KEW

REPORTS





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REPORT

ON

THE PROGRESS AND CONDITION

OF

THE ROYAL GARDENS AT KEW,

During the Year 1882.



LONDON:
PRINTED BY EYRE AND SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.
SOLD BY W. CLOWES & SON, LIMITED, 13, CHARING CROSS.
1884.

Price One Shilling.

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REPORT

ON

THE PROGRESS AND CONDITION

OF

THE ROYAL GARDENS AT KEW,

During the Year 1882.

Royal Gardens, Kew, November 1, 1883.

SIR,

THE great pressure of work during the present year has unavoidably delayed the preparation of the Report for the year 1882. Not merely has the time of the staff been occupied with several laborious undertakings, such as the extensive repairs and rearrangement at the north end of the Palm House and the reorganisation of the Timber Museum, but these, together with the ordinary duties of the establishment, have had to be carried on without the assistance of the Curator, who was first incapacitated from work by domestic affliction and severe personal illness and who was afterwards absent from Kew on sick leave for six months.

The **Number of visitors** (1,244,167) to the Royal Gardens during 1882 was enormously larger than any hitherto recorded. It is 407,491, in fact nearly half as much again greater than the number, 836,676 of the preceding year.

The number of visitors on the Whit Monday, Bank Holiday, May 29, was 95,300, the largest number of visitors ever admitted on any single day in the year. On December 1 the Royal Gardens were visited by only 27 persons.

Bank Holidays.—The following figures give the total numbers admitted during each, and also the numbers of persons who on each occasion entered before 1 p.m.

	Total Number during day.	Number before 1 p.m.
April 10	56,676	8,521
May 29	95,300	12,589
August 7	75,879	8,600
December 26	1,460	520

The following figures show the rate of arrival of the morning visitors on Easter Monday, April 10:—

From 10–11	1,314
,, 11–12	2,694
,, 12–1	4,513
Total	8,521

Badge for patrols. — Some trouble having been given on crowded days by petty injuries to shrubs, &c., caused rather by thoughtlessness than mischief, I submitted to the Board that on the principle that

" prevention is better than cure," the labourers and other *employés* who on Sundays and public holidays act as patrols, should be furnished with some distinctive badge. Hitherto, there had been nothing to distinguish them from ordinary visitors to the gardens. Their presence had therefore not been noticed, and their remonstrances when made disregarded as not obviously official.

With the kind assistance of Mr. Ramsay, Director of Clothing in the Army Clothing Department, an armlet was devised of a sufficiently distinctive character, and to the wearing of which the patrols do not take any exception.

The experiment has been tried with complete success. Notwithstanding the unprecedented number of visitors to the Royal Gardens in 1882, and the absolute freedom with which every part of the establishment is accessible during public hours, the amount of damage which the collections have suffered may be described as practically *nil*.

Telephonic communication between offices.—Great inconvenience having been felt in the transaction of current business at the wide separation of the offices of the Director, the Curator, and the Curator of the Museums, an application was made to the Postmaster-General for the supply of telephones to communicate between these three buildings. The approval of the Treasury having been given the instruments were fitted and the wires fixed at the expense of the Post Office. The convenience and saving of time which the members of the staff have obtained from this boon cannot be too warmly acknowledged.

Central office.—Although the telephonic communication so liberally provided by the Post Office has much facilitated the transaction of the daily routine business of the establishment, a proper central office is urgently needed. Such a requisite has been contemplated ever since the Gardens became a public establishment, but has never been provided. At present the whole of the public business is transacted partly in the Director's private house, partly in a dark and contracted annex of the Curator's house, and partly in a room in the Gardens, originally intended for the use of a draughtsman but now occupied by the Assistant-Director.

The **Lessons** given **to the young gardeners** in the evening twice a week through about nine months in the year by members of the staff (assisted in the cases of elementary physics and chemistry by Mr. J. F. Harris, B. Sc., F.C.S.), have been well attended, and continue to give satisfactory results.

Botanic Garden.

Some progress has been made in the reformation of the **Parterre-beds** of shrubs, **at the back of the Palm House,** to which I alluded in my last year's report (p. 6). These not only occupy the most depressed area in the gardens, but are situated on a bed of wet undrained soil which traverses the ground from the river to the Richmond Road; it is, in fact, the bed of an old channel that left the Thames opposite Sion House and re-entered it between Kew and Mortlake; and it is within memory of living individuals, that where this depression crossed the Richmond Road, the latter was covered with water, across which stepping stones were placed. The Palm House and Lake opposite to it occupy a portion of its bed, and a much larger piece of the garden ground was covered with water during last century. During this year a drain has been carried across the lawn to the north and west

of this area, and this it is hoped will tend to dry it and to check the destruction of the yew fence, which has suffered severely during the last few persistently wet seasons. Within this Parterre shrubbery itself, the sunk gravel paths, to which there was no access but over the turfed bank, and which, never being walked upon, were always loaded with weeds, have been replaced by grass, and preparations are being made for renovating the shrubberies, which being now nearly 40 years old are in many cases quite worn out.

Rock Garden. — Of late years an increasing taste has sprung up for the open air cultivation by amateurs of herbaceous plants. The large systematically arranged collection in the herbaceous ground in the Botanic Garden has been more and more appreciated by the public, and the extent and interest of the collection have alike greatly benefitted by the exchanges which have resulted from the visits at one time or another of all the principal private cultivators to Kew.

For a very large number of the rarer and less readily cultivated species of temperate herbaceous plants, especially those belonging to the Alpine and sub-Alpine zones the flat beds and light and hot soil of the herbaceous ground have proved little suited. Besides this, however, the Royal Gardens possessed merely a small rockery north of the ice-house which afforded accommodation for only a limited number of select species, and such space as could be given in the frame yard, not accessible to the general public, for species which could be grown in pots under glass. A number of gentlemen in the habit of visiting the Kew collections and who were anxious to see a larger development of rock-gardening at Kew, eventually determined to address a memorial to Her Majesty's Office of Works setting forth their views. They did so towards the close of 1881. I reproduce two of the concluding paragraphs of this document of which I was furnished with a copy:

"The existing rockwork at Kew, "though much too limited in ex- "tent to include more than a small "proportion of the hardy plants "which are found even in private "establishments, has manifested "how successfully ornamental rock "plants and herbaceous perennials "can be cultivated at Kew, and has "been a centre of attraction both "to the general public as well as "to botanical students and amateur "cultivators.

"Your petitioners believed that "the formation of a Rock Garden "on a sufficiently important scale "would largely increase the popu- "larity of the Royal Gardens to "the public; and by botanists it "would be appreciated as a valu- "able addition to the Kew esta- "blishment."

To give effect to what was proposed of course involved the expenditure of a considerable sum of money. For some time it was under consideration. This was, however, brought to an issue by the gift on the part of the executors of the late George Curling Joad, Esq., F.L.S., of Oakfield, Wimbledon Park, in accordance with the wishes expressed by him before his death, of the entire collection of herbaceous plants cultivated at Oakfield.

This collection was a very large and excellent one. Mr. Joad spared neither pains nor expense in getting it together and of its kind it was far superior to anything possessed by the Royal Gardens. Mr. Joad, if not actually one of the signatories of the memorial, was a warm supporter of its prayer. The bequest made it absolutely necessary that some

decision should be come to at once on the whole Rock Garden question.

