

Council Paper No. 43 of 1893.



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**BOTANIC GARDENS.**

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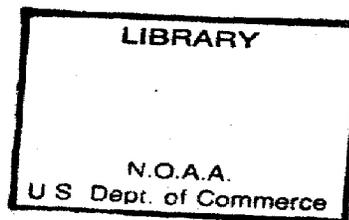
**Report of the Superintendent for the year 1892.**

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*Laid before the Legislative Council on the 27th  
March, 1893.*

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*In continuation of Council Paper No.*



*Registered No. of Correspondence relating to the subject—M. P. No. 1363/1893.*

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## BOTANIC GARDENS.

### Report of the Superintendent for the year 1892.

*Council Paper No. 43 of 1893.*

*M. P. No. 1863/1893.*

ROYAL BOTANIC GARDENS,

*March 23, 1893.*

SIR,

I beg to forward herewith my Sixth Annual Report on the Royal Botanic Gardens and their work. The year under review ends December 31st, 1892.

1. The year under report has been one of exceptional difficulty owing to the unusual rainfall which has been experienced, it being heavier than any of the recorded annual falls during the past thirty-one years.

As a consequence Horticultural and Agricultural operations have been impeded, and the amount of labour expended on routine operations was heavier than usual, with less apparent result.

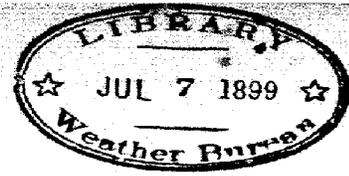
#### ESTABLISHMENTS.

2. The staff of the Royal Botanic Gardens has been changed by the removal on promotion of Mr. H. K. Collens in July last, after three years of satisfactory service, and the appointment of Mr. Geo. Vahl in his place.

The Superintendent was absent for a few days in January on privileged leave, having proceeded on service to Barbados for the purpose of procuring information on the Sugar Cane disease which prevailed in many districts in Trinidad. This has formed the subject of a large correspondence during the year, and the matter has been ably treated by Mr. Walter F. Blandford, F.E.S., F.L.S., in the Kew Bulletin, whose report has been reproduced locally in the "Agricultural Record," the official organ of the Agricultural Board of Trinidad. My report on the matter was also published therein.

#### METEOROLOGY.

The usual correspondence on Meteorological subjects has been fully maintained, and the Returns have been published in the "Royal Gazette." A copy of the "Island Return" being furnished monthly to each observer who has been good enough to furnish this office with the rainfall. A record of Meteorological observations, which have now been carried on for a period of thirty-one years at the Royal Botanic Gardens is, as usual, made an Appendix of this report. A copy of the same in detail is also annually compiled by request of the Government for the Blue Book of the Colony. Copies of our Returns are also furnished to the Meteorological Office, London, to Weather Bureau, Washington, and to the English Meteorological Magazine, and from these sources valuable exchanges are regularly received. In the Meteorological Magazine our Returns find place in the Climatological Table for the British Empire, which is of great service to all engaged in the transport of plants to foreign countries. To do such work successfully the Botanical staff of a Colony must possess not only an accurate knowledge of the countries themselves, but also of the routes traversed by railway or steamer, for unless the climatology of a country is known it is hardly possible to make successful introductions of suitable plants either to or from such a country. For instance, we as yet know little or nothing of the climate of New Guinea or Western Australia. The meagre information given in the Colonial Office List being utterly inadequate for our purpose, as only the mean for the year is given (65° Fah.) Between Jamaica, Mauritius and Trinidad we are better able to institute a comparison, as Meteorological Statistics are regularly kept. In the matter of climate both Mauritius and Jamaica have an advantage over Trinidad in having a greater range of temperature in the inhabited districts—the hill temperature being the cooler. The average rainfall of Mauritius is 47.98 inches, while that for Trinidad equals 65.91 inches annually. The average temperature for the year 1890 at Mauritius was 72° 2 while the mean annual of Trinidad showed 77° 5 Fah. In some of the hill districts in



Jamaica the mean annual temperature is 63°, in Mauritius 67°, while in Trinidad our hill temperature is not recorded, which makes Trinidad compare unfavourably with those countries in such Returns.

It will be seen, therefore, that temperature in many respects reveals the character of a flora, and, together with the relative humidity, wholly determines it—and thus it is plainly indicated how important the information must be, which affords details of the climatology of various countries to the practical Agriculturist and Horticulturist. It is not enough to say such a thing grows in Jamaica, it should grow in Trinidad. Such a thing grows in tropical Australia, it should also grow here. No inference that could be drawn could possibly be more deceptive. We want to know from what part and what elevation a plant comes, and the special Meteorological condition of that part, before we can even “begin to form an opinion” as to whether a plant thriving in one place will thrive in another to which it is introduced.

In England for many years several plants introduced from Jamaica were (because they came from Jamaica) put into Tropical Hot Houses, and, as a result, the plants died consignment after consignment; but when the climatic condition of that portion of the Island was known to the English cultivator, the case was altered and the plants could be readily and easily grown with the appliances at their command. Conifers will *not* grow on the South side of Jamaica. In Trinidad they do fairly well. The cause is readily apparent to those interested in the matter, in the difference of the climatic conditions, although in this case the temperatures are similar, almost to a degree, yet the relative humidity is totally dissimilar.

Successful gardening in the Tropics almost entirely depends upon the introduction of plants from a suitable or similar climate, and although there are a few ubiquitous plants which appear to thrive under the most contrary conditions, the majority of plants will only thrive in similar climatic surroundings as prevail in their native country. The Rose we know from English practice stands “forcing” well, but there are varieties which are useless for that purpose. Those varieties it is useless to introduce to a climate like that of Trinidad, as they will produce little else but leaves. In fact, to grow the roses at all, means constant *renewal of plants* and renovation of the soil in which they grow; and those varieties which stand the process of “forcing” in Hot Houses out of their season in Europe are those best suited for tropical culture—the sweet-smelling “Hybrid perpetuals” of English gardens being well nigh useless. It will thus be seen how much depends upon the science of Meteorology and how important it is that continuous and accurate records should be kept.

The Island Rainfall has, by direction of the Government, been compiled in the office of the Royal Botanic Gardens for the past six years, and the Returns are much appreciated by planters as affording an independent record of weather which can be sent to absentee owners, in explanation of the working expenses being high or low at any particular season. Although we experienced during 1892 the excessive fall of 91.14 inches, yet this taken with the previous 30 years only gives an average annual fall of 66.59 inches, or 0.68 inches more than the previous average, the influence of which addition may be considerably reduced during the remaining years of the decade just entered. The annual fall for the whole Island is 91.14 inches.

#### HERBARIUM.

The usual routine of work in this department has been carried on during the year.

The source of the “*Topinambour*” tubers, often found in our local markets, has been authoritatively determined by Kew—from specimens of the plant grown and cultivated in the Gardens—as *Calathea Allouya*, Lindl. It appears that their food value was well-known to the “Caribs” before the Spanish occupation, but that the original name “Allouya” had been gradually lost, and the French and Portuguese common name belonging to the “Girasole,” or Jerusalem artichoke, had usurped its place.

Public attention was called during the year to the want which existed for a popular Hand Book of the Trinidad Flora. This shewed a want of knowledge of the working of the Botanical Department, and made it apparent that the local public were not generally acquainted with the efforts which were being made to further the end in view, and supply the needed want. It would be easy to sit down and make a catalogue of books for a Library, but such would be of no public service if the books were not in existence and available for use. So also would it be easy for any Botanist to sit down and write a Flora for Trinidad, but such a publication would be of little value if written without materials. In fact it would describe what plants in the opinion of the author *ought to be* in Trinidad, not what plants are actually found there. To write a Flora it is first necessary that we have the materials with which to construct our work. Such materials have been accumulating in the Herbarium for the past six years, and

are yet insufficient to commence the work, but the end is held steadily in view, and we hope in time it may be accomplished. In Ceylon, with the labours of his predecessors for many years before him, Dr. Trimmen has, after *ten years'* work, only lately found it possible to commence to prepare a Flora of Ceylon, and it can scarcely be hoped that Trinidad will be able to do better than its larger sister. The material, so far as Trinidad is concerned, for Grisebach's Flora of the West Indies was prepared by Dr. Cruger and a few others and will for long remain a testimony to his industry and skill. To-day we are humbly trying to follow in his footsteps and collect material for a Flora of Trinidad, and it is believed that there is sufficient evidence of our success on the shelves of our Herbarium to warrant us in assuming that we have not been wholly unsuccessful. What we as labourers have most to complain of is, the want of sympathy with such work exhibited by the general public, who apparently fail to understand its usefulness and general utility. One thing is certain, a Flora cannot be written without an Herbarium any more than a house can be built without timber or other material. Visitors and residents are always welcome to inspect and make use of the resources of the Herbarium for the determination of our native plants, or for study of the Flora. Consequent upon an enquiry from the Directorate of the Royal Gardens, Kew, I was called upon by the Secretary of State, through His Excellency the Governor, to prepare a Report on the condition of the Herbarium. It was intimated in the despatch that the Secretary of State desires the Herbarium to be maintained "in the highest state of efficiency." I am glad to record that I was able to report the Herbarium as in good order and steadily progressing. It is not to be expected that the educational institutions of this Island will remain much longer without including Botany in their Curriculum, and thus again the Herbarium of the Royal Botanic Gardens will be found of the greatest service as being easily accessible for all such purposes, in fact in many countries this is the primary object for maintaining such Institutions.

#### CORRESPONDENCE.

Colonial, foreign and local correspondence has been regularly maintained. The local letters chiefly seek advice on plant culture, and entails a large expenditure of time in replying thereto. Foreign and Colonial letters refer to interchange of plants and seeds, and to Botanical matters generally, while not a few contain orders for plants not obtainable elsewhere. The following is a detailed list of our correspondence during past years since registration was commenced:—

Letters sent out	in	1887	from	March	to	December	..	..	774
"	"	1888	"	January	"	"	..	..	1150
"	"	1889	"	"	"	"	..	..	1789
"	"	1890	"	"	"	"	..	..	1664
"	"	1891	"	"	"	"	..	..	1701
"	"	1892	"	"	"	"	..	..	1506

In addition to this, the Journal of the Agricultural Board of which I am *ex officio* a member, has been under my management, and numerous articles have been contributed thereto during the past year.

