal interest in this enterprise and last but not the least to His Highness the Maharaja of Sikkim and his able officers, the Private Secretary to His Highness Mr. Tse Tse Ten Tashi, Assistant Private Secretary to His Highness and Eai Sahib R. B. Prophan, Forest Manager, Sikkim and others. The writer offers his grateful thanks to His Highness the Maharaja of Sikkim and his staff. Cinematographic and photographic studies of the vegetation was made possible with the prompt co-operation of Dr. E. D. Merrill, Director, Arnold Arboretum and Administrator of Botanical Collections, Harvard University, Jamaica Plain, Mass., U. S. A., who made special arrangements to supply the films for the purpose. The writer is extremely grateful to Prof. Merrill for timely help in this direction. Valuable living collections were brought down for cultivation in the Lloyd Botanic Garden, Darjeeling, and for preservation in the herbarium. Much first hand information of the vegetation of this part of the Himalayan Mountains was collected for acclimatisation of the high alpine plants. Another short excursion was undertaken by the writer in the dense Terai forest of Laltung Dooars and a large number of specimens for the Herbarium was gathered during this trip also.

Dr. Biswas continued as honorary lecturer in Botany, Post-Graduate Teaching in Science of the Calcutta University during the year.

**Visitors and research workers.**—The herbarium while in Darjeeling as well as when in the Royal Botanic Garden, Sibpur, was visited by a large number of distinguished Indian and Foreign Scientists, travellers, Judges, and the lay public. Among a host of eminent men, the following are noteworthy:—

Mr. Zakaria, Director of Public Instruction, Bengal; Justice S. K. Sen of Nagpur; Dr. Ross, Forest Department, West Africa; Prof. Tan Tun Run; Artist Nnmiaial Bose of Santiniketan; Major Gordon of the Missouri Botanical Garden; L/C Drude of Wisely, Surrey, England; Mr. J. Sinclair; Mr. W. T. Stearn, Librarian, Royal Horticultural Society,

London; Rev. J. C. Cuishaw; Dr. Emeri, California University; Prof. S. R. Sen Gupta; Prof. R. Chatterjee; Miss Milton Hall; Dr. B. Dutta Sharma; Dr. S. Rao, Tropical School, Calcutta; H. Y. How of National Geological Survey of China; L. J. F. Brimble, Editor, Nature: G. x. \*? P. F. C. L. Watson, Macmillan & Co.; His Eminence Syed Burhanudcun Sahib, Heir Apparent to His Holiness the High Priest of the Dawooai Boh™ Community; Mr. H. I. Mathews, Director of Ordnance Facton\*. Calcutta; Rani Sahiba S. B. Roy of Sylhet; Dr. C. E. Ballingen, Nutrition Research Officer, New Zealand; Dr. W. Padwick, Principal, Benga^ Agri-cultural Institute, Dacca; Mr. Cheo-Chia-Chit, Biology Department. Yunnan University, Kunming, China; W. W. Chung-Iwen, Forest Depart-ment, Yunnan University, Kunming, China; Mr. S. Dutta, i.c.s., Deputy Secretary, Government of Bengal, Department of Agriculture; Mr. H. Smith, Hadsfield, England; Mr. J. Paryman of Imperial Chemical, Indus-tries, Ltd., England; Mr. B. V. Bhagwant, Superintendent, & MV^ reaa Botanical Garden, Poona; Dr. S. P. Agharkar, Head of the Departmein-x, Botany, Calcutta University; Dr. S. R. Bose; Mr. D. G. Stoll, bTM\*\*x, u ni England; Mr. J. Harland, R.A.M.< ; Mrs. Isabell Urakiel, London; H. G. Urakiel, London.

**The Gardens.**—Vegetable and other crops were grown on a scale in suitable areas as usual.

It was not prtssible to go ahead with any major scheme for the 1^PiteJ^ ment of the garden for lack of funds. The preateflt task before the. hea^ was to bring the garden into its normal tidy condition and sufficient way was made in this direction.

On account of the extreme drought that prevailed during the ye^ ^e tanks became practically dry. There was great scarcity of water in garden which affected a number of delicate plants and numerous seedlings raised in the garden for various purposes. The jradpp roads and lawns suffered not to a small extent due to the driving of huge military true ka and motor vehicles of various descriptions. Control of these vehicles and their passengers inclined to do damages^ to the garden plants was a problem. Continuous rain during October considerably damaged the winter annuals. Despite war conditions and consequent scarcity of seeds and da^ a^e (to seedlings on account of late rains a fair show was put up in front of f^ river gate, Oreodoxa avenue, orchid house, palm house, etc., which was much appreciated by the public.

Two lakhp ninety-one thousand and two hundred and ninety cubic f^ et ot silt was lifted from the moat in continuation of the progress made 1^ of year. The damaged lawn near the annual flower beds was renovated double trenching and levelling.

About 100 timber trees were planted during the season along the fore-shore road. The following were planted in the large and small palm house and orchid house:—

*Licuala svinosa*; *Licunla grandis*; *Livistona rotundifolia*; *Livistona Chinensis*; *Thrinax barbad,ensis*; *Eheu guineenm*; *Actinophloeus Macar-tkuri*; *Oreodoxa regia*; *Attalea Cohune*; *Dypsis madagascarnens^is*; *Dracaena sp.*; *Bambum \*p.*; *Phoenix rupicoh*; *Kentia sp.*; *Begonia \*?.. Codiaeam variegatum*.

Seeds of *OenotJiera Lamarldana* and *Citrus sp.* brought down i^roDl Darjeeling by the Superintendent were successfully germinated under oat e About 440 layers and 1,100 gootees of different garden nplants were rall sed for propagation. Two new rock beds were made in the flower garden. \* meet the increasing demands for avenue trees by the public and Govern-ment departments the number of seedling beds were increased in the Economic Garden.



Weeding, sickling and cleaning of the natural family\* beds were carried out. New plants were put in wherever wanted. Care was taken to represent as many local plants as possible to help the visiting student population in their study. Special attention was paid to the Great Banyan tree, so as to speed up the growth of branches across the road, and ten new aerial roots were rooted to the ground to prop up the branches.

More than 100 plants were distributed to different military hospitals in Bengal. About 200 plants were distributed to the public in India and Burma. 250 packets of various seeds were sent to different parts of India and Overbear. 62 packets of seeds were received from different botanical gardens in India and abroad. The following orchids collected from the hills of Upper Burma were received from Mr. Jack R. B. Macmillan of the U. S. A. Army.

*Dendrobium* sp. (10), *Oberonia* sp. *Sarcanthus* sp. (2), *Eria* sp. (2),  
*Saccolabium* sp. (2), *Pholidota* sp. (2), *Bulbophyllum* sp. (2).

**Orchids in flower.**—The following orchids flowered in the glass house: —*Aerides multiflorum*, *P. halaenopsis Schileriana*, *Plialaenopsis rosea* *Cattleya Pottsii*, *Uneidium luridum*, *Oncidium ampliaium var majys*, *Cattleya alba*, *Vattleya dldoo*, *Cattleya Trianae*, *Cattleya continii*, *Cypripedium concolor*, *Cypripedium venustum*, *Epidendrum atropurpureum*, *Dendrobium Pierardii*.

**Label writing.**—Forty-nine sign boards, 134 small labels, addresses on BO boxes, 585 garden labels, 45 avenue boards, 62 new labels and 132 pot numbers were written by the label writers. 62 plants were named and labelled.

Botanical specimens were supplied to different colleges in Calcutta for their class work and examination purposes. Barks and roots of different plants were supplied to the public for medicinal purposes.

Experiments on the germination of Casuarina seeds with various treatments were carried out by Mr. S. Mitra, Overseer, under the guidance of Prof. S. It. Bose of Carinichael College, Calcutta, and the Superintendent. In the first set of experiments the seeds showed signs of germination but later on died. They were kept in a covered house as directed by Prof. Bose, but probably due to want of sufficient light and temperature, the plants died. The second set of experiment gave good results. The percentage of germination under different treatments was good. Experiment on winter vegetables by the application of different manures was also carried out and it was found that cowdung manure was the best for the purpose. Rice, Maize, Cajauus sp. were grown on an experimental scale.

**The Herbarium.**—The normal work of the Herbarium suffered some dislocation during the latter half of the year, on account of the reshifting of its valuable collections, amounting to more than 3,000,000 sheets to Sibpur, where they were reassembled and housed in their original home. The temporary transfer of the valuable collections to Darjeeling for safety against unforeseen damage or destruction on account of the war and the subsequent retransfer to Sibpur after the close of the war did not affect the condition of the brittle specimens adversely as feared. The local herbaria remained at Sibpur alone.

**Identification.**—Facilities for getting the botanical specimens named at the Herbarium were availed of by a number of persons, among whom Forest Manager, Sikkim, Rev. H. Santapau, St. Xavier's College, Bombay, Rev. J. C. Culshaw, Methodist Church, Bankura, J. Sinclair of R. A. F., Forest Botanist, Forest Research Institute, Dehra Dun, Students of the Presidency College, Calcutta. Mr. R. X. Tagore, Calcutta; H. T. How of the National Geological Survey of China, Lance-Corporal E. Moyes; Professor of Botany, Cotton College, Gauhaty; Director, School of Agriculture, Dacca; Lecturer in Botany, Coimbatore. Madras, and the

Pharmacologist, Tropical School, Calcutta, are some of the chief beneficiaries. Besides identification work for the correspondents, the Curator of the Herbarium examined the sheets of the following genera, namely, *Salix*, *Podophyllum*, *Sedum* and *Flemingia* and the grass sheets of the Burmese local herbarium. The assistant for systematic work, Botanical Survey of India, gave much useful help in herbarium work and in the re-writing of the new Flora of Bengal which is under preparation by the writer.

Supply of information, covering a wide range of subjects, namely, botanical, agricultural, horticultural, economic, medicinal drugs, distribution, sources of supply and availability of plants and botanical literature, loomed large during the year under report. Botanical descriptions of *Rauwolfia serpentina*, the serpentine root of repute, *Mansonia* and *Centelto* were furnished to the Secretary, Upper India Trading Corporation, Working Plans Officers, Forest Department, Assam, and Rev. H. Santapau of the Botany Department, St. Xavier's College, Bombay, respectively. Prof. C. Kundu, Jute Research Station, Dacca, and Prof. G. P. Majumdar of the Presidency College, Calcutta, were supplied with botanical informations and lists of *Gnetums*, *Selaginellas* and *Lycopodiums* occurring in India together with their distribution, respectively. Maps illustrating the Forest types in Bengal were made available to Dr. S. P. Chatterjee, Head of the Geography Department of the Presidency College. Information on the distribution of 26 plants with their vernacular names was furnished to Dr. N. Chakravarty of the Calcutta University. Dr. P. C. Guha of Bangalore Institute was furnished with a detailed note on the distribution, availability and the scientific names of 29 Indian and exotic plants which yielded resins. Sources of supply of 26 drug yielding plants were supplied to Himmat Rai & Sons, dealers in drugs, Amritsar; Scientific and corresponding vernacular equivalents of the Indian mustards were supplied to the Commercial Officer, East Indian Railway. Supplies of (1) seeds of fodder plant *Paspalum dilatatum*, (2) *Loranthus* parasites with their plants to Miss Mitra of the Science College, Calcutta, for research (3) materials of *Osbeckia*, *Oxispora*, *Campanula* and *Cornus* in alcohol, to Messrs. Subramanyam and Gopinath of the Mysore University for cytological work were arranged. Mr. Venkataswaralu of the Andhra University, Waltair; Proprietor, Export and Import Trading Co., M. S. J. Rel Member Indian Pharmaceutical Committee Dr. A. C. Joshi of the Lahore College, Director, Herbal Herald, Calcutta, and others received help and guidance in their difficulties about distribution and vernacular names of plants. Informations on medicinal plants and their distribution on Tung oil trees and Wattle trees were furnished to Director of Agriculture, Bengal, and the Entomologist, Ice-rya Purchase Scheme, respectively. A list of the Botanical Gardens in India, Burma and Ceylon was sent to the Superintendent of the Municipal Gardens, Bombay. A note on the sand-binding plants and on methods of prevention of soil erosion was supplied to Mr. J. H. G. Bland of the 208 Field Company, Royal Engineers. A note on the cultivation of Patchouli was given to H. C. Thomas of Travancore, Capt. B. N. Dutta, A. D. C. to His Highness the Maharaja of Cooh Behar, had information on the cultivation of Magnolias and Lagerstroemia's. Lists of literature on the systematic botany of India and Burma, with particular reference to that of Assam and Northern Burma were supplied to E. L. Walker, Assistant Curator, Plant Division, of the Smithsonian Institution, Washington, U. S. A., Lt. M. L. Steinacker, Mycologist to the Typhus Commission of America, U. S. A., Juan of the American Army and M. B. Raizada of the Forest Research Institute, Dehra-Dun, respectively.

A photo of the type sheet of *Buddleia Farreri*, Balf. F. et. W. W. Smith from Mr. Cotton of Royal Botanic Garden, Kew; a chart showing the

localities of *Mantisia Saltatoria* Sims and *M. Wengeri* C. E. C. Fischer from Sir W. W. Smith and a specimen of a new species of *Mansonia* from the Working Plans Officer, Assam, were the acquisitions to the Herbarium during the year; 50 specimens sorted out from our duplicates were presented to the Birla College, Jaipur, at their request. Three specimens of *Berberis* and one *Mahonia* were sent to Rev. Dr. Leslie Ahrendt, Botany Department, Oxford University.

1,500 herbarium sheets were repaired while the herbarium was in Darjeeling. Mounting, incorporation and changing of genus and species covers were also done.

**Publications.**—The writer gave a radio-talk on "The beginning of botanical studies in India" during the year. He also contributed the following papers during the year:—(1) Cultivation and Systematic Study of Tung oil yielding trees in India [Journ. Sci. & Res. IV(5), 1945]; (2) A general Review of the Marine Algae of the West Coast of India, Bomb. Nat. Hist. Soc. 45(4), 1945; (3) Plant Hunting in Northern Sikkim of the Himalaya—Puja Number of the Hindusthan Standard—1945; (4) Obituary Notice on late Sir David Prain published in the year book of the Royal Asiatic Society of Bengal, 1945. The typescript of the 2nd Edition of the "Common Water and Marsh Plants of India and Burma" was sent to the Public Health Commissioner to the Government of India for printing. The Printing of the "Bharatiya Banoushadhi Pariohaya" in Bengali by the writer is nearing completion. The Curator of the Herbarium contributed a short article on a new Burmese orchid "*Aerides Biswasianum* Ghose at Mukerjee" in the Orchid Review, Vol. 53, 1945, in collaboration with Mr. B. N. Ghose, Orchidologist, Darjeeling.

**Library.**—During the reassembling of the library books in their original shelves in the building of the Sibpur Herbarium after their retransfer from the Lloyd Botanic Garden, Darjeeling, it was found that a large number of books had suffered considerable damage. Such of the books that required repair have been listed and the work of binding them pends the sanction of the Government for a special grant as the work cannot be carried out within the budget grant for normal routine works of the department. Apart from this the routine work of the library proceeded on usual lines. Researchers in and out of India received the usual help from the library. Fifty-six volumes were on loan and 42 were received back from loan. Twenty-five periodicals were subscribed for and 7 new books were purchased. A number of journals and reprints of scientific articles and 3 books were received as gifts. Twelve books were bound and 250 volumes were repaired in the library.

**Finance.**—*Receipt.*—The receipts of the department during the year were Rs. 1,240.

*Expenditure and appropriation.*—Against a total budget grant of Rs. 2,44,947 for the department under all heads Rs. 2,44,045 were spent leaving a very small saving of Rs. 902 only. The total expenditure for the Royal Botanic Garden, Calcutta Gardens, and the Lloyd Botanic Garden, Darjeeling, were Rs. 1,52,604, Rs. 58,056 and Rs. 33,385, respectively.

#### LLOYD BOTANIC GARDEN, DARJEELING.

The total rainfall during the year was 113.80 which was slightly higher than that of the last year. The highest rainfall was recorded in August when it reached 31.07 inches. Although the prolonged rain was not very favourable to the production of good annuals, the results were however satisfactory and the summer growth of flowers in front of the conservatory

and other suitable places was much appreciated by the public. The scarcity of foreign seeds was again felt this year but the deficiency was made up by local collection of seeds, Ferns, Orchids, Shrubs and other ornamental plants. A further collection of more indigenous orchids was brought from the interior of Buksa Duars and Sikkim. A large number of sub-alpine and alpine plants were gathered from the high snowy wilds of the mountains of the Northern Sikkim during the writer's expedition to the place. Among the rare plants introduced to the garden from the high mountains are the following: —

*Rhododendron xetomn*, *R. triflorum*, *R. lepidotum*, *Meconopsis simplicifolia*, *Betula utilis*, *IMTIX Griffithiana*, *Juniperus recurva*, *J. pseudosahlbana* (the scrub scented Junipers) *Bryocarpum himalaicum*, *Clintonia filipina*, *Allium victorialis*, *Polygonatum Hookeri*, *Primula denticulata*, *P. obtusa*, *P. sikkimensis*, *Trillium Govanianum*, *Daphne genkwa*, *Arenaria politrichoides*, \**Cassiope fastigiata*, *Rosa sericea*, *Ephedra Gerardiana*, the well-known medicinal plant, the *Mandragora* sp. of Mythological interest, and the two insectivorous plants of considerable botanical importance, namely *Pinguicula alpine* and *Drosera peltata*.

Plants were also received from the Mother Superior, Loreto Convent, Darjeeling; Mr. G. H. Fothergill, Muusong; Mr. J. Caldwell, Kurseong, Mr. A. Percy Lancaster, Delhi; Mrs. A. Dash, Darjeeling, and the Curator, Royal Botanic Garden, Calcutta. Fifty packets of seeds were received from the Regius Keeper, Royal Botanic Garden, Edinburgh, Scotland, of which the following germinated and are doing well: —

*Buddleia Davidii*, *Berberis tibetica*, *Clematis orientalis*, *Caragana tibetica*, *Camphora officinarum*, *Lobelia Tupa*, *Nepeta imbricaria*, *Philadelphus Delavayii*, *Pentstemon campanulatus*, *Salvia officinalis*, *S. Bulleyana*, *Viola aetolica*, and *Verbascum Wiedemannianum*.

Eight packets of seeds of Kashmir alpine plants received from Mrs. Kohli, Barainula, Kashmir, were sown in the month of March; and the following were successfully raised: —

*Gentiana Moorcroftiana*, *Primula Moorcroftiana*, *Cortusa Mathiana*, *Polygonum affine*.

\*\* Attention was paid to stocking of alpine plants in the Rock Garden. The introductions to the Rock Garden during the year under review were *Verbascum Wiedemannianum*, *Viola aetolica*, *Salvia officinalis*, *Bulleyana*; *Aubrietia purpurea*, *Pentstemon campanulatus*, *Gentiana Quadrifida* and *Iris tinctoria*. Plants of *Hypericum reptans*, *Ephedra Gerardiana* which were brought by the writer during his botanical expedition to the upper Sikkim were planted in the Rockery, but unfortunately the latter did not survive—the climate being too wet and warm for it. Vacancies occurring through dead and dying plants were filled in whenever possible, and the area kept well stocked. A number of plants is being raised in the nursery and they will be new introductions to the Rock Garden. The Rock Garden and the medicinal corner of the garden continued to be of special interest to the students of botany and a large section of the interested public. Some experimental work was carried out on some plants of medicinal importance which was the subject of correspondence between the Director, Royal Botanic Garden, Kew, and the Superintendent, Royal Botanic Garden, Calcutta.

*Atropa Belladonna* planted last year are now about 3 feet tall bearing flowers and fruits. Two plants of *Pyrethrum roseum* have been successfully matured and are now being carefully attended to with a view to procuring acclimatised seeds for future use in the garden or for other interested institutions. *Elsholtzia himalaya* has also been successfully acclimatised here; and seeds will be available from it in November.

Seeds of *Lobelia inflata* received from Canada were not viable and hence failed to germinate. *Podophyllum Emodi* plants received from the Forest Manager, Sikkim, were planted in the inTusey under as cool a condition as possible. Two plants have been successfully raised out of 4 rhizomes received and have been kept under observation to confirm its doubtful name as *P. Emodi*. Collection of specimens for confirmation will be undertaken as soon as these two plants bear flowers and fruits. *Vitex peduncularis* seeds did not germinate but a plant received from the Royal Botanic Garden, Calcutta, is surviving however. Four seedlings of *Vatalpa tibetica* reported in 1944-45 unfortunately died.

A packet of *Digitalis purpitrea* seeds was received from Dr. K. Michael of Praha, United Chemical and Metallurgical Work, Ltd., for experimental cultivation in the open for his studies on the influence of the sun on the quantity and quality of medical substances in pharmaceutical plants. The seedlings raised have now been planted out; and in due course dried leaves will be despatched to Dr. Michael as per his instructions.

Seeds and plants and other botanical materials were supplied to a number of workers and institutions for experimental and educational purposes. Of these the following recipients are keenly interested in the horticultural and scientific work : —

(1) The Director, Herbal Herald & Co., Ltd., 1, College Road, Calcutta; (2) Kumar Bahadur P. D. Raikot, Jalpaiguri; (3) Dr. K. S. Bhargava, Assistant Professor of Botany, Birla College, Pilani (Jaipur State); (4) Mr. Anderson, the Conservator of Forests, Simur State, Jfahan; (5) The Director, Department of Chemical Technology, Bombay University, Bombay; (6) Sister Mary Dominic, St. Helen's School, Ku seong; (7) ~~Dr. B. C. Kundu, Director, Jute Research Institution, Dacca;~~ (8) ~~The Forest Officer in Beluchistan;~~ (9) Prof. Y. Bharadwaja, Head of the Department of Botany, Benares Hindu University, Benares; (10) Principal, Bihar Veterinary College, Patna; (11) Professor of Botany, Haraganga College, Munshiganj, Dacca; (12) Revd. Mother Superior, Loreto Convent, Darjeeling; (13) Mr. J. Smith, "The Oak", Lancaster; (14) Messrs. L. R. Bros., Saharanpur, U. P.; (15) The Regius Keeper, Royal Botanic Garden, Edinburgh.

The roads are fast deteriorating as no repair work could be undertaken due to lack of funds and want of road materials. The entire glazed roof of the Western section of the hot house has been thoroughly repaired and many of the posts inside were replaced.

Two hundred new labels of plants were written.