It was finally decided by the Treasury that a sum of 500*l.* should be placed upon the estimates for the formation of a Rock Garden, and I was thus placed in a position to meet, to at any rate some extent, the desires of the memorialists, and also to accept the bequest of the Joad collection.

The immediate removal of the plants was, however, pressed upon me as a condition of the gift, and on a further application, the Treasury in February, authorised an immediate expenditure of 200*l.* chargeable on the general current vote for the parks to meet the expense. The further sum of 300*l.* making up the total expenditure authorised was placed on the estimates for 1882–3.

As soon as possible, the work of making the Rock Garden was commenced. It was necessary that it should be in the neighbourhood of the Herbaceous Ground as the staff of that department would have the charge of it. The site selected lies between the wall bounding the Herbaceous Ground, on the east, and the New Range on the west. As the surface was perfectly flat, it was necessary, in order to get any variation of level without moving large quantities of soil, that the main path through the Rock Garden should be sunk. This path was first laid out in a winding course so as to bring in as natural features the picturesque trees with which the ground was studded. The general idea which was finally worked upon was that of the rocky course of a stream, such as may be met with in some of the side valleys of the Pyrenees. Such streams dry up after winter, and are bounded by rock-piled banks amidst the crevices of which a copious summer vegetation springs up. Above the rocks an evergreen shrubby growth descends wherever the soil is of sufficient depth.

The path (8 feet wide and 514 feet long) at the bottom of the Rock Garden represents the dry bed of such a stream. On either side fragments of rock are piled up in a manner as little artificial as was possible to a height of about five feet. Above this the view is limited by shrubberies of box and rhododendron rising to a varying height.

The natural soil of the site chosen was a perfectly pure sand. As much good soil as possible was therefore thrown in behind the rock bank together with turf parings and the sods of the top spit. As the stones were arranged this was carefully rammed down; and up to the present time no perceptible subsidence of any part has occurred. For parts of the banks with a northern exposure tree stumps were employed. This enabled us to use up a large accumulation from the heavy wind-fall in the pleasure grounds referred to below (p. 13), and it also enabled us to extend our operations on a considerably larger scale than the money at our disposal would have otherwise permitted. The use of wood has been a good deal criticised; but it is not wholly out of keeping with the general idea, and as a matter of fact it proves admirably suited to the growth of the larger and stronger-growing species.

One of the chief difficulties to contend with in this country in the cultivation of herbaceous plants is the violence and volume of the summer showers. As parts of the bottom of the Rock Garden are sunk as much as four feet below the general level it was necessary to thoroughly drain the whole to prevent swamping from rain-fall. A drain with numerous catch-pits was carried throughout the whole length and connected with the main drain of the garden, which discharges into

the Thames. In order, on the other hand, to protect the numerous plants of more humid climates from the effect of summer drought a copious water-supply was laid on with stand-pipes at intervals. The water of the garden supply being always maintained at high-pressure the whole rock-work can be rapidly and efficiently watered by an improvised shower in very dry weather.

I must here express my obligation to several gentlemen who, during the progress of the work, favoured me with many useful suggestions and otherwise interested themselves in its details. I may especially mention Mr. George Maw, F.L.S., Dr. Masters, F.R.S., and the Rev. H. Ellacombe. To the latter gentleman we are particularly indebted for considerable trouble in procuring us a quantity of finely weathered pieces of Bath oolite. Colonel A. M. Jones, of Clifton, also most kindly exerted himself to procure a quantity of weathered mountain limestone from the well-known Cheddar cliffs. This is a material admirably adapted for the purpose, as the stones can be arranged with little care but agreeable effect much in the positions which they naturally occupied on the *talus* of the cliffs.

Besides these sources, on which we should have drawn more if money had been available, we made use of an overgrown and neglected rockery (Stonehouse Ruins) dating from the time of George III. in the Pleasure Grounds. Most of the stone of which this was composed had disappeared below the surface by gradual subsidence. Besides a large quantity of useful material several fine masses of marble and Portland oolite were recovered by digging. As a good deal of the stone so obtained had been squared and worked we were obliged to dispose of it in several masses roughly simulating uptilted stratified rocks. The crevices were all plugged with soil, and these afford positions especially suited to the habits of many plants, and these when so grown produce an agreeable effect.

As the rocks were built up, care was made to leave between them deep pocketing for the subsequent reception of the plants. The pockets were filled with loam mixed with leaf mould, and in this the majority of the plants appear to thrive. The principle of a rock garden is to imitate the conditions of growth of deep-rooted plants. Almost all sub-Alpines are of this character; the distance to which their roots extend makes them to a great extent independent of extremes of temperature and also of drought. They are all, however, intolerant of standing moisture and flourish best on sloping broken ground from which water readily flows off and does not rest near the collar of the plant and its dormant winter buds. Rock fragments appear to be congenial to the development of roots which follow their surfaces; they keep also no doubt the temperature more equable than soil and yield a more uniform and constant supply of moisture.

Mr. Joad's collection after its removal from Wimbledon was temporally disposed of and the plants plunged in open borders. They amounted to a total of 2,630. As soon as the rock-borders were ready they were planted out, an operation which under the circumstances had to be somewhat hurried as they were for the most part starting into growth. For this reason it was hopeless to attempt anything like a geographical arrangement; nothing more could be done than to distribute them with an eye to general effect. The collection pretty completely filled the available space. Very few species were lost in the

transference from Wimbledon to Kew. In less than three months the whole Rock Garden was constructed and planted, and even in the first summer produced an effect which was much appreciated and admired by the public.

Wild Garden.—The piece of ground adjoining the Cumberland gate, part of which rises into the hill crowned by the temple of Æolus, has long been in an unsatisfactory state. The trampling of visitors has reduced much of the turf to an arid caked condition of barrenness ; and the romping of children to which the hill has been an irresistible attraction has only made matters worse. As the place was becoming an eyesore, I have temporarily enclosed with hurdles the sloping surface of the hill ; the bare places have been planted with ivy, and a beginning has been made of planting the slopes with bulbs and spring flowers. I hope in time by continuing this, and by the gradual introduction of ferns and striking herbaceous plants, to convert the whole tract into a piece of woodland wild garden.

The elaboration of the order *Palmæ* for the *Genera Plantarum*, published by Mr. Bentham and myself, has led me to a critical examination of the **species of Palms in cultivation at Kew.** This proves to be of somewhat unexpected richness, a fact which, however, need scarcely perhaps be matter of surprise, seeing that for many years past, in fact since the existence of the Gardens as a public establishment, no pains have been spared to obtain seeds of these attractive plants for the cultivation of which Kew possesses peculiar facilities, from our numerous correspondents in all parts of the world.

In Appendix II. I have given a classified list of palms, 420 in number, at present cultivated in the Royal Gardens.

The compilation of an accurate catalogue of palms under cultivation is a matter of great difficulty ; owing, partly to the impossibility of determining them till they flower, and partly to the practice that prevails in the nursery-trade of attaching provisional names to seedlings of palms which, though unrecognisable both as to genus and species when in that state, are as full-grown plants well known under older names.