#### DECORATIVE WORK.

In last year's Report the decorative work of the Establishment was reported as heavy. During the year 1892 there has been plants loaned out on twenty-seven occasions including Public Balls or entertainments of like character. The number of plants used was 1,897. Many of the plants were large ones in tubs requiring the aid of four men to lift them into the conveyances sent for them. The plants, as a rule, are carefully treated, but at all times they suffer more or less damage during transit, (sometimes of one and two miles), and on one occasion two handsome Palms were allowed to become damaged beyond recovery, which were valued at over \$10 each. Flowers have been supplied to Government House every day of the year, Sundays included, and 698 baskets were sent in. During the season as many as 400 blooms per month of Mareschal Niel roses have been cut for this purpose alone. Plants to the number of 4,871, or 405 per month, have been supplied for decorative purposes in Government House, and on the occasions of Balls and Dances these have been supplemented by numerous contributions of Palm branches and evergreens not specially noted, and on the occasion of the Queen's birthday an Agri-Horticultural trophy was erected by the department as a Ball-room decoration. Our best decorative plants are *Palms*, *Crotons*, *Dracaenas*, *Anthuriums*, *Marantas*, and other *foliage plants*, and with these, in number and perfection, the Trinidad garden can probably hold its own with any part of the world. The Total number of decorative plants used for all purposes was 6,768.

The Orchids in flower during the year were :—

*Pleurothallis discoidea* Lindl. and several other species.  
*Bletia ophioglossoides*, Sw.  
*Liparis elata*, Lindl.  
*Dendrobium undulatum*.  
 „ *Jenkenii*, Wallich.  
 „ *aggregatum*, Roxb.  
 „ *fimbriatum oculatum*, Hook.  
 „ *Anosmum*, Lindl.  
 „ *bigibulum*, Lindl.  
 „ *densiflorum*, Wallich.  
 „ *Farneri*, Paxt.  
 „ *Formosum*, Roxb. ; *Giganteum*, Van Houtte.  
 „ *moschatum*, Wallich.  
 „ *Pierardii*, Roxb.

And a few undetermined species :—

*Bulbophyllum pachyrhachis*, Gr.  
*Dendrochilum*, sp.  
*Bletia Shepherdii*, Hook.  
*Hexisia reflexa*, G. Rehb.  
*Hexadesmia fusiformis*, Gr.  
*Diacrium bicornutum*, Benth.  
*Ponera prolifera*, G. Rehb.  
*Epidendrum indivisum*, Bradf.  
 „ *ciliare*, L.  
 „ *variegatum*.  
 „ *fragrans*, Swartz.  
 „ *nocturnum*, L.  
 „ *schomburgkii*.  
 „ *bituberculatum*, Rolfe, n. sp.  
 „ *sthenopetalum*, Hook.  
 „ *atropurpureum*, Willd.  
 „ *patens*, *sw. sec.*, Lindl.  
 „ *cochleatum*, L.  
 „ *jamaicense*, Lindl.  
 „ *rigidum*, Tacy.  
 „ *raniferum*, Lindl.  
*Broughtonia Sangwinia*, R. Br.  
*Cattleya Skinneri*, Batem, var. *parviflora*, Hook.  
 „ *Gaskelliana*, Rehb., f.  
 „ *Mossia*, Hook.  
 „ *superba*, Lindley.  
*Brassavola cucullata*, R. Br.  
*Schomburgkian undulata*, Lindl.  
 „ *Humboldtii*, Rehb.  
*Polystachya luteola*, Hook.  
*Cryptopodium cristatum*, Lindl.  
*Zygopetalum cochleare*, Lindl.  
*Batemannia*, sp.

*Zygopetalum*, (*Warszewiczella Wendlandii discolor*, Rehb., f.  
*Xylobium Colleyi*, Rolfe.  
*Gongora atropurpurea*, Stet.  
 „ *maculata*, Lindl.  
 „ (White form).  
*Coryanthes maculata*, Hook.  
*Stanhopea Bucephalus*, Lindl.  
 „ *grandiflora*, Lindl.  
*Peristeria elata*, Hook.  
 „ *pendula*, Hook.  
*Catasetum tridentatum*, Hook (vits. various forms).  
*Cygnoches ventricosum*, Bateman.  
*Steuia pallida*, Lindl.  
*Scuticaria Steelii*, Lindl.  
*Maxillaria rufescens*, Lindl, va. and a few undetermined species.  
*Dichaea graminea*, Grise.  
*Ornithidium album*, Hook.  
*Trichocentrum iridifolium*, Lodd.  
*Rodriguezia secunda*, Kunth.  
*Aspasia variegata*, Lindl.  
*Oncidium iridifolium*, Kth.  
 „ *luridum*, Lindl.  
 „ *ampliatum*, Lindl.  
 „ *lanceanum*, Lindl.  
 „ *Sprucei*, Lindl.  
 „ *Baueri*, Lindl.  
 „ *citrinum*, Lindl.  
 „ *Papilio*, Lindl.  
*Brassia maculata*, R. Br.  
 „ *caudata*, Lindl.  
*Trizeuxis falcata*, Lindl.  
*Ionopsis utricularioides*, Lindl.  
*Ornithocephalus gladiatus*, Hook.  
 „ *Creugeri*, G. Rehb.  
*Lochneria acuta*, Rehb.  
 „ *elegans*, Hook.  
*Phalaenopsis amabilis*, Lindley (? Blume).  
 „ *grandiflora*, Lindl.  
 „ *Schilleriana*, Kchb., f.  
*Aranthus*, sps.  
*Saccotabium violaceum*, Lindl.  
 „ *ampullaceum*, Lindl.  
*Angraecum sesquipedale*, Thomas.  
 „ *Scotianum*, Rehb., f.  
*Vanilla—planifolia, grandifolia* and *phaenantha*.  
*Epistephium parviflorum*, Lindl.  
*Prescottia*, two or three undetermined species.  
*Spiranthes Hostmannii*, G. Rehb. and other species.  
*Phystrus*, sps.  
*Cypripedium*, sps.

The decorative department entails a very heavy expense upon our funds. The item for pots and tubs being annually a specially heavy one, the former having to be imported from Barbados and other places, as no local institution for their manufacture exists beyond one or two small and ineffective attempts by Coolie immigrants, and yet it has been proved that good clay for the purpose exists in the Island. The consequence is, that as a rule they cost as much for a single pot, as per dozen in European countries, and were it not for the large quantity of bamboo joints used for pots the expenditure on this head would be much larger. The manufacture of compost for such a large quantity of pot plants also consumes a large proportion of available labour. We have no resources for obtaining natural soil for potting, and all we use has to be made in the garden itself, from rubbish collected.

The detail of the number of plants loaned to the public during the year is as follows, exclusive of Government House decorations.

January	...	...	88	July	...	...	—
February	...	...	—	August	...	...	176
March	...	...	193	September	...	...	179
April	...	...	207	October	...	...	159
May	...	...	74	November	...	...	348
June	...	...	74	December	...	...	399
				Total	...	...	1897

#### FLOWER GARDEN AND GROUNDS.

The introduction of the new strains of Canna during 1892 has provided us with a flowering plant of great service and one which supplies large quantities of flowers in the cooler months of the year. Our first supplies of seed were kindly presented

by J. J. Bowrey, Esq., Government Analyst of Jamaica, and we have ordered further supplies of the best strains from a celebrated grower in France. It is extremely difficult to maintain a series of plants producing a continuous succession of flowers in the tropics, and frequently a few heavy showers will spoil the labour of weeks. Many persons on first coming to the tropics are surprised at this fact, as they believe it to be "*warm enough for anything to grow.*" The fact is, for European plants there is little or no season of rest. Artificially induced rest may sometimes be commanded, but at the best, it is only an apology for the real rest of their native climate and as often fails as succeeds.

Roses in Trinidad are grown under similar circumstances of climate as if kept for years continuously in a European forcing house, and all experts know the result of such treatment is rapid enervation and deterioration. Examples are sometimes shown us of what can be done, and what roses, etc., can be produced, in which case sometimes not over generous comparisons are made.

The facts will be generally found to be, that new plants have been imported and they have been grown on new ground. *Of successes we hear all, of failures we hear nothing.* It cannot be disputed that both failures and successes are met with by others as well as ourselves. To maintain a large supply of roses all the year round taxes an establishment like ours to the utmost, as we have perforce to be continuous in our supply, and we cannot like the private cultivator hide our little failures when they do occur. Freshly imported roses on new ground thrive well for a season or two, but after that, they become weak, and gradually decrease in production.

Our best roses are Mareschal Niel and its congeners, and this class suits our climate better than any other. Grafted or budded roses on the *mannetti* or briar are worse than useless, as the stock is used in Europe specially on account of its ability to bear cold; here we require one that will bear heat. If such are imported the result is they grow for a season and then die out, but if planted so as to cover the graft, they occasionally make roots of their own. Roses on their own roots are a *sine qua non* with us, as we can depend upon these longer than upon any other, both for successional flowers and steady growth. Some fairly sized new beds were made up during the year and planted with roses specially imported for the purpose, from which it is hoped the supply of flowers may be regular.

#### RAVINE AND DRAINS.

The large ravine which runs the whole length of the Garden, East to West, has been repaired and paved the greater part of its length. It is an important work to keep this outlet in good order as it receives the drainage from Government House, the major part of the Botanic Gardens as well as that from adjacent properties. It is so situated as to take all storm waters, and a small shower flushes it completely. It can also be flushed in dry weather by a large tank or bath situated near to its highest level. This ravine is called the Nutmeg Ravine owing to the largest nutmeg trees having been originally planted on each side of it, which probably accounts for their flourishing condition in an otherwise poor and unfertile soil.

The Garden drains in the environs of Government House, constructed to take storm waters from the surface, have all been completely overhauled during the year, and the extent to which the Garden authorities are responsible for the drainage system has been definitely settled, by the several drains under their charge being noted on the official plan of the Gardens by a competent Surveyor.

#### TENNIS COURT.

There has been, constructed during the year, in the Eastern side of the grounds, a Tennis Court paved with Asphalt.

#### VISITORS.

Visitors to the number of 428 registered their names at the office during the year. By far the greater part do not come to register, and the number of transient visitors to the Gardens probably far exceeds one thousand per annum, without taking into account the local attendance on Band days. A shelter house to which visitors, children, nurses, etc., might resort in case of sudden showers is a much needed appendage to the Gardens.

The Gardens are much appreciated by American visitors, and very flowery compliments are often left by them in the Visitors' Book at the Superintendent's Office.