**Herbarium.**—Considerable attention of the *sidtX* had to be diverted in packing the herbarium materials and books to retransfer them to their original home in the Royal Botanic Garden, Calcutta, and winding up of the office which functioned so efficiently during the period of the Avar. A special section in the garden herbarium containing all the specimens of plants grown within the bounds of this garden is now being started. This is with a view to facilitating a revision of the "list of plants of the Lloyd Botanic Garden, Darjeeling", by Dr. K. Biswas and also towards enriching the herbarium collections.

The number of visitors rose to 107,520 as recorded at the gate.

**Staff.**—Mr. M. Jones waftlie Curator up to 15th May 1945 and Mr. J. A. Hulbert, from 16th May\* 194a % the end of the year.

## CALCUTTA GARDENS.

Attempts were made this year by early preparation of seed beds to force some of our regular annuals into prime condition for cold weather show of

flowers. The display in spite of ill providence weather conditions during the year was quite good.

In addition to the general routine work numerous flowering shrubs and trees were planted in the open in all the gardens. The old group of *Oreodora regia* were replaced by new ones. The rockery was overhauled and the decorative plants, such as *Areca lutescens* and other palms, orchids, Ferns, Arums, etc., were also increased. *Dendrobium*, *Vanda Phalaenopsis*, *Lily*, *Cattleya*, *Croton*, *Amaryllis*, etc., were rearranged. *Grammatophyllum*; *Cattleya*, *Phalaenopsis*, *Amaryllis*, *Renanthera* and *Dendrobium* flowered during the year.

The Hide in the Kden Garden which has been lying hitherto in a deplorable condition as a result of the military using it as a garage and a place for dumping goods for war purpose needs repair. Arrangement is being made to take up the repair work of this Hide.

The A. R. P. slit trenches in all the gardens have been filled up and levelled.

The Dalhousie Square Garden and Curzon Garden could not be maintained in proper condition as it was used to be, owing to the absence of railings round the gardens. Arrangements are being made for fencing again and overhauling the garden thoroughly.

Annual repairs and painting—benches, notice-boards, seed-vats, etc., were satisfactorily done.

**Staff**—Messrs. G. Mohiuddin and Fazlul Karim were Assistant Curator and Overseer, respectively, throughout the year.

K. BISWAS,  
Superintendent,  
Royal Botanic Garden, Calcutta-



Government of West Bengal

Annual Report of the  
Royal Botanic Garden and the Gardens in  
Calcutta and of the Lloyd Botanic  
Garden, Darjeeling, for 194647

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## Annual Report of the Royal Botanic Garden and the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling, for 1946-47.

**General.—Staff.**—Dr. K. Biswas, M.A., D.Sc. (Edin.), F.H.S.B., was the Superintendent and carried on the duties of the Director, Botanical Survey of India, at the Herbarium throughout the year. Dr. S. K. Mukherjee, M.Sc., Ph.D. (Edin.), was the Curator of the Herbarium up to 3rd March 1947, when his services were temporarily lent to the Central Waterways, Irrigation and Navigation Department of the Government of India, where he was to work as a Botanist with the Snow Survey party. Mr. V. Narayanaswami, M.A., Systematic Assistant, Botanical Survey of India, carried on the duties of the Curator of the Herbarium from the 3rd March 1947 till the end of the year. Mr. M. Jones was the Curator, Royal Botanic Garden, till the end of the year, except for the period from the 12th October 1946 to the 12th February 1947 when he was on leave. Mr. G. Mohiuddin acted as Curator, Royal Botanic Garden, during Mr. Jones' absence on leave. Mr. S. Mitra, M.Sc., was the Overseer and Babu Ashutosh Banerjee the Head Clerk respectively, throughout the year.

2. The Superintendent attended the Indian Science Congress in Delhi during the first week of January as a member of the Executive Committee of the Congress. He delivered a lecture on the "Origin and Development of the Royal Botanic Garden, Calcutta," at the Calcutta Club on the occasion of the Anniversary of the East and West Fraternity Club. At a meeting of the Royal Asiatic Society of Bengal the Superintendent also gave a talk on the foundation of the Royal Botanic Garden, Calcutta, based on some of the old records and letters of Sir Joseph Banks which had been formally handed over to the Society on behalf of the Royal Society of London by the Right Hon'ble Mr. R. G. Casey, the then Governor of Bengal, for safe custody of these valuable documents in India. Seven talks on various aspects of plant life were given by the Superintendent over the Radio at the Calcutta Broadcasting Station during the year.

3. Botanical exploration was undertaken by the Superintendent in the Munsong forest of the Cinchona Plantation and Terai forest of Tarkhola in Kalimpong Division. Special investigation was made on the possibilities of extracting rubber and manufacturing rubber on a commercial scale from the India Rubber tree plantations, which were started some years ago near Tarkhola and Ranikhola by the side of Lachen Road leading to Gangtok and Lachen in Sikkim. A report on this subject was submitted to Government. The Curator of the Herbarium made a fair number of botanical collections during his study of the vegetation of the flora of Mymensingh, Ranchi and Palamau districts, '

4. **Scientific workers and distinguished visitors:**—A batch of 5 Research Scholars receiving stipends from the Government of India to receive training in Systematic, Taxonomy and Economic Botany worked in the Herbarium under the Superintendent. They studied problems of Economic Botany, Horticulture, Mycology and other branches of Cryptogamic Botany, as well as floristic works. Mr. N. P. Chowdhury, M.Sc., and Mr. V. Narayanaswami, M.A., Systematic Assistant, Botanical Survey of India, were appointed by Government of India to instruct the trainees in their work at the Herbarium. Full facilities were given to the of the Botanical Survey of India.



5. Dr. C. L. Rumke, Chief of the Section of Cane Breeding and Sugar Experimental Station, Java, Mr. M. S. W. Fadluf, S/c Q Fort William, M. M. Srinivasam, I.F.S., Silviculturist, Assam, Mr. A. & Ghose, Garden Superintendent, Jamshedpur, Mr. K. C. Gupta, Director, Bay Fishery Farming, Ltd., Mr. J. Mffira, Mr. A. K. Sharma, Mr. R. Sheshagiri Eao, Mr. D. D. Awasthi, and Mr. Dilwar Hossain, Research Scholars under the training scheme of the Botanical Survey of India, are some of the investigators who worked at the Herbarium.

6. Her Excellency Lady Dora Burrows paid several visits to the Herbarium and the Garden. The Eight Hon'ble Harold MacMillan, MP, with his A.D.C., was taken round the Garden. Hon'ble Sir Bijoy Singh Boy, President, Bengal Legislative Council, Sir Edward Bantall, a former Member, Viceroy's Executive Council, Dr. Shyama Mukherjee, M.L.A., Dr. and Mrs. Pandya, all visited the garden. A delegates of the Australian Industrial Mission who came to India paid a visit to the Botanic Garden with Mr. S. Mitra, O.B.E., Director of Industries, Bengal, and the Hon'ble Mr. Ahmed Hussain, Minister of Agriculture, Forests and Fisheries to the Government of Bengal, accompanied by Mr. S. Dutt, O.K.E., r.c.s., Secretary to the Government of Bengal Department of Agriculture, Forests and Fisheries, inspected the Herbarium and discussed with the Superintendent the question of the proposed transfer of the Herbarium to the Central Government. Mr. P. A. Narreiwala, Chairman, Essential Oil Advisory Committee, visited the Garden and examined the progress of the work of Bose Scheme under the Superintendent and the prospect of making coloured reproduction of about 2,000 original sets of the well-known and irreplaceable Roxburgh's Icones. I Osrar Biddle of the Carnegie Institute also examined the Roxburgh Icones and had a discussion with the Superintendent about the possibilities of printing these coloured large portfolio illustrations. Mr. M. S. Eandnaw to i.c.s., Secretary, Indian Council of Agricultural Research, paid a visit to the Herbarium and the Garden and discussed with the Superintendent the question of introduction of exotic plants in India on a larger scale than hithertofore. Professor Harlow Shafley, the Astronomer Royal of Harvard University, U.S.A., Dr. W. Hanna, Director of Agriculture-Canada, and Professor A. F. Blakeslee of Smith College, Northampton, Mass., who came to India as delegates to the Indian Science Congress Association, expressed satisfaction with the geographical arrangement of the Garden and were keenly interested in the scientific work done in the Herbarium.

**The Gardens.**—The normal garden work of cleaning, maintenance, preservation of rare and delicate specimens, plant introduction work, supply of plants and seeds, botanical materials and information and various other works associated with the Botanic Garden were carried on as usual in spite of the serious disturbances in the locality.

Owing to the postal difficulties and the lingering post-war troubles revival of the exchange of plants and seeds with the other leading botanical gardens of the world could not be restored to its pre-war standard, although vigorous attempts had been made towards satisfactory progress in the work of plant introduction with a large variety of seeds received from U.S.A. The authorities of this Garden are grateful to the New York Botanic Garden for their generous gift.

The display of Annuals this year was quite fair, in spite of the drawbacks, still persisting, in procurement of good seeds from overseas in time. Season flowers from our stock of acclimatised seeds did exceedingly well.

The gardens faced extreme drought this year, as a result of which nearly all the shallow tanks dried up. The palms and other delicate plants in the open and the conservatories were scorched. Pumping up of

water from the river, therefore, had to be resorted to with a view to filling up the tanks near the orchid and other houses in order to water the plants to a certain extent until the advent of the monsoon. Mass desiccation of the shade-loving plants was thus avoided.

The roads which were damaged during the war could not be repaired during the year under report due to non-availability of road materials, lulling up of the ruts and other minor repairs to some of the main roads were, however, done. Some progress was also made in lifting up of the silt from the portion of the moat not yet attended to. Attempts are being made to develop a mangrove garden along the silted up river banks near the College Gate. About one hundred seedlings of typical mangrove species of *Rhizophora mucronata* were planted for this purpose. These plants will also serve as natural protection to the bank against erosion. Some palms, pines and succulents were added to the palm houses and planted in the open. Hedges were grown over newly-laid-out lawns in the flower garden. To meet public demands, stock of road-side and avenue trees was increased as far as funds permitted. More than 2,000 *gooties* and 500 layerings were raised. Vegetables were grown in the economic garden as a "grow more food campaign" and the produce was sold to the labourers and other staff by auction as usual.

Increased activities in the sphere of exchange of seeds and plants were noticed as the post-war period advanced. About 3,000 plants, seedlings and seeds were distributed in India and abroad during the year. The trees and shrubs were replaced and introduced in their respective geographical divisions as in previous years.

The following orchids were in flower during the year:—

*Cattleya alba*, *Cattleya Martinii*, *Cattleya Portia*, *Cattleya atlanta*, *Phalcnopsis Schilleriana*, *P. esmeralda*, *P. amabilis*, *Oncidium ampliatum*, *Q. Luridum*, *Cypripedium venustum*, *Cypripedium concolor*.

Germination experiments on the seeds of casuarina trees with a view to tracing the symbiotic relation of the fungus with the seedlings and adult plants and its effect on the life history of the casuarina trees, one of the best fuel trees of India, were continued by Dr. S. E. Bose in collaboration with Mr. S. Mitra, the overseer.

**Finance.**—The receipts of the department during the year were Bs. 11,858 of which Es. 7,592 were received on account of settlement of claims for damages done to Eden Garden ride by the U. S. Army during the war period. Out of the total budget grant of Es. 2,91,964 for the Directorate under all heads, Es. 2,89,788 were spent leaving a saving of Bs. 2,176.

**The Herbarium.**—The routine work of the Herbarium suffered to a certain extent on account of disturbances in the city, due to which attendance was rather poor at times and the work suffered considerably. In spite of this drawback the normal work of the herbarium and the investigations on the different aspects of plant life were carried on satisfactorily.

**Identification.**—The total number of specimens identified during the year was 2,113. Of these over 200 specimens came from the Botanical Forest Officer, Assam. The Forest Manager, Sikkim, Eev. J. C. Culshaw, Methodist Church, Baukura, Father Santapau, Head of the Department of Biology, St. Xavier's College, Bombay, Mr. M. B. Eaizada of Forest Institute, Dehra Dun, and Mr. B. A. Khan, M.Sc., Research Scholar, University of Calcutta, all sent more or less 100 plant specimens each, for naming.

Queries received from different quarters on various problems of botanical, agricultural and horticultural researches, medicinal plants or plants otherwise useful and important, distribution and availability of plants as also systematic position and nomenclature of species were all duly answered. Suggestions for planting of avenue trees and ornamental shrubs in the compound of the Indian Aluminium Co. situated near Muri Junction, were sent to the Resident Engineer of the Company. Names of 26 fodder grasses occurring in the Andaman and the Nicobar Islands and the scientific names of "*lalang*", a common grass in these islands, were sent to Rao Bahadur G. N. Rangaswami Ayangar, Agricultural Survey Officer, Andamans. A note on *sabai* grass (*Eulahopsis binata*), its scientific and vernacular names and uses in paper and rope manufacturing industries was furnished to the Botanist, Soil Conservation Research Scheme, Sriniketan, Bolepur. A note on Patchouli plant giving the scientific name, methods of cultivation and extraction of its oil was sent to Mr. B. F. Varughese of Travancore. Similar note was sent to Mr. H. J. Maynard of Thalherince, Australia, about the scientific name, distribution, use and method of cultivation of horse radish. Descriptions of different species of plants were sent to the Government Systematic Botanist, Coimbatore, and to Mr. K. Shri Ram, to whom a specimen of *Rauvolfia serpentina* was also sent. A detailed note on the methods of preparation of dry specimens of orchids, and a long list of orchids reported from Khasia and Jaintia Hills of Assam were sent to Mr. S. C. Mustafi of Shillong. Notes on the occurrence in India of awned rice, its use, method of cultivation, etc., were furnished to Mr. C. R. Stonor, Agricultural Officer, North-East Frontier Agency, Shillong. Similar notes on Red Squill were supplied to the Secretary, Central Rural Uplift Association, Bombay.

Addresses of firms who can supply materials of drug plants and those who can supply Tung fruits and Tung oil were furnished with necessary notes on their uses to Assistant Fruit Specialist, Coonoor, and to Indian Plastics, Ltd., Bombay. A list of institutions for training in culture in Great Britain and Ireland and in U.S.A. was sent to the Director, Cinchona, Bengal.

The Botanical Forest Officer, Assam, was furnished with a note on correct systematic position and authentic botanical name of "*Val*" (*Hymenachne amplexicaulis* Nees). Detailed notes enumerating different sections and sub-genera under "*Cassia Linn*" and the scientific names of the pulses (1) *Tur*, (2) *Mung* and (3) *Uddid* were sent to the Economic Botanist, Bombay. Valid name and synonyms of the Indian *Sesbania* were furnished to Mr. F. Sundara Rao, of Mrs. A. V. College, Vizagapatam. Notes on systematic positions of the 2 *Marlea* and *Alangium* and the valid name for *Marlea begonicefolia* together with the reference to relevant literature were furnished to Mr. R. M. Dutta of Dacca. The Divisional Forest Officer, Kurseong, was informed about the availability of *Brucea mollis* Wall., in Darjeeling district and the localities wherefrom specimens of the same had been collected. Messrs. Technical Engineering & Chemical Products, Ahmedabad, were supplied with information regarding different methods of eradication of water hyacinth from streams, canals, *jheels* and lakes.

The Curator of the Herbarium critically examined the specimens of genera *Illicium*, *Lespedeza*, *Aquilegia*, *Isclwemum*, *Pholidota* and *Eulophia* and made necessary changes in the specific names. Experiments on the germination of seeds of *Melocanna bambusoides* Trin. were undertaken. Four sprouting shoots were cut and separately planted. These grew up into healthy plants which were afterwards transplanted in the open. Of the arboreal grasses, *Melocanna bambusoides* produces the

largest fruit, of the size of a large apple. It is a rare phenomenon in the plant kingdom where more than one plant can be grown separately from a single grass seed.

Mr. C. McCann of Bombay Natural History Society made a gift of 8 specimens of *Ceropegia* which were not sufficiently represented in our Herbarium. The Government Lecturing and Systematic Botanist, Coimbatore, presented a specimen of *Tritaxis Beddomei* Bth. for our Herbarium. A specimen of *Crotalaria agatiflora* Schw. was received from the Mycologist, United Planters' Association, Ootacamund. Our thanks are due to these donors to the Herbarium.

**Loan.**—Almost all our sheets of Indian *Cucurbitaceae* numbering 1,854 sheets have been sent on loan to the Eegius Keeper, Royal Botanic Garden, Edinburgh, in connection with the revision work of Indian *Cucurhitaceae* undertaken by Mr. H. L. Chakravarty studying in Edinburgh. 9 sheets of *Lespedeza* and *Compylotropis* were sent to Curator, Division of Plants, Smithsonian Institute, United States National Museum, Washington D.C., for his examination. One sheet of *Selaginella* sent on loan to Mr. A. H. G. Alston of Natural History Museum, London, has been received back.

2,393 sheets were repaired and 117 sheets mounted and incorporated during the year. 104 genus-covers and 1,726 species covers were changed.

The Systematic Assistant, Botanical Survey of India, and the trainees rendered much help to the Curator of the Herbarium in his routine work.

**Publications.**—A book entitled "Pure Culture of Algae" by E. G. Pringsheim was reviewed by the Superintendent and it was published in "Science and Culture", Vol. 12, No. 4, October 1946. The printing of "Bharatiya Banaushadi Parichaya" by Dr. K. Biswas and Babu E. Ghose, a work on the medicinal plants of India written in Bengali, is nearing completion. The McMillan & Co., London, is printing another book by Dr. K. Biswas and Mr. L. J. F. Brimble, Editor, "Nature," viz., "A Text Book of Botany for Indian Universities." A monograph on "Studies on Tung Oil Yielding Trees of India" by the Superintendent is passing through the press to be published in the Journal and Proceedings of the Royal Asiatic Society of Bengal (since published). Another comprehensive work by the Superintendent on the "Lichen Flora of India" is also passing through the press of the same society. A third paper on the "Economic uses of Indian Lichens" has been accepted by the Indian Council of Agricultural Research for publication in their journal. The book entitled "The Science and Scientist in the Netherlands Indies" edited by Pieter Bonig and Frans Yerdoorn, a monumental work of international importance, was exhaustively reviewed by the Superintendent. The review was published in "Science and Culture", Vol. XII, No. 10, April 1947.

**Library.**—The work of the library proceeded on usual lines. Attempts were made to revive previous exchange relations with other libraries abroad. The research workers who visited the Herbarium were given all facilities for consultation of literature in the library and books were sent out on loan in compliance with the requests received from many workers in different parts of India. 252 old books were repaired and 17 new books were bound. 31 different journals and periodicals were purchased and 35 were received in exchange. 3 books, 8 annual reports, 25 index semina and 25 reprints of papers published in different journals were received as presentations to the library. 17 new books were acquired by purchase. 76 books were sent on loan and 47 were returned. 2 copies of "Annals of the Royal Botanic Garden, Calcutta," were sold from the stock in the library, as well as 6 copies of 150th Anniversary Volume and 5 copies of "Guide to Royal Botanic Garden, Calcutta".

The preparation of the new catalogue of the library is going on.

### LLOYD BOTANIC GARDEN, DARJEELING.

The rainfall was fairly heavy during the year and the total rain recorded was 127.63 inches. The maximum was in July when it went up to 34.23 inches in a month. In June it was 25.36, August 19.90 and September 27.99. The minimum rainfall was in February when it fell to 0.01 inch. Prolonged rain from May to September was quite unfavourable for the annuals particularly of the rainy season. Salvias, Celosias, Chrysanthemums, Dahlias and Ageratums suffered most, due to such rather unusual rain. It proved injurious to several other trees, shrubs and herbs too, apart from the annuals.

With a view to compensating the scarcity of seeds from foreign sources, attention was paid to the introduction of indigenous flowering shrubs in the garden. Rhododendrons, *Lilium giganteum*, Magnolia, Ferns, Orchids, Acers, Arissemas and Begonias of various sorts were acclimatised and introduced during the year. The existing Rhododendron group below the Rock Garden had long been under uncongenial condition due to the loss of sub-soil, the humus being constantly washed away by rain and there being no means to conserve the soil. Attention was paid to improve this plot by spreading leaf-mould over the area. Sickling has been discontinued in order to keep the surface damp and moist. Heavy boulders, if placed in scattered places would ensure better results as regards the preservation of the sub-soil.

A further extension of indigenous Rhododendrons was done in the area above the "Students' Garden".

A packet of seeds of *Puya aipestris* received from Messrs. Stevens Bros., Bastia Hills, Wanganui, N. Z., germinated well. One packet of seeds of each of *Cinchona Ledgeriana* and *C. succirubra* of very high (about 15 per cent.) quinine content received from Dr. B. A. Krukoff of New York Botanical Garden, U.S.A., were sown in a separate nursery bed with bamboo mat shelter near the small conservatory. Care was paid to the aspect and other factors suitable for the culture of these two species. The experiment of these economical plants in the trying climate of these gardens was more or less successful, the result being the germination of about 100 seeds of the former (*C. Ledgeriana*). Seeds of the latter failed to germinate. Some of the fittest of survivals of *C. Ledgeriana* have attained a height of 5 to 7 inches in pots. It is hoped that these seedlings\* if and when put out in the open field, will adapt to the soil of the garden and eventually produce pure high yielding seeds for distribution to interested parties or institutions. One packet of seeds of *Lobelia inflata* was again received from Ottawa. The seeds were sown on 4th March 1947 and showed a result of about 50 per cent. germination. Seedlings germinated will be soon transplanted in pots for further culture and observation. Experiments on seeds from Mrs. Kohli, Kashmir, were undertaken.

Out of 14 packets of seeds of alpine plants the following germinated:—  
*Arenaria foliosa*, *Androsace sarmentosa*, *Geranium Wallichianum*, *Lychnis coronaria*, *Nepeta govaniensis*, *Spircea Lindleyana*, *Sedum Ewersii*, *Costus Mathioli* and *Wolfenia Amherstiana*. Result of germination of 64 packets of seeds received from Dr. Alexander of the Arnold Arboretum, New York Botanical Garden, is as follows:—

*Germinated*.—*Salvia* sp. (No. 349), *Tagetes* sp. (No. 892), *Orthosanthus* sp. (924), *Calliandra* sp. (No. 578), *Tagetes* sp. (No. 1046), *Calliandra* sp. (No. 202). These seeds having been collected in 1945 by Dr. Alexander were not viable by the time they were sown on the 4th March 1947.