The Kew collection of palms is the oldest of any note, it was eclipsed altogether between the years 1820 and 1845 by the famous collection of the brothers Loddiges at Hackney, which in the latter year contained upwards of 200 kinds, but which was dispersed shortly afterwards.

Now it has but two rivals, a European and Asiatic one, namely, the magnificent collection made chiefly by Herr Wendland, in the Botanical Garden at Herrenhausen, Hanover ; and the Palmetum of the unrivalled tropical gardens at Buitenzorg in Java. The Royal Botanical Garden at Calcutta would doubtless hold rank with these, were it not for the destructive cyclones which have on several occasions decimated its contents, and especially struck down its palms.

The Kew collection is indebted to all the above named institutions for seeds or plants of many of the species it contains. It is, however, especially indebted to Herr Wendland, himself an *élève* of Kew, whose knowledge of the order is unrivalled, not only for many species, but for valuable information as to their names, affinities, and culture.

The following statistics give an idea of the progress made in the introduction of palms into cultivation,

premising that before the publication of the first edition of Aiton's Hortus Kewensis, only two were generally known in our houses, the dwarf fan-palm (*Chamærops humilis*) of the Mediterranean and the date (*Phœnix dactylifera*), both cultivated in the Chelsea Garden about 1731, and probably earlier elsewhere.

Palms enumerated in Miller's Gardener's Dictionary, 1731	7
Palms enumerated in Aiton's Hortus Kewensis, Ed. 1, 1779	10
Palms enumerated in Aiton's Hortus Kewensis, Ed. 2, 1813	24
Palms enumerated in Loudon's Hortus Britanicus, 1830	131
Palms enumerated in Loddiges' Nursery Catalogue, 1845	210
Palms enumerated in Wendland's Index Palmarum, 1853	287
Palms enumerated in Botanical Gardens of Buitenzorg, Java, 1860	273
Palms enumerated in Herrenhausen Garden (Hanover), 1882	445
Plants enumerated in Kew, 1882	420

In the **Propagating department** the remainder of No. 18 has been reglazed in a modern fashion, completing the work of the previous year (*see* Kew Report, 1881 p. 7); the staging has also been reconstructed and improved. This part of the house is employed for bringing forward plants for exhibition in the conservatory (No. 4). The increase of interest in the floral display which I believe gives greater satisfaction than formerly, must be partly attributed to this improvement.

The formal establishment of a lectureship on botany in the reorganized Normal School of Science at South Kensington has led to an application from the Department of Science and Art for a regular **supply of materials** (fern prothallia, &c.) **for class instruction at South Kensington** during the summer months. In order to obviate the waste of time in seeking such things in different parts of the establishment, the erection of a small heated sunk-pit for their cultivation and maintenance was sanctioned and carried out by the Board. Within reasonable limits I have also supplied other educational establishments with materials now that this service is conveniently organized.

The following **Plants of special botanical interest**, amongst others of less importance, have **flowered** during the past year in the Royal Gardens:—

Aglaonema pictum, Kth.; Java.
Albuca Nelsoni, N.E.B.; Natal. Bot. Mag., t. 6649.
Angraecum, sp. nov.; Madagascar.
Anthericum graptophyllum, Baker, sp. n.; Socotra.
Anthurium crassifolium, N.E.B., sp. n.; Colombia?
Aphelandra Chamissoniana, Nees. (*A. punctata*, Hort. Bull.); S. Brazil. Bot. Mag. t. 6627.
Argyræa Hookeri, C.B.Cl. (*Calonyction sanguineolentum*, Hort.); India.
Arisarum proboscideum, Savi.; S. Italy. Bot. Mag., t. 6634.
Artemisia, sp. nov.; N. China.
Aster tricephalus, C.B.Cl.; India.
Babiana ringens, Linn.; Cape. Bot. Mag., t. 6667.
Beloperone atropurpurea, Nees. (*Simonisia chrysophlœa*, Hort.).
Beschorneria bracteata, Jacobi; Mexico. Bot. Mag., t. 6641.
Bilbergia Euphemiæ, Morr.; Brazil. Bot. Mag., t. 6632.

Bilbergia Porteana, Morr.; Bahia.
Bolbophyllum delitescens, Hance; Hong Kong.
„ *occultum*, Thouars; Mauritius.
Bomarea conferta, Benth.; Bogota.
Bomarea frondosa, Mast.; Peru.
Cereus cæspitosus, Engl.; New Mexico. Bot. Mag., t. 6669.
Chlorophytum Kirkii, Baker, sp. n.; Zanzibar.
Cirrhopetalum picturatum, Lodd.; India.
Clerodendron, sp. nov.; Zanzibar.
Comparettia macroplectron, Rchb. f.; New Grenada.
Crinum Hildebrandtii, Vatke; Johanna Island.
Cryptostemma, sp. nov.; S. Africa.
Dendrobium Mortii, F. Muell.; Australia.
„ *revolutum*, Ldl.; Moulmein.
„ *rhodocentrum*, Rchb. f.
„ sp. nov.; India.
Dendrochilum Cobbianum, Rchb. f.; Philippines.
„ *uncatum*, Rchb. f.; Philippines.
Doryanthes Palmeri, Hill; Queensland. Bot. Mag., t. 6665.
Dracæna Goldieana, Baker; W. Trop. Africa. Bot. Mag., t. 6630.
Dracontium, sp. nov.; Venezuela.
Epidendrum tovarense, Rchb. f.; Columbia.
Eucharis Sanderiana, Baker, sp. n.; N. Andes.
Fallugia paradoxa, Endl.; New Mexico. Bot. Mag., t. 6660.
Grevillea annulifera, Muell.; Australia.
Haberlea rhodopensis, Frw.; Rumelia. Bot. Mag., t. 6651.
Halenia elliptica, Don.; Himalayas.
Houlletia chrysantha, Lind. and Andr.; Columbia.
Impatiens Sultani, Hk. f., sp. nov.; Zanzibar. Bot. Mag., t. 6643.
Jasminum gracillimum, Hk. f.; Borneo. Bot. Mag., t. 6559.
Kæmpferia pandurata, Roxb.; Siam.
Lælia (*Trigonidium*) *monophyllum*), Gr.; Jamaica.
Laportea amplissima, Miq.; Java.
Lilium Parryi, S. Watson; S. California. Bot. Mag., t. 6650.
Liparis Sandersiana, Rchb. f.; Jamaica.
Lycium chilense, Miers.; Chili.
Mamillaria Boccasana, Hort.(?)
Masdevallia Barlœana, Hort.
Massangea musaica (*Tillandsia*), Morren; Columbia.
Meyenia, sp. nov. India.
Peperomia brevipes, D.C. (*P. prostrata*, Hort.)
Ponthieva maculata, Ldl.; Venezuela. Bot. Mag., t. 6637.
Primula obconica, Hance. (*P. poculiformis*, Bot. Mag., t. 6582); China.
Pseudodracontium Lacouri, N.E.B. (*Amorphophallus*, Hort.); Cochin China.
Sagittaria lancifolia, L.; Bahamas.
Satyrium nepalense, Don.; India. Bot. Mag., t. 6625.
Senecio lagopus, Raoul.; New Zealand.
Sonchus Jacquini, D.C.; Canary Islands. Bot. Mag., t. 6642.
Spathoglottis ixioides, Ldl.; Himalaya.
Spiranthes Euphlebius, Rchb. f.; Columbia (?)
Streptocarpus parviflora, E. Meyer; S. Africa. Bot. Mag., t. 6636.
Tanacetum, sp. n.; N. China.
Tinnæa, sp. nov.; Zanzibar.
Torenia rubens, Benth.; Hong Kong.