Among the names of English visitors for the year are those of the Duke of St. Albans and party, Lord and Lady Brassey, the Earl of Donoughmore, Earl Cawdor, Miss Roper and Miss Vicary. The latter, a lady having great talent as an artist, occupied much time at the Gardens in painting many of our finest flowering

and foliage plants. Her work on being submitted to the authorities of the Royal Gardens, Kew, has proved of great interest botanically and has led to the identification of a hitherto unnamed plant.

The available resources of the Gardens were placed at her disposal, and the Herbarium was used as a studio at intervals for some weeks.

#### NURSERIES.

I am again able to report progress in this section of the Department. The sales are given in the following Table, and the stock remaining on hand is believed to be the largest which has yet been held since the Gardens have been established. The number of plants distributed during the past six years (economic and ornamental) reaches a total of nearly 200,000, which of itself shows how much the work of the Department is appreciated by the general public. This gives an average of over 35,000 per annum which we believe is a record few Colonial Gardens exceed. It is intended during the coming year, by sanction of the Government, to dispose of a large proportion of the surplus stock by public auction. The demand for coffee plants has been more than the resources of the Department could supply, although every available portion of ground has been used for the purpose. The supply of orange plants of various kinds is also large and well grown. Planters are again reminded that plants of all kinds are carried free to all stations by the Government Railway and to all ports by the coasting steamer, and that every care is taken at the Gardens in the selection and packing of plants ordered by letter from distant portions of the island. The distributions for the year are shown in the following lists, which is rather below the average in plants but above in seeds:—

DISTRIBUTION OF PLANTS AND SEEDS, 1892.

Where Distributed.	Plants.	Seeds.
To places outside the Island ...	1,970	246 packages.
To places outside the Island ...	...	7,700 Nutmegs.
Locally ... ..	20,716	11,900 Nutmegs.
Total Distribution ...	22,686	19,600 Nutmegs, 246 p'ks seeds

Details of plant and seed distribution, and exchange, will be found in Appendix I., and our importations or purchases in Appendix II. of this Report.

The Nursery catalogue, which, completed by us in 1890 and then sent to the Government Printer has not yet been received. We feel the want of this very much, as it is constantly being asked for and would if on hand save considerable correspondence and satisfy enquiries without taking up valuable time in relating to each enquirer a list of the plants in stock and their prices.

We hope, however, shortly to issue it as the Bulletin of the Department for the first quarter of 1893. \*

#### ECONOMICS.

The success of the economic section of the Royal Botanic Gardens is fully shewn by the sale of plants and seeds during the past year, but in a Report of this kind the public look for something more than a Report of Garden sales or distribution, it being generally expected that from such centres as the Royal Botanic Gardens useful information concerning Tropical economics should be collected and disseminated for the public benefit. To collect such information it is necessary that we should establish an interchange of ideas with similar establishments and maintain a record of work and observation, which shall be of such permanent form as to be useful for reference. For this purpose it was several years ago suggested by the Kew authorities that a regular issue of printed Botanical Bulletins should be maintained which would be of service to the planting community. The scheme was fully approved by the Secretary of State for the Colonies, and in accordance therewith such have been prepared at intervals in the Office of the Department. No. 16 of this series was issued during 1892.

The subjects treated in our Bulletin since its commencement have been:—

1. Disease in Cocos (Tannias).
2. Kiln-drying corn, *Agave rigida*.
3. List of Trinidad Timbers.
4. *Castilloa Elastica* (Central American rubber).
5. Coffee Culture.

\* The first part has now been published (No. 17), April, 1893.

6. Vanilla, Kola nut, Cohune Palm, Crotons, Orange blight, Mineral deposits in woods.
7. Lecture on "Our Work."
8. Tobacco Culture
9. Tobacco Culture in Spanish language. The Fruit Trade.
10. Cane. Ramie or China Grass. Report on Coffee.
11. List of Trinidad Ferns, Produce Reports.
12. Report on the Agri-Horticultural Resources of Tobago.
13. Sisal Hemp.
14. Coffee planting.
15. How to raise plants from seed.
16. Nutmeg planting in Trinidad.

Most of the above are original papers, and are now out of print, but as it is intended to give the latest information on each subject treated upon, the forthcoming numbers will contain when necessary and as convenient, a resumé of former articles in addition to the latest information.

We here note some of the details of the work in this section for the year.

**TOBACCO.**—The experiments of growing Tobacco at Siparia has been terminated. The officer imported as specialist and employed temporarily by the Government to superintend the culture decided at the conclusion of his engagement to remain in the district and has purchased land on his own account. This, I take it, is an encouraging feature, as in his hands I believe the industry is likely to increase, the more so, as he has identified himself with the people, and is prepared to settle for good in the district. The last crop like the former ones was small, but being of the nature of an experiment I could not advise the Government to expend large sums in cultivating a sufficient area to become a remunerative culture. The first question to be decided was: Can a Tobacco of a suitable character for making good cigars be grown in Trinidad? The second question: Can it be grown to pay? is a question which the industry of the people themselves should solve. The first question having been resolved in the affirmative, on the Report of London brokers and manufacturers, on Reports of samples of cigars sent to England, and on numerous Reports of local smokers, the second question may safely be left to the hands of enterprising planters to whom it properly belongs. In the meantime it may be said that the quality of the produce of the district in which operations were conducted (always a tobacco-producing one) has much improved. The native cultivators having seen and partially adopted the methods employed by the skilled cultivator, and it may be confidently anticipated that the industry will continue to make progress during future years.

**CALATHEA ALLOUYA, Lindl.**—During the year 1890 (as stated in my Annual Report for that year) attention was called to the sale of a curious tuber in the local markets, which was named "Topitamboo" or "Topinambour." The source of this tuber and the scientific name of the plants producing it was then unknown.

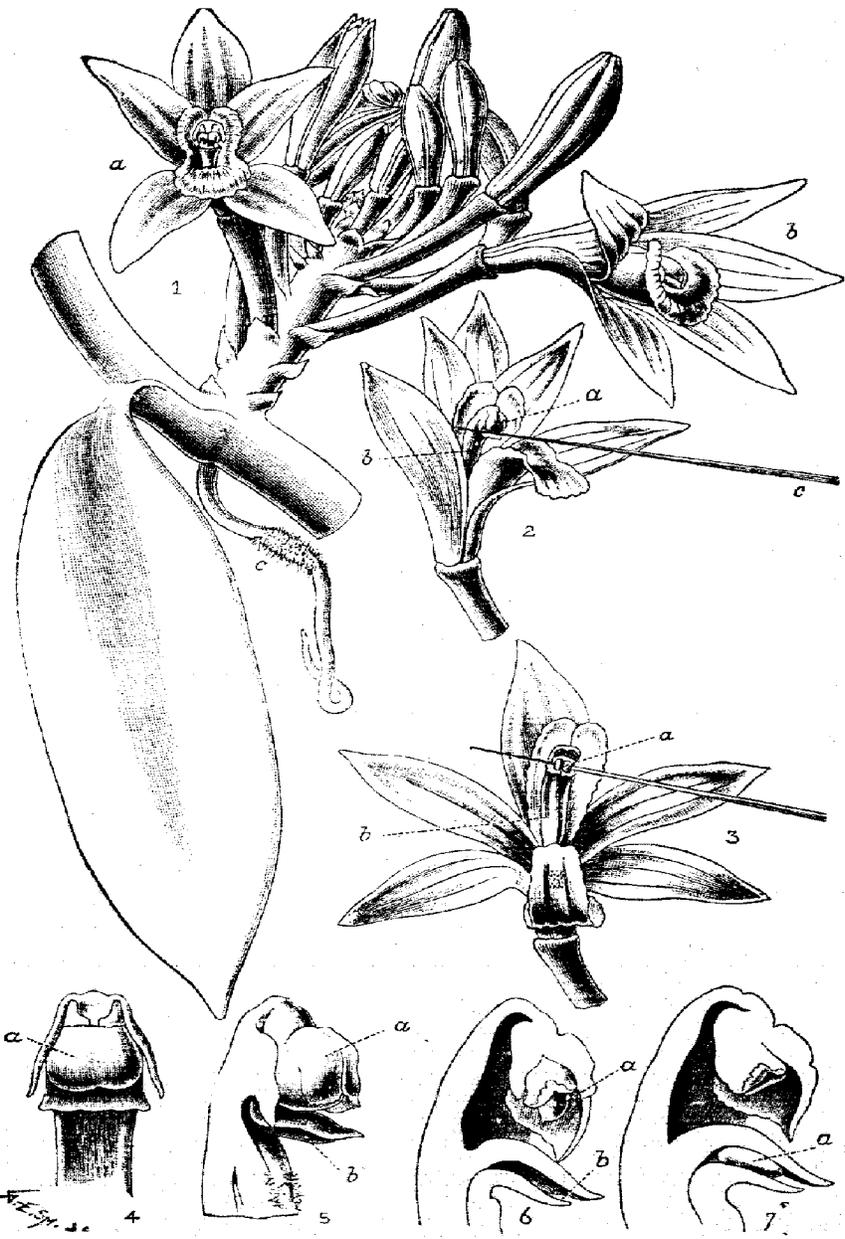
As stated in a previous section they have now been authentically determined as the produce of a scitamineous plant known as *Calathea Allowya*, Lindl. The smaller tubers boiled and eaten with salt form a very agreeable and palatable food, and will possibly prove a welcome addition to the table in many tropical countries. With regular and improved culture it is probable that the tubers could be much increased in size and possibly in flavour. It is certainly a vegetable which should find a home in every tropical garden, and also well worthy of being tested for use in sub-tropical countries. Having this in view we have distributed tubers to most of our correspondents and shall be glad if they will be good enough to "report progress" in due course.

**MACADAMIA TERNIFOLIA, F.M.,** or Queensland Nut.—This plant in Trinidad grows into a bushy tree some 20 to 25 feet in height and has produced for the past two years successive crops of nuts. So far as I am aware this is the first record of its having reached the fruiting age in the Western World.

As the tree appears to have acclimatized itself very fairly indeed, the possibility of establishing it permanently in the West Indies is well within the range of possibility. The nuts or seeds are round and about the size of a schoolboy's marble. The shell or putamen is very hard and cannot be broken unless a fairly heavy hammer is used.

The flavour of the kernel is somewhat like that of the Brazil nut. The tree is evergreen and very suitable for orchards and small gardens.

**PIPER NIGRUM, L.,** "Black Pepper."—Can be easily grown in Trinidad, provided the proper kind of plants are secured. There are some varieties in cultivation which seldom produce seed, but there are also varieties which give a regular supply of fruit. Care is taken at the Royal Botanic Gardens to propagate exclusively from the latter by layers, and plants are now supplied at a cheap rate, which can be thoroughly relied upon as bearing vines.