Twenty packets of seeds of different species were received from Mr. Barreto, President, Lisbon Municipality, Portugal. The following germinated:—

*Cupressus lusitanica*, *Cotoneaster pannosa*, *C. scrotina*, *Circis siliquastrum*, *Campanula medium*, *Aquilegia coerulea*, *Begonia tuberosa*, *-Fraxinus dngustifolia* and *Pinus Pinea*.

Plants, seeds, bulbs, etc., were received from Mr. G. H. Fothergill, General Manager, Cinchona Plantations, Mungpoo, Mrs. A. J. Dash, Kalimpong, Mrs. G. Morgan, Kalimpong, and Mr. M. B. Prodhon, Kalimpong.

Plant materials and information were supplied to many correspondents in India and abroad. Among those may be mentioned Dr. S. R. Bose, Ph.D., Professor of Botany, Victoria Institute, Calcutta, supplied with *Marchantia* (male and female), moss with capsules, and twigs of *Cupressus macrocarpa* bearing male cones; Curator of Gymnosperms, the University, Adelaide, S. Australia, was supplied with twigs bearing cones and fruits of 8 species of Conifers; the Director, Indian Central Jute Committee, Agricultural Research Laboratories, Dacca, with one dozen twig<sup>3</sup> of each of *camellia sinensis* and *Pelargonium* sp.; R. Duran, 12, Rio de Janeiro, Brazil, with photographs of *Rhododendron arboreum* and *R. Grande*; Dr. B. A. Krukoff, New York Botanical Garden, Bronx Park, New York, N.Y., with herbarium specimens and a piece of fresh log of *Erythrina arborescens* for investigation; the present Hon'ble Premier Dr. B. C. Roy, 36, Wellington Square, Calcutta, with 6 seers dried roots of *Artemisia vulgaris*, *Cosivs speciosa* and 3 seers of *Dichroa febrifuga* for investigation on their active principles; Professor N'. K. Sen of the Presidency College, Calcutta, with 10 seers leaves, stems and roots of *Elsholtzia blanda* for analysis and investigation of the healing property of this plant; Professor of Botany, Haraganga College, Dacca, with *Equisetum* with spikes and moss with capsules for class work of students: Principal, Bihar Veterinary College, Patna, with moss with capsules, Fern with sori, Pine twigs with rones and *Marchantia* with capsules; Curator, Indian Museum, Industrial Section, Calcutta, with 1 seer bark and 2\ seers fresh leaves of *Gordonia ercelsa* for investigation; Curator, Royal Botanic Garden, Calcutta, with one maund moss for use in the garden; Mr. Chunhangli, Indian China Bhawan. Santiniketan, Bengal, with 26 packets of seeds of indigenous plants and flowering shrubs; Dr. Puskarnath, M.sc, Ph.D., Imperial Agricultural Research Institute, Simla, with seeds of 14 different species of Solanaceae; Experimental Farm, Ontario, with one packet of seeds each of *Bvddleia asiatica* and *B. paniculata*; Mr. G. Morgan, C.I.E., Kalimpong, with one packet of fresh seeds of *Rosa macrophylla*; the Secretary, Royal Agri-Horticultural Society of India, Calcutta, with one packet of seeds of *Callistemon lanceolatus* and 15 seeds of *JEsculus punduana*; Dr. A. C. Joshi, Botany Department, Government College, Lahore, with one packet of seeds of each of *Rubia cordifolia* and *R. SiMimensis*; Mr. John.Wheatley, Perth, W. Australia, with 33 packets of seeds of indigenous shrubs, trees and herbs; Major Chowhan, Calcutta, supplied with one bag of moss.

ROCK Garden.—In order to give shade to young plants in the Rock Garden quick growing shady trees and shrubs like *Alnus nepalensis* and *Daphne cannabina* were planted out in scattered places. The following species were added to this garden:—

*Cuphea* sp., *Pentstemon hirsuta*, *P. campanulatus*, *Veronica longifolia*, *Bupleurum Candolii*, *Hypericum cernuum*, *Potentilla Kleiniana*, *Meconopsis Wallichii*, *Begonia laciniata*, *Rhododendron Edgeworthii*, *R. Dalhousieae*, *Bryocarpum himalaicum*, *Androsace geraniifolia*, *Euonymus thmfolitut*,

*Verbascum Wiedemannianum* and *Smilacina fusca*. Indigenous ferns as *Asplenium normala*, *Polypodium junglandifolia*, *Cheilanthes farinosa*, *C. Formosa*, *Lomaria pycnophylla*, *Lastrea apiciflora*, *Aspidium* sp., *Polystichum Prescottianum*, *Botrychium virginianum*, *Leucostegia pulchra*, *Lindsaya cultrata*, *Davallia* sp., etc., were introduced in the fern house as well as in the Rock Garden. Vacancies caused by dead and dying plants were also filled in as much as possible.

Sir John Anderson Rock Garden was fairly fully stocked and it is proposed to construct a further small extension on the south during the coming year, if funds are available.

**Students' Garden.**—Dead and sickly plants belonging to their respective natural orders were replaced by new ones. Attention was paid to represent as many species as possible in the different natural order beds. Sickling, cleaning and labelling of this section of the garden was earned on as usual.

**Other improvements.**—Not much improvement of the garden could be effected on account of the lack of supply of building materials, zinc plates for writing labels of plants, glass, planks, etc., for renovating nurseries and last but not the least the garden implements which have become so scarce in these days. Nevertheless, a new rustic rose bower was made in the middle terrace of the Terrace Garden. Annual beds in front of the large conservatory were altered and substituted by new designs. Rose bed in the western part of the large conservatory near the huge *Araucaria* tree was converted into an Annual bed. One large round Annual bed was also made in front of Pantling Road. More flower beds were added in most of the neglected places inside the garden.

**Herbarium.**—Collection of specimens of the entire garden plants was undertaken with a view to enriching the local existing herbarium. A number of specimens have already been mounted. These sheets will be incorporated after scrutiny in a separate wing of the local herbarium.

**Visitors.**—A total number of 104,783 visitors as per records maintained by the durwans at gates, appear to have visited the garden during the year. Apart from this, distinguished visitors, viz., Mr. G. Morgan, C.I.E., Mr. J. N. Rakhit, Chemical Examiner, Government of India, Mr. A. Hopkinson, i.c.s., Political Officer, Sikkim; Mr. M. P. Nigam, M.Sc, Head of the Department of Botany, Lucknow Christian College, with his students; and last but not the least, Professor A. F. Blakeslee and Dr. W. Hanna, prominent Botanists of Canada and U.S.A., visited the garden. Usual facilities were given to all the teachers and the students, Horticulturists, Botanists and Gardeners who came to the garden to study the vegetation of the Eastern Himalayas.

**Staff.**—Mr. J. A. Hulbert held the post of the Curator during the year.

### CALCUTTA GARDENS.

The work of the Calcutta Gardens was seriously affected on account of the riots in the city. Many labourers failed to turn up and even the regular labourers of the garden could not put in their mind and full energy to the work because of the periodic flaring up of the communal disturbances in the city from time to time.

The rainfall was favourable and advantage was taken of the same to grow larger number of the varieties of Annuals in pots. Dahlias, Asters, Pansies, Petunias, Verbenas, Carnations and other cold weather flowers did quite well. Their colourful display at vantage points of the gardens and in the open beds attracted the usual admiration of the public.

The most important item of the work that received attention during the year was the restoration of the Dalhousie Square and Curzon Gardens which

were almost entirely destroyed as a result of the removal of the railings round these gardens during the war period. It will take some time before these gardens are again stocked with pre-war ornamental shrubs and herbs and the lawns are brought to their former condition. Attempts had, however, been made since refixing of the fencings around these gardens to grow hedges of ornamental plants all round the fencing by planting fresh young plants replacing the old and damaged ones.

The portion of the Orchid and Fern house which was broken down was duly repaired and the stock of Orchids, Caladiums, Ferns, Palms, Crotons, Dracaenas, Anthuriums, Marantas and other delicate indoor plants were attended to and replaced as usual by new ones.

The ride round a portion of the Eden Garden which was a pride to the garden was entirely destroyed during military occupation when the ride was used as an improvised garage. After its re-requisition, attempts were made to restore it to its former condition. This has been possible to a large extent with the money received as compensation from the Military Department.

Renovation of the southern arc of the ride was taken up.

The condition of the roads, of the Dalhousie Square was deplorable during the war. Although road materials were scarce, general repair work including surface dressing of nearly all the roads of this garden was done. The condition of the Dalhousie Square tank and the lakes of the Eden Garden was far from satisfactory. They needed re-excavation and proper treatment. Some fish were, however, released into the Dalhousie Square tank. It is expected that sportsmen will take full advantage of this tank during this angling season.

**Staff.**—Mr. G. Mohiuddin was the Assistant Curator throughout the year except for the period from 80th September 1946 to 12th February 1947 during which time he officiated as Curator, Royal Botanic Garden, in addition to his own duties. Mr. F. Karim was the overseer throughout the year.

K. BISWAS,  
*Superintendent,*  
*Royal Botanic Garden, Calcutta.*





Government of West Bengal

**Annual Report of the  
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## **Annual Report of the Royal Botanic Garden and the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling, for 1946-47.**

**General.—Staff.**—Dr. K. Biswas, M.A., U.S.C. (Edin.), F.R.S.E., was the Superintendent and carried on the duties of the Director, Botanical Survey of India, at the Herbarium throughout the year. Dr. S. K. Mukherjee, M.sc., PH.D. (Edin.), was the Curator of the Herbarium up to 3rd March 1947, when his services were temporarily lent to the Central Waterways, Irrigation and Navigation Department of the Government of India, where he was to work as a Botanist with the Snow Survey party. Mr. V. Narayanaswami, M.A., Systematic Assistant, Botanical Survey of India, carried on the duties of the Curator of the Herbarium from the 3rd March 1947 till the end of the year. Mr. M. Jones was the Curator, Eoyal Botanic Garden, till the end of the year, except for the period from the 12th October 1946 to the 12th February 1947 when he was on leave. Mr. G. Mohiuddin acted as Curator, Royal Botanic Garden, during Mr. Jones' absence on leave. Mr. S. Mitra, M.S.C., was the Overseer and Babu Ashutosh Banerjee the Head Clerk respectively, throughout the year.

2. The Superintendent attended the Indian Science Congress in Delhi during the first week of January as a member of the Executive Committee of the Congress. He delivered a lecture on the "Origin and Development of the Eoyal Botanic Garden, Calcutta," at the Calcutta Club on the occasion of the Anniversary of the East and West Fraternity Club. At a meeting of the Royal Asiatic Society of Bengal the Superintendent also gave a talk on the foundation of the Royal Botanic Garden, Calcutta, based on some of the old records and letters of Sir Joseph Banks which had been formally handed over to the Society on behalf of the Royal Society of London by the Right Hon'ble Mr. R. G. Casey, the then Governor of Bengal, for safe custody of these valuable documents in India. Seven talks on various aspects of plant life were given by the Superintendent over the Radio at the Calcutta Broadcasting Station during the year.

3. Botanical exploration was undertaken by the Superintendent in the Munsong forest of the Cinchona Plantation and Terai forest of Tarkhola in Kalimpong Division. Special investigation was made on the possibilities of extracting rubber and manufacturing rubber on a commercial scale from the India Rubber tree plantations, which were started some years ago near Tarkhola and Ranikhola by the side of Lachen Road leading to Gangtok and Lachen in Sikkim. A report on this subject -was submitted to Government. The Curator of the Herbarium made a fair number of botanical collections during his study of the vegetation of the flora of Mymensingh, Ranchi and Palamau districts,

4. **Scientific workers and distinguished visitors:**—A batch of 5 Research Scholars receiving stipends from the Government of India to receive training in Systematic, Taxonomy and Economic Botany worked in the Herbarium under the Superintendent. They studied problems of Economic Botany, Horticulture, Mycology and other branches of Cryptogamic Botany, as well as floristic works. Mr. N. P. Chowdhury, M.S.C., and Mr. V. Narayanaswami, M.A., Systematic Assistant, Botanical Survey of India, were appointed by Government of India to instruct the trainees in their work at the Herbarium. Full facilities were given to the staff of the Botanical Survey of India,

5. Dr. C. L. Rumke, Chief of the Section of Cane Breeding and Sugar Experimental Station, Java, Mr. M. S. W. Fadluf, S/c Fort William, M. M. Srinivasam, I.F.S., Silviculturist, Assam, Mr. A. Ghose, Garden Superintendent, Jamshedpur, Mr. K. C. Gupta, Director, Bay Fishery Farming, Ltd., Mr. J. M. Era, Mr. A. K. Sharma, Mr. B. Sheshagiri Rao, Mr. D. D. Awasthi, and Mr. Dilwar Hossain, Research Scholars under the training scheme of the Botanical Survey of India, are some of the investigators who worked at the Herbarium.

6. Her Excellency Lady Dora Burrows paid several visits to the Herbarium and the Garden. The Right Hon'ble Harold MacMillan, M.P., with his A.D.C., was taken round the Garden. Hon'ble Sir Bijoy Singh Roy, President, Bengal Legislative Council, Sir Edward Bentall, a former Member, Viceroy's Executive Council, Dr. Shyama Mukherjee, M.L.A., Dr. and Mrs. Pandya, all visited the garden. The delegates of the Australian Industrial Mission who came to India paid a visit to the Botanic Garden with Mr. S. Mitra, O.B.E., Director of Industries, Bengal, and the Hon'ble Mr. Ahmed Hussain, Minister of Agriculture, Forests and Fisheries to the Government of Bengal, accompanied by Mr. S. Dutt, O.B.E., i.c.s., Secretary to the Government of Bengal, Department of Agriculture, Forests and Fisheries, inspected the Herbarium and discussed with the Superintendent the question of the proposed transfer of the Herbarium to the Central Government. Mr. P. A. Tewari, Chairman, Essential Oil Advisory Committee, visited the Herbarium and examined the progress of the work of Rose Scheme under the Superintendent and the prospect of making coloured reproduction of about 2,500 original sets of the well-known and irreplaceable Roxburgh's *Icones*. Mr. Oscar Riddle of the Carnegie Institute also examined the Roxburgh's *Icones* and had a discussion with the Superintendent about the possibility of printing these coloured large portfolio illustrations. Mr. M. S. Randna, i.c.s., Secretary, Indian Council of Agricultural Research, paid a visit to the Herbarium and the Garden and discussed with the Superintendent the question of introduction of exotic plants in India on a larger-scale than hithertofore. Professor Harlow Shafley, the Astronomer Royce, of the Harvard University, U.S.A., Dr. W. Hanna, Director of Agriculture, Canada, and Professor A. F. Blakeslee of Smith College, Northampton, Mass., who came to India as delegates to the Indian Science Congress Association, expressed satisfaction with the geographical arrangement of the Garden and were keenly interested in the scientific work done in the Herbarium.

**The Gardens.**—The normal garden work of cleaning, maintenance, preservation of rare and delicate specimens, plant introduction work, supply of plants and seeds, botanical materials and information and various works associated with the Botanic Garden were carried on as usual in spite of the serious disturbances in the locality.

Owing to the postal difficulties and the lingering post-war troubles, revival of the exchange of plants and seeds with the other leading gardens of the world could not be restored to its pre-war standard, although vigorous attempts had been made towards satisfactory progress in the work of plant introduction with a large variety of seeds received from the U.S.A. The authorities of this Garden are grateful to the New York Botanic Garden for their generous gift.

The display of Annuals this year was quite fair, in spite of the drawbacks, still persisting, in procurement of good seeds from overseas in time. Season flowers from our stock of acclimatised seeds did exceedingly well.

The gardens faced extreme drought this year, as a result of which nearly all the shallow tanks dried up. The palms and other delicate plants in the open and the conservatories were scorched. Pumping up of

water from the river, therefore, had to be resorted to with a view to filling up the tanks near the orchid and other houses in order to water the plants to a certain extent until the advent of the monsoon. Mass desiccation of the shade-loving plants was thus avoided.

\ ' The roads which were damaged during the war could not be repaired during the year under report due to non-availability of road materials, filling up of the ruts and other minor repairs to some of the main roads were, however, done. Some progress was also made in lifting up of the silt from the portion of the moat not yet attended to. Attempts are being made to develop a mangrove garden along the silted up river banks near the College Gate. About one hundred seedlings of typical mangrove species of *Rhizophora mucronata* were planted for this purpose. These plants will also serve as natural protection to the bank against erosion. Some palms, cactuses and succulents were added to the, palm houses and planted in the open. Hedges were grown over newly-laid-out lawns in the flower garden. To meet public demands, stock of road-side and avenue trees was increased as far as funds permitted. More than 2,000 *gooties* and 500 layerings were raised. Vegetables were grown in the economic garden as a "grow more food campaign" and the produce was sold to the labourers and other staff by auction as usual.

Increased activities in the sphere of exchange of seeds and plants were noticed as the post-war period advanced. About 3,000 plants, seedlings and seeds were distributed in India and abroad during the year. The trees and shrubs were replaced and introduced in their respective geographical divisions as in previous years.

\*

The following orchids were in flower during the year:—

*Cattleya alba*, *Cattleya Martinii*, *Cattleya Portia*, *Cattleya atlcmta*, *Phalanopsis Schilleriana*, *P. esmeralda*, *P. amabilis*, *Oncidium ampliatum*, *O. Luridum*, *Cypripedium venustum*, *Cypripedium concolor*.

Germination experiments on the seeds of casuarina trees with a view to tracing the symbiotic relation of the fungus with the seedlings and adult plants and its effect on the life history of the casuarina trees, one of the best fuel trees of India, were continued by Dr. S. R. Bose in collaboration with Mr. S. Mitra, the overseer.

**Finance.**—The receipts of the department during the year were Rs. 11,858 of which Rs. 7,592 were received on account of settlement of claims for damages done to Eden Garden ride by the T.J. S. Army during the war period. Out of the total budget grant of Rs. 2,91,964 for the Directorate under all heads, Rs. 2,89,788 were spent leaving a saving of Rs. 2,176.

**The Herbarium.**—The routine work of the Herbarium suffered to a certain extent on account of disturbances in the city, due to which attendance was rather poor at times and the work suffered considerably. In spite of this drawback the normal work of the herbarium and the investigations on the different aspects of plant life were carried on satisfactorily.

**Identification.**—The total number of specimens identified during the year was 2,113. Of these over 200 specimens came from the Botanical Forest Officer, Assam. The Forest Manager, Sikkim, Rev. J. C. Culshaw, Methodist Church, Bankura, Father Santapau, Head of the Department of Biology, St. Xavier's College, Bombay, Mr. M. B. Raizada of Forest Institute, Dehra Dun, and Mr. B. A. Khan, M.S.C., Research Scholar, University of Calcutta, all sent more or less 100 plant specimens each, for naming.

Queries received from different quarters on various problems of botanical, agricultural and horticultural researches, medicinal plants or plants otherwise useful and important, distribution and availability of plants as also systematic position and nomenclature of species were all duly answered. Suggestions for planting of avenue trees and ornamental shrubs in the compound of the Indian Aluminium Co. situated near Muri Junction, were sent to the Resident Engineer of the Company. Names of 26 fodder grasses occurring in the Andaman and the Nicobar Islands and the scientific names of "*lalang*"\*, a common grass in these islands, were sent to Rao Bahadur G. N. Rangaswami Ayyangar, Agricultural Survey Officer, An damans. A note on *sabai* grass (*Eulahopsis binata*), its scientific and vernacular names and uses in paper and rope manufacturing industries was furnished to the Botanist, Soil Conservation Research Scheme, Sriniketan, Bolepur. A note on Patchouli plant giving the scientific name, methods of cultivation and extraction of its oil was sent to Mr. B. F. Varughese of Travancore. Similar note was sent to Mr. H. J. Maynard of Thalherince, Australia, about the scientific name, distribution, use and method of cultivation of horse radish. Descriptions of different species of plants were sent to the Government Systematic Botanist, Coimbatore, and to Mr. K. Shri Ram, to whom a specimen of *Rauvolfia serpentina* was also sent. A detailed note on the methods of preparation of dry specimens of orchids, and a long list of orchids reported from Khasia and Jaintia Hills of Assam were sent to Mr. S. C. Mustafi of Shillong. Notes on the occurrence in India of awned rice, its use, method of cultivation, etc., were furnished to Mr. C. R. Stonor, Agricultural Officer, North-East Frontier Agency, Shillong. Similar notes on Red Squill were supplied to the Secretary, Central Rural Uplift Association, Bombay.

Addresses of firms who can supply materials of drug plants and who can supply Tung fruits and Tung oil were furnished with notes on their uses to Assistant Fruit Specialist, Coonoor, and to Indian Plastics, Ltd., Bombay. A list of institutions for training of culture in Great Britain and Ireland and in U.S.A. was sent to the Director, Cinchona, Bengal.

The Botanical Forest Officer, Assam, was furnished with a correct systematic position and authentic botanical name of "*Hymenachne amplexicaulis* Nees). Detailed notes enumerating different sections and sub-genera under "*Cassia* Linn" and the names of the pulses (1) *Tur*, (2) *Mung* and (3) *Uddid* were sent to the Economic Botanist, Bombay. Valid name and synonyms of the Indian of *Sesbania* were furnished to Mr. F. S. S. S. Rao, of Mrs. A. V. N. College, Vizagapatam. Notes on systematic positions of the *Marlea* and *Alangium* and the valid name for *Marlea begoniaefolia* Roxb., together with the reference to relevant literature were furnished to Mr. R. M. Dutta of "Dacca." The Divisional Forest Officer, Kurseong, was informed about the availability of *Brucea mollis* Wall., in Darjeeling district and the localities wherefrom specimens of the same had been collected. Messrs. Technical Engineering & Chemical Products Co., Ahmedabad, were supplied with information regarding different methods of eradication of water hyacinth from streams, canals, *jheels* and lakes.

The Curator of the Herbarium critically examined the specimens of genera *Illicium*, *Lespedeza*, *Aquilegia*, *Ischemum*, *Pholidota* and *Eulophia* and made necessary changes in the specific names. Experiments on the germination of seeds of *Melocanna bambusoides* Trin. were undertaken. Four sprouting shoots were cut and separately planted. These grew up into healthy plants which were afterwards transplanted in the open. Of the arboreal grasses, *Melocanna bambusoides* produces the

largest fruit, of the size of a large apple. • It is a rare phenomenon in the plant kingdom where more than one plant can be grown separately from a single grass seed.