Tulipa Borszczowi, Regel; Cent. Asia. Bot. Mag., t. 6635.

THE ARBORETUM.

Removal of old trees.—The clearance of the immediate effects of the destructive cyclone of October 1881 has been completed, though I regret to say that the results of that storm are still felt in the loosened hold in the ground of some very fine specimens of Beech, Elm, and Oak, which rock ominously in ordinary gales, and being no longer protected by neighbouring trees are being gradually stripped of their branches. Considerable progress has been made also in clearing areas occupied by some of the worst timber, for replanting, an operation the necessity of which is obvious, and has been persistently urged upon me by experienced foresters conversant with the grounds of Kew.

The Treasury having sanctioned a small grant for the above clearance, operations were commenced at the very end of 1881, and continued for three months of 1882. In all 147 trees were removed in the Arboretum; of these, 146 were contained in an area not exceeding one-third of the grounds, extending from the Brentford Gate to the Stables, and including the Nurseries, the Stables, Filter beds, Engine-house, Pagoda Vista, and the American Garden, and the ground occupied by the collection of Beech, Oak, Hornbeam, and Chestnut.

Of these 146 trees, 30 of large size were blown down by the October gale, or were so injured that they had to be removed. Of the remainder a few were removed because of their unsightliness, but the most of them because they were decaying and injuring young and better trees in their immediate neighbourhood. Upwards of 800 trees are still standing over the area from which the above have been removed, and at least one-third of these had better be taken down, in the interest of the remainder, quite irrespective of clearing areas for replanting, which is essential if the sylvan scenery in the grounds is to be maintained for the benefit of a future generation.

In the Botanic Garden only one tree of any consequence was totally destroyed, namely, the great White Lime in the old Arboretum, which was literally smashed to pieces by the gale; but the Seven Sisters, as the largest group of Elms in the Garden is called, have suffered most severely. On the Green two of the enormous Elms opposite the Herbarium were levelled, and the rest had to be removed. These have been replaced by young Planes.

Along the river side five of the fine young Elms, planted by the Board about 10 years ago, were uprooted, but most of them have been replanted without serious injury.

In the Palace Grounds the damages were very great; the Housekeeper's cottage had a narrow escape from destruction by the fall of a very large Horse Chestnut, which measured its length on the ground within a very few feet of the front of the house. Some of the largest Elms were uprooted, and others have had to be taken down. In the Queen's Cottage Grounds the damages are great, but to repair them is beyond the means at my disposal.

The Pinetum.—The collection of Yews has been lifted and arranged in semicircular beds *en suite* with the *Cupressineæ*. Of Yews, there are about 30 hardy species and varieties, represented by 100 specimens in two beds, each about 30 yards long. The genera *Podocarpus*, *Dacrydium*, and *Torreya* have been similarly arranged in a bed 21 yards

long, containing 37 specimens. *Salisburia*, of which there are five varieties, occupies a bed 30 yards long, containing 21 specimens, all of small size. *Cunninghamia* and *Sciadopytis* occupy a bed 15 yards long. Considerable addition has been made to the collections of *Pinus*, *Abies*, and *Picea*, and many loads of peat and better soil have been given to the best specimens of the two latter genera, which, with few exceptions, do not grow with any luxuriance in the soil of Kew. Some, indeed, as the common Silver Fir, will not grow at all, whilst the Spruce is always a shabby and naked tree.

The species and varieties of **Cedrus** (Atlantic, Deodar, and Lebanon) have been brought together in an avenue 165 yards long, leading from the Juniper Avenue to the Heath collection. Of these there are 36 specimens, representing about eight more or less distinct species or varieties. Sixteen of the large Junipers, which had reached 8–15 feet high, having outgrown their places in the collection, have been transplated so as to form a continuation of the same avenue.

At the same time the old collection of Junipers had been re-arranged and given more space and good soil. The Juniper Avenue, which was 200 yards long, is thus lengthened to 260. Large beds of mixed shrubs, forming a nursery for specimens of rare Conifers, have been planted in the clearance to the south of the path along the south side of the Lake, from which a considerable number of trees were removed last year.

The plantation formed on the slope behind the collection of European and Asiatic Spruce and Silver Firs, and which formed a shelter for these when young, has been thinned, and the fine specimens of Deodara, Wellingtonia, and Atlantic Cedar which had been planted amongst the other trees and shrubs have, by means of the transplanting machine, been re-arranged in clumps, which will eventually present a very handsome appearance. The **Larch collection,** which forms the youngest part of the Pinetum, except the Cedrus collection, has been supplied with good soil; it includes 12 species and varieties, represented by 45 specimens. The largest of these will soon require transplantation. The **Ash collection** has been considerably improved by transplanting many of the rarer kinds to the ground between the east end of the Lake and Garden fence, where they form an avenue leading from the fine Luccombe Oak that stands near the gate opening on Sion Vista, to the equally fine Horse Chesnut at the end of the Lake.

The **Leguminous collection,** which occupies the avenue leading from the Pagoda to the Ruined Arch, has been enlarged by the addition of new species and many loads of good soil. Throughout its whole length the ground has been trenched at the back of the beds on both sides and planted with Rhododendrons, thus providing a much needed shelter for the young specimens.

The collection of **Terebinthaceæ, Sapindaceæ,** and **Rhamneæ,** and their allies, have been also replanted, greatly extended, and supplied with better soil.

The collection of **Hazels, Filberts,** &c. have been arranged in a short avenue leading from that of the Beeches to the American Garden and have been sheltered by belts of Rhododendrons.

The whole collection of **Monocotyledonous Shrubs,** &c., including the hardy Bamboos, Yuccas, *Smilax*, *Ruscus*, &c., &c. have been removed from their former position and planted in semicircular beds

prepared for them on the lawn on the east side of the Holly Walk. These beds are in all 147 yards long, and will be backed with a belt of Rhododendrons. They contain about 60 species, represented by 125 specimens.

Before dismissing the subject of the Arboretum, I have to report that this collection, which is now by far the richest that exists, is annually exciting greater interest amongst planters, foresters, nurserymen, and especially amongst gentlemen desirous of rendering their parks and pleasure grounds instructive as well as ornamental. No inconsiderable share of my daily correspondence is devoted to the answering questions respecting hardy trees and shrubs, and I am habitually interviewed by professional planters and amateurs, who, however, I am bound to confess, often give me more valuable information than they receive. In fact, I am led to regard the Arboretum as next in national importance to the Propagating Department in respect of the living collections of Kew, and I can but regret that this noble collection has to vegetate in a soil of extreme poverty and an atmosphere polluted by the smoke, both of London and of the Brentford manufactories.