No. 1. *Vanilla Planifolia*, Aud.  
(*Mexican Vanilla.*)

No. 2. *Vanilla Phoenantha*, Rchb., f.  
(*Creole Vanilla.*)

No. 3. *Vanilla Grandifolia*, Lindl.  
(*Large Vanilla.*)

**PIPER CUBEBÆ, L.** ("Cubebæ")—Plants purporting to be this medicinal plant received some two years ago from a London house interested in economics proved after growing them to the flowering stage to be a totally different plant. Since that time a consignment has been received from the Royal Gardens, Kew, which are thriving well and it is hoped will prove to be the "Cubebæ" of commerce, but they are too young yet to bear fruit.

**PIPER BETLE, L.**—This plant is mentioned by Kew as having become acclimatized in St. Vincent. While not known in a wild state in Trinidad it is still quite a common plant in gardens in the town of Port-of-Spain and answers as well for forming arbours and covering walls, as does the Ivy in many parts of Europe. It grows with great luxuriance on South walls, clinging thereto without support and rapidly forms a screen of foliage where unsightly objects require to be hidden.

**PIPER LONGUM, Linn.**—Plants of this pepper were introduced from Kew a few years since and again recently. These have done remarkably well and fruit freely. It is a plant easily cultivated in the open ground, and propagates very freely by cuttings or suckers. The part used is the unripe dried "pod." The produce is quoted at 24/- per cwt. in the current market quotations (January, 1893). I consider the plant well adapted for growth in Trinidad.

**PIPER OVATUM, Vahl.**—"Poutt")—This plant, as stated in my Report for 1890, has long been believed to possess virtues of no uncommon kind. During the year consignments have been sent to England to enable experienced scientists to carry on the examination of the principle it contains. This examination is not yet complete, but without anticipating, we may say that it promises very interesting results.

**PIPER METHYSTICUM, L.**, is also growing freely.

**UNCARIA GAMBIR, Hunt.**—Those plants introduced from Kew in 1890, though promising at first, have not thriven. They were tried in various positions but no plant has, up to the present, made such a start as will entitle us to look with confidence to their ultimate acclimatization.

#### THE CULTIVATED SPECIES OF VANILLA.

The varieties of Vanilla found growing in the Royal Botanic Gardens on my assuming the direction in 1887, described in the Annual Report for that year, p. 19, were found to be so mixed up as to be unsaleable. From that time our efforts have been directed to disentangle the nomenclature and to ascertain the value of each species.

We have now, through the kindness of the Kew authorities, been able to ascertain that three if not more *species* are present.

- No. 1. *Vanilla planifolia, Aud.* (*Mexican Vanilla.*)
- No. 2. *Vanilla phœnantha, Rehb., f.* (*Creole Vanilla.*)
- No. 3. *Vanilla grandifolia, Lindl.* (*Large Vanilla.*)

The first is the long-podded sweet Mexican Vanilla and is the only one that can be thoroughly recommended for growing in quantity.

The second is an inferior Vanilla, short-podded, and probably classed in the markets as "*Vanillon.*"

The third is our large "Creole" Vanilla. Specimens of it were found in the Gardens, but I subsequently received it from Mr. C. W. Meaden (who obtained it from the Chaguanas woods), and from Mr. John C. Lewis, of San Fernando, who had it in cultivation and exhibited it at our last local Exhibition.

This plant produces large "meaty" pods which have a kind of sweet heliotrope flavour, suitable for domestic use, but it is also classed with the "*Vanillon's*" of commerce and is considered very inferior to the Mexican species, our No. 1, but nevertheless is much used for flavouring purposes locally. This kind of bean is imported here from Martinique at times.

The Mexican Vanilla besides being more valuable, produces a much larger number of pods if the fertilization is carefully attended to.

We reproduce for the information of our readers a plate of No. 1, or Mexican Vanilla, shewing the proper method to be pursued to effect fertilization. (Kew Bulletin, 1888.)

**CACAO.**—The past year has been noted by well-devised attempts to solve the problem of drying Cacao by artificial means, and the Legislature, through the Agricultural Board, bestowed the first prize of one hundred pounds on a local invention, which, though certainly the best that entered the competition, is still capable of improvement in many respects. It has however been fully shewn that artificially-dried Cacao is in no way inferior to sun-dried, if it is not superior; and when it is considered what one apparatus can save on a large estate in wet weather, there is little

doubt that artificial drying will shortly be a common process throughout the Island, as managers and planters must adopt it, or be responsible for large losses.

An experiment which shows how careful the planter should be in the selection of beans for seed purposes, and carried on in the Gardens for the past three years, has this year shown to advantage. A pod was selected from a strong growing, but unfruitful, tree. Another pod was taken from a "free bearing" tree. The result is that their progeny—the first is a free bearing tree, and the second is almost barren—which shows that it is always best to select seed from a stock which produces a first-class bean, and possesses a free bearing character, and not trust to seed which has been gathered from fruitful and unfruitful trees indiscriminately, or the result may be unfruitful and unprofitable plantations.

MANGOSTEEN (*Garcinia Mangostana*).—This tree only gave about one dozen fruit during 1892.

The grafting experiment mentioned in former reports has turned out a complete failure, as the grafts, after uniting with the stock, die away rapidly on being separated from the parent stock. We have not heard whether the Jamaica Botanical Department, which recorded a similar experiment, has met with any better success.

NEPHELIUM LITCHEE.—These trees fruit very irregularly and very partially, although they grow to a large size. What little fruit is produced is of excellent quality. At the time of writing (February, 1893,) there are a few flowers on one of the trees.

TACCA PINNATIFIDA.—This plant, sent to us from Kew for trial as a food or starch product, does not appear "happy." A considerable supply was received, but the tubers produced were not half the size of those originally planted. Its cultivation has been continued with a view to its being distributed into various situations for further trial.\*

MARANTA ARUNDINACEA, *Arrowroot*, Lim.—On taking up my duties here in 1887 I found what was called *Maranta arundinacea*, or "arrowroot," growing in the Garden, and cultivators informed me it was quite useless to try and grow arrowroot for starch producing purposes. For experiment I had ground prepared, but could not succeed in producing tubers of any economic value with the plants then cultivated. It occurred to me, however, that our plant might not be the true starch-producing variety, and I procured tubers from St. Lucia. These have now for four years given good crops of tubers which produce excellent starch, and it is therefore proved that as good a crop of arrowroot can be produced in Trinidad as in any other West Indian Colony. The original plants are indistinguishable botanically from the St. Lucia variety, but they will not produce tubers of sufficient size to be of value. For long years, Bermuda has maintained a pre-eminence in the production of arrowroot with which no West Indian Island has been able to compete. It may be possible that this is entirely owing to the variety of plant cultivated. There is no secret in the manufacture of Starch from any root, and it can scarcely be the case that superior climate, soil or manufacture should make the difference of 300 per cent. in value, if manufactured from the same plant. Bermuda arrowroot is quoted at 1/10d. while St. Vincent only makes 4d. per lb.

Plants of the Bermuda variety have just been received (February 27, 1893,) and a comparison of the starch they contain has been made with that locally grown. The microscopical examination revealed the fact that the starch cells were larger and much more regular in size than those in the Trinidad grown specimens.

ZINZIBER OFFICINALE, Rox., "Ginger."—A few years ago plants of what were supposed to be the source of "Chinese Ginger" were distributed to West Indian Gardens. Doubts arose however, as to its authenticity owing to the fact that its rhizome could not be prepared to correspond with the preserved article. These doubts were fully justified by the plant being proved later to be an *Alpinia* and not a *Zinziber*, by the researches of Mr. Ford of the Botanical Department, Hong Kong. In my report for 1889, p. 16, I drew attention to the matter, and recorded the fact that the true kind had been procured direct from China through the kind offices of some of the Chinese mercantile community in Trinidad, and some of the tubers sent on for examination were thought by the Kew authorities not to differ specifically from the official or Jamaica Ginger.

Planted in the ordinary manner these rhizomes were found to decrease in size until they were not to be distinguished from "Jamaica Ginger." Carrying out an experiment however during the current year, with a *special kind of manure*, said to be much favoured by Chinese gardeners, it was found possible to increase the size of the rhizomes and to produce material of such soft and succulent character that it quite represents the oriental variety. If therefore supplies for preserving are required there will be little difficulty in producing them in future in almost any of the West Indian Islands, as "Ginger" of itself is a plant of very easy culture.

\* From an old record in this office we find that this plant was included in a list of cultivated plants grown at the Bath Garden, Jamaica, 1860.

**BERTHOLLETTIA EXCELSA, Brazil Nut.**—Attention is called to the fine lot of plants of this magnificent tree which are now on hand at the Gardens. They are about one foot in height and very healthy. When it is known that it takes three full years to raise plants to this height from seeds in the ordinary course it can easily be seen what an amount of labour and attention such a culture involves. It has been found by experiment however, that by cutting the hard shell of nut away on one side, and thus allowing moisture to enter, the period of germination may be hastened by some eight or nine months, and the same has been found to be the case with many of our hard shelled tropical seeds. The Brazil-nut tree however makes rapid growth once it has passed its juvenile stages and soon becomes a handsome, and from the quantity of fruit it bears, a valuable tree to the planter. It is also said to be a first-class timber, in common with its near relation, the Balata. *Mimusops dissecta*.

**CYCAS CIRCNALIS, L.**—Two plants of opposite sexes having flowered at the same time, opportunity was taken to attempt artificial fertilization which was completely successful, and a large crop of seeds resulted. These were found to contain on examination as much as 30 per cent. of excellent starch, not taking waste in manufacture into account. A specimen of the starch has been sent on to the Chicago Exposition.

**CYPERUS ARTICULATUS, L., "Adruc."**—The Department forwarded a supply of roots of the above plant to an eminent firm of manufacturing chemists in the United States in February, 1892.

Enquiries for plants of medicinal character are yearly becoming more frequent, and we are generally able to recognise what is required, owing to the increasing efficiency of our Herbarium, and we supply at cost, sufficient material for experiment. It is considered that in no way are we more likely to develop commercial relations than by giving a ready trial of all such products.

**CLIBADUM ASPERUM, D. C. (Fish Poison).**—This plant furnishes one of the fish poisons of the West Indies, and possibly possesses a toxic principle which may be of medicinal value. A consignment has been placed for a first trial and experiment.