Mr. C. McCann of Bombay Natural History Society made a gift of 8 specimens of *Ceropegia* which were not sufficiently represented in our Herbarium. The Government Lecturing and Systematic Botanist, Coimbatore, presented a specimen of *Tritaxis Beddomei* Bth. for our Herbarium. A specimen of *Crotalaria agatiflora* Schw. was received from the Mycologist, United Planters' Association, Ootacamund. Our thanks are due to these donors to the Herbarium.

**Loan.**—Almost all our sheets of Indian *Cucurbitaceae* numbering 1,854 sheets have been sent on loan to the Regius Keeper, Royal Botanic Garden, Edinburgh, in connection with the revision work of Indian *Cucurbitaceae* undertaken by Mr. H. L. Chakravarty studying in Edinburgh. 9 sheets of *Lespedeza* and *Compylotropis* were sent to Curator, Division of Plants, Smithsonian Institute, United States National Museum, Washington D.C., for his examination. One sheet of *Selaginella* sent on loan to Mr. A. H. G. Alston of Natural History Museum, London, has been received back.

2,393 sheets were repaired and 117 sheets mounted and incorporated during the year. 104 genus-covers and 1,726 species covers were changed.

The Systematic Assistant, Botanical Survey of India, and the trainees rendered much help to the Curator of the Herbarium in his routine work.

**Publications.**—A book entitled "Pure Culture of Algae" by E. G. Pringsheim was reviewed by the Superintendent and it was published in "Science and Culture", Vol. 12, No. 4, October 1946. The printing of "Bharatiya Banaushadi Parichaya" by Dr. K. Biswas and Babu E. Ghose, a work on the medicinal plants of India written in Bengali, is nearing completion. The McMillan & Co., London, is printing another book by Dr. K. Biswas and Mr. L. J. F. Brimble, Editor, "Nature," viz., "A Text Book of Botany for Indian Universities." A monograph on "Studies on Tung Oil Yielding Trees of India" by the Superintendent is passing through the press to be published in the Journal and Proceedings of the Royal Asiatic Society of Bengal (since published). Another comprehensive work by the Superintendent on the "Lichen Flora of India" is also passing through the press of the same society. A third paper on the "Economic uses of Indian Lichens" has been accepted by the Indian Council of Agricultural Research for publication in their journal. The book entitled "The Science and Scientist in the Netherlands Indies" edited by Pieter Bonig and Frans IVerdoorn, a monumental work of international importance, was exhaustively reviewed by the Superintendent. The review was published in "Science and Culture", Vol. XII, No. 10, April 1947.

**Library.**—The work of the library proceeded on usual lines. Attempts were made to revive previous exchange relations with other libraries abroad. The research workers who visited the Herbarium were given all facilities for consultation of literature in the library and books were sent out on loan in compliance with the requests received from many workers in different parts of India. 252 old books were repaired and 17 new books were bound. 31 different journals and periodicals were purchased and 35 were received in exchange. 3 books, 8 annual reports, 25 index semina and 25 reprints of papers published in different journals were received as presentations to the library. 17 new books were acquired by purchase. 76 books were sent on loan and 47 were returned. 2 copies of "Annals of the Royal Botanic Garden, Calcutta," were sold from the stock in the library, as well as 6 copies of 150th Anniversary Volume and 5 copies of "Guide to Royal Botanic Garden, Calcutta".

The preparation of the new catalogue of the library is going on.

### LLOYD BOTANIC GARDEN, DARJEELING.

The rainfall was fairly heavy during the year and the total rain recorded was 127.63 inches. The maximum was in July when it went up to 34.23 inches in a month. In June it was 25.36, August 19.90 and September 27.99. The minimum rainfall was in February when it fell to 0.01 inch. Prolonged rain from May to September was quite unfavourable for the annuals particularly of the rainy season. Salvias, Celosias, Chrysanthemums, Dahlias and Ageratums suffered most, due to such rather unusual rain. It proved injurious to several other trees, shrubs and herbs too, apart from the annuals.

With a view to compensating the scarcity of seeds from foreign sources, attention was paid to the introduction of indigenous flowering shrubs in the garden. Rhododendrons, *Lilium giganteum*, Magnolia, Ferns, Orchids, Acers, Arissemas and Begonias of various sorts were acclimatised and introduced during the year. The existing Rhododendron group below the Rock Garden had long been under uncongenial condition due to the loss of sub-soil, the humus being constantly washed away by rain and there being no means to conserve the soil. Attention was paid to improve this plot by spreading leaf-mould over the area. Sickling has been discontinued in order to keep the surface damp and moist. Heavy boulders, if placed in scattered places would ensure better results as regards the preservation of the sub-soil.

A further extension of indigenous Rhododendrons was done in the area above the "Students' Garden".

A packet of seeds of *Puya alpestris* received from Messrs. Stevens Bros., Bastia Hills, Wanganui, N. Z., germinated well. One packet of seeds of each of *Cinchona Ledgeriana* and *C. succirubra* of very high (about 15 per cent.) quinine content received from Dr. B. A. Kruskal of New York Botanical Garden, U.S.A., were sown in a separate nursery bed with bamboo mat shelter near the small conservatory. Care was paid to the aspect and other factors suitable for the culture of these two species. The experiment of these economical plants in the trying climate of these gardens was more or less successful, the result being the germination of about 100 seeds of the former (*C. Ledgeriana*). Seeds of the latter failed to germinate. Some of the fittest of survivals of *C. Ledgeriana* have attained a height of 5 to 7 inches in pots. It is hoped that these seedlings, if and when put out in the open field, will adapt to the soil of the garden and eventually produce pure high yielding seeds for distribution to interested parties or institutions. One packet of seeds of *Lobelia inflata* was again received from Ottawa. The seeds were sown on 4th March 1947 and showed a result of about 50 per cent, germination. Seedlings germinated will be soon transplanted in pots for further culture and observation. Experiments on seeds from Mrs. Kohli, Kashmir, were undertaken.

Out of 14 packets of seeds of alpine plants the following germinated:—  
*Arenaria foHosa*, *Androsace sarmentosa*, *Geranium Wallichianum*,  
*Lychnis coronaria*, *Nepeta govaniensis*, *Spiraea Lindleyana*, *Sedum Ewersii*,  
*Costus Mathioli* and *Wolfenia Amherstiana*. Result of germination of 64 packets of seeds received from Dr. Alexander of the Arnold Arboretum, New York Botanical Garden, is as follows:—

*Germinated*.—*Salvia* sp. (No. 349), *Tagetes* sp. (No. 892), *Orthosanthos* sp. (924), *Calliandra* sp. (No. 578), *Tagetes* sp. (No. 1046), *Calliandra* sp. (No. 202). These seeds having been collected in 1945 by Dr. Alexander were not viable by the time they were sown on the 4th March 1947.

Twenty packets of seeds of different species were received from Mr. Barreto, President, Lisbon Municipality, Portugal. The following germinated:—

*Cupressus lusitanica*, *Cotoneaster pannosa*, *C. scrotina*, *Circis siliquastrum*, *Campanula medium*, *Aquilegia coerulea*, *Begonia tuberosa*, *Fraxinus angustifolia* and *Pinus Pinea*.

Plants, seeds, bulbs, etc., were received from Mr. G. H. Fothergill, General Manager, Cinchona Plantations, Mungpoo, Mrs. A. J. Dash, Kalimpong, Mrs. G. Morgan, Kalimpong, and Mr. M. B. Prophan, Kalimpong.

Plant materials and information were supplied to many correspondents in India and abroad. Among those may be mentioned Dr. S. R. Bose, Ph.D., Professor of Botany, Victoria Institute, Calcutta, supplied with *Marchantia* (male and female), moss with capsules, and twigs of *Cupressus macrocarpa* bearing male cones; Curator of Gyniosperms, the University, Adelaide, S. Australia, was supplied with twigs bearing cones and fruits of 8 species of Conifers; the Director, Indian Central Jute Committee, Agricultural Research Laboratories, Dacca, with one dozen twigs of each of *camellia sinensis* and *Pelargonium* sp.; R. Duran, 12, Rio de Janeiro, Brazil, with photographs of *Rhododendron arboreum* and *?. Grande*; Dr. B. A. Krukoff, New York Botanical Garden, Bronx Park, Aew York, N.Y., with herbarium specimens and a piece of fresh log of *Erythrina arborescens* for investigation; the present Hon'ble Premier Dr. B. C. Roy, 36, Wellington Square, Calcutta, with 6 seers dried roots of *Artemisia vulgaris*, *Costus speciosa* and 3 seers of *Dichroa febrifuga* for investigation on their active principles; Professor N. K. Sen of the Presidency College, Calcutta, with 10 seers leaves, stems and roots of *Elsholtzia hlanda* for analysis and investigation of the healing property of this plant; Professor of Botany, Haraganga College, Dacca, with *Equisetum* with spikes and moss with capsules for class work of students: Principal, Bihar Veterinary College, Patna, with moss with capsules, Fern with sori, Pine twigs with rones aud *Marchantia* with capsules; Curator, Indian Museum, Industrial Section, Calcutta, with 1 seer bark and 2\ seers fresh leaves of *Gordonia creelsa* for investigation; Curator, Royal Botanic Garden, Calcutta, with one maund moss for use in the garden; Mr. Chunhangli, Indian China Bhawan, Santiniketan, Bengal, with 26 packets of seeds of indigenous plants and flowering shrubs; Dr. Puskarnath, M.SC, Ph.D., Imperial Agricultural Research Institute, Simla, with seeds of 14 different species of Solanaceae; Experimental Farm, Ontario, with one packet of seeds each of *Buddleia asiatica* and *B. paniculata*; Mr. G. Morgan, C.I.E., Kalimpong, with one packet of fresh seeds of *Rosa macrophijlla*; the Secretary, Royal Agri-Horticultural Society of India, Calcutta, with one packet of seeds of *Callistemon lanceolates* and 15 seeds of *JEsculus punduana*; Dr. A. C. Joshi, Botany Department, Government College, Lahore, with one packet of seeds of each of *Rubia cordifolia* and *R. Sikh'mensis*; Mr. John Wheatley, Perth, W. Australia, with 33 packets of seeds of indigenous shrubs, trees and herbs; Major Chowhan, Calcutta, supplied with one bag of moss.

**Rock Garden**,—In order to give shade to young plants in the Rock Garden quick growing shady trees and shrubs like *Alnus nepalensis* and *Daphne cannahina* were planted out in scattered places. The following species were added to this garden:—

*Cuphea* sp., *Pentstevwn hirsuta*, *P. campanulatus*, *Veronica longifolia*, *Bupleurum Candolii*, *Hypericum cernuum*, *Potentilla Kleiniana*, *Meconopsi\** *Wallichii*, *Begonia ladniata*, *Rhododendron Edgeworihii*> *R. Dalhousieoz*, *Bryocarpuvi Jimalaicum*, *Androsace geranifolia*, *Euonymus thafolius*,



*Verbascum Wiedemannianum* and *Smilacina fusca*. Indigenous ferns as *Asplenium normale*, *Folypodium junglandifolia*, *Cheilanthes farinosa*, *C. Formosa*, *Lomaria pycnophylla*, *Lastrea apiciflora*, *Aspidium* sp., *Polystichum Prescottianum*, *Botrycijiium virginianum*, *Leucostegia pulchra*, *Lindsaya cultrata*, *Davallia* sp., etc., were introduced in the fern house as well as in the Rock Garden. Vacancies caused by dead and dying plants were also filled in as much as possible.

Sir John Anderson Rock Garden was fairly fully stocked and it is proposed to construct a further small extension on the south during the coming year, if funds are available.

**Students' Garden.**—Dead and sickly plants belonging to their respective natural orders were replaced by new ones. Attention was paid to represent as many species as possible in the different natural order beds. Sickling, cleaning and labelling of this section of the garden was earned on as usual.

**Other improvements.**—Not much improvement of the garden could be effected on account of the lack of supply of building materials, zinc plates for writing labels of plants, glass, planks, etc., for renovating nurseries and last but not the least the garden implements which have become so scarce in these days. Nevertheless, a new rustic rose bower was made in the middle terrace of the Terrace Garden. Annual beds in front of the large conservatory were altered and substituted by new designs. Rose bed in the western part of the large conservatory near the huge *Araucaria* tree was converted into an Annual bed. One large round Annual bed was also made in front of Pantling Road. More flower beds were added in most of the neglected places inside the garden.

**Herbarium.**—Collection of specimens of the entire garden plants was undertaken with a view to enriching the local existing herbarium. A number of specimens have already been mounted. These sheets will be incorporated after scrutiny in a separate wing of the local herbarium.

**Visitors.**—A total number of 104,783 visitors as per records maintained by the durwans at gates, appear to have visited the garden during the year. Apart from this, distinguished visitors, viz., Mr. G. Morgan, c.i.E., J.J.L.C.; Mr. J. N. Rakhit, Chemical Examiner, Government of India, Rtd.; Mr. A. Hopkins, i.c.s., Political Officer, Sikkim; Mr. M. P. Nigam, M.Sc, Head of the Department of Botany, Lucknow Christian College, with his <sup>10</sup> <sup>0</sup> <sup>t</sup> <sup>^</sup> students; and last but not the least, Professor A. F. Blakeslee and Dr. W. Hanna, prominent Botanists of Canada and F.S.A., visited the garden. Usual facilities were given to all the teachers and the students, Horticulturists, Botanists and Gardeners who came to the garden to study the vegetation of the Eastern Himalayas.

**Staff.**—Mr. T. A. Hulbert held the post of the Curator during the year.

### CALCUTTA GARDENS.

The work of the Calcutta Gardens was seriously affected on account of the riots in the city. Many labourers failed to turn up and even the regular labourers of the garden could not put in their mind and full energy to the work because of the periodic flaring up of the communal disturbances in the city from time to time.

The rainfall was favourable and advantage was taken of the same to grow larger number of the varieties of Annuals in pots. Dahlias, Asters, Pansies, Petunias, Verbenas, Carnations and other cold weather flowers did quite well. Their colourful display at vantage points of the gardens and in the open beds attracted the usual admiration of the public.

The most important item of the work that received attention during the year was the restoration of the Dalhousie Square and Curzon Gardens which

were almost entirely destroyed as a result of the removal of the railings round these gardens during the war period. It will take some time before these gardens are again stocked with pre-war ornamental shrubs and herbs and the lawns are brought to their former condition. Attempts had, however, been made since re-fixing of the fencings around these gardens to grow hedges of ornamental plants all round the fencing by planting fresh young plants replacing the **old** and damaged ones.

The portion of the Orchid and Fern house which was broken down was duly repaired and the stock of Orchids, Caladiums, Ferns, Palms, Crotons, Dracaenas, Anthuriums, Marantas and other delicate indoor plants were attended to and replaced as usual by new ones.

The ride round a portion of the Eden Garden which was a pride to the garden was entirely destroyed during military occupation when the ride was used as an improvised garage. After its re-requisition, attempts were made to restore it to its former condition. This has been possible to a large extent with the money received as compensation from the Military Department.

Renovation of the southern arc of the ride was taken up.

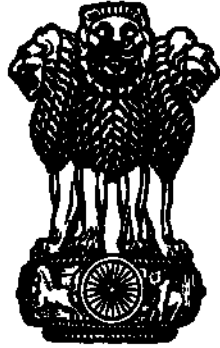
The condition of the roads of the Dalhousie Square was deplorable during the war. Although road materials were scarce, general repair work including surface dressing of nearly all the roads of this garden was done. The condition of the Dalhousie Square tank and the lakes of the Eden Garden was far from satisfactory. They needed re-excavation and proper treatment. Some fish were, however, released into the Dalhousie Square tank. It is expected that sportsmen will take full advantage of this tank during this angling season.

**Staff.**—Mr. G. Mohiuddin was the Assistant Curator throughout the year except for the period from 80th September 1946 to 12th February 1947 during which time he officiated as Curator, Royal Botanic Garden, in addition to his own duties. Mr. F. Karim was the overseer throughout the year.

**K. BISWAS,**

*Superintendent,*

*Royal Botanic Garden, Calcutta.*



सत्यमेव जयते

Government of West Bengal

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Garden, Darjeeling**

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# Annual Report of the Royal Botanic Garden and the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling for 1947-48.

## ROYAL BOTANIC GARDEN.

General Staff.—Dr. K. Biswas, M.A., D.Sc. (Edin.), F.R.S.E., held the charge of the Superintendent, throughout the year. Dr. S. K. Mukherjee held charge as the Curator of the Herbarium upto the afternoon of the 6th February 1948, when his services were temporarily placed at the disposal of the Government of India as Systematic Botanist to the Botanical Survey of India for field work in Manipur borders along with the explorer Capt. Kingdom Ward. Sri V. Narayanswami, M.A., Systematic Assistant, Botanical Survey of India, was temporarily appointed to act as the Curator of the Herbarium in addition to his own duties under the Government of India from the afternoon of the 6th February 1948. Mr. M. Jones was the Curator of the Garden till 14th August and Jonab G. Mohiuddin, Assistant Curator, Government Gardens, Calcutta, took over the charge of the post of the Curator with effect from the afternoon of that date in addition to his own duties. Sri S. N. Mitra, M.Sc, Overseer, Eoyal Botanic Garden, Calcutta, carried on the current duties of the Assistant Curator, Royal Botanic Garden, Calcutta, throughout the year in addition to his own.

Sri Ashutosh Banerjee was the Head Clerk throughout the year.

2. **Tours.**—The Superintendent with a party of the trainees in the Botanical Survey of India toured in the Sikkim Himalayas for botanical study and collection of plants. He was accompanied by Mr. J. A. Hulbert, the Curator of the Lloyd Botanic Garden, Darjeeling, who spared no pains in collecting Alpine plants and gaining firsthand knowledge of their natural habitat. From Darjeeling the party went as far as the Nathula upto about 14,000 ft. *via* Karponang and Changu Lake. A collection of more than 1,500 plants both living and herbarium specimens was made. The living plants which included specimens of *Ehododendrons*, *Primulas*, *Cotoneaster*, *Corydalis*, *Viburnums*, *Anemones* and others have been grown in the Lloyd Botanic Garden for acclimatisation.

3. **Visitors and Research Workers.**—A large number of distinguished personalities and research workers from within India and overseas visited the herbarium as listed below:—

Toshituro Morinaga, Director of Imperial Agricultural Experimental Station, Tokyo (concerning his study of wild rice plants); Miss L. Beckett, (God-child of late Sir David Prain), Calcutta; U. Tin, Agricultural Statistician, Agriculture Department, Burma; M. G. Provence, French Trade Commissioner; Charles Gratrey, Tower House, Calcutta (regarding investigation on essential oils); C. M. and E. A. Palmer of Butler University, T.J. S. A. (*in connection with research work on Algae*); Gladys Elpbick of New Zealand; Swami Avyaktananda, Chairman, Indo-British Goodwill Mission; S. T. Padmanabhan, Mycologist, Central Eice Eesearch Institute, Cuttack; Vyvyen Jenkin, Secretary, Indo-British Goodwill and Cultural Mission; Brahmachari Asokachaitanya, Librarian, Eamkrishna Mission, Institute of Culture; Swami Prashantananda, Ballichak, Eamkrishna A.shram, Midnapore; E. C. Lacy with botany students of Science College, Patna; C. E. Narasimhan (Government House), Calcutta (son of His Excellency the Governor of West Bengal); Miss C. E. Indira (Government

House) Calcutta, (grand-daughter of His Excellency the Governor of West Bengal); E. Misra, Head of the Department of Botany, University of Saugar; K. S. Eanganathan, Head of the Department of Botany, Government College of Indian Medicine, Madras; Rev. F. Joseph Pallithanani, S.J., St. Mary's College, Kurseong; Dr. Victor Cofman and Mrs. Lucy Cofman of London (on study mission to India); E. N. Suri and a party of 20 students of the Indian Forest College, Dehra Dun; V. Seas, Forest Utilisation Officer, West Bengal; Capt. M. L. Devender Singh, A-D-C His Excellency Sri Eajagopalachari; Dr. Sverre Petterson, Oslo, Norway, Meteorologist; S. K. Banerjee, Director-General of Observatories, Delhi (Meteorologist); C. E. Krishnaswami, son of His Excellency the Governor of West Bengal; H. Bhattacharjee, A.D.C. to the Governor of West Bengal; P. C. Mahajan, C.E.I.E., New Delhi.

4. Special mention may be made of the following Australian delegates to the Indian Science Congress who paid a visit to the Garden and took keen interests in the work of this Institution:—

5. P. C. Madsen, University Sydney, New South Wales, Australia; Kerr Grant, University of Adelaide, South Australia; J.- A. Prescott Waite Arboretum, Adelaide; Guy Bresford, C.S.I.E., Melbourne, Australia, E. Grenfell Thomas, Melbourne, Australia.

6. His Excellency Dr. Ibrahim Kadry Bey, Undersecretary of State for Agriculture of Egypt, Cairo, also visited the herbarium and the garden for purchase of garden plants and exchange of botanical materials and publications of the Department.

7. Mr. S. K. Dey, i.c.s., Secretary, Agriculture, Forest and Fisheries Department, Government of West Bengal and Mr. P. M. Das Deputy Secretary of the same department, inspected the Herbarium on different occasions and discussed the question of transfer of the Garden and the Herbarium to the control of the Government of India together as an integral institution and the possible advantages and disadvantages of the West Bengal of such transference. Nirode Kumar Sen, Presidency College, Calcutta (identification of specimens); Kunja Lal Sharma and Bunshi Dhar Sharma of Jaipur City Agricultural Department (State nominees for Garden experience) visited the nursery Garden and the Herbarium; Shyama Shankar Bhattacharjee for identification of plants; Dr. E. Chatterjee (examination of *Atropa Belladonna* and *Datura*); Vijoy Kumar Chatterjee (selection of fire and fuel wood); A. Bose (consultation of literature and examination of specimens); Ghosh, Forest Research Institute (Wood technology—Examination of Herbarium specimens and consultation of old literature); J. P. Srivastava, Lecturer in Geology, Lucknow University.

8. Nine stipendiary scholars of the Training Scheme in Taxonomy and Systematic Botany of the Government of India with their Instructor Mr. N. P. Chowdhury materially assisted the Curator of the Herbarium and the Superintendent in connection with the various scientific work of this directorate.