I have again to record the liberal action of the principal nurserymen, especially in presenting specimens of rare trees and shrubs to this collection.

Sion Vista, previously occupied by a broad walk of rough gravel, which being unrolled was never walked upon, now presents a uniform grass walk, the gravel having been removed and replaced by good soil, over which lawn grass is sown. The young trees on either side are growing well and promise to form a good avenue.

The American Garden.—Plantations so named and consisting of beds of American shrubs, chiefly Azaleas, Rhododendrons, Kalmias, Andromedas, and Heaths, arranged in various forms and divided by grassed walks, were attractive features in many old-fashioned gardens and pleasure grounds of the last century; they are now rarely seen, having in many cases been swept away to make room for the funereal American Conifers and other dark evergreens with which too many gentlemen's grounds are infested. The taste for hardy deciduous shrubs is, however, happily reviving, and I know of no gardening features that can be rendered more attractive.

The commencement of an American Garden was made by my predecessor in the woods on the north side of the Sion Vista, about 30 years ago. The shrubs in this having become far too crowded, and suffering from want of air, the necessity of separating and replanting them offered the opportunity of enlarging and improving the whole, which was effected last year. The specimens have all been lifted and replanted and many new ones added, doubling the area of the plantations. Some of the fine Magnolias, which were smothered among the Azaleas, have been transplanted by the machine and placed on the lawns, various American deciduous trees have been introduced, as Tulip-trees, Liquidambers, deciduous Cypress and Larches, and more peat leaf-mould and loam have been liberally given to all the beds. As the old trees surrounding this Garden disappear I propose replacing them with American deciduous ones, especially such as colour in Autumn.

The **Deodars,** forming the short avenue leading from the Temperate House to the North Gallery, which had never thriven, have been removed

and replaced by Atlantic Cedars, which grow much faster, are more hardy, and become incomparably handsomer trees. In fact, the Deodar is a failure at Kew. Though some few of the many hundreds planted along the principal avenues and walks are handsome objects, the majority present a miserable appearance. They suffer from the cold winters and springs. Few have reached a height of 30 feet in as many years; many have had to be removed, and I anticipate that more will have to be replaced by better things. One variety alone, "*robusta*," which I suspect is a native of the far North-west or Punjaub Himalaya (the Deodar extends from West Nepal to Afghanistan), resists the most severe springs by reason of its budding later than the other varieties. The Deodar buds earliest of the Cedar tribe, the Lebanon Cedar follows it, and the Atlantic is the last to put forth new leaves.

The east end of **the Lake** has been cleaned out and the opportunity taken of adding a little to its breadth. The mound at the west end has been cleared of the rough shrubbery that covered it, lowered and grassed, &c. There is still much to be done towards improving the Lake, especially along its north side which a few years ago presented a straight steep bank rising 6–8 feet above the water. All this side needs to have the banks sloped far back, to bring the water into view from the Sion Vista. The soil here is the strongest in the whole grounds, and is invaluable for mixing with that of the Botanical Garden and Arboretum generally, which consists principally of sand and gravel without a particle of loam or vegetable matter. Hitherto the sloping of the north bank of the Lake has proceeded no faster than the demand for this soil necessitated. The Lake might be greatly enlarged and still further improved at a very moderate cost.

Interchange of Plants and Seeds.

The following is a statement of the plants, &c., sent out during the past year, and included in 328 consignments :—

——	Ward's Cases.	Packets of Seeds.	Stove and Greenhouse Plants.	Herbaceous Plants.	Trees and Shrubs.	Number of Recipients.
Britain - -	—	967	2,926	1,380	785	113
Continent -	—	750	435	149	58	24
Asia - -	7	649	221	—	—	11
Africa - -	1	194	150	—	—	9
America - -	12	229	534	12	6	17
Australia and New Zealand.	6	127	198	—	—	8
Total -	26	2,916	4,464	1,541	849	182

Argan tree (*see* Kew report, 1879, p. 12).—A supply of seeds was obligingly obtained for us by Mr. John Brooks, of Tangier, and packets have been distributed to the Botanic Gardens of Adelaide, Brisbane, Cape Town, Fiji, Hong Kong, Jamaica, Grahamstown, Melbourne, Natal, Saharanpore, and Washington (Department of Agriculture.)

Mr. J. M. Wood writes from the Natal Botanic Gardens, October 6, 1882 :—"I am sorry that so far we "have failed in raising plants of "*Argania Sideroxylon*, but a "gentleman living at Inanda, 2000 "feet above the sea, to whom "I gave a few of the seeds, has "been more fortunate, and told "me yesterday that he has several "plants which are looking very "well. I hope, therefore, that we "shall now succeed in acclimatising "this plant, the seed of which has "several times been introduced, "but, as Mr. Keit informs me, has "always failed to germinate."

Arracacha (*see* Kew Report, 1869, p. 31).—Mr. Duthie reports from Saharanpore May 30, 1883 :—"Of this valuable South American "vegetable there are a few plants "still left, and they are in a fairly "healthy condition. They do not, "however, appear to have formed "to any extent the characteristic "tubers which constitute the edible "portion of the plants so highly "valued in its native country. "M. Decandolle, in his recently "published work on the origin of "cultivated plants, observes that "this vegetable bears comparison "with the potato, and yields a "starch which is lighter and more "agreeable. It has been tried in "England and in several parts of "Europe, but without success, the "climate being evidently too damp "for it. I intend to give it a trial "at Arnigádh, where it will at any "rate have a better chance of being "looked after than it had at Cha-"juri."

Mr. Morris, the Director of Public Gardens and Plantations, Jamaica, has communicated to the "Planter's Gazette" for October 16, 1882, an important note on the little known cultivation of this esculent in Jamaica. He states that it was introduced into the island in 1822 by Dr. Bancroft ; it flourishes best in the Blue Mountain districts at elevations between 2,500 and 5,000 feet, with mean annual temperatures of 72° and 65° Fahr. respectively, and a mean annual rainfall of 100 inches.

Mr. Morris adds—"I believe the "Arracacha is a most valuable food "plant ; and for my own part I "not only like it, but find that it "becomes more palatable and de-"sirable the longer it is used. If "the natives of India take to "it as an article of food, I can "conceive nothing more likely to "flourish in the hill districts, "and to afford with little labour, "the means of sustaining life under "adverse circumstances."

I mention these particulars as much interest appears to be taken in Arracacha in several of the colonies. When it is generally known that it is thoroughly naturalised in Jamaica the various colonial botanical authorities will doubtless experience little difficulty in obtaining supplies from the obliging Director of Public Gardens and Plantations in that colony.

Cacao.—In reference to the plants sent to Fiji in 1881 (*see* Kew Report, 1881, p. 11), the Hon. J. B. Thurston writes March 31, 1882 :—

"All the plants sent me from "Kew are doing well, and you will "be glad to hear that the Cacao I "introduced from Java and distri-"buted in various parts of the "group three years ago is bearing

" in several places." In a subsequent letter he wrote—" My Cacaos " from Java are doing very well. " Altogether I have about 1,500 " trees established in various parts " of the colony, irrespective of the " few finer sorts saved from those " obtained by you from Trinidad; of " these the Yellow Criollo are look- " ing splendid."