**COFFEE—Coffea Arabica, Q.**—The demand for Coffee plants has again been greater than the resources of the Garden could supply—the ground at our disposal being insufficient. The Department is in receipt of communications showing that a great extension of the area tender Coffee may be expected during the coming season; and also, that the methods of curing have had consideration. A large firm applied to the Gardens to clean some Coffee which had been dried in the "cherry," or in the "berry" as some have it, and the results were as follows: A total weight of 1,140 lbs. contained in 9½ bags was sent to us. Coffee thus dried therefore weighs about 120 lbs. per bag *nett*. The total loss in cleaning was 731 lbs., as only 399 lbs. *nett* of clean Coffee was obtained, or in other words, 64 per cent. of loss on each 100 lbs. To dry Coffee in the cherry to send to London to be cleaned cannot prove a remunerative course, while, on the other hand, if the Coffee is pulped by machinery on the spot, it can be dried in one-tenth of the time, and it can be sent with advantage to be "London cleaned," as then only the parchment skin has to be removed, which does not increase the weight more than some 10 or 12 per cent., and the cleaning can be done for 2/6 per cwt. Home cleaners do not recommend the sending of Coffee dried in the cherry, but they advocate an extension of the system of sending home in parchment, as Coffee can thus be made to retain its full flavour for a longer time.

**SARSAPARILLA, Smilax officinalis, L.**—Plants of Jamaica Sarsaparilla received from that island two years ago, have done well, and show plainly that the plant can be readily cultivated to a large extent, if desired, in Trinidad.

#### KITCHEN GARDEN.

The Kitchen Garden has been maintained throughout the year as usual, but the returns would have been larger in a dryer season. A season like the last which gave heavy rains during every month of the year, is particularly hard upon tropical gardening of every kind, and especially so with the more delicate kinds of vegetables and salads.

Kohl-Rabi and Marrow Kale were grown and proved extremely useful vegetables towards the end of the year.

#### NATURAL HISTORY NOTES.

In April nests of *Æcodoma* sp. were discovered with winged male and females. In the following month the colonies in the Garden were more numerous than usual—following upon the migration of fertilized Queens from the original nest. It is an important point to note when the migration of the mature insects from the old nests take place, as it is evident that efforts at destruction made at this particular time are

sure to be successful in reducing numbers. Whether ants migrate at a particular season or not each year, has not as yet been recorded, but we undertook experiments during 1892, which will probably result in affording information on this point during the coming year. Observations by Superintendent on the habits of the Parasol Ant (*Ecodoma* sp.) were read at a meeting of the Linnæan Society in London in the latter part of 1892. They were of the same tenor as those here given :—

Residents in Trinidad are so well aware of the large amount of damage and destruction to the farm and garden occasioned by the agency of the "Parasol" ant, that a few notes on their life history will probably prove interesting to the readers of the *Agricultural Record*, especially as such notes tend to increase our knowledge of the means by which they may be exterminated.

In June, 1892, I tried several times to maintain a nest artificially without any large margin of success. I was desirous of doing this for the purpose of observing the development of the fungus on which these insects were said to feed by "Belt" the traveller and naturalist. "Bates," another traveller, considered they used the leaves to thatch the domes which cover the entrances to their underground nests. Both of these observations have been proved correct, one species of ant making a special habit of depositing all its leaf cuttings near the entrance to the nest—while another species takes them directly to the inside where ultimately both species use them for the growth of a fungus on which they feed themselves and their progeny. Believing that the Botanical classification of the fungus had not hitherto been attempted, I was anxious to procure material under observation, from which the necessary notes might be made, and on examining portions of nests that were brought in, I found in them evident signs that the fungus had reached its fruiting stage. A portion was placed under the microscope, when with a  $\frac{1}{4}$  inch objective sporiferous *asci* could be distinctly seen. This observation was kindly confirmed at the time by the Hon. J. E. Tanner who was good enough on my invitation to take a look at the newly discovered organism. Subsequently the form of the fungus was more distinctly seen when irrigated on the microscope with Schultze's solution, which rendered the *nucleoli* clearly visible, and enabled a camera lucida drawing to be made.

Mr. Tanner succeeded almost immediately afterwards in maintaining a nest artificially by following a somewhat similar plan to that so successfully adopted by Sir John Lubbock\* and published a most interesting account of his observations in the *Field Naturalists' Journal*.

Copying this plan I successfully started three nests which I propose to call numbers one, two, and three. I was able to make careful observations of the growth of the fungi. Some of the material was sent to Mr. Masee, of Kew. He describes it as "a very interesting production" and refers it to the *Phycomycetes* to which class I had myself referred it, owing to its resemblance to the well-known *Pythium de Baryanum*, or the fungus which kills young seedling plants in such large numbers, but the exact place it holds in mycological science is not yet determined. Nests once established are easily maintained, and the examination of their labours forms a delightful recreation in leisure moments, and far more interesting than any of the commoner household pets.

The history of my nests is as follows :—Numbers one and two, were both taken (August 9th) on the same day, while destroying nests in the Gardens and were portions of separate nests but of the same species. No. 3 was procured on September 5th and is evidently a different although an allied species to Nos. 1 and 2.

Finding neither of my nests had a queen, I procured one from another nest about to be destroyed and place it with No. 1 nest. It was received by the workers and at once attended by a numerous retinue in royal style. On August 30th I removed the queen from No. 1 and placed it with No. 2 when it was again received in a most loyal manner. The queen is easily recognised by the presence of three ocelli placed in a triangle in the centre of the head front. The males have three ocelli also, but their head is much smaller and rounder than that of the queen.

Ants taken from Nos. 1 and 2 and placed with No. 3 were immediately destroyed by the latter, and even the soldiers of No. 3 as well as workers or nurses were destroyed when placed with Nos. 1 and 2.

In nest No. 2 from which I removed the queen on August 30th there are now in the pupa stage several queens and several males. The forms of ant in nests Nos. 1 and 2 are as follows :—(a) queen (b) male, (both winged but the queen loses its wings after marital flight) (c) large workers (d) small workers and (e) nurses. In nest No. 3, I have not yet seen the queen or male, but it possesses—(a) soldier (b) larger workers (c) smaller workers and (d) nurses, but these are different in form to those of nests No. 1 and No. 2. Probably we might add a third form of worker, as there are several sizes in the nest.

The nests No. 1 and No. 2 use readily almost any kind of foliage or flower presented to them, but No. 2 does not carry well to the nest. No. 3 instead of carrying material into the nest forms a high heap outside, covering the entrance with a dome and afterwards the material is transported inside and cut up for use. This is evidently the species observed by Bates.

It is curious that in No. 1 nest from which the queen was removed on August 30, new queens and males are now being developed, while in No. 2 nest where the queen is at present, nothing but workers have been brought out and if a queen larvæ or pupæ is placed there it is at once destroyed, while worker larvæ or pupæ are amicably received. In No. 3 all the eggs larvæ and pupæ collected with the nest have been hatched, and no eggs have since made their appearance to date. There is no queen with this nest. On November 22nd the Beckia, (described by Sir John Lubbock as an ant guest), a small insect said to be blind, was first observed in No. 2 and No. 3 nests (i.e.) about six weeks after their being established, but has not yet made its appearance in No. 1. I attributed its appearance to the state of humidity maintained in the nest, as the nest kept drier had not been visited by it and subsequently on keeping the nests drier they disappeared. On November 14, I attempted to prove by experiment how small a number of parasol ants it required to form a new colony. I placed two dozen of ants (one dozen workers and one dozen nurses) in two separate nests, No. 4 and No. 5. With No. 4 I placed a few larvæ with a

few rose petals for them to manipulate. With No. 5 I gave a small piece of nest covered with mycelium. On the 16th these nests were destroyed by small foraging ants, known as the "sugar" or "meat" ant, and I had to remove them and replace with a new colony. My notes on these are not sufficiently lengthy to be of much importance. But I noted four eggs laid on the 16th, or two days after being placed in their new quarters; no queen being present. The experiment is being continued. I may mention that in No. 4 nest in which no fungus was present, the larvæ of all sizes appeared to change into the pupæ stage at once for want of food, a circumstance tending to show that the development of the insect is influenced entirely by the feeding it gets in the larvæ stage.

In nest No. 2 before the introduction of a queen there were no eggs or larvæ. The first worker was hatched on October 27th or 57 days afterwards, and a continual succession has since been maintained, but as yet (November 19) no males or queens have made their appearance.

The history of the ants' nest so far as our present observations extend appear to be as follows, but our deductions may have to be modified by future observations.

(1) A small number of worker ants can found a colony if they have a portion of an old nest, but the fungus of the nest has not at present been observed to occur spontaneously.

(2) The workers themselves are able at times to produce queens or males without the immediate aid of a queen or male.

(3) There is more than one species of parasol ant.

(4) The parasol ant has no sting and only grips with its mandible and the soldier ant of nest No. 3 is capable of thus drawing blood. No. 3 has however what appears to be an aborted sting.

(5) The parasol ant is easily destroyed by a small foraging ant which appears to be its natural enemy. The name of this ant will be ascertained later.

(6) The "parasol" ant passes through the following stages: 1st, egg; 2nd, Larva (*in which stage it requires to be fed as it cannot feed itself*); 3rd, Pupa; 4th, the imago, or the perfect insect stage. To pass through the stages from the egg to the mature worker, appears to take about 57 days, but the queens and males appear to take longer to develop.

(7) If the living insects are destroyed in a nest, the eggs are powerless to produce a new colony, but a new colony seeking a home are sure to seize upon an old nest if any quantity of fungus infected material is left for them to feed upon, which explains the frequent re-occupations of old nests.

(8) The food of the larva has been identified as the fruit of the fungus, as a portion was taken from the mouth of a larva, after observing it to have been placed there by a "nurse" ant and was immediately afterwards identified under the microscope.

The Botanical interest of the subject centres itself entirely upon the curious fungus which permeates the nest to the exclusion of all other forms.

Attempts to grow this fungus in a damp micro-chamber have resulted in the production first of the usual fructification and then a rank growth of *Penicillium* which Mr. Masee says may be a form of the original fungus. I cannot add much to Mr. Tanner's excellent description of the manipulation of the leaf for the growth of the fungus; as described in *Field Naturalists' Journal*, (No 3) but I may point out as important, the statement that the ants *lick the leaf with their tongues*. Those who have studied ever so little, the wonderful ubiquity of the various micro-fungi, know well how important it is to sterilize every article to prevent fungus growth, and the object of this "*licking with their tongues*" would appear to be, to sterilize the leaf by cleaning it in such a manner that no fungus spores should grow, other than those of the *species* required for food. The ants carry in the material, cut it up, chew it into balls, and then form into a flocculent cellular mass on which the fungus grows in a few hours.