**Garden.**—Normal garden work continued as usual. Although November showers damaged the seedlings of the annuals, they revived later on and a fairly good show was possible with the pot plants. They were displayed in suitable spots of the garden and on the whole the bringing up of the season flowers was quite attractive. The lawns were dressed up and many of them were now brought to their pre-war condition. The work of replanning the wire-netting of the main block of the No. 1 was nearly completed during the year. Satisfactory progress was made in road work by adopting a better method of premixing tar

stone chips with the help of a rolling hand machine made from an empty barrel. This expedited the work considerably. Thanks are due to Sri. Kristo Chandra Dey for favour of his kindly supervising the road-work free of charge. The total area repaired is 40,808 square feet.

9. About 500 timber, fruit, roadside and ornamental trees and shrubs were planted in the open in addition to the normal replacement of the\* old and dead specimens cultivated in the garden in their respective squares within the different geographical divisions. In the Orchid and palm houses and rockery about 200 plants were added during the\* year. With a view to meeting the increasing demand of the public for roadside trees, timber trees and ornamental plants including various types of palms, foliage plants, the normal stock\* of the nursery seedlings and young plants-suitable for planting outside had been increased.

Nearly 7,000 cuttings, 340 layerings and 2,180 gootees were raised by vegetative propagation. In addition to these about 170 packets of seeds of useful plants received from U.S.A., and 180 packets from Dr. John Axel Naunfldt, Upsala, Sweden, were sown in the Nursery Nos. 1 and 2 and Lloyd Botanic Garden, Darjeeling, for experimental purposes. In connection with the Grow More Food Campaign vegetables were grown in the economic garden and were sold to the labourers and garden employees by auction as usual. Proper attention was also paid to the Great Banyan and further attempts were made towards expanding its branches over the adjoining lawn across Banyan circle.

10. Nearly 500 plants were despatched to the public or Government institutions in India and abroad. Two-hundred plants were received from different sources. About 281 packets of seeds of different species were distributed to different parties in India and overseas countries, about 50 packets of seeds of different plants were received on exchange basis from different botanical gardens in India and outside. In addition to these a large number of plant materials were supplied to the universities, colleges and botanical, horticulture and agricultural institutions in different parts of India and abroad for research work and experimental purposes.

11. The following orchids flowered in glass houses:—

Cypripedium concolor, C. Fairrieanum, Oncidium Ampliatum, Epidendrum Stamfordianum, Oncidium lanceanum, Cattleya hardyana, Cattleya alba, Cattleya montani, Cattleya atalanta, Phalaenopsis schilleriana.

12. Progress was made in the revision work of the names of the garden plants with the help of the trainees of the Botanical Survey of India and the Systematic Assistant during their field work in the garden. About 950 labels of plants, boxes, wardien cases, sign boards, etc., were written up during the year.

\* 13. Investigation into the systematic rotation of fungus and Casuarina equisetifolia was made and new data recorded by Sri S. Mitra, the Overseer, under the direction of Dr. S. R. Bose, Professor of Botany, Carmichael Medical College, Calcutta. The Overseer also undertook, with promising results, hybridisation work of the well known orchid Cattbya. The seeds produced as a result of crossing have been sown in different hot houses in Calcutta and Darjeeling and the results of germination are awaited.

14. The garden put up a flower show at the All-India Exhibition in the Eden Garden which opened at a rather belated period for the annuals on the 10th February and continued up till the 31st March. The flower show was arranged in six sections— (1) Stove plants, (2) delicate and rare annuals, (3) alpines, (4) succulents, (5) medicinal plants, and (6) economic

plants including dye, fibre, gums and oil yielding plants of great commercial importance and last but not the least, the insectivorous pitcher plants and flycatcher *drosera* and the well known *Victoria regia*, the largest water lily of the world, a native of the Amazon river and named after Queen Victoria.

15. These selected plants staged for educative purposes attracted enormous number of visitors daily. The garden staff and the trainees under the Botanical Survey of India were all in attendance to supply necessary information, explain various aspects of plant life and answer numerous queries of the interested visiting public. Such high altitude temperate plants as, *Meconopsis*, *Primulas*, *Junepferus*, *Saxifraga*, *Aconitum*, *Lycopodiums* and others brought from the Lloyd Botanic Garden, Darjeeling, after acclimatisation there, withstood fairly well the Calcutta climate during the period of the exhibition. Some of these alpine plants created much curiosity among the lay public and afforded opportunities to the botanists of the plain to examine plants found growing at an elevation of 10-12,000 feet in the Sikkim Himalayas.

16. **The Herbarium.**—The normal routine work of the Herbarium carried on as usual. The work of the Herbarium and scientific investigation received new impetus with the recruitment and activities of a further batch of enthusiastic trainees of the Botanical Survey of India working in the Herbarium.

The presence of the trainees in the Herbarium, under the Government of India, Training Scheme in Taxonomy and Systematic Botany, taken advantage of in getting the sheets in the several sections of the local Herbarium, namely, Assam, Bengal, Eastern Himalayas, Madras and Bombay, Upper Gangetic Plain, Nepal or Central Himalaya and the Western Himalayas, the Punjab and the North-West Frontier, catalogued. The stamping and numbering of the Herbarium sheets was re-introduced after some years and more than 8,000 sheets belonging to one family alone, namely, *Eranunculaceae*, was numbered at the close of the year.

17. In connection with the All-India Exhibition held in February 1948, at the Eden Gardens, Calcutta, sets of Herbarium sheets of the more important medicinal plants of recognised therapeutic value in the western and indigenous systems of medicine and other wall illustrations of rare plants were exhibited in the stall of the Royal Botanic Garden, along with the collections of living plants of medicinal, economic and scientific values in pots. They were classified according to their known therapeutic values, properly labelled with name cards and other directive sign boards and posters. The exhibits created a great deal of interest to the interested public and enquiries for advice and list of medicinal plants; suitable for cultivation was received in the office.

18. Seven thousand eight hundred and seventeen specimens were identified of which 1,004 specimens belonged to extra departmental clientele and the balance of 5,813 belonged (1) to the materials of *Grewia* and *Chonemorpha* of the Calcutta, Dehra Dun, Shillong and Coimbatore Herbaria, and (2) to the collections brought from the tours to Rampa Agency tracts, Chota Nagpur Hills, Sikkim Himalaya, Rajgir (Patna), Santhal Pargana and Paresnath. The Herbarium staff and the trainees of the Government of India participated in this work. One hundred and forty-one specimens of the moss collections of this Herbarium were sent to Mr. Edwin B. Bartram, Burkill, Pike country, Pennsylvania, for identification and they were received back duly identified. Sixty cryptogamic specimens were also worked out. Among the chief extra departmental

correspondents who availed themselves of the facilities in the Herbarium for examination, identification and confirmation of their specimens were the following: —

19. Rev. J. Brusters, Ranchi; R. Misra, University of Saugar, C.P.; Rev. J. C. Culshaw, Superintendent, Methodist Church, Saranga, Bankura; Professor of Botany, Punjab Agricultural College, Lyallpur; The Entomologist-in-charge, Icerya Purchase Control Scheme, Bangalore; Government Lecturing and Systematic Botanist, Agricultural College, Coimbatore; Silviculturist and Botanical Forest Officer, Shillong; Prof. A. C. Dutta of Cotton College, Gauhati; M.B., Raizada, Forest Research Institute, Dehra Du&; Economic Botanist, Poona; S. C. Mustafi, Shillong, Assam; A. Sanyal, D.F.O., Chaibasa, Bihar; Madras Herbarium, Coimbatore, and K. Jf. Kaul, Government Agricultural College, Kanpur.

20. Eight thousand two hundred and sixty-seven sheets were incorporated into the Herbarium, the major portion of this being the "Wallichian sheets" which were isolated during the war from the rest of the collections of the Herbarium. Five thousand five hundred and sixty-six sheets were repaired, 2,129 sheets mounted and 1,138 species and genus covers renewed and rewritten. Two sheets of *Mansonia Dipinae* De, represented by the Silviculturist and Botanical Officer, Shillong, 2 sheets of *Alternanthera pungens* H.B. and K presented by Prof. Aleila and sheet of *Trapa maximowiczii* presented by Dr. Biol of the V. L. Komarov Botanical Institute of the Academy of Science, T.T.S.S.R., were new additions to the Herbarium collections.

21. Three hundred and seventy-eight sheets of *Poa*, 1 sheet of *Sporobolus*, 11 sheets of *Sophora*, 1 sheet of *Gomphrena decumbens*, 2 sheets of *Eunynus Kachimenois* and 36 sheets of Sir Percy Cox's Persian collections were sent out on loan to (1) Dr. N. L. Bor, Kew, (2) Mr. P. T. Soong (Kew) and (3) to Jey respectively. Three hundred and six sheets of Burma grasses collected and deposited by Mr. Rhind here were sent to Kew Herbarium in connection with his work on the grasses of Burma.

22. Two hundred duplicate sheets of the Orissa collections were presented on exchange basis to Mr. F. L. Bennett, Biology Department, Black Hills, Teachers' College, Sparfist, South Dakota, T.J.S.A.; 200 duplicate materials of the Sikkim Himalayan collections were presented to the Botany Department of P. R. College, Cocanada; 551 well-preserved and named Herbarium specimens were received as part of exchange relations from Th. Arwidsson, Curator, Naturhistoriska, Rikmuseet, Botaniska Avdelningen, Stockholm 50. The Botanical Forest Officer, Shillong, presented 2 sheets of *Mansonia Dipikal* to this Herbarium. Capt. Kingdom Ward made over, as gift to the Herbarium, some of the specimens collected by him in the Khasia hills. Prof. K. N". Kaul of the Government Agricultural College, Kanpur, added 9 sheets of plant specimens as gift to the Herbarium. Some flowering specimens of *Costus speciosus* were received from the Botanical Forest Officer, Shillong for purposes of cultivation in the Royal Botanic Garden. Fifty sheets (duplicate) were supplied to Dr. Misra of the Saugore University, C.P. These sheets belonged to the collections from Mymensingh. A dozen seeds of *Hevea brasiliensis* Mull received by the Curator of the Industrial Section, Indian Museum, were passed on to this garden for cultivation.

23. **Supply Of plants and seeds.**—James Boyle of county Mayo of Eire was furnished with a list of Indian plants suitable for cultivation in Eire and arrangements were made with the Curator, Lloyd Botanic Garden, Darjeeling, for the supply of seeds of the plants listed either from his stock of Himalayan plants or by procuring same from the probable sources



of supply. Arrangements were also made to secure a supply of oil seeds of Indian plants for A. A. Pristupov of Rostov on Don, Pedagogic Institute, Russia, from different parts of India. Col. G. P. Pollitt of South Rhodesia was put in touch with the sources of supply of the Patchouli Plant and its seeds for cultivation in South Rhodesia. B. A. Krukoff, c/c New York Botanic Garden, U.S.A., was supplied with the sources of supply of some cultures—the fungus, causing cotton-boll shedding disease in India.

**Supply Of information.**—Scientific and Economic information was supplied to a large circle of clientele as mentioned below.

The special Officer, Potatoes, West Bengal, had been supplied with information on *Stictocardia tiliifolia*; Mr. M. F. Chandraratna, Botanist, Agriculture Department, Peradenya, Ceylon, was furnished with information about the habitat, cultivation and size of *Derris robusta* Bth.; Prof. A. Das Gupta, Botany Department, Bangabasi College, Calcutta, was furnished with information about the family and poisonous properties of *Anliaris rufa* Mic. and *A. toxicaria*.; Dr. F. R. Barucha, D.Sc.F.N.Io Royal Institute of Science, Bombay was supplied with necessary information on the correct nomenclature and literature, synonym of *Bonibax* and *Salmalia*.; information on the alleged seed and mixture of poisonous nature was supplied to the Director of Inspection, Government of India\* Department of Food. They were sown in the garden and necessary information will be supplied after germination. The Mycologist, Department of Agriculture, Beluchistan, was supplied with information about the habitat of the 2 Orobanchaceous specimens, their description and reference of literature and also of *Populus euphratica* Oliv.; Mr. J. H. Mahg of St. Vincent School was furnished with the information about the names of Indian plants known as "Flame of the Forest"., The Director of Public Health Laboratory, Chittaranjan Avenue, Calcutta was supplied with names of two kinds of seeds given by him for examination and also information on the poisonous nature of the seeds; Names of books dealing with ornamental plants of India were given to Mr. G. D. Meninger, L<sup>o</sup> Angels, California; Information was supplied to Prof. Quazilbash about the occurrence of *Hyoscimimus reticulatus* in Baluchisthan and the distinguishing characters of *H. reticulatus* and *H. niger*.. Information was supplied to Bijan Dutta of Calcutta about *Couroupita guianensis* Aubl of the family Myrtaceae. Mr. B. Sundarasiva Rao of Andhra University was furnished with the names of places where the species of *Psilotum triquetrum* occur. Information was supplied to Mr. S. P. Lancaster of Agr-Horticultural Society of India about 3 plants. Suggestions were offered regarding methods of eradicating *Flacourtia ramontchi*—mango orchards; Brother Maher of St. Vincent School, Asansol, was supplied with botanical name of the Candle tree; Dr. K. Ramiah, Director, Central Rice Research Institute, Cuttack, was offered suggestions to prepare locally a handy specimen press with the ply wood or any strong light wood; the Honorary Secretary, Bombay Natural History Society, was supplied with the date and place of discovery, names "of the discoverer, ranges of distribution, etc., of *Luculia gratissima*; Mr. H. F. Mooney was furnished with the description of *Aleurites Fordii* and *A. Montana* giving the" correct names of a few species of plant and reference to some literature, dates of publication of a few books, etc.; the Assistant Economic Botanist, Bombay, Poona, was supplied with names of authors and reference to literature for 2 species of *Desmodium*; Mr. A. Ma-jeed, Reader, S. E. College, Bhawalpur, was furnished with names of 16 ferns common in the Punjab; Mr. V. S. Rao, Assistant Editor, Dictionary of Economic Products of India, was supplied with correct names of 36 plants, position of genera *Cissus Calazuintha* Moll, *Cicer L.* and about the non-occurrence of *Carapa moluccensis*

B. C. Last, 39, Alexandra Court, Calcutta, was supplied with information regarding production of common plankton organisms in Brackish Water and reference to literature on this subject; Mrs. Mildred Archer, Deputy Commissioner's Bungalow, Naga Hills, Assam, was furnished with information regarding paintings of plants at the time of East India Company; 3Jr. T. Basu, Calcutta, was supplied with names of plants which absorb the bad smell of trenching ground; Mr. T. S. Chauhan, Superintendent, Government Gardens, Allahabad, was suggested ways and means to eradicate *Elacourtia Rainontchi* "Kakai"; F. B. Manekji, Calcutta, was supplied with the distribution of *Aralia pseudo-Ginseng* Bth native and its uses for medicinal purposes, etc.; Messrs. Eastern Trading Corporation, Calcutta, were given the vernacular name for grain Sorghum; Mr. Raizada Holas Rai Saksena, Landlord and Contractor, Hawa Mahal, Bhopal, was supplied with information about the cultivation and collection of white Moosli; Messrs. Birla Jute Manufacturing of Calcutta were furnished with information about the plant which yields the cork of commerce (*Linobum* plant); Georges Minacoulis Inventions Exploitation, des Brevets d'Inventions Rue Zaher and tew-fick, Port-Said (Egypt), were supplied with information regarding full description of the African "Umkalobo" alleged to be a specific for Tuberculosis; Economic Botanist, West Bengal, Chmsurah, was furnished with a list of the distribution of (1) *Urtica dioeca*, (2) *Urtica urena*, (3) *Urtica filulifera*; Mr. B. L. Desai via Sachin was supplied with information regarding adoption of Latin terminology and generic and specific name in Botany; Dr. R. L. Nirula, Professor of Botany, College of Science, Nagpur, was furnished with the information regarding distinguishing characters in the flowers of two specimens *Rungia repens*, *R. elegans*; Mr. J. A. Jacobs of Travancore, South India, was supplied with information regarding cultivation and variety of *Cymbopogon Martinii*; Sri A. 3L Bhattacharjee, Vice-Principal, Ramsaday College, Amta, Howrah, was supplied with botanical names and vernacular equivalent of 9 species; the Deputy Director of Health Services, West Bengal, was supplied with the sources of supply of Indian drugs (12 species); Dr. B. L. Manjunath was supplied with information (quarter) regarding *Cymbopogon*, *Berberis* and Algae of economic importance for the New Dictionary of Economic Products of India; the Senior Advisory Officer, Indian Tea Association, Tocklai Experimental Station, Assam, was furnished with reference to literature regarding Balsa wood; the Government of West Bengal. (Agricultural Department) was furnished with notes on the possibilities of Punifal cultivation in the West Bengal; the Ministry of Agriculture, Government of India, was furnished with a list of Research Workers at the Herbarium of Royal Botanic Garden, Calcutta, for compilation of the Indian Section of the lists of Research Workers, Agriculture, and Forestry in the British Empire; Mr. J. If. Sen Gupta. D.F.O., Darjeeling, was supplied with information about "Somarasa" *Somalata*.

24. **Publications.**—The Superintendent, Royal Botanic Garden, Calcutta, attended the 35th Session of the Indian Science Congress Association held in Patna during the first week of January 1948. The following papers were read before the Botany Section of the Congress by the Superintendent and by other members of the staff working under him in the Herbarium:— (1) Confusion in the Systematic Position in some of the Indian Species of *Rhododendrons*, by Dr. K. Biswas and Sri R. S. Rao, (2) Sargassams of Indian Seas, by Dr. K. Biswas and A. K. Sarma, (3) Economic Plants of the Darjeeling District, by Dr. K. Biswas and J. Mitra, (4) Distribution of Indian Lichenes, by K. Biswas and D. D. Awasthi, (5) A Preliminary Note on the Indo-Malayan Species of *Grewia*, by V. Narayanswami and R. S. Rao and (6) Role of Botany in Pharmaceutics, by K. Biswas

and V. Narayanaswami, presented to the All-Pharmaceutical Conference held at Patna during the same week.

25. The Superintendent contributed also the following scientific papers and articles during the year under review:

" Algae" for the Dictionary of the Eaw Products and Industrial Resources of India, (2) "Bharatiya Udvid Sampad" submitted for publication in the Agricultural Journal of the Government of Bengal, (3) Romance of Flowers in the Puja Number of the *Hindustfian Standard* for 1947, (4) The Prospects of India Rubber and Para rubber submitted to the Jour. Ind. Coun. Agr. Res., (5) Economic uses of Indian Lichens in the Jour. Ind. Coun. Agr. Research—passing through the press, (6) Comparison of the Flora of the Calcutta University Science College compound and garden, Ballygunge in 1922-23 sent for publication in the Jour. Bot. Soc. Bengal, (7) Writer's monograph on "Studies in Tung Oil Yielding Trees in India" has since been published in Jour. Roy. As. Soc, Bengal, (8) Lichen Flora of India in the Jour. Roy. As. Soc, Bengal—passing through the press, (9) Bharatiya Banushadi Parichay University Publication—passing through the press (out of the total number 650 pages and 800 blocks, 600 pages and all the blocks have already been finally printed off), (10) Atom Bomb experiment in the Pacific Ocean and its possible effect on the Marine life of the Indian Ocean, published in Science and Culture, Vol. XII, No. 10, April 1947, (11) Science has created much interest among the American Scientists engaged in the investigation on the attacks of the bomb. Scientists in the Netherland Indies—A review in Science and Culture, Vol. XII, No. 10, 1947, (12) Review of Indian Forest Records, No. 7 of 1945—with M. A. Sampathkumaran (Trainee). Dr. S. K. Mukherjee, Curator of the Herbarium, contributed two articles on *Berberis* sp. and *Mahonia* sp., to the New Dictionary of the Economic Products of India.

26. **Library.**—Forty-seven volumes were issued on loan to institutions and researchers in India. Fifty-seven volumes were back during the year from loan. Forty volumes were still on loan at the end of the year. Sixteen new books were subscribed for. Two hundred and thirty-one journals and reprints of scientific articles and 4 books were received as gifts. Thirteen books were bound and 1 book was repaired. Two copies of the "150th Anniversary Volume of the Royal Botanic Garden" were distributed to Mrs. L. Schwarten, Librarian, Arnold Arboretum, Harvard University, U.S.A., and to the Editor, *Hindustan Review*, Patna, respectively. Two copies each of the Annual Reports of the Royal Botanic Garden, Calcutta, for the years 1940-45 and 79 copies of the same for 1945-46 were distributed to the parties and Institutions on our exchange list.

27. **Finance.**—*Receipt.*—The receipts of the Directorate during the year were Rs. 3,220.

*Expenditure.*—Total expenditure of the Directorate under all heads was Rs. 2,84,616. The total expenditure, for Royal Botanic Garden, Calcutta gardens and Lloyd Botanic Garden were Rs. 1,84,396, Rs. 68,616 and Rs. 31,528, respectively.

### LLOYD BOTANIC GARDEN, DARJEELING.

28. The total rainfall during the year was 98.34 inches, comparatively less than that of the last year. The highest was recorded in July when it reached 33.89 inches.

29. Though the rainfall under report was below average, the dampness that prevailed throughout the rainy season was abnormal, causing extensive rot damage to the summer annuals, much damage was also caused by grubs, unfortunately introduced from cattle manure which ate into the roots of several annuals and roses. Much labour and preventive measures were expended to eradicate this very troublesome pest. Other annuals housed in the conservatories also suffered with the excessive damp, the damage being enhanced by the bad ventilation arrangements peculiar to these houses. Nevertheless, in spite of these handicaps the weather conditions were congenial for raising, with success, enormous and profuse flowering strains of single and double Begonias. Their size and perfection gave a brilliant and spectacular display in the main conservatory. It is confidently expected that it will be even better this next season as raising and storage of these were assiduously studied with successful results. Carnations, Asters, Miums of sorts, and Cyclamens also did well despite adverse weather conditions. The old vine, spreading over the eastern side of the large conservatory, had, unfortunately, to be totally removed. It was severely attacked by a virulent fungus disease which had spread down to the roots. It is anticipated to replace this loss by another plant of a stronger and better fruiting strain.

30. During the cold season from November to February when normally the glass houses are devoid of much flowering plants, a great success was attained in overcoming that deficiency by quantitative culture of such decorative plants as Daffodils, Narcissi, Primulas, winter-flowering Jasmines, Chrysanthemum Leucanthemum, Amaryllis, Cyclameans and other bulbous plants. Stocks of these are now being very appreciably increased. Two healthy plants, raised from cuttings, of *Trachyloperum jasminoides*, were planted in the large conservatory and are doing well. The two plants of *Stretlitzia reginae*—the Bird of Paradise Flower—were reported with beneficial results. The blooms were larger and more brilliant. These flowers are always an endless source of wonder and admiration to the public. The new orchids housed in the main conservatory gave a display as normally expected. A *Vanda coerulea*, the recent acquirement to the collection, flowered exceptionally well. Unfortunately the bulk of the orchids here are sub-tropical species. These can never be cultivated to a higher standard of perfection unless better arrangements can be afforded for it. There is no adequate heating fuel to nurture such plants during the winter months, and it is mainly from this deficiency that many plants, collected or raised by propagation here, are lost rapidly, or in the course of a year or two. No amount of care and cultivation can save these plants unless their natural environmental temperature can be maintained as near as possible.