Carica candamarcensis.—Of this species of Papaw (the fruit of which first ripened at Kew in 1875, *see* Report, p. 4), a large number of plants have been raised from seeds produced in the Economic House at Kew. They were distributed during the year, the principal recipients being the Botanic Gardens of Calcutta, Ceylon, Fiji, and Madras.

China cuprea (*see* Kew Report, 1880, pp. 31, 32).—*Ceylon.*—Dr. Trimen reports January 1, 1883 :— " After much trouble, seed has been " obtained at Kew of the 'Cûpra " Quina' tree affording the 'Cu- " prea' bark imported during the " last two or three years to the " London market (*viâ* New York) " in such vast quantities. A little " of this seed has been sent to me; " it was collected from trees grow- " ing between 5,000 and 6,000 feet " at Landasugi, in the State of " Santander (U. S. Colombia), and " sent from Bogota. No time was " lost by me in forwarding this to " Hakgala, but I regret to say that " only two seeds germinated, of " which one subsequently died, so " that we have now but a single " seedling of this interesting plant. " Mr. Triana has identified the " cuprea-bark trees as species of " *Remijia*, a genus nearly allied to " *Cinchona*, so that it is no longer " possible to consider the febrifugal " alkaloids as exclusively produced " by the latter. The analysis of the " better sorts of cuprea bark aver- " age 1·8 to 1·9 of quinine sul- " phate, rarely reaching 2 per cent.; " but some varieties are almost " worthless. Manufacturers, how- " ever, prefer it in consequence of " its freedom from cinchonine and " the readiness with which it pul- " verises. There are many varieties, " and some grow at a much lower " elevation than that above given; " it is thought such may do in low " coast districts."

Seeds were also sent from Kew to Calcutta, Fiji, Jamaica, Mauritius, and Seychelles.

Darjeeling.—Dr. King reports, March 31, 1883, that from the seed sent him " only a single seedling " resulted."

Jamaica.—Mr. Morris reports, Feb. 22, 1883 :—" A few plants of " the cuprea bark, *Remija pedunculata?* raised from seed received " from Bogota, are being tried in " order to test the value of this " bark under cultivation."

Cinchona.—*Brisbane.*—Mr. Pink writes March 26, 1882 :— " I am making a trial of *Cinchona*. " I have several plants planted out, " that have stood our hot dry " summer well, and now our autumn " rains have come, are making fine " growth."

Jamaica.—Mr. Morris reports :— " Numerous cuttings from the " three Ledgeriana trees received " from Kew in 1880 (Kew Report " 1880, p. 12), have been rooted in " the propagating houses, and after " being hardened they were planted " in a well-prepared and sheltered " spot near the nurseries. They " are over 50 in number and are " growing well. Some scions from " the same trees were grafted about " the middle of August, on roots " from strong growing healthy trees " of 'Hybrid,' and they have now " united and have commenced " making healthy growth."

Mauritius (*see* Kew Report 1879, p. 14).—Mr. Horne reports :— " The *Cinchona succirubra* has

" thriven well at the nurseries, and " during 1881 about 4,200 young " plants of it were propagated for " three experimental plantations."

Cola nut (*see* Kew Reports, 1880, pp. 14, 15; 1881, p. 11).—Mr. Morris writes, January 23, 1883:—" This is very plentifully " distributed throughout Jamaica; " having, probably like the Akee " (*Blighia sapida*) and other West " African plants, been introduced " by slave ships. If necessary " several tons of the nuts could be " shipped every year."

Columbian barks (*see* Kew Reports, 1878, pp. 10, 11; 1879, pp. 12, 13; 1880, p. 15; 1881, p. 11).—Calisaya of Santa Fè.—Dr. Trimen reports to the Madras Government, June 30, 1883:—" The two surviving plants of this " valuable Cinchona are both at " Dodabetta, one planted out in the " lower part of the north-east ride, " the other still in a pot in the pro- " pagating house. They are now " 2½ years old, and that planted " out is about 3 feet high only. " The few leaves they possess are " peculiar and appear to indicate a " species quite unknown to me. " The figure (fortunately not " coloured) in Howard's 'Quino- " logy,' t 14, is a very good repre- " sentation of them. Both Weddell " and Triana place the 'Calisaya of " Santa Fè' under *C. lancifolia*; " and, in default of further material " for comparison, here it must re- " main for the present."

Hard Carthagena.—*Ceylon.*—Dr. Trimen reports, January 1, 1883:—" Two plants of 'Hard " Carthagena' bark were received " from Kew in September. One of " these succumbed to the voyage " and was dead on arrival, and the " other nearly so, but Mr. Nock " has succeeded in saving it, and " there are now three plants at " Hakgala. Several varieties of " this were collected by Cross in " 1878, the best at Coralis Inza, in " the district of the Magdalena, at " 7,000 feet elevation. An analysis " of the bark by Howard showed:—

" Quinine -	1·88
" Cinchonidine -	1·18
" Quinidine -	·18
" Cinchonine -	71
" Total -	4·75"

Darjeeling.—Dr. King reports, January 23, 1883:—" I fear Cart- " hagena is not going to be a suc- " cess with us at any elevation. We " have tried it at several and it has " failed miserably. The last lot " were planted out in a beautiful " warm sheltered corner at about " 2,000 feet elevation, and they did " no better than plants put out " at 3,500 and at intermediate " heights."

Jamaica (*see* Kew Report, 1881, p. 15).—Mr. Morris reports, January 20, 1883:—" I have a few other " kinds of which I hope to send " you specimens later; but, at pre- " sent, they have not flowered; " for instance, the Carthagena bark " of which I had one plant through " Kew from the Government of " India. We have now a large " number of well established plants " growing at our highest eleva- " tions, and, as plants, they are " the strongest and finest on the " plantations."

Madras.—Dr. Trimen reports to the Madras Government, June 30, 1883:—" There are seven plants of " this permanently put out at " Dodabetta and two at Naduvatam; " the latter are the more healthy " and the larger is about 4 feet " high. Numerous cuttings are in " the propagating houses. There " is also a fine plant in Sim's Park " at Coonoor. Of the name of this

" handsome species I am quite " ignorant; it has possibly never " yet been defined or named. The " leaves of seedlings and young " plants are useless for comparisons, " being frequently very different " from those of adult trees; in these " plants they resemble *micrantha* " more than any other species. The " 'Hard Carthagena Bark' is usu- " ally referred to *C. cordifolia*, " Mutis, a variable species with a " very wide distribution in South " America. Mr. Howard has sug- " gested an affinity with *C. pur-* " *purea*, R. and P., which to judge " from the description and his plate " (Illustrations, t. 11) seems to be " probable."

Copal-tree of East Africa (*see* Kew Report, 1880, pp. 36, 37).—Mr. Wood writes from the Natal Botanic Gardens, October 6, 1882:—" You will be pleased to hear that " the trees of *Trachylobium* have " this season produced a few pods, " I believe, for the first time. We " are watching them closely, and " hope to rear plants for distribu- " tion in the coming season. The " plants seem to grow here luxu- " riantly, though the soil in which " they are is only a poor sand."