We hope to return to this subject later, when a fuller and more complete record of our observations will be given. Meanwhile it may be understood there is hardly any insect more easy to kill than the parasol ant, if only the right way to do it is chosen.

The best method of killing them when nests are in the ground, is by the application of coal tar or gas water. If in walls or buildings, by sulphur fumes, or any other poisonous gases driven in by bellows or centrifugal fan. A very effective and useful machine termed the "Asphyxiator," used for the latter purpose, can be seen at anytime at the Royal Botanic Gardens. The method known as "padding" is effective, as it destroys the food of the nest as well as the insects themselves and consequently there is no inducement for a new colony to take up the same abode, but gas water or gas tar is just as effective, if carefully and properly used. In fact there are as many ways of killing the parasol ant, as of building a house, and where failure results the numerous methods are not in fault, but the want of care in the application of them.

J. H. HART.

November 19th, 1892.

SCALE INSECTS OR COCCIDÆ.—Several specimens of Coccidæ occurring in the Garden have been sent to Mr. T. D. A. Cockerell of the Jamaica Institute, who has been good enough to name them and supply a list of the Trinidad species as at present known, which has been published in the December number of the *Agricultural Record*.

ARTIBEUS HARTII, n. sp. *Thomas*, is a small bat captured in the Superintendent's quarters. It is the third known member of the *sub-genus Uroderma* and named in compliment to its finder.

J. H. HART, F.L.S.,

Superintendent.

The Hon'ble Colonial Secretary,  
Trinidad.

## APPENDIX I.

## PLANT AND SEED DISTRIBUTION AND EXCHANGE.

Plants and Seeds were distributed to the following Correspondents during the year :—

ROYAL GARDENS	...	...	...	...	Kew.
BOTANIC GARDENS	...	...	...	...	Calcutta.
" "	...	...	...	...	Ootacamund, Madras.
" "	...	...	...	...	Ceylon.
" "	...	...	...	...	Malta.
" "	...	...	...	...	Fiji.
" "	...	...	...	...	Java.
" "	...	...	...	...	St. Petersburg.
" "	...	...	...	...	Singapore.
" "	...	...	...	...	Gold Coast.
" "	...	...	...	...	Hong Kong.
" "	...	...	...	...	Mauritius.
" "	...	...	...	...	Natal.
" "	...	...	...	...	Saharanpur.
" "	...	...	...	...	British Guiana.
" "	...	...	...	...	S. Australia.
" "	...	...	...	...	Tasmania.
" "	...	...	...	...	Bombay.
" "	...	...	...	...	Lucknow.
" "	...	...	...	...	Leeward Islands, West Indies.
" "	...	...	...	...	Jamaica.
" "	...	...	...	...	Grenada.
" "	...	...	...	...	St. Vincent.
" "	...	...	...	...	St. Lucia.
" "	...	...	...	...	Washington, U.S.A.
" "	...	...	...	...	Martinique.
" "	...	...	...	...	Madras.
SECRETARY AGRI-HORTICULTURAL SOCIETY	...	...	...	...	Oodeypore, India.
SAYJAR NIVAS GARDENS...	...	...	...	...	Jamaica.
DE. G. C. HENDERSON	...	...	...	...	London, England.
MESSRS. THOMAS CHRISTY & Co.	...	...	...	...	Middlesex, England.
J. O'BRIEN, ESQR.	...	...	...	...	Belgium.
MESSRS. JULES DE COCK...	...	...	...	...	Barbados.
DR. ROUTE	...	...	...	...	England.
R. M. M. DAVY, ESQR.	...	...	...	...	Barbados.
S. F. HERNAMAN	...	...	...	...	Michigan, U.S.A.
MESSRS. PARKE, DAVIS & Co.	...	...	...	...	Oviedo, U.S.A.
T. L. MEAD, ESQR.	...	...	...	...	Jamaica.
J. J. BOWREY, ESQR.	...	...	...	...	Jersey.
E. CAMPBELL, ESQR.	...	...	...	...	London.
A. AMBARD, ESQR.	...	...	...	...	Goldaming, England.
MRS. NELSON	...	...	...	...	Belgium.
MESSRS. L. LINDEN, L'Horticulture Internationale Société	...	...	...	...	Middleburg, Holland.
Anonyme	...	...	...	...	H.M.S. "Buzzard."
MESSRS. M. BUYSMAN	...	...	...	...	England.
LIEUTENANT ELLIOTT, R.N.	...	...	...	...	England.
CAPTAIN DICKINSON	...	...	...	...	Barbados.
DR. GOODRIDGE	...	...	...	...	Barbados.
CAPTAIN HASSELL	...	...	...	...	Venezuela.
CAPTAIN BATTERSBY	...	...	...	...	New York, U.S.A.
DR. RAFAEL A. GARCIA	...	...	...	...	St. Vincent.
MR. WILSON	...	...	...	...	Barbados.
CAPTAIN RADEMAKER	...	...	...	...	London, England.
W. F. NEWSAM, ESQR.	...	...	...	...	Bournemouth, England.
R. H. SKINNER	...	...	...	...	Yorkshire, England.
COLONEL COOPER	...	...	...	...	Jamaica.
M. R. COTES, ESQR.	...	...	...	...	Antigua.
MR. BALDWIN	...	...	...	...	England.
E. E. C. HOSACH, ESQR.	...	...	...	...	Tobago.
S. HOLBOROW, ESQR.	...	...	...	...	Venezuela.
SIR WM. MARKBY	...	...	...	...	Barbados.
J. AGARD, ESQR.	...	...	...	...	Venezuela.
J. M. GOMEZ, ESQR.	...	...	...	...	Bogota.
MR. GARRAWAY	...	...	...	...	London, England.
F. W. MAYER, ESQR.	...	...	...	...	St. Vincent.
R. THOMPSON, ESQR.	...	...	...	...	Dominica.
J. EPPS, ESQR., JNR.	...	...	...	...	Barbados.
T. M. MACDONALD, ESQR.	...	...	...	...	Venezuela.
MR. RANKIN	...	...	...	...	Barbados.
MR. GREENIDGE	...	...	...	...	Barbados.
MADAME URDANCTA	...	...	...	...	Venezuela.
MRS. BURSMA	...	...	...	...	Barbados.

APPENDIX II.

Plants and Seeds were received from Correspondents according to the following List, which forms annually a permanent record of introductions made, and is also an acknowledgment to our Correspondents in the various Institutions which favour us with exchanges, and present similar returns:—

NAME.	A.	B.	NAME.	A.	B.
<b>From Royal Gardens, Kew.</b>			<b>From Botanic Gardens, Saharanpur.</b>		
Casuarina muricata ...	S	S	Andropogon muricatus ...	S	S
Momordica cochinchinensis ...	S	F	"   annulatus ...	S	G&F
Azelia bijuga ...	S	F	"   pertusus ...	S	F
Erythroxylon Coca ...	P	F	"   sp. ...	S	S
Arundinaria sp. (Calcutta) ...	S	S	Eragrostis cynosuroides ...	S	S
Stillingia sebifera ...	S	S	Saccharum spontaneum ...	S	F
Ptychoraphis augusta (Nicobar Is.)	S	S	Panicum sanguinale ...	S	F
Corypha Gebanga ...	S	F	"   ciliare ...	S	F
Eucalyptus drepanophylla ...	S	S	Triumfetta pilosa ...	S	F
Anamirta cocculus ...	P	S	Leea alata ...	S	F
Vanilla planifolia (Sion House var.)	P	S	Luehea cordifolia ...	S	F
Acrocarpus fraxinifolius ...	P	S	Erythrina suberosa ...	S	F
Bassia Parkii ...	P	S	Thuja orientalis ...	S	F
Brehmia spinosa ...	P	S	"   compacta aurei ...	S	F
Piper longum ...	P	S	Embelia robusta ...	S	F
Combretum sundaicum ...	P	S	Terminalia chebula ...	S	F
Diospyros discolor ...	P	S	Wendlandia puberula ...	S	F
Dalbergia lanceolaria ...	P	S	Grewia salvifolia ...	S	F
(Godwinia) Dracontium gigas ...	P	P	Ficus scandens ...	S	F
Ilex sp. (118-89, Janeiro, No. 3)	P	S	Flemingia strobilifera ...	S	F
Phyllanthus gomphocarpus ...	P	S	Bauhinia Vahlia ...	S	S
Piper Cubeba ...	P	S	"   purpurea ...	S	S
Pine Apple. Hen and Chickens	P	S	Butea frondosa ...	S	G&F
Sandoricum lucidum ...	P	S	Ficus cordifolia ...	S	F
Streblus aspera ...	P	S	Colebrookia oppositifolia ...	S	F
Strychnos, sp. (Africa) ...	P	S	Solanum capsicastrum ...	S	F
Spondias borbonica ...	P	S	Rubus trivialis ...	S	S
Tabernaemontana Barteri ...	P	S	Hibiscus mutabilis ...	S	F
Wrightia zeylanica ...	P	S	Ipomoea rubra coerulea ...	S	F
Legume (470-91) Glazion ...	P	S	Ardisia humilis ...	S	F
Adenocalymma nitidum ...	P	S	Strobilanthes auriculatus ...	S	F
Anthurium hastiferum ...	P	S	Casuarina muricata ...	S	G&F
Aphelandra grandis ...	P	S	"   equisitifolia ...	S	F
Allamanda Schottii, var. Hendersoni	P	S	Lawsonia inermis ...	S	F
Antiaris Bennetii ...	P	S	Ochna squarrosa ...	S	F
Aristolochia gigas, var. Sturtevantii	P	S	Polyalthia suberosa ...	S	F
Cycas Seemannii ...	P	S	Solidago longifolia ...	S	F
Citriobatus multiflorus ...	P	S	Glycosmis pentaphylla ...	S	F
Calamus grandis ...	P	S	Phlogacanthus thyrseiflorus ...	S	F
Carex scaposa ...	P	S	Vitex agnus costus ...	S	S
Dregia floribunda ...	P	S	Barleria scabra ...	S	F
Eranthemum cinnabarinum ...	P	S	Dendrocalamus Hamiltoni ...	S	F
Euadenia eminens ...	P	S	Heterophragma adenophylla ...	S	F
Ficus sp., 377-82 ...	P	S	Combretum decandrum ...	S	F
Geonoma pumila ...	P	S	Murrya exotica ...	S	S
"   Spixiana ...	P	S	Flacourtia Ramontchii ...	S	F
"   Scottiana ...	P	S	Lagerstromia reginae ...	S	F
"   princeps ...	P	S	Lagerstromia indica alba ...	S	F
Hibiscus sp., (S-92, Elliot), Africa	P	S	"   purpurea ...	S	F
Musa Manni ...	P	S	"   parviflora ...	S	F
"   coccinea var. ...	P	S	Bombax malabaricum ...	S	F
Pandanus graminifolius ...	P	S	Ficus glomerata ...	S	F
Ptychoraphis augusta ...	P	S	Pinus longifolia ...	S	G&F
Phoenix humilis, var. Hanceana	P	F	Gmelina parvifolia ...	S	F
Plectranthus fetidus ...	P	S	Colquhounia vestita ...	S	F
Ptychosperma paradoxa ...	P	S	Ixora undulata ...	S	F
Tecoma sp. (No. 46), 104-91 ...	P	S	Ehretia serrata ...	S	F
Tree 80 feet (8-92), Elliot, Africa	P	S	Hematoxylon campechianum ...	S	F
Tala sp. (571-92), Dr. Fallow, Arg. Rep.	P	S	Grevillea robusta ...	S	F
			Quercus incana ...	S	F
			Bauhinia variegata ...	S	F
			Pithecolobium bigeminum ...	S	S
			Cedrela Toona ...	S	F
			Bischoffia javanica ...	S	F
			Calosanthos indica ...	S	F
			Moringa pterygosperma ...	S	G&F
			Terminalia tomentosa ...	S	F
			Shorea robusta ...	S	F
			Stereospermum suaveolens ...	S	F
			Dalbergia sissoo ...	S	F
			Cassia glauca ...	S	F
			Diospyros embryopteris ...	S	F
			Prosopis spicigera ...	S	F