31. The early rain this year was of advantage to the winter season annuals and the colour schemes of the various flower beds showed up satisfactorily. Sweet peas were in greater profusion than in previous years, and the newly designed beds on the western side of the main conservatory were carpeted with masses of a scented strain of Pansies edged with pink Daisies. These beds were extremely beautiful and greatly admired by the visiting public. *Silene*, *Stock*, *Myosotis*, *TJrsinia*, *Schizanthus*, *Polyanthus*, *Candy-tuft*, *Cheiranthus*, *Poppies*, *Calendula*, *Erysimum*, *Mesembryanthemum*, *Grypsophylla*, *Antirrhinum*, *Carnation*, etc., all bloomed profusely, while *Cinerarias*, *Nemesias*, *Calceolarias*, *Petunias*, *Lapeyreusia*, *Clivia*, *Aquilegia* *Roses*, and other plants housed in the conservatories all bloomed profusely with magnificent decorative effect.

32. Acclimatised seeds and plants were again encouraged during the year. The rock gardens and glass houses were stocked with indigenous plants with a view to enriching the local collections. A number of local

ferns and orchids were added to previous stocks. A group of local Rhododendron seedlings were planted on the northern side of the "Anderson Rock Garden". Sickly and dead plants were replaced where necessary, and compost and pit manure given liberally to seedlings and shrubs to add to their nourishment.

36. The long felt project of laying boulders on the surface of Rhododendron group below the Rock Garden for conserving sub-soil and avoiding soil erosion is still undone. The lack of arrangements for soil conservation is being seriously felt due to deterioration of the general health of these rare Rhododendrons, and it is hoped that the project will soon meet with the provision for its implementation.

34. The stocks of rare varieties of Azalias, Camellias, Juniperus, etc, were increased by raising them from cuttings, collected and borrowed from the local institutions and persons interested in these plants. Thanks are due to Revd. Mother Superior, Loreto Convent, Darjeeling, for the kind offer of a large number of Camellia cuttings for propagation. Thanks are also equally due to Mr. G. H. Fothergill, General Manager, Government Cinchona, Mungpoo, who supplied a number of plants for these gardens such as Achimenes, Cupheas, Cymbidium eburneum, Geraniums, etc. Two pots *Cyripedium villosum* and 2 pots *Rehmannia elata* received from Her Highness the Maharani Sahiba of Cooch Behar on exchange for gold fish, were also added to the garden.

35. Two hundred and forty-five labels of trees and shrubs including signboards were written and re-written during the year.

**36. Botanical materials supplied to the following correspondences,—**  
Hon'ble Dr. B. C. Roy, M.K.C.P., F.R.C.S., was supplied with 30 seers dried roots of *Dichroa febrifuga* for his investigation of febrifugal and anti-malarial property of this plant; Messrs. Sutton & Sons, Calcutta, with one packet dried leaves of *Digitalis purpurea* cultivated here from the seeds supplied by them for Dr. K. Michael of Praha United Chemical & Metallurgical Work for his studies on the influence of sun upon quality and quantity of medical substances in pharmaceutical plants; Superintendent, Royal Botanic Garden, Calcutta, with four authentic specimen sheets of *Rosa macrophylla*, and a sheet of *Fuchsia* sp.; A. N. Haider, Esq., Gluconate Ltd., Prinsep St., Calcutta, with 32 seers dried roots of *Dichroa febrifuga* for the purpose of research febrifuge in the plant; Revd. Sister Mary, F.C, St. Helen's, Kurseong, some twigs with winged fruits of *Acer villosum* var. *thomsoni* and cut flowers of *Abutilon* sp. for the Cambridge Local Examination in Botany; Revd. Mother Superior, Loreto Convent, Darjeeling, with twigs with winged fruits of *Acer villosum* var. *thomsoni* for the purpose of Examination in Botany; Curator, Industrial Section, Indian Museum, Calcutta, with 5 seers fresh leaves of *Gordonia excel sa* for research work; **Divisional Forest Officer, Darjeeling Division, Darjeeling, with the information on the medicinal plants and their habits, especially of *Aconitum* species available in this district;** S. P. Lancaster, Esq., Agricultural Society, Calcutta, with one packet seeds of *Hexacentris* (*Thunbergia*) *coccinea* and *H. Lutea*; the Principal, Bihar Veterinary College, Patna, with samples of fern sporophylls with sori and Pine cones (male and female) for the class work of his students; A. J. Haider, Esq., Gluconate, Ltd., Prinsep St., Calcutta, with 2 maunds dried roots *Dichroa febrifuga* for research of febrifuge on the plant.

37. The following plants of economic importance and of botanical interests were exhibited by the Lloyd Botanic Garden, Darjeeling, in the last All-India Exhibition held during February 1948 at Eden Garden, Calcutta.

38. *Cyphamandra betacea*, *Citrus auranteum* var. *sinensis*, *Sechium edule*, *Aleurotes iordii*, *Alnus nepalensis*, *Cryptomeria japonica*, *Thea sinensis*, *Eleusine coracana*, *Coffea arabica*, *Fagopyrum esculentum*, *Dichroa febrifuga*, *Rubia cordifolia*, *Viscum articulatum* var. *dichotoma*, *Hydrocotyle javanica* var. *podantha*, *Mentha arvensis*, *Polygala arillata*, *Elettaria cardamomum*, *Juniperus recurva*, *Rheum emodi*, *Trachycarpus martiana*, *Phormium tenax*, *Taraxicum officinale*, *Nepenthus khasiana*, *Luculia gratissima*, *Ephedra vulgaris*, *Brunfelsia (Datura) stramonium*, *Lobelia pyramidalis*, *L. inflata*, *Cinchona ledgeriana*, *TJragoga (Psychotria) ipecacuanha*, *Pyrethrum roseuni*, *Berberis umbellata*, *Saxifraga legulata*, *Swertia Chirata*, *Acorus calamus*, *Alium* sp., *Martricaria chamomilla*, *Aeonitum luridum*, *Cyathea spinulosa* and *Sphagnum* moss.

39. In addition to these plants of commercial value, the following flowering plants of horticultural value were also exhibited at the Exhibition. These include high altitude plants of *Chrysanthemum leucanthemum*, *Primula sinensis*, *P. acaule*, *P. japonica*, *P. petiolaris*, *Cymbidium grandiflorum*, *Hoya lanceolata*, *H. fusca*, *Pentapterygium serpens*, *Meconopsis wallichii*, *Narcissi*, *Cyclamen persicum*, *Begonia* sp., *Camellia japonica* (red & white), *Azalia* sp., *Lycopodium clavatum*, *L. lycopersicum*, *Saxifraga legulata*, *Cyripedium fairieanum* and others. 9

40. Seeds were supplied and received from various correspondents in India and abroad: T. Tang, Esq., National Bureau of Forest Research, Weagon, Nankin, China, was supplied with 82 packets seeds; Prof. Blakesley, Smith College, Northampton, Department of Botany, Massachusetts, U.S.A., with one packet seeds *Brunfelsia (Datura) Sauveolens*; H. Jungbauer, Esq., Vienna, Austria, with 188 packets seeds; Mr. K. Landy, Austria, with one packet seeds of *Lilium giganteum*; Col. D. Lowndes, Lansdowne, TT. P., with 20 packets alpine seeds; Tobacco Research Station, Gantur, with one packet seeds of *Evodia fraxinifolia*; the Director, Indian Agricultural Research Institute, Jfew Delhi, with one packet seeds of *Pueraria phaseoloides* for the cultivation of leguminous plants; the Superintendent, Royal Botanic Garden, Calcutta, with 3 packets seeds of *Gegonia megaptera*, B.sp., and *B.semperflorens* for Flanders Farm, New Jersey; Administra Zonic Fratella, Bornea, Miland (Italy), with 26 packets seeds; Flander3 Farm, New Jersey, with further consignment of 6 packets seeds of different species of *Begonia*; E. J. Stregnell, Esq., State Forest Officer, Perak, Malaya, with one packet seeds of each *Alnus nepalensis* and *Bucklandia populnea*; and James O# Boyle, Esq., Kellala, County Mayo, Eire, with 39 packets seeds of flowering trees and shrubs.

41. One packet of seeds of *Podophylluin emodi* was received from the Forest Manager, Sikkim State, for distribution to other institutions; 9 packets were received from Mr. S. P. Lancaster, Calcutta, through the Superintendent, Royal Botanic Garden, Calcutta, and these were sown in the nursery, and the following germinated: —

*Achillea borealis* sub-sp. *arenicola*, *Brunella vulgaris* var. *lanceolata*, *Erysemum capitatum*, *Fraxinus oregona*, *Godetia whitney* and *Lupinus arboreus*.

One packet of seeds of a new species of Chinese tree named *Metasequoia glyptostroboides* HN. et Chung was received from the Superintendent, Royal Botanic Garden, Calcutta. These seeds were sown in the nursery, and they showed good result of germination. This new pine was introduced for the first time in India. It is a valuable acquisition to the Indian Flora from the neighbouring country. One hundred and eighty packets of seeds were received from the Universiteteta Botaniska Tratgard, Upsala, Sweden, through the Superintendent, Royal Botanic Garden, Calcutta. Most of the seeds were sown in the nursery, and 80 per cent, germination was successful.

42. Mr. G. H. Cave, a former Curator of this garden, paid a visit here after retirement of 22 years. He subsequently proceeded to Lonak Valley in Northern Sikkim for botanical finds, and from a 3-week tour he brought back about 200 specimens and packets of seeds. He very kindly gave one-third of his collections to the garden. A list of names of majority of specimens contributed by Mr. Cave was received from him from England.

43. There were not many plants put out in the "Sir John Anderson Rock Garden" during the year under review. Apart from renewals, a few introductions were tried, but the abnormal dampness caused severe losses. Some alpine seeds received from Kashmir were successfully germinated and such plants as *Salvia hiens*, *Gentiana moorcroftiana*, *Androsace sarinentosa*, *Cortusa mathioli*, *Aremaria foliosa* and *Wolfinia* were successfully cultivated, while others unfortunately died through excessive rain. *Primula rotundifolia*, *P. vaginata*, *P. geranifolia*, *P. petiolaris*, *Saxifraga legulatu* (red), *Meconopsis horridula*, *Potentilla ambigua*, *Ranunculus* sp., *Trollius pumilus*, etc., collected from Changu, Sikkim, during the Superintendent's\* tour in that area in May 1947, were cultivated with success and many flowered here during the spring.

44. In the course of years it is evident that through world exchange of seeds the stocks in the Botanical Garden must necessarily increase, and in the light of this evidence the present Rock Garden is specially in urgent need of a further extension. The introduction of alpine flora is continually being enhanced and it is now hardly possible to accommodate these increases in the present limited area. There is room for an extension, and a small grant for the purchase of boulders, sand and rubble would immediately enable this extension to be carried out, and thus relieve the congestion. Annual excursions for collections from alpine regions, receipts of seeds from Foreign Botanical and Horticultural Institution,\* and collections from local sources all add greatly to the problem of cultivation space.

45. Attention was paid to the general improvement of this garden as usual. Different species of alpine and sub-alpine plants were planted and replaced in their respective natural order beds. Labels were repaired or re-written where necessary. A few beds were extended on the western side of the garden, and planted out with economic plants in the students' garden, viz., *Atropa acuminata*, *Acorus calamus*, *Swertia chirata*, etc.

46. Eighty-nine thousand nine hundred and twenty-three visitors, as recorded by the Durwans, visited the garden during the year. His Excellency Sri C. Rajagopalachari, Governor of West Bengal, visited the garden on the morning of 23rd October 1947. He was taken round the garden by the Curator. Necessary facilities and help were extended to other visitors interested in plants, gardening, and in other subjects relating to horticulture and agriculture.

47. A fair number of specimens, collected in and round the garden, were made into authentic sheets, and these sheets are ready for despatch to the Royal Botanic Garden, Calcutta, for their identification and confirmation. It will add to the treasure of the existing local Herbarium when these sheets will be identified and lodged in a separate rack of the local Herbarium of the garden consisting of specimens of the garden and its neighbourhood.

48. **Staff.**—Mr. J. A. Hulbert was the Curator throughout the year.

### CALCUTTA GARDENS—1.

49. The display of winter annuals was on the whole quite up to the standard in spite of adverse weather condition prevailing during the year under report. Flower pots were displayed in vantage grounds of the garden till the end of January when they had to be brought to the nursery due to

the construction of the All-India Exhibition at the Eden Gardens where mass display of the annuals was supplemented by the stock of the Eden Gardens. Plants were also liberally supplied for decorating many stalls put up by Government and semi-Government institutions. The normal garden work of the Eden Gardens except cleaning operation and general upkeep was practically suspended during the period of exhibition. Hedges and plants were destroyed in spite of our repeated and fervent appeal to the Exhibition authorities and contrary to the conditions laid down for holding the exhibition. The condition of the garden lake was also rendered insanitary by dumping refuse matters and letting into the lake waste dirty waters from the restaurants in and around the lake.

50. The ride and the lawns which were just renovated from the funds received from the American Army were again rendered utterly out of order. It is, however, hoped that the garden will soon be released and funds will be available for restoring such a beauty spot in the heart of the city which serves as the lung of this one of the largest cities of the world. Nevenhe-Joss opportunity was taken to divert the labour force of the Eden Gardens to the cleaning up of the Dalhousie Square and Curzon Gardens. In the former, after fixing up of the railings replanting of the hedges along the railing with the new ornamental shrubs, repair, work of the roads and replating of the Camera beds over the sloping sides of the tank was completed and thus much progress was done towards the general improvement of the garden during the year.

51. The nuisance created by the mobile hawkers in the two gardens was kept under check as far as possible. There were fairly good flowering of Dahlia, Asters, Phlox, Betunias, Cosmos and other annuals.

52. The store rooms and the malis' quarters on the north-western corner of the garden were completely burnt as a result of an accidental fire caused by a flying cracker falling on the thatched roof of these huts, fortunately there was no casualty but all the inmates were rendered peniless and without any shelter for sometime. Prompt Government aid and quick restoration of the hut relieved their distress. It is hoped that in near future these quarters will be made pucca and will thus be rendered free from such eventualities.

53. Stock of orchids, ferns, caladiums, crotons, and other stove plants in the orchid house were attended. Annual repairs and painting of benches, notice boards and seed vats were done as usual.

**Staff.**—Jonab G. Mohiuddin was the Assistant Curator up to 14th August 1947. Jonab Fazlul [Karim was Overseer till 14th August and Sri B. C. Sarker held the post with effect from 15th August 1947.

### 1947-48.

#### Botanical Garden and Other Public Gardens.

Budget Head.	Budget Grant.		Expenditure.	Saving.	Excess.
	Us.	Rs.			
1. Pay of Officer ..	..	13,870	13,751	119	..
2. Pay of Establishment ..	..	19,415	20,448	..	1,033
3. Allowances, honoraria, etc...	..	14,215	14,392	..	177
4. Contract Contingencies ..	..	1,01,800	1,00,081	1,719	..
a. Other Contingencies ..	..	15,000	15,075	..	75
		<u>1,64,300</u>	<u>1,63,747</u>	<u>1,838</u>	<u>1,285</u>





सत्यमेव जयते

**Government of West Bengal**

Annual Report of the Indian  
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# Annual Report of the Indian Botanic Garden and the Gardens in Calcutta and of the Lloyd Botanic Garden, Darjeeling for 1949-50.

## INDIAN BOTANIC GARDEN.

**Change of title.**—The name of the Royal Botanic Garden, Calcutta, was changed to the Indian Botanic Garden, Calcutta, with effect from the 26th January 1950, the inauguration day of Indian Republic.

**General staff.**—Dr. K. Biswas, M.A., D.Sc. (Edin.), F.R.S.E., F.N.L., F.B.S., held the charge of the Superintendent and Dr. S. K. Mukherjee, M.Sc., Ph.D. (Edin.), F.B.S., was the Curator of the Herbarium throughout the year. Jonab G. Mohiuddin carried on the duties of the Curator of the Garden throughout the year in an officiating capacity. Shri S. N. Mitra, M.Sc., carried on the duties of the Assistant Curator of the Garden up to 31st August 1949 in an officiating capacity, after which his services were placed at the disposal of Damodar Valley Corporation, Ltd. Shri Sukumar Banerjee, B.Sc., Overseer, Government Gardens, Calcutta, was posted at Royal Botanic Garden, Calcutta, with effect from 29th April 1949 as Overseer and carried on the duties of the post in an officiating capacity up to 31st January 1950, after which he was appointed to the post of Assistant Curator of the Garden in an officiating capacity and carried on file duties of the post for the remaining period of the year. The post of Overseer remained vacant from 1st April 1949 to 28th April 1949 and again from 1st February 1950 to 31st March 1950 and that of the Assistant Curator remained vacant from 1st September 1949 to 31st January 1950. Shri Ashutosh Banerjee was the Head Clerk throughout the year.

The Superintendent continued to be the Honorary Lecturer in Botany of the Calcutta University and All-India Institute of Hygiene and Public Health as in the previous year. He was again elected President of the Botanical Society of Bengal for the year 1950. The Superintendent also presided over the Symposium on "Food and Population" organised by the UNESCO held under the auspices of the Botanical Society of Bengal and inaugurated by Hon'ble Shri P. C. Sen, Minister, Food and Agriculture. The Superintendent was a member of the Sub-Committee of the Indian Medicinal Plants Committee. He attended also the meeting of the Essential Oil Committee on the same date and submitted his report on the results of his botanical and chemical investigation of roses carried on under his guidance.

**Exploration.**—Field study and collection work of botanical species from the different parts of the country during the year was satisfactory. The total number of specimens collected for the Herbarium during the tours amounted to over 7,000. Most of these were examined, sorted out, classified and named. Seeds and seedlings of many rare plants of medicinal, economic and horticultural importance were brought from the Subalpine and Alpine Zones of the eastern border of Sikkim and Tibet. Two insectivorous plants from Santinikatan and several unrecorded species and drug plants were also brought from Satpura Hills.

Scientific workers and distinguished visitors.—The second batch of trainees under the Government of India Training Scheme in Systematic Botany and Taxonomy completed their training in July 1949. Two students of the third batch received the training at the Herbarium up to 30th September 1949 after which they were transferred to Dehra Dun. Dr. K. Jacob and Mr. R. N. Srivastava of the Geological Survey of India worked in the Herbarium in connection with determination of some fossil flowering plants. Mr. M. B. Raizada,,

Systematic Botanist, Forest Research Institute, Dehra Dun, paid his usual yearly visit to the Herbarium and worked for a week to ascertain the systematic position of some of the doubtful plants. Sri S. K. Mukherjee, Assistant Botanist, Sugarcane Breeding Station, worked here for identification of specimens of *Saccharum* and allied genera. Dr. J. C. Sen Gupta, Head of the Department of Botany, Presidency College, Calcutta, got a large number of his algal specimens identified by the Superintendent. Syed Bazley Ali, Lecturer in Botany, Dacca University (East Pakistan), examined the Herbarium sheets and consulted relevant literature in connection with his work on Agaves of India. Shri S. V. Maitra, Botanist and Soil Conservation Officer, Santinekatan, Bolepur, worked out his specimens and took notes from the literature. Dr. H. L. Chakravorty continued his taxonomic researches on the Indian Cucurbitaceae and Passifloraceae. All the fresh specimens of plants brought by Mr. C. A. Rylands, Lecturer in Sanskrit, University of London, were named and he was also supplied with coloured pictures of some of the common flowering plants mentioned in Sanskrit literature. Mr. J. Sinclair, Curator of Herbarium, Royal Botanic Garden, Singapore, examined the collection of Annonaceae of India and Malaya Peninsula. Mr. H. R. Malik of the Agriculture Department, Dacca, studies the weeds of Eastern Pakistan. Mr. G. N. Sanyal, Chemist, Shalimar Paints, Calcutta, was supplied with informations on *Sapium sebiferum* the seeds of which yield an oil similar to linseed oil. Mr. A. K. Paul, Research Assistant to Economic Botanist, Government of West Bengal, studied *Coix Lachryma-jobi*. Mr. G. P. Mitra of Government Agricultural Farm, Chinsurah; Mr. R. Seshagiri Rao, Lecturer of Botany, P. R. College, Coconada; Mr. K. N. Dutta of Tocklai Experiment Station; Mrs. Promila Bose, Lecturer in Botany, Bethune College, Shri D. K. Dutta; Shri R. P. Nath; Dr. Gokul Chandra Sing Roy; Miss Tara Mitra; Shri A. K. Sarma; Shri S. Banerjee and Shri P. C. Sen came to the Herbarium and consulted literature in the library.

His Excellency Dr. Kailas Nath Katju, the Governor of West Bengal, paid a visit to the Garden and Herbarium on 11th March 1950. Dr. B. C. Mukherjee, the Hon'ble Chief Minister, West Bengal, inspected the Herbarium and discussed with the Superintendent possibilities of extension of the present Herbarium building with a view to relieve congestion and accommodating the specimens properly. Shri H. C. Naskar, Hon'ble Minister, Forests and Fisheries, paid visits to the Garden on two occasions and scrutinised various work of construction and repair of plant and hot houses. Shri Jaglal Chowdhury, Hon'ble Minister, Agriculture, Bihar, during his visit showed keen interest in the Garden and the Herbarium.