Elephant Sugar Cane (*see* Kew Reports, 1876, p. 25; 1880, p. 15).—Mr. Morris reports, December 31, 1881:—" This cane " which was introduced last year " from the Royal Gardens, Kew, " has been propagated with great " success. It is now well estab- " blished at the Hope Plantation " and is of a most promising charac- " ter, more especially for moist " districts. As showing what may " be done in propagating plants of " this character, it may be men- " tioned that this cane, of which " only two small plants were re- " ceived 12 months ago, is now " being distributed amongst planters " by thousands at a time. As it " has been taken up by the most " intelligent and enterprising " planters, its value as a cultivated " cane in Jamaica will soon be " known. For eating purposes it " is already a favourite among the " peasantry; and I have no doubt " that its yield under cultivation " will prove it to be, for certain dis- " tricts, of a valuable character. A " block established at the Hope in " June last, in ordinary soil, had " canes in October 8 feet long, " with joints 7 inches in length " and with a circumference of 6 " inches."

And again, subsequently, February 22, 1882:—" The Elephant " cane, the history of which has " already been given in former " Reports, continues to be in great " demand, and is much liked in cer- " tain districts. It is evidently " best suited for warm, humid " climates. In dry districts, even " with irrigation, it is not so suc- " cessful as the Salangore. With " such varying conditions of soil " and climate as exist on sugar " estates in Jamaica, it may natur- " ally be expected that numerous " varieties of canes are required to " enable the planter to obtain the " best results with the means at his " command. Hence, I look upon " the greater interest which is taken " in cultivating new varieties of " sugar canes and the establishment " of nurseries on estates as most " hopeful signs of awakening in the " staple industry of Jamaica."

Eucalyptus citriodora.—*Bengal.*—I quote from the proceedings of the Agri-Horticultural Society of India, January 5, 1883:—" *Eucalyptus citriodora* has taken " very kindly to Bengal, and being " sweeter scented than *Aloysia* " *citriodora*, sweet-scented Verbena, " besides growing to a good size, " ought to make it a very popular

" plant, and one that no house " should be without."

Jamaica.—Mr. Morris reports:— " One of the best trees for the plains " here is *E. citriodora*. You can " safely recommend this for warm " climates. Its foliage, as its name " denotes, is beautifully fragrant, " the tree itself is fast growing and " hardy."

Fodder plants.—*Mesquit bean.*—The distribution of this to India is recorded in the Kew Report for 1877, p. 20. Mr. Ridley, Superintendent, Horticultural Gardens, Lucknow, reports, March 31, 1883:— " The plantation of *Prosopis glandulosa* also continues to flourish. " It would seem the plants get more " prolific with age, as they are bearing an unprecedently heavy crop " of pods this year. No water is " given, yet the trees make new " growth and produce their crop of " pods at the hottest and dryest " season of the year. For clothing " dry or broken raviny ground, " where little else would grow, it " would, I believe, prove a success, " and is worthy of trial on account " of the grazing it would afford for " goats and cattle at a season, and " in places where scarcely any green " food exists."

Salt bush.—I extract the following passage from Mr. Duthie's report on the Saharanpore Gardens (May 30, 1883). The desirability of finding any useful plants which will grow on salt in crusted lands in North-west India is a constant topic in Indian correspondence:—" The " progress which *Atriplex nummularia* has made within the last " year is decidedly encouraging. " Forty-eight plants were raised " from the packet of seed received " in November 1881, from Mr. " W. R. Guilfoyle, the Director of " the Melbourne Botanic Garden. " Twenty-one of these were planted " out, three are kept in pots, and " the remainder have been distributed. Those planted out in this " garden have grown into compact, " healthy-looking shrubs. A few " of these are coming into flower, " and will, I hope, produce seed. " If this takes place annually there " will soon be a large stock of plants " for distribution. Another supply " of seed lately received from Dr. " Schomburgk, Director of the " Botanic Garden, Adelaide, is germinating well. Cuttings have " been tried, but with very partial " success, only 19 surviving out of " 230. * * * * " Mr. Wilson writes:—" Out of the six plants of " salt bush received from you five " are alive. Four of them were " planted in bad *usar*, which was " either efflorescent or covered with " *usar grass* (*Sporobolus tenacissimus*, Beauv). The fifth is in a " patch of soil which was covered " with dáb grass. The fifth plant " is coming into flower. The others " all looking healthy, and are growing rapidly. I think that there is " no doubt that the salt bush will " grow well on *usar*. It has yet to " be proved whether it will grow " without irrigation." Mr. Impey says:—" The six *Atriplex nummularia* plants are looking exceedingly well. I planted them in various " kinds of soil, from best garden " soil to bad *usar*, and have been " carefully watering them, as I did " not wish to lose any of them. " Those in *usar* seem actually better " than the others and look very " strong, green, and healthy. I " do not know if they would get on " without water."

Sheep Bush.—In the Kew Report for 1873, p. 5, I recorded the result of the introduction in 1869 of this composite through Kew into South Australia from the Cape of Good Hope. It has now found its way to North-west India, and Mr. Duthie

reports (May 30, 1883) :—"*Pentzia* "*virgata*, Less., the 'Sheep bush' "of South Africa, is a small bush "something like an *Artemisia*, to "which genus it is closely allied. "It has been strongly recommended "as a suitable plant to introduce "into desert countries, for besides "being able to stand long-continued "droughts, it spreads rapidly by "means of its trailing stems which "take root as soon as they touch "the ground. The plant has been "tried in Australia for several years "and is highly spoken of as a fodder "plant. Seeds were received (at "the Saharanpore Garden) from "Dr. Schomburgk, Director of the "Adelaide Botanic Garden, and "subsequently from Captain Bagot, "R.E., who has lately returned "from a visit to Australia."

Tagasaste.—The first distribution of this from Kew is recorded in the Kew Report for 1879 (p. 18). Dr. Schomburgk reports in March of the present year :—"I must again "especially recommend to the squat- "ter the 'Tagasaste' (*Cytisus pro-* "*liferus*, Linn.), which has found "a most genial climate in South "Australia. The dry season has "not shown the slightest effect on "the plants. If the seed be sown "on the runs it would soon become "acclimatized, and would stock "them with a profitable shrub "capable of withstanding the se- "verest drought. Although I offered "seed of the 'Tagasaste' for dis- "tribution only a few applications "have been made in South Aus- "tralia, but a large number were "received from the neighbouring "colonies. I am sorry to mention "that during my severe illness the "plants were cut down shortly after "flowering, so that only a small "quantity of seed has been gathered "for distribution."

India-rubba. — CASTILLOA. — *Ceylon.*—Dr. Trimen reports, October 20, 1882 :—"We have some sturdy "little seedlings of *Castilloa* coming "on from our seed. Only three "fruits ripened in June, and the 15 "seeds from these were sown at "once and germinated in 15 days, "according to Clark's report.

"The Rubber from Castilloa "strikes me as the most satisfactory "sort growing here, the proportion "of caoutchouc in the milk being "larger than in any of the others."

Jamaica.—Mr. Morris reports, Feb. 22, 1883 :—"The Castilloa, "or Central American rubber, was "introduced last year from Kew, "and there are two plants, of which "one is in good health. Being a "member of the bread-fruit family, "this rubber-tree promises to be "most valuable as a shade tree for "cacao, and arrangements are being "made to introduce seeds in large "quantities, and distribute them for "experimental trial amongst cacao "planters."