A.—P. Plants. S. Seeds.

B.—S. Succeeded. F. Failed.

## APPENDIX II.—Continued.

NAME.	A.	B.	NAME.	A.	B.
<b>From Botanic Gardens, Saharanpur.—Cont'd.</b>			<b>From Botanic Gardens, Hong Kong.—Cont'd.</b>		
Prosopis glandulosa	...	S	Pardanthus chinensis	...	S
Sterculia elata	...	S	Clematis crassifolia	...	S
Caryota urens	...	F	Iris speculatrix	...	S
Albizia Lebbeck	...	F	Stillingia sebifera	...	S
Acacia arabica	...	F	Eugenia buxifolia	...	S
Woodfordia floribunda	...	S	Rhaphiolepis indica	...	S
Cassia Fistula	...	S	Pinus sinensis	...	S
Kydia calycina	...	G&F	Styrax suberifolia	...	S
Dædalacanthus purpureus	...	S	Ormosia pachycarpa	...	S
Nyctanthes arbor tristis	...	S	Camellia reticulata	...	S
Jatropha curcas	...	S	<b>From Botanic Gardens, Jamaica.</b>		
Tithonia tagetifolia	...	S	Gouania domingensis	...	S
Tamarindus indicus	...	S	Aristolochia elegans	...	S
Brussonetia papyrifera	...	S	Paritium elatum	...	S
Dendrocalamus stricta (?)	...	S	Coffea	...	S
Sterculia alata	...	S	Pimenta officinalis	...	S
<b>From Botanic Gardens, Singapore.</b>			<b>From Botanic Gardens, British Guiana.</b>		
Sterculia rubiginosa (?)	...	S	Ravenala guianensis	...	S
Myristica elliptica	...	F	Stevensonia grandifolia	...	S
<b>From Botanic Gardens, Bangalore.</b>			Licuala grandis	...	F
Lagerstromia parviflora	...	S	<b>From Botanic Gardens, Grenada.</b>		
Bauhinia variegata	...	F	Roses, assorted varieties	...	F
Melia dubia	...	F	Passiflora sp.	...	S
Terminalia tomentosa	...	F	Nipa fruticans	...	S
" arjuna	...	F	Caryota urens	...	S
Michelia champaca	...	G&F	Palm (unnamed)	...	F
Balanites Roxburghii	...	F	Hibiscus mutabilis	...	S
Alangium Lamarckii	...	F	Canavalia ensiformis	...	S
Cassia montana	...	F	<b>From Botanic Gardens, St. Vincent.</b>		
Clausea Wildenovi	...	F	Catostemma fragrans	...	S
Passiflora alba	...	S	Crossulaceæ	...	P
<b>From Botanic Gardens, Mauritius.</b>			Dialium guineense	...	S
Verschaffeltia splendida	...	S	Myristica surinamensis	...	S
Latania rubra	...	S	<b>From Agricultural Department, Leeward Islands.</b>		
Cocos flexuosa	...	F	Michelia Champaca	...	S
Bætris flavispina	...	F	Corypha australis	...	S
Livistona humilis	...	F	Livistona mauritiana	...	S
Stevensonia grandifolia	...	F	Areca rubra	...	S
Deckenia nobilis	...	F	<b>From Botanic Gardens, Natal.</b>		
Areca lutescens	...	S	Vitis capensis	...	S
Corypha elata	...	F	Watsonia densiflora alba	...	S
Areca sp.	...	F	Cephalandra palmata	...	S
Licuala horrida	...	F	Kniphofia sp.	...	S
<b>From Botanic Gardens, Hong Kong.</b>			Buttonia natalensis	...	S
Cocos plumosa	...	S	Ceratostoma triloba	...	S
Heteropanax fragrans	...	F	Agapanthus umbellatus albus	...	S
Gleditschia sinensis	...	S	Ophiocaulon gummifera	...	S
Cananga odorata	...	F	Crotalaria lanceolata	...	S
Livistona chinensis	...	S	Protea hirta	...	S
Spathodea sp.	...	F	Streptocarpus sp.	...	S
Hibiscus tiliaceus	...	S	Strelitzia augusta	...	S
Viburnum odoratissimum	...	S	Pseudarthria robusta	...	S
Symplocos crassifolia	...	S	Ipomoea n. sp.	...	F
Secum formosarum	...	F	Scilla rigidifolia	...	F
Rhodomyrtus tomentosa	...	S	Littonia modesta	...	F
Uraria crinita	...	S	Gomphocarpus sp.	...	F
Livistona chinensis	...	S	Sparmannia palmata	...	S
Fluggia microcarpa	...	S			
Quercus salicina	...	S			

A.—P. Plants. S. Seeds.

B.—S. Succeeded. F. Failed.

## APPENDIX II.—Continued.

NAME.	A.	B.	NAME.	A.	B.
<b>From Botanic Gardens, Natal.—Cont'd.</b>			<b>From Messrs. Jules de Cock, Belgium.</b>		
Anona senegalensis	...	S F	Mignonette	...	S F
Gardenia Thunbergii	...	S F	Liriodendron tulipiferum	...	S F
Umbellifera, No. 1	...	S F	Lavatera variegata	...	S F
" No. 2	...	S F	Senecio elegantissima	...	S F
Plectranthus sp.	...	S F	Scabiosa atropurpurea	...	S F
Thalictrum rhyncocarpum	...	S F	Antirrhinum majus	...	S F
Tephrosia grandiflora	...	S F	Salpiglossis variabilis	...	S F
Mimusops obovata	...	S F	Acroclinium roseum	...	S F
Aloe Cooperi	...	S F	Viola tricolor maxima	...	S F
Smodingium sp.	...	S F	Rheum sp.	...	S F
Tysonia africana	...	S F	Liriodendron sp.	...	S F
Brunsvigia Josephina (?)	...	S F	Celosia cristata	...	S F
Rrythrina Humei	...	S F	(Hoxinia (hybrid)	...	S F
			Magnolia superbum	...	S F
<b>From Botanic Gardens, S. Australia.</b>					
Solanum viride	...	S F	Clarkia elegans alba	...	S F
Eucalyptus miniata	...	S F	Verbascum olympicum	...	S F
" Toelscheana	...	S F	Zinnia elegans robusta	...	S F
Helicia australasica	...	S F	Dianthus Heddeiwigi	...	S F
Persoonia falcata	...	S F			
Verticordia Cumminghamii	...	S F	<b>From J. R. Bovell, Esq., Dodds' Reformatory, Barbados.</b>		
Eugenia Holtzeana	...	S F	Sugar Cane Seeds	...	S F
Parinariium Griffithianum	...	S F			
Hemicyclia sepiaria	...	S F	<b>From Botanic Gardens, Brisbane.</b>		
Alstonia verticillata	...	S F	Stenocarpus sinuatus	...	S S
Antiaris macrophylla	...	S F			
Zanophyllum falcatum	...	S F	<b>From Messrs. Haage &amp; Schmidt, Germany.</b>		
Sarcocephalus cordatus	...	S F	Cupressus sempervirens	...	S S
Tephrosia flaminea	...	S F	" horizontalis	...	S S
Peltophorum ferrugineum	...	S S			
Crinum uniflorum	...	S F	<b>From Hugo Finck, Esqr., Cordova, Vera Cruz.</b>		
Microstemma tuberosum	...	S F	Agave sp.	...	P S
<b>From Botanic Gardens, Fiji.</b>			<b>From H. W. C. Dihm, Esqr., U.S.T.N. Nurseries, Trinidad.</b>		
Antiaris Bennettii	...	S S	Palms, assorted	...	P S
Unnamed	...	S S	Anthurium crystallinum	...	P S
Pritchardia Thurstoni	...	S S	Calathea, assorted	...	P S
			Victoria regia	...	P S
<b>From Agri-Horticultural Gardens, Madras.</b>					
Andamon Corypha	...	S G & F	Cycas revoluta	...	P S
			Tacsonia sp.	...	P S
<b>From Botanic Gardens, St. Petersburg.</b>					
Garuga pinnata	...	S F	Rhapiis sp.	...	P S
Casuarina glabra	...	G & F			
Callicarpa sp. I. (Japan)	...	S F	<b>From Conrad F. Stollmeyer, Esq., Trinidad.</b>		
Agave heteracantha	...	S F	12 Cocos nucifera	...	P S
" sp.	...	S F			
Gleditschia sinensis	...	S F	<b>From Mr. J. Bailey, Trinidad.</b>		
Croton (Japan)	...	G & F	Panax Victoria	...	P S
Bumelia sp.	...	S F			
Pittosporum undulatum	...	G & F	<b>From Mrs. Cipriani, Trinidad.</b>		
Acacia sp. (Japan)	...	S F	Cycas revoluta	...	P S
Cucurbitaceae	...	S S			
Acacia eburnea	...	S F	<b>From Eugene Maingot, Esqr., Trinidad.</b>		
Desmodium sp. (Japan)	...	S S	Roses, assorted	...	P S
Callicarpa sp. II. (Japan)	...	S S			
Bauhinia aculeata	...	G & F			
Acacia arnae	...	S S			
Acacia sp.	...	S S			
Æschynomene sp. (Japan)	...	G & F			
Agave angustifolia	...	S F			
" heisbreghtii	...	S F			
Cassalpinia sepiaria	...	S S			
Spathodea Wallichii	...	S F			
Clerodendron sp. (Japan)	...	S F			
Acacia genistifolia	...	S F			
Cephalostachyum capitatum	...	S F			
Rhynchosia sp. (Japan)	...	S F			

A.—P. Plants. S. Seeds.