The foreign scientists of worldwide fame who were delegates to the 37th Session of the Indian Science Congress paid a visit to the Garden. Among them were Dr. (Madam) J. Juliot Curie, F.R.S., N.L., Professor of Chemistry, University; Dr. F. Juliot, F.R.S., N.L., Professor of College of France; P. J. Bernal, F.R.S., University of London; Sir Robert Robinson, President, Royal Society of London and Lady Robinson; Professor A. W. Ashby (Agricultural Economist), University of Oxford; Dr. and Mrs. S. Trone; Dr. W. Engelhardt and Dr. V. Butrova of the Academy of Sciences, Moscow, U.S.S.R.; Professor P. S. Moholanobis, F.R.S., General President of the 37th Session of the Indian Science Congress; and Mr. Peter Koinange, East African delegate, admired the Garden. They appreciated the research work done in the Garden and the Herbarium. Mr. H. C. Fin, Science Co-operation Officer, UNESCO, Delft, came with Mr. T. H. Wu and Mr. W. H. Lee of the Chinese Consulate-General office, Calcutta. The Egyptian delegates consisting of Dr. M. Bahgat, Mr. Mahamed Drar, Mr. R. A. Q. Fatty and Mr. I. M. Ismail paid two visits to the Garden, in connection with the exchange of plants and plant materials with this Garden. Mr. Drar examined the specimens of *Acacia* and literature on Egyptian flora. Mr. R. Du Posquier, Director of Agriculture, Indo-China; Mr. Y. Coyaod, Director of Office due Riz., Saigon; Mr. Bernard Fontam,

Chief du Service, Indo-China; Professor F. E. Zeuner, Institute of Archaeology, London University; Mr. John Moffit of New York, U.S.A.; Dr. Gustaf Ailing, M.D., of Hoquas, Sweden; Mr. Moris H. Hansen, Assistant Director, U. S. Bureau of Census, Washington, U.S.A.; Mr. S. A. Hameed, Director of Statistics, Ministry of Food and Agriculture, W. Pakistan; Professor R. Henkel, Kabul University, Afghanistan; were some of the other foreign visitors to the Garden.

The members of the All-India Council of Technical Education headed by Sir J. C. Ghose; Dr. J. N. Mukherjee; Mr. H. Tarporwalla; Mr. P. N. Joshi; Mr. S. Ratnam; Mr. V. S. Jha and others; Professor P. Parija, Pro-Vice-Chancellor, Benares Hindu University; Dr. B. B. Mundkar, Plant Protection § Adviser, Government of India; Lady Ranu Mukherjee, Calcutta; Dr. D. D. Saigal, I.F.S., Project Officer, C.W.I.N.S.; Mr. M. D. Chaturvedi, I.F.S., Inspector-General of Forests; Mr. J. Banerjee, I.F.S., Deputy Inspector-General of Forests; Mr. A. C. Ganguly, i.c.s.; Mr. S. Ranganathan, President, Indian Library Association; Dr. E. K. Janaki Amal, Adviser on Food Production, Government of India; and Dr. H. K. Ray, Officer-in-charge, Parasitological Section, Indian Veterinary Research Institute, Mukteswar, were the other distinguished visitors of the Garden during the year.

**The Gardens.**—The Garden work continued in the usual manner and some minor improvements were done by taking more effective measures for protection of the Garden, maintenance of the road and overhauling of the stock of plants in the nurseries, palm houses, orchid, fern and cactus houses.

A good deal of road repair work was undertaken and completed during the year under review.

Wallich Avenue—100,520 s. ft. (including junction of Wallich, Kyd and Hamilton Avenue), Hamilton Avenue—15,454 s. ft., Wight Avenue—59,125 s. ft. were repaired.

The display of the annuals in the vantage spots of the Garden was less attractive, and the standard of the flowers was also not quite up to the mark on account of the late receipt of the seeds through the Customs formalities. Heavy rains in Autumn did much damage to the seedlings both imported and indigenous. Nevertheless, most of the annuals except Dahlias came out well and presented a fairly good show.

The following plants were planted out in the open:—

*Artocarpus integrifolia*—(3), *Mangifera indica*—(2), *Tectona Grandis*—(4), *Citrus medica* (kagji)—(2), *Citrus medica* (pati)—(1), *Citrus decumana*—(2), *Eugenia Jambolana*—(2), *Eugenia Javanica*—(2), *Eugenia malaccensis*—(5), *Nephalium litchi*—(4), *Nephalium longana*—(2), *Vitex peduncularis*—(1), *Sesbania grandiflora*—(5), *Nyctanthes Arbor-tristis*—(13), *Michelia Champaca*—(1), *Eugenia Jambolana*—(2), *Anthocephalus Cadamba*—(1), *Aegle Marmelos*—(15), *Psidium Guajava* (seedless)—(2), *Cinnamomum Camphora*—(1), *Swietenia Mahagoni*—(17), *Cassia Siamea*—(1), *Swietenia macrophylla*—(11), *Sterculia alata*—(4), *Ficus Benjamina* Var *comosa*—(5), *Saraca indica*—(2), *Brownea hybrida*—(1), *Amherstia noblis*—(3), *Ficus Roxburghii*—(1), *Casuarina equisetifolia*—(12), *Labormia Bojerii*—(3), *Sterculia villosa*—(1), *Sterculia Colorata*—(2), *Anona reticulata*—(1), *Couroupita guianensis*—(1), *Justicia Ventricosa*—(1), *Shorea robusta*—(1), *Antidesma Buniis*—(1), *Ardisia humilis*—(1), *Cochlospermum Cossypium*—(1), *Gardenia Lucida*—(1), *Butea frondosa*—(1), *Clausena wampii*—(1), *Sterculia Roxburghii*—(1), *Erioglossum Edule*—(1), *Hamelia patens*—(3).

The following plants were planted either in large palm house, orchid house and small palm house:—

Licuala spinosa—(24), Livistona rotundifolia—(94), Livistona chinensis—(30), Thrinax barbadensis—(26), Actinophloeus MacArthurii—(22), Luma grandis—(20), Chrysalidocarpus lutescens—(37), Oreodoxa regia—(13), Elaeis guineensis—(5), Dypsis madagascariensis—(4), Dracaena of sorts—(15), Croton of sorts—(15), Pandanus odoratissimus—(6), Begonia Sp.—(15), Cinnamomum Zeylanicum—(2).

Besides others the seedlings of the following plants were raised from seeds to meet the demand of the public:—

Kleinhovia Hospita, Putranjiva Roxburghii, Albizzia Richardina, **Peltophorum** ferrugineum, Pithecolobium dulce, Lagerstromia **Flos** Reginae, Albizzia lebbek, Dalbergia latifolia, Dalbergia lanceolana, Tectona grandis, Swietenia Mahagoni, Swietenia macrophylla, Casuarina equisetifolia, Cassia Fistula, Cassia Siamea, Lagerstromia parvifolia, Cassia nodosa, Shorea robusta, Dolichandrone Stipulata, Hopea odorata, Bauhinia, purpurea, Pterospermum acerifolium, **St. cr.** culia alata, Terminalia Bellerica, Acacia leaefolia, Thevetia neriiifqua, Baphia nitida; Amoora Rohituka, Albizzia lucida, Tamarindus indica, Heterophragma adenophyllum, Thespesia populnea, Bombax malaDaficum, Myroxylon Pereirae, Livistona rotundifolia, Oreodoxa regia, Licuala grandis, Eugenia Jambolana, Delonix regia, Schleicheria **trijuba**, Bursera sarata, Polyalthia longifolia, Santalum album and Artocarpus integrifolia.

About 900 cuttings, 2,010 layerings and 4,140 gootis of defferent plants were raised for propagation. In the Economic Garden vegetables were grown and the produces were sold to the labourers at fair prices. About 165 packe weighing 65 lbs. of micellaneous seeds were sown in the nurseries.

Proper attention was paid for its maintenance and improvement of **the** Student Garden. Special care was taken as usual to protect the **ex\*en^** branches of the Great Banyan and taking down new aerial roots across the Banyan circle.

**Nursing of "Bo" plants.**—The saplings of the historical plants which were sent to the Garden for proper nursing developed vigorously and are kept in excellent condition awaiting transplantation.

• The following orchids were in flower:—

Epidendrum atropurpureum, Cattleya portia, Cattleya montana, Cattleya trianae, Cattleya Guttata var Leopoldii, Cattleya attalanta, Oncidium Luridum, Cyripedium insignii, Cyripedium concolor Dendrobiui\*<sup>1</sup> Williamsonii, Dendrobium ochreatum, Dendrobium nobile, Dendrobium formosum and Eria flava.

Distribution and exchange of plants.—About 514 plants were despatched to the public or Government Institutions in India. Sixty-one plants were received from two Compaines in India. Nearly 64§ packets of seeds of different species were distributed to different parties in India and abroad. Ninety-four packets of seeds of different species were received on exchange basis from different botanical gardens and institutions mainly from countries overseas. These seeds were sown in the nursery with proper care and up-to-date results of the seeds which germinated were recorded.

Five hundred and fifty-two garden labels, 125 small labels for exhibition and 355 small labels for green houses were written. Naming and identification of

unknown and unnamed plants of the Garden were continued. Systematic serial numbering and identification of all the shrubs and trees of the Garden made satisfactory progress.

Fresh botanical specimens were supplied to different Colleges in Calcutta and mufassil for demonstration, practical examinations and research purposes. Barks, roots, leaves and stems of different species of plants of medicinal and economic value were supplied to the public. In the annual general meeting of the Royal Asiatic Society and in the exhibition of the Bengal Botanical Society, this Garden displayed flowering annuals and various medicinal, insectivorous and other rare plants of botanical interest for the benefit of students and interested public.

Finance.—The receipts of the Directorate during the year amounted to Rs. 961. Total expenditure of the Directorate under all the heads amounted to Rs. 3,66,818 (unverified figure) against the total grant of Rs. 3,67,660, leaving a small saving of Rs. 842. Rs. 2,50,114, Rs. 80,020 and Rs. 36,684 were spent for Indian Botanic Garden, Calcutta, Government Gardens, Calcutta, and Lloyd Botanical Garden, Darjeeling, respectively.

Herbarium identification.—Total number of specimens identified during the year was 4,183 of which 2,065 specimens were sent by extra-departmental clientele and the rest were those collected by the staff during the tour in different areas. The bulk of the specimens that were sent by our correspondents, consisted of 665 specimens from P. R. College, Coconada, 202 specimens from the Presidency College, Calcutta, 169 specimens from Gauhati University and 151 from Tea Experiment Station, Tocklai, Assam. Mr. K. N. Chowdhury, Forest Utilisation Officer, \*West Bengal; Mr. M. B. Raizada, Systematic Botanist, Forest Research Institute, Dehra Dun; Professor A. C. Dutta of Cotton College, Gauhati; Dr. B. C. Kundu, Director, Indian Central Jute Committee; Government Mycologist, Agricultural College and Research Institute, Coimbatore; Sugarcane Specialist, Bihar, Pusa; Dr. H. C. Chowdhury, Special Officer, Potato Research, West Bengal; Dr. R. Misra, Head of the Department of Botany, Saugor University; Rai Bahadur B. S. Nirody of India Institute of Science, Bangalore; Mr. D. Awasthy, Botanist, National Botanic Garden, Lucknow; Divisional Forest Officer, Burdwan; Divisional Forest Officer, Midnapore, were among others who had their specimens identified from the Herbarium.

Information supplied.—The Superintendent sent a note to the Secretary, Ministry of Agriculture, Government of India, giving his views towards the effective linkage of research with production. In this note he stressed the need particularly on dissemination of the results of scientific experiments in India and abroad not only to the general public but more to the tillers of the soil by preparation and free distribution of pamphlets written in simple language of the different provinces in India and by sending technical experts into remote corners of the country for associating themselves with the local people in order to enlighten them on the latest results of researches by way of friendly conversations and popular talks. The Supply and Movement Officer, Ministry of Agriculture, Government of India, was furnished with a note on the life history, place of origin, etc., of Algal species of the Genus *Chlorella*, supposed to be a substitute food especially for cattle. After careful scrutiny of the possibilities of its culture in India the Superintendent declared it to be unsuited for the purpose. The Ministry of Agriculture, Government of India, were furnished with suggestions for the botanical exploration and field study of the territories of Afghanistan and Nepal. The Superintendent sent his views to the Secretary, Film Enquiry Committee, Ministry of Information and Broadcasting, Government of India, in connection with the film enquiry and in another note he submitted his views regarding the rewriting of the Indian Floras. Where he expressed his considered opinion that the work should be taken up immediately under the guidance of the Director, Botanical Survey of India.

Mr. B. B. Neogy, Director, Albert David Co., Ltd., Calcutta, was advised to carry on research with *Stephania Japonica* Miers. which is available in the temperate and tropical Himalayas and Assam and which may prove to be a remedy of pulmonary tuberculosis. A Biographical note of Dr. Nathaniel Wallich, one of the Superintendents of the then Hon'ble East India Company's Garden, was sent to the Director, Rothschild Hospital, Haifa. Information about the plant collectors in Nepal and the literature on the flora of that area was sent on request to Mr. J. G. Srivastava of T. N. J. College, Bhagalpur. The Secretary, National Institute of Science, India, was furnished with a note on the history, scope, achievements, etc., of the Botanical Survey of India. The Assistant Conservator of Forests, Galle, Ceylon, was furnished with detailed note on the distribution of a few species of *Rhododendron* and of certain South Indian plants and their associates. Full particulars about "Dill Seed" were supplied to Messrs. Indo Tea Company, Calcutta. Information regarding cultivation, propagation, etc., of Litchi plant, and reference to literature were sent to Assistant Plant Pathologist, Department of Agriculture, California. The Deputy Director of Plant Diseases and Seeds, New Delhi, was furnished with the common names and flowering time of 24 species of plants. Information regarding the oil content in the kernel of the fruits of the oil palm-*Elaeis guineenses* Jacq. was sent to the Secretary, Royal Agri-Horticultural Society of India. Information about the vernacular names of 7 medicinal and insecticidal plants and their distribution in Pakistan were supplied to the Lecturer in Botany, University of Dacca. Mrs. Davi Hmi, Calcutta, was furnished, in compliance with her request, the Burmese names of 8 medicinal plants of Burma. Information regarding habit and habitat of *Crotalaria anagyroides* H. B. & K., its mode of cultivation, sowing and harvesting seasons, availability, uses, etc., was furnished to Messrs. Globe Nursery, Calcutta. Major L. M. Gibni, French' Army Analytical and Pharmaceutical Chemist, Pondicherry, was furnished with a list of Saponin-yielding Indian plants. Valid names and authors of several species of plants were furnished to the Curator of Herbarium, Botanic Garden, Singapore. Short descriptions giving the diagnostic characters of *Datura innoxia* Mill, and *D. metel* Linn, were supplied to Professor N. A. Quazilbash, Islamia College, Peshawar, West Pakistan. Information regarding the chemical analysis of the fruits of *Enterolobium saman* Prain was sent to Mr. Aung Khei, Lecturer in Chemistry, University of Rangoon. Dr. J. C. Sen Gupta, Head of the Department of Botany, Presidency College, Calcutta, was furnished with a note giving the original description of the jute plants—*Corchorus capsularis* Linn, and *C. olitorius* Linn, and their original home. Information on authentic nomenclature, uses, distribution and descriptions of plants, reference to literature and various other matters was also furnished to the undernoted persons :—

The Entomologist, West Bengal; the Secretary, Indian Council of Agricultural Research, New Delhi; the Sugarcane Specialist, Bihar, Pusa; the Government Lecturer and Systematic Botanist, Agricultural College, Coimbatore; Dr. S. R. Sen Gupta of Army Research Centre, Cawnpore; Mr. W. Wight, Botanist, Tea Experiment Station, Tocklai; Dr. H. C. Chowdhury, Special Officer, Potato, West Bengal; Mr. B. N. Johri of the Department of Botany, Delhi University; the Advisory Officer, Indian Tea Association, Kurseong; Captain F. Kingdon Ward, Botanical Explorer; Mr. R. S. Rao, Lecturer in Botany, P. R. College, Coconada; the Forest Botanist, Forest Research Institute, Dehra Dun; the Horticulturist, Angul; the Curator, Industrial Section, Indian Museum; the Director, Hazelwood Brothers, -Epping, N.S.W.; Messrs. Indian Economic Products, Amritsar; the Subdivisional Agricultural Officer, Krishnanagar; Mr. A. Dahomi of Colombo, Ceylon; Mr. D. Satyanarayana, Supervisor, Co-operative Societies, Vizagapatam; Dr. Janaki Amal, Advisor on Food Products to Government of India; Mr. S. Mitra, Criminal Bar Association, Contai; the Conservator of Forests, Western Circle, Central Province and Berar; and a few others.

**Distribution.**—Duplicates of our collections were sent to the Herbarium, the National Museum, Manila; the Phillipines (200 specimens); the West Virginia University, Morgantown, U.S.A. (100 specimens); and the National Botanic Garden, Lucknow (100 specimens). Spores of 18 species of Ferns were supplied to Dr. B. T. Cromwell, University College, Hull, England, and spores of 3 Ferns were supplied to Professor W. Dopp, Marburgh, Germany, for his investigation on the life history of Ferns. Leaves and germinating fruits of *Avicennia officinalis* Linn, were sent to Professor of Botany, Auckland University College, New Zealand, for his research. A specimen of *Engelhardtia acerifolia* Bl. was sent to Professor of Botany, Bucknell University, Pennsylvania, U.S.A. One sheet each of *Euphorbia pilulifera* and *Anamirta cocculus* were sent to Messrs. Indian Economic Products, Amritsar. Two mounted sheets of *Cephalis ipecacuanha* A. Rich were sent to Capt. S. M. H. Shah, V. P. College of Veterinary Science and Animal Husbandry, Muttra. One sheet each of *Holboelia latifolia* and *Decaisnea insignis* were supplied to Professor Ing. Armando T. Hunziker of Argentina. Four mounted sheets of Ferns and Mosses and two sketches of one of a Fungal and the other of an Algal specimens were supplied to Mr. M. S. Subramaniam of Madras.

Small quantities of seeds of *Apium graveolens* Linn, and *Carum Roxburghianum* Bth. were supplied to Mr. D. D. Awasty, Botanical Assistant, National Botanic Garden, Lucknow, in compliance with his request. Specimens of Ergot of Rye, procured from Coimbatore Agricultural College, were supplied to Dr. T. Kawatani, Director, Experimental Farm, National Hygiene Laboratory, Japan. A few fruits of the largest variety of Chebulic Myrabolan, obtained from the District Forest Officer, Nilgiris, Ootacamund, were sent to the Political Officer, Sikkim, in compliance with his request.

**Acquisition.**—Additions to the Herbarium from gifts and exchange amounted to 301 specimens and 6 photographs. One hundred and forty-two specimens of Philippine plants came from the National Museum, Manila. Ninety specimens were received from the West Virginia University. Sixty-three specimens collected in Siam were sent by the Rijks Herbarium Leiden, and 6 specimens were presented by Forest Botanist, Forest Research Institute, Dehra Dun. The 6 photographs were photos of the types and co-types of 6 species of *Dipterocarpus*. Some specimens of Algae were collected and sent by Shri S. C. Maitra, Soil Conservation Officer, Santiniketan, for the Superintendent's research.

**Loan.**—Sheets that went out on loan from the Herbarium amounted to 451 sheets for research workers in institutions in India and abroad. Of these 236 sheets went to Botanic Garden, Singapore, and 107 sheets went to Botanic Garden, New York. Seventy-one sheets were sent to Systematic Botanist, Forest Research Institute, Dehra Dun. Two sheets were sent to the Director, Drug Research Laboratory, Jammu, Kashmir; 2 sheets to the Botanical Forest Officer, Shillong; 1 sheet to the Research Assistant to the Economic Botanist, West Bengal; and 1 sheet to the Principal, P. R. College, Coconada, in compliance with their requests. Sheets returned from loan during the year were 539 of which 283 were sent in the year before. We returned specimen of *Grewia* received on loan from the Agricultural College, Coimbatore, 1,084 sheets of *Grewia* and 1,404 sheets of *Dipterocarpaceae* were returned to the Herbarium of Forest Research Institute, Dehra Dun, and 20 sheets of *Moghania* to St. Xavier's College, Bombay. All these sheets were sent to this Herbarium in compliance with our request for taxonomic study.

**Stamping, incorporating, mounting, etc.**—Stamping and numbering of Herbarium sheets were continued and 28,596 sheets were stamped and numbered. Four thousand six hundred and three sheets were incorporated and 2,412 new specimens were mounted and 9,339 sheets were repaired during the



year. Fifty-five genus covers and 4,283 species covers were replaced by new covers, noting down the changes of nomenclature, wherever necessary.

The Systematic Assistant, Botanical Survey of India, and the staff of the Training Scheme rendered valuable help to the Curator of the Herbarium in carrying on the routine work of the Herbarium.

Scientific contributions.—The Superintendent's monograph entitled "The Common Fresh and Brackish Water Algal Flora of India and Burma with a catalogue of Indian Myxophyceae (Blue-green Algae), Chlorophyceae (Green Algae), Xanthophyceae (Yellow-green Algae) and Bacillariophyceae (Diatoms)" has been published in the Records of the Botanical Survey of India, Volume XV, Parts I and II. The Superintendent contributed an article entitled "Marine Algae and food problem" in Science and Culture, Volume 1, No. 8, 1949. Another article, viz., "In the Woods and Temples of South Burma" by the same author was published in the Puja Number of "Hindustan Standard," 1949. The speech on "Science and Culture" delivered by the Superintendent on the occasion of Jubilee Celebration of Bangabasi College was published in the Jubilee Commemoration number of the College in 1949. The printing of "Bharatiya Banaushadhi" in two volumes, a monumental work in Bengali on Indian medicinal plants by the Superintendent and Shri Ekkori Gnos is almost complete and is expected to be out of press during the year 1950.

The following papers by the Superintendent are passing through the press :—

(i) Microscopic Life Forms in Fresh Water—sent for publication in the Jubilee Commemoration Volume of the St. Paul's College, Calcutta. (ii) The Flora of the Science College, Ballygunj—sent to the Botanical Society of Bengal, (iii) The prospect of India Rubber and Para Rubber in India—publication in the Journal of the Scientific and Industrial Research. A paper entitled "Sub-alpine and Alpine vegetation of the Sikkim Himalaya" by the Superintendent was sent to the 37th Session of the Indian Science Congress. The Superintendent delivered a talk on "The Royal Botanic Garden, our National Garden" at the Rotary Club, Howrah, on the 5th May 1949, and contributed to the discussion on the Symposium on "Food and Population" at the Royal Asiatic Society of Bengal on 16th July 1949. At a meeting of the Botanical Society of Bengal held in the Presidency College on 21st December 1949 the Superintendent read a paper on "the Vegetation of the Eastern Himalayas". Another talk on "The Beautiful Flowers of Eastern Himalayas" was given by the Superintendent, illustrated by lantern slides at a discussion meeting of the Royal Asiatic Society of Bengal.