Mr. Morris also mentions a fact, which is worth recording, for the benefit of cultivators of the tree in the old world :—"In Central America the "juices of *Calonictyon* and some "other Convolvulaceæ are used to "coagulate (temper) the milk of "*Castilloa elastica*. The milk of "the cow and that of an Artocarpad "are, I know, not similar, but it "would be well to test the effects "produced on cow's milk by the "juices of these plants."

CEARA. — *Ceylon.* — Dr. Trimen writes, October 20, 1882 :—"Some "planters here are going in for "vast quantities of Ceara as a re- "sult of the price put on the best "sort by Messrs. Silver. If it "should prove profitable it will be "a great help as it grows *anywhere* "up to almost 2,500 ft."

The introduction of this valuable plant from Kew into Ceylon is recorded in the Kew Report for 1877, p. 16.

I quote the following further information from the extremely useful publication, "The Tropical Agri-culturist," for February 1883, p. 626 :—"The full significance of "the latest harvesting report (three "ounces from six months' tapping "of a tree 18 months old) will only "be understood when we mention "that our correspondent estimates "that a yield of *four ounces* per "annum will give a satisfactory "profit. Rubber in Ceylon pro-"mises to pay as well as Cinchona, "where the tree flourishes, in both "cases."

Jamaica.—Mr. Morris reports, February 22, 1883 :—"The Ceara "rubber trees, of which there are "several specimens in excellent "health, promise in every way to "be suitable for cultivation in "Jamaica. The largest tree is "about 25 feet high, with a circum-"ference at 2 feet from the ground "of 30 inches."

Madras.—I quote from the "Madras Mail" (October 24, 1883) an account of the prospects of the plant in Southern India :—"About six months ago some "gentleman imported Ceara rubber "seed from Ceylon. The produce "of these trees may now be seen "flourishing in a wonderful manner "at the foot of the Neilgherry "Hills, by any one curious enough "to look out of the tonga, just "before reaching Kallar. Being "much interested in the introduc-"tion of this comparatively new, "but very valuable product, I "gladly availed myself of an invi-"tation to inspect these trees more "closely. The rapid growth of the "Ceara rubber tree is marvellous; "some, measured six months old "from seed, were fully 8 feet high, "and a cutting, that I was told had "been put down scarcely six months "ago, was quite 8 feet high and in "blossom. Being of such wonder-"fully rapid growth, the tree is "naturally very susceptible of wind "and liable to be blown over, until "it gets firm hold of the ground; "consequently a sheltered position "is most necessary. It seems to "thrive on poor soil, requires no "shade, and very little rain. With "such moderate requirements we "may expect to hear, before long, "that this valuable tree, the de-"mand for the produce of which "seems to be unlimited, is being "largely planted in India, where "there is so much land likely to "suit it. I was informed that a "considerable quantity of seed has "been sent to the S. E. Wynaad, "where it is to be tried on some "of the unprofitable coffee lands "of the various gold companies. "Unfortunately the unusually "heavy monsoon has been rather "against the experiment. From "what I could gather, it seems "that it would be better to plant "out the young Cearas after the "first heavy burst of the monsoon, "say in the months of August or "October when the ground is "thoroughly saturated, and the "showers only occasional, with "bursts of sunshine between. The "germination of the seed seems a "very simple process, and gener-"ally occurs in 10 days, and some-"times less, from the time the seed "is placed in the damp sand. The "seed coat, being extremely hard, "requires very careful filing, so as "to enable it to burst more easily; "if this is not done the seed may "take months to germinate."

Natal.—Mr. Wood writes from the Durban Botanic Garden, October 6, 1882 :—"One of the plants "of *Manihot Glaziovii* has seeded "for the second time, but the seeds "produced last year and planted by "Mr. Keit have failed to ger-"minate; the trees are now quite "leafless, which appeared to sur-

" prise Mr. Scott Blacklaw, who " called here a short time ago; he " has, I believe, gone to the Trans- " vaal."

HEVEA. — The British Guiana species, *H. Spruceana* (*see* Kew Report, 1880, pp. 37, 38), has been received from Mr. Jenman, of the Demerara Botanic Gardens, and a portion of the plants distributed among the Botanic Gardens of Brisbane, Calcutta, and Ceylon.

A further distribution will be made when the young plants in the propagating houses are strong enough. Neither this species nor *H. brasiliensis* can be propagated with any success by means of cuttings, so that seeds will be necessary to its becoming widely distributed.

LANDOLPHIAS (*see* Kew Reports, 1880, pp. 39–43; 1881, pp. 15, 16). —A further distribution of these plants was made during the year, principally of the two most important species, viz., *L. Kirkii* and *L. florida*. They were sent to the following Botanic Gardens:—Ceylon, Fiji, Jamaica, Rio de Janeiro, Queensland, and Sydney. All the principal Botanic Gardens in the Colonies have now been supplied with a good stock of the four species of Landolphia, and as they are easily propagated by means of cuttings their future distribution over the Colonies is easy of accomplishment.

Brisbane.—Mr. James Pink reports, March 26, 1882: — "The " Landolphias you kindly sent are " doing well. I have had one of " each variety planted in our new " economic ground, and I have for- " warded one plant of each to Mr. " H. A. Wickham, on the Herbert " River, a much warmer district."

Ceylon. — Dr. Trimen reports, October 20, 1882:—"None of the " Landolphias have flowered yet, " though the plant of *L. Kirkii*, " which I brought out with me, " now covers a wild nutmeg tree of " great size at Heneratgoda, and " has a stem as thick as one's " thumb."

MANGABEIRA RUBBER (*see* Kew Report, 1880, pp. 47, 48): — A quantity of good seeds of this plant (*Hancornia speciosa*) were sent to Kew by Mr. C. Craven, of Pernambuco, and were distributed among the following Botanic Gardens: — Brisbane, Calcutta, Ceylon, Demerara, Singapore, Java, and Jamaica. The seeds sown at Kew germinated freely, but owing to damp the plantlets all perished. Apparently this plant prefers a dry atmosphere and a sandy soil.

Ipecacuanha.—Mr. Cantley reports from Singapore (January 30, 1882):—"These plants which had " hitherto been grown in partial " shade under some trees in the " economic grounds, were lifted and " placed in pots, the change being " evidently highly beneficial to " them, for from the diminutive " and starved appearance, they have " developed into nice little shrubby " plants. As most people complain " of their slow growth when planted " in the ground, it might be found " advantageous for planters to try " them in pots; the cost could be " considerably reduced by making " the pots themselves."

Liberian Coffee. — *Fiji.* — The Hon. J. B. Thurston writes, March 31, 1882:—"The few Libe- " rian coffee-trees I have here pro- " mise to be a great success, and " since reading the Jamaica report " that you so kindly procured for " me, I am anxious to get all the " seed I can. It seems to me that " Liberian Coffee would be an ex- " cellent thing to distribute among " the natives."

Grenada.—The Administrator of Grenada reports in the Blue Book for 1881 (published August 1882): —"Liberian Coffee, which has