B.—S. Succeeded. F. Failed.

## APPENDIX II.—Continued.

NAME.	A.	B.	NAME.	A.	B.
<b>From A. Maingot, Esqr., Arima.</b>			<b>From G. Vahl, Esqr., Trinidad.</b>		
Begonia rex. var. ...	...	P S	Flower and Vegetable Seeds ...	...	S S
Cynoches ...	...	P S			
<b>From L. Libert, Esqr., Trinidad.</b>			<b>From D. W. Alexander, Trinidad.</b>		
Pritchardia pacifica ...	...	S S	Orchids, assorted ...	...	P S

NOTE TO APPENDIX II.—It has been brought to our notice by Correspondents for whom we have the greatest respect that our last year's list of Seeds and Plants received did not show sufficiently well the results of the several importations. It is to be understood this year that where the letter F is placed, the Seed or Plant has *failed* altogether; where the letters G and F, *grew and failed*; and where the letter S is placed, succeeded up to the time of writing. (See column B.) Sometime Plants received in good health succumb on after cultivation, although very promising when first started. All Seeds and Plants received have special care, and every effort is used to make their culture a success. Climate, and the vicissitudes the Plants and Seeds incur in transit, often forbids successful growth; but it is found that a second, or even third or fourth trial, may succeed where all others fail. The Department now makes it a rule, from which no deviation is allowed, to send all Seeds to Correspondents as soon as gathered, and not to keep them in stock a day longer than is necessary for despatch—a course deemed essential to success after a long course of practical experience.

**APPENDIX III.**  
**METEOROLOGICAL RESULTS, TRINIDAD ROYAL BOTANIC GARDENS, FOR THE**  
**YEAR 1892.**

Station 130 feet above Sea-level.

MONTH.	BAROMETER.		THERMOMETERS.										Rainfall.	Dew Point, 7 A.M.	Dew Point, 3 P.M.	WIND. Direction.
	REDUCED READINGS.		DRY & WET BULBS.				Maximum.	Minimum.	Mean Temperature, Blackened Bulb in Vaccum in Sun.	Mean Temperature, Thermometer on Grass.	Humidity.	Tension of Aqueous Vapour.				
	7 A.M.	3 P.M.	7 A.M.		3 P.M.											
	Bar.	Bar.	D.	W.	D.	W.	°	°	°	°	°	°				
January ...	29.975	29.921	71.6	69.9	83.6	76.	87.9	68.8	144.9	62.5	77.	.733	1.93	68.6	70.9	E.
February ...	29.978	29.926	72.8	70.1	84.	75.1	88.2	69.2	146.7	60.7	72.	.696	2.19	68.1	69.2	E.
March ...	29.967	29.911	72.3	70.5	84.1	75.7	88.7	69.	142.6	60.4	74.	.708	1.85	68.4	70.1	E.
April ...	29.992	29.935	73.1	71.2	82.1	75.6	87.	69.7	134.	61.1	79.	.746	7.59	69.7	70.9	E.
May ...	30.010	29.945	75.	73.4	83.4	76.9	87.8	70.7	136.7	61.3	80.	.798	11.61	72.2	72.5	E.
June ...	30.020	29.980	73.7	72.7	80.6	75.9	86.	70.	129.9	59.2	84.	.798	16.26	71.9	72.7	E.
July ...	30.026	29.981	73.2	72.3	80.8	75.9	86.3	73.8	128.9	...	87.	.798	15.35	71.61	72.57	E.
August ...	29.987	29.942	73.8	72.7	82.3	77.2	80.9	70.4	127.	...	83.	.799	9.21	70.9	74.19	E.
September...	29.944	29.902	74.1	72.9	82.8	76.9	88.7	70.5	117.	69.	85.18	.798	3.57	72.03	72.09	E.
October ..	29.942	29.888	73.31	72.34	83.	76.5	88.5	70.3	107.	68.6	83.13	.785	11.49	71.62	72.15	E.
November..	29.915	29.851	73.55	72.17	83.78	76.17	86.51	70.86	111.10	68.31	83.11	.759	5.40	71.30	71.15	E.
December ...	29.969	29.948	70.66	69.50	82.16	75.05	86.80	67.00	113.27	64.50	80.13	.720	4.69	68.62	70.26	E.
Average } for year. }	29.977	29.927	73.09	71.64	81.05	76.11	87.02	70.02	128.25	63.65	80.29	.761	91.14	70.41	71.64	E.
Mean daily } height of } Barometer }	29.954 inches.		Mean Annual } Temperature }				78.7				Total } Rainfall }		91.14 } inches.			

APPENDIX III—Continued.

TRINIDAD—ROYAL BOTANIC GARDENS.

ANNUAL RAINFALL, 1862 TO 1891, INCLUSIVE.

YEAR.	JAN.	FEB.	MAR.	APRIL.	MAY.	JUNE.	JULY.	AUG.	SEPT.	OCT.	NOV.	DEC.	Total Rainfall in each year in Inches.	Decades.
	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.		
1862 ...	0-00	·66	·77	·25	1-41	8-47	10-36	9-57	11-97	6-60	10-06	3-03	63-15	In the decade 6 years above and 4 years below 30 years average.
1863 ...	1-54	2-71	1-45	·85	1-26	9-12	10-12	10-53	12-11	6-24	4-30	6-57	66-80	
1864 ...	2-51	·53	·36	·04	8-15	4-96	7-17	12-06	8-04	6-53	5-94	6-61	62-90	
1865 ...	2-62	3-20	1-07	7-98	3-22	5-64	10-35	14-83	7-32	14-62	4-81	9-62	85-28	
1866 ...	2-24	3-91	1-44	1-09	1-45	6-59	7-83	12-34	5-87	10-11	8-17	6-82	67-86	
1867 ...	1-31	6-36	·83	1-32	2-33	5-30	12-20	15-21	10-45	7-87	·67	2-71	66-56	
1868 ...	2-06	·82	3-20	·64	4-17	7-78	11-35	6-73	5-46	4-66	8-31	1-03	56-21	
1869 ...	·08	·93	·74	·41	·69	5-52	10-17	8-74	8-86	5-15	6-30	5-87	53-46	
1870 ...	2-61	·56	1-46	1-51	4-65	8-81	11-91	9-00	10-63	3-98	5-94	8-29	69-35	
1871 ...	6-62	1-40	2-89	·92	3-97	8-84	11-73	12-97	7-87	4-37	10-73	3-27	75-58	
1872 ...	1-45	·07	·74	·39	3-14	7-09	5-45	10-82	3-07	4-80	9-89	3-04	40-95	In the decade 4 years above and 6 years below 30 years average.
1873 ...	1-78	1-08	1-98	·53	0-00	4-31	5-04	8-37	5-80	10-34	3-48	1-31	44-02	
1874 ...	3-47	1-96	3-67	5-16	2-51	12-28	12-28	11-20	9-38	6-42	3-66	4-29	76-28	
1875 ...	3-39	·91	·56	·42	2-61	4-15	12-62	7-22	11-95	10-85	3-74	2-48	60-90	
1876 ...	3-26	1-03	1-78	1-67	6-65	11-17	12-23	15-18	12-03	7-04	5-95	3-96	81-95	
1877 ...	2-14	0-00	7-46	3-38	3-19	8-43	5-35	12-94	6-39	6-68	7-66	5-48	72-10	
1878 ...	3-44	·70	0-00	3-22	4-99	5-78	5-42	8-88	11-15	5-89	8-72	3-05	61-24	
1879 ...	1-52	2-76	4-56	3-03	3-08	14-92	6-86	10-35	6-15	3-54	4-28	4-38	65-43	
1880 ...	11-72	6-53	·67	2-32	3-90	7-83	6-30	17-39	7-47	5-74	10-51	1-96	82-34	
1881 ...	·57	·65	·23	1-60	4-66	11-05	7-82	10-90	10-59	3-36	12-06	2-23	65-72	
1882 ...	1-33	2-38	·73	1-57	3-74	6-33	5-93	8-40	4-93	5-86	10-29	1-50	52-99	In the decade 4 years above and 6 years below 30 years average.
1883 ...	1-56	·71	·26	3-37	5-89	10-91	13-66	10-26	5-53	3-99	6-06	8-30	70-50	
1884 ...	3-43	2-50	4-40	1-51	2-91	6-84	5-71	8-70	5-03	5-05	5-14	5-66	56-88	
1885 ...	1-30	·89	1-49	·43	5-27	3-44	5-87	4-56	6-08	4-08	5-37	4-44	43-22	
1886 ...	3-32	1-97	3-27	3-83	4-49	9-70	17-48	8-15	6-73	12-59	8-54	6-75	86-82	
1887 ...	2-69	1-46	1-67	1-08	3-98	7-40	5-51	9-93	5-07	5-84	7-60	11-86	64-09	
1888 ...	8-37	1-79	2-41	2-28	3-46	11-92	6-89	7-02	5-53	5-06	7-76	2-95	65-44	
1889 ...	0-94	0-85	4-16	1-05	6-34	11-66	12-14	11-73	3-76	6-30	7-38	7-48	73-79	
1890 ...	7-76	0-51	2-09	7-62	5-14	9-68	12-89	11-65	3-37	10-98	5-93	5-28	82-90	
1891 ...	3-17	0-92	0-03	1-44	2-54	5-54	11-88	4-26	7-44	5-77	6-66	4-09	53-74	
Avg. Monthly Rainfall for 30 years, 1862 to 1891.	2-94	1-69	1-87	2-03	3-65	8-04	9-45	10-32	7-53	6-67	6-86	4-81	*65-91	
1892 ...	1-93	2-19	1-85	7-59	11-55	16-26	15-55	9-21	3-57	11-49	5-40	4-69	91-14	

\*Average Annual Rainfall for 30 years—1862 to 1891 = 65-91 inches.

J. H. HART, F.L.S.,  
Superintendent Botanical Department.