Library.—With the increased library grant it was possible to purchase £' books on Botany, Agriculture and other branches of biological science, subscribe for 24 Indian and foreign journals and periodicals. Eighty-five different periodicals were received in exchange and periodicals, pamphlet administrative reports and Index Semina, received as gifts from different institutions numbered 92 copies. Twenty-eight books of the library were repaired and bound by the staff of the Directorate and 77 volumes of different periodicals were bound at the office of the Superintendent, Government Printing, Bengal. Volume XIV, Part II of the Annals of the Royal Botanic Garden, Calcutta, was distributed to the recipients in India and to the overseas countries through the High Commissioner for India in London. One copy of Annals, Volume IX, Part II, was sold. Ten copies of the 150th Anniversary Volume of the Royal Botanic Garden, 4 copies of "Trees of Northern Bengal" by A. M. and J. M. Cowan, 3 copies of "A Guide to the Royal Botanic Garden, Calcutta", and one map of the Royal Botanic Garden, Calcutta, were sold.



HU Excellency the Governor of West Bengal, the Hon'ble Dr. B. C. Roy, Chief Minister, Darjeeling.



The Su|K-flhiiTn1fin. (nrtian Botanic Gardens, discussing wild (IK i~t|t| MuLitter ttbrjii the cultivation *ui* Intiir nf lite medicinal plants which can *Uttcutnutnt* strict. In the *Uttcutnutnt* init background 1 jitttrltr, Pyrethrum, Ilcllpdunns and t.obelia plants are seen tii pots.

## LLOYD BOTANIC GARDEN, DARJEELING.

The total rainfall recorded during the year was 133.90. The highest 36.59 inches reached during the month of July.

The rainfall was much above the average during the year under review, in consequence of which some of the rainy season annuals were not up to the high standard that this Garden generally displays. More attention was given to some of the usually waterlogged flower beds by deep digging and laying in 2-feet of bottom rubble, with a view towards better percolation for drainage. This proved successful with quite encouraging results. There was little or no respite from the wet weather, which commenced earlier in the year than usual, and much of the flower display generally beautiful in May was lost this year. The Dahlias, Salvias and Zinnias were, on the whole, healthier and more uniform this year, owing to the efficacy of "Gammaxine" insecticide, which was sprinkled and mixed in with the soil all over the beds prior to planting out the seedlings. For years cut-worms, ants and other insect pests destroyed great numbers of these plants during the rainy season, and though many methods had been regularly tried for counteracting this evil, nothing ever succeeded so efficiently and economically as "Gammaxine" powder. Only 1 cwt. of this insecticide was used for the whole garden during the year, with two six-monthly sprinklings, and this was sufficient to completely eradicate both cut-worms and ants—the two most prevalent and destructive pests common to horticulturists of the Darjeeling district. However, during the cold weather months, from October to March, the Garden was again very successful with late flowering masses of Dahlias, Tagetes, Zinnias, Salvias, Cosmos, dark-blue Dwarf Browallia, and Chrysanthemum, later succeeded by the Spring season-annuals, which gave an excellent display of colour, with Pansies, Ursina, Stocks, Silene, Azaleas, Calendulas, Sweet Peas, Russell's Lupins, Poppies, Echium, Cheiranthus, Myosotis, Candytuft, Schizanthus, Mimulus, Antirrhinum, Daisies, Larkspur, Allysum, Lilies of sorts, and other planted in a lesser degree as borders or in small beds. The climbing roses were beautiful during April and May and many new plants were put out to improve drab corners. All shrubs and smaller plants were again generously treated with manure and leaf mould, and the usual routine work of pruning, cleaning and tidying up of trees was done systematically.

The rains this year severely washed off the winter dressing of all roads and paths.

The following trees, having died, were removed and fresh seedlings put in to replace them where possible:—

*Cupressus lawsonia*, *Eucalyptus*, *Buddleia davidii*, *Indigofera dosua* and *Calliandra brevipes*. During the year these additional plants were put out: *Acer japonicum* (3), *Azaleas* (2), *Ardisia macrocarpa* (1), *Alnus nepalensis* (5), *Berberis* sp. (3), *Buddleia davidii* (1), *Callistemon rigidus* (1), *Calliandra brevipes* (1), *Daphne sureil* (2), *Forsythia suspensa* (1), *Hibiscus syriacus* (3), *Indigofera dosua* (1), *Jasminum* sp. (1), *Leptospermum scoparium* (1), *Magnolia cambellii* (1), *Magnolia globosa* (2), *Photinia* sp. (2), *Pinus* sp. (2), *Picea* sp. (2), *Skimmia laureola* (1), *Spiraea micrantha* (1), *Vaccinium serratum* (1).

Seeds and plant materials were distributed to fifteen recipients. Seeds of *Cedrus libani*, *Alnus nepalensis*, *Heptapleurum impressum*, *Pinus longifolia* (seedlings) were supplied to the Secretary, Royal Agri-Horticultural Society of India, Calcutta; seeds of *Alnus nepalensis*, *Dobinea vulgaris*, *Dichroa febrifuga*, *Erythrina ajijorensis*, *Impatiens balsamina*, *Leucoscepterum canum*, *Pentaptyxis stipulata*, *Polygala arillata*, *Sambucus niger*, *Saurauja nepalensis*, *Trachycarpus maritiana*, *Thunbergia lutea* and *Thunbergia coccinea* were supplied to

Mr. William Pemberton, Morden Park, Surrey, England; seeds of *Hypericum hookerianum* were supplied to Shri K. V. Srinath, M.Sc, Ph.D. (Lond.), Department of Botany, Central College, Bangalore; seeds of *Lactuca gxaciliflora* were supplied to Dr. B. P. Pal, M.Sc, ph.D., F.L.S., F.N.I., Head of Division of Botany, Indian Agricultural Research, India; twigs of Pine trees with Cones and Fronds of ferns of srots, with sori were supplied to the Principal, Bihar Veterinary College, Patna; Equisetum, with spikes were supplied to the Principal, Dinabundhoo College, 412/1, G. T. Road, Calcutta; dried bark of *Litsaea* was supplied to Professor R. Chatterjee, M.Sc, Department of Chemistry, Presidency College, Calcutta; 1 dozen seeds of *Hodgsonia heteroclita* was supplied to the Superintendent, Indian Botanic Garden, Calcutta; 1 packet *Magnolia stellata*, *Buddleia asiatica* & *B. intermedia* seeds, spores of some Ferns, viz., *Dryoptens* sp., *Aspidium auriculatum*, and seedlings of *Cinchona robusta*, *Primula melacoides*, *P. denticulata*, *P. petiolaris*, *P. sinensis*, *P. obconica*, *Lobelia inflata*, *Digitalis purpurea*, *Atropa belladonna*, *Daphne cannabina* were supplied to the Superintendent, Indian Botanic Garden, Calcutta; seeds of *Pinus longifolia* and specimens of *Holboelia latifolia* Wall and *Dcaisnea insignis* were supplied to the Curator, Herbarium, Indian Botanic Garden, Calcutta; specimens of *Cupressus govaniana*, *C. australis*, *C. macrocarpa*, *Podocarpus narifolia* and *Cryptomeria japonica* were supplied to the Principal, Bihar Veterinary College\* Pusa; specimens of *Cupressus australis*, *C. macrocarpa* and *Cryptomeria japonica* were supplied to the Director, Maharastra Association for the Cultivation of Science, Law College Building, Poona; dried roots'' of *Dichroa fabrifuga* were supplied to Mr. A. N. Halder, Gluconate, Ltd., 115, Prinsep Street, Calcutta; specimens of *Cupressus australis*, *C. govaniana*, *C. macrocarpa*, *Pinus sylvestris*, *P. patula*, *Cephalotaxus drupacea*, *Cryptomeria japonica* and *Abies webbiana* were supplied to Professor K. R. Mehta, M.Sc, Ph.D., Head of Department of Botany, Benares University, Benares; seeds of *Verbascum thapsus*, *Digitalis purpurea* and *Matricaria chamomilla* and dried materials *Atropa belladonna* and *Verbasoum thapsus* were supplied to the Director, Entr-eprise Saintaire E. T., Pharmacentique D'Etat, Sofia, Bulgaria.

Seeds of *Cedrus libani* were received from the Forest Botanist, Forest Research Institute, Dehra Dun; seeds of *Hodgsonia heteroclita* were received from Chandra Nursery, Sikkim; seeds of *Salvia moorcroftiana* were received from the Secretary, Agri-Horticultural Society, Alipore, Calcutta; seeds of *Baccharis palmifolia*, *Asclepias tuberosa*, *Sarracenia purpurea*, *Lobelia-syphy*<sup>ff''''</sup> ties, *Mina lobata* and *Ipomea* sp. were received from the Superintendent, Indian Botanic Garden, Calcutta; seeds of *Brosimum galactodendron* were received from the Curator, Industrial Section, Indian Museum, Calcutta; seeds of *PjJ*<sup>^s</sup> *longifolia* were received from the Range Officer, Darjeeling Range, Birch<sup>11111</sup> Darjeeling; seeds of *Araucaria bidwillii*, *Cedrus libani* were received fro<sup>1</sup> National Drug Corporation, Prem Nagar, Dehra Dun; seeds of *Hodgsonia heteroclita* were received from Standard Nursery, Kalimpong; plants of *Dendrobium formosum*, *D. ammoenum*, *Vanda teres*, *Dendrobium gibbsonii* were received from A. Rand, Esq., Duars; cuttings of *Buddleia* were received from G. H. Fothergill, Esq., General Manager, Mungpoo; plants of *Dendrobium falconerii*, *D. williamsonii* and seeds of *Rhododendron*, *Primula malacoides*, (*rubra*) were received from Shri B. Ghosh, Town End, Darjeeling.

Rock Garden.—The plants of *Alnus nepalensis*, a quick growing "Birch", which were put in around the southern end of the "Sir John Anderson" Rock Garden to shade this exposed area from sun and dry winds during the cold weather months now reached a size when their beneficial shade is now evidenced. For this year the plants were more verdant and their blooming better. The whole Rock Garden had been a success as usual, and fewer casualties occurred despite the excessive rain during the year. Owing to the possibility of congestion from introductions of newer plants a further extension has been added, a small area on the northern end and a larger one on the southern." These

were filled in with sub-alpine plants and were expected to be well established in another year's time. *Primula scapigera* and *P. edgeworthii* collected from Sikkim two years ago and gradually acclimatised here bloomed profusely this year. With careful nursing and sheltered accommodation in the Rock Garden these delicate plants from regions of 12,000 feet and more can be successfully cultured at this elevation of 6,500 feet. It is hoped that other beautiful and rare flowering plants of this nature will also lend themselves for acclimatisation and cultivation here if conditions can be made more adaptable by studied experiments. The following plants were planted out this year: *Achillea* sp. *Aubretias*, *Azaleas*, *Androsace hookeriana*, *Aquilegia olympica*, *Armeria formosa*, *Armeria pungens*, *Aster sikkimensis*, *Bupleurum candollii*, *Chrysanthemum corymbosa*, *Chrysanthemum balsamita*, *Dianthus allwoodii*, *Eryngium planum*, *Eryngium ferra*, *Francoa appendiculata*, *Gentiana moorcroftiana*, *Geranium wallichianum*, *Gilia densiflora*, *Heuchera pubescens*, *Heuchera sanguinea*, *Homeria collina*, *Linaria cymbalaria*, *Lobelia inflata*, *L. syphillitica*, *Mecynopsis wallichii*, *Nepeta macrantha*, *N. nervosa*, *Oenothera rosea*, *Pentstemon campanulatus*, *P. ovatus*, *Primula capitata*, *P. japonica*, *P. malacoides (rubra)*, *P. petiolaris*, *P. rotundifolia*, *P. smithii*, *Puyalapestris*, *Pyrethrum*, *Salvia hians*, *S. officinalis*, *Smilacina fusca*, *Trifolium hybridum*, *Verbascum thapsus*, *V. weidemannianum*, *veronica*, *Teucrium*.

The Conservatory.—This house functioned as a suitable conservatory. The usual minimum repairs were done to it by the Works and Buildings Department. The brilliant display of Double Begonias was again a great success. The whole of the stands was staged with these, with *Adiantum* ferns interspersed amongst them. This glorious show was maintained for the greater part of the monsoon season, the majority, having been raised from seeds sown in February. The smaller stands at the doorways were filled with large flowered *Gloxinias* of gorgeous colours. These too were raised from seeds sown in February as their bulbs could not be successfully stored from one season to another in damp climate. The spring season flowers in the Conservatory were also of a high standard, consisting of *Geraniums*, *Daffodils*, *Narcissi*, *Cyclamen*, *Azaleas*, *Petunias*, *Nemesias*, *Cinerarias*, *Pelargoniums*, *Canterbury bells*, *Calceolarias* and a large number of *Primulas*. Some excellent blooms of *Primula kewensis* were witnessed and those of *P. obconica* in various shades were large and prolific. Several pots of *Tulips*, *Crocus* and *Ranunculus* were as successful as in the previous year. The two *Bougainvilleas (glabra)* in the Conservatory also bloomed profusely, as well as the three tubs of *Strelitzia reginae* ("Bird of Paradise" flower) which always cause admiration among the visitors. The number of orchids are yearly increasing and the present stock is due to assiduous care and collection. Their flowering was very encouraging again. A tub of *Cymbidium eburneum* with twenty-one large white blooms was especially attractive. *Dendrobium hookeriana*, *D. formosum*, *D. moschatum*, *D. falconerii*, *D. aggregatum*, *Coelogyne barbatum*, *C. maculata*, *C. hookeriana*, *Cypripedium charlesworthii*, *Renanthera imschootiana*, *Vanda coerulea*, *Cymbidium lowianum* and *C. devonianum*, being some of the less ordinary orchids all gave excellent results. A collection of Assam orchids sent up by Dr. S. K. Mukerjee, Curator of the Herbarium, Indian Botanic Garden, Calcutta, collected during his tour with Captain Kingdon Ward, all did well. A very few deaths occurred among them. The surviving plants were very healthy and many flowered. The smaller Conservatory, mainly used for Fern, Begonias, Aroidae, etc., was repaired as well as renovation of its entire plinth walls.

The Nurseries.—Through a grant of Rs. 10,000 from Government, the Nursery Hot Houses, Propagating Sheds and Frames, together with the Small Conservatory, were overhauled and thoroughly repaired with first class sal wood. Half of the Nursery Hot House had to be completely re-built. The condition of these buildings was in an excellent state. Much propagating by cuttings and seed was carried out, while more attention was given to the cultivation of

plants of economic value, especially those of pharmaceutical importance. There are many of these, indigenous and exotic, which can be successfully grown around this district, but will require preliminary trials with their cultivation and their analysis before they can be commercially exploited.

Three viable seeds of *Brosimum galactodendron* were received from the Curator, Industrial Section, Indian Museum, Calcutta, but in spite of careful treatment, for their germination, the seeds lay dormant for two months and then rotted off. This was the "Milk Tree" of South America.

The plants of *Cinchona ledgeriana* raised from highly quinine-yielding mother plant seeds obtained by the Superintendent from Dr. Krukoff of New York three years ago, after attaining healthy proportions in pots, were put out in the Garden. Every effort was made to keep these valuable plants growing, but after the cold and snowfall of February, they all died off.

From seeds received in February 1948, the seedlings of Chinese Conifer tree, *Metasequoia glyptostroboides*, Hu-et Cheng, now attained a size of 18 inches in height, are in excellent form, and will be planted out in the Garden during the following rainy season.

Visitors.—The popularity of the Garden seems to be growing year to year satisfactorily. There were 67,100 visitors this year by count at the gates. The Garden was visited by many distinguished persons of whom the name of His Excellency the Governor of West Bengal who along with many other distinguished personalities, came to the Garden on the 3rd June, deserves special mention.

Mr. Frank S. Smythe, the world-famous mountaineer and writer, before his sad demise, visited the Garden on several occasions. His keen interest in Himalayan alpine flora was a very great help to many institutions in Britain and America. There is no doubt that had he lived to carry out his intended tour to Jongri in Sikkim and to the Gharwal regions, the Gardens here would have profited handsomely by his collections of seeds and plants, part of which he intended to make gift. His death is mourned by mountaineers, botanists and horticulturists all over the world. The Gardens were also honoured with a visit by the great "Nobel" scientist, Sir Robert Robinson, O.M., in January, when he came to Darjeeling on a flying visit. He, too, was keenly interested in the Himalayan alpine flora, and a small parcel of living plants was given for his beautiful rock garden in England.

A large number of forestry students came here during the course of the year, notably those from Dehra Dun Forest College.

There is always a great number of amateur botanists and horticulturists, who repeatedly come to these Gardens to become acquainted with plants to their particular interests, and who obtain specimens for determination of research or study. In these circumstances every possible help was extended to them as usual.

Herbarium.—The Herbarium has progressed considerably since its practically static condition of a few years back. Many specimens were added to the existing collection. The Herbarium is now becoming more and more popular with those of the visiting public who are interested in botany and other sciences associated with plant life. Many of these pore over the specimen sheets whenever they have the opportunity to do so. There are still many sheets which have their identification to be confirmed at the Herbarium, Indian Botanic Garden, Calcutta.

Labels.—The nomenclature labels of trees and shrubs continue to be given constant attention and many omissions have been made good. The difficulty of obtaining zinc sheeting for this purpose is still acute. Over 200 fresh labels were put out, old labels re-printed and sign boards, road names, etc., were repaired and repainted again this year.

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**Staff.**—Mr. J. A. Hulbert held the post of the Curator during the year.

### CALCUTTA GARDENS. •

During the summer and rainy seasons miniature *Helianthus Annus*, *Kochia trichophylla*, *Impatiens balsamina*, *Coreopsis*, *Gaillardia* and *V. alba* were planted. Kochias by their large size of 32-35" attracted the eyes of the public. Alternate beds of pink and scarlet varieties of *Impatiens*, *Gaillardia*, miniature Sunflowers and others increased the beauty of the garden. On 25th Baisakh (Tagore Memorial day) young plants of *Nephilium lichi* and *Michelias* were planted. On 15th August (Independence Day), 120 plants of *Swietenia macrophylla*, *Peltophorum ferrugenum*, *Diospyros*, *Hibiscus* and *Bauhinias* were planted.

Other works done during this period were the preparation of two new ditches for dumping refuse and repair of the boundary hedges. Repairing and repainting of the tenches were carried out as usual.

The winter annuals were success particularly in Poppy, Sweet Sultan, Asters, Calendulas, Phlox, Dianthus, Salvias and others. White *Salvia* which is of rare occurrence was found also among the red ones. It was carefully transplanted on pot for collection of seeds in order to perpetuate this variety. The beautiful double-decorative Dahlias of variegated colours planted on the central beds enhanced the beauty of the Garden and was much appreciated by the visitors.

**Dalhousie Square.**—Like Curzon Park, *Coreopsis*, *Gaillardia*, *Impatiens balsamina*, *Kochia*, *Zinnia* and others were planted during the summer and rainy seasons and these somehow raised the beauty of the Garden in spite of the raids from cattle and some section of the public. On 25th Baisakh young plants of *Nephilium lichi* and *Amherstia nobillis* were planted on the southern side of the tank but as these plants are now in the area occupied by Central Public Works Department there is not much chance for their survival. On the 15th August (Independence Day) *Diospyros*, *Allamanda*, *Thuya orientalis*, *Araucaria Cookii*, *Mesua ferea*, *Hibiscus*, *Memecylon edule*, *Peltophorum ferrugenum* and others were planted.

The winter annuals were success this season specially in Dahlias and Salvias, Dahlias were planted on four new beds. The border bed on the north-east corner of the Garden with beautiful Dahlias like Uttarayan, Rajkumar, Red-cactus, Jersey-beauty, Grada, Duchess was very much appreciated by the discerning public.

In this season the number of beds was increased from 43 to 69. Along with the beautiful Dahlias and Salvias, Dainthus, Pansy, Phlox, Calendula, Aster, Petunia, Verbena, Lupins, Larkspur, Cherrygold, *Tagetis patula*, Cornflower, Sweet Sultan, *Nasturtium*, etc., were of exquisite beauty.

The palm groves in front of the northern gate of the tank were decorated with succulents, ferns, caladiums and others. The boundary hedges were renewed with *Acalypha*, *Erythimum*, *Hibiscus*, *Bauhinia*, etc., and the roadside hedges with *Durantas*.

**Eden Garden.**—Thirty bulbs of beautiful Dahlias were added and by means of cuttings nearly 800 new plants were grown. About 300 plants grown here were planted in Dalhousie and Curzon Parks, about 300 plants were grown in pots and the rest in beds in and outside the nursery. Among the imported Dahlias—Pride of Kaisarbagh, Nance-gene, Rosamande-Wilmer, Devachan, Bharat, Nirmal Chandra—the last came out well and one of them reached a diameter of 13".



Among other annuals, Asters (ostrich-plume, victor, giant comet, splendid mixed), Carnation, Verbena, Antirrhinums were really attractive. Neary 200 pots of Carnations, 100 pots of Asters, 50 pots of Verbenas, 50 pots of Phlox and 50 pots of Antirrhinums were made. Among other pot plants and plants planted on beds inside the nursery Larkspur, Lupins, Calendula, Cornflower, Sweet Sultan, Sweet-William, Nasturtium, Linaria, Sweet Peas need special mention. Four new beds were prepared within the nursery—Carnation, Aster, Pansy, Petunia and Antirrhinums were planted on them.

Fourteen new beds were made in front of the orchid house. Beautiful Dahlias, Antirrhinums, Phlox, Dianthus and Calendulas were planted on them. Beautiful and attractive annual flowers were exhibited in and outside the nursery and other vantage points of the Garden.

By means of "cuttings" and other horticultural practices many new plants have been raised and plotted inside the nursery for future planting as usual.

In the orchid house the number of orchids, palms, ferns, crotons and other ornamental plants was increased. Among the orchids—Cymbidium, Cypripedium, Cattleya, Dendrobium, Oncidium were worth mentioning.

In connection with the annual general meeting of the Bengal Botanical Society and at the exhibition of botanical interest which was opened by His Excellency Dr. Kailasnath Katju on the 24th March 1950 at the Baker Laboratory, Presidency College, Calcutta, various pot plants of annuals and beautiful orchids in hanging baskets of the Garden were displayed with other rare plants. These were very much appreciated by the visitors.

Annual repair and painting of benches and Garden gates were done as usual.

Staff.—Janab G. Mohiuddin, officiating Curator, Indian Botanic Garden, Calcutta, carried on the current duties of the Assistant Curator of the Garden, in addition to his own throughout the year.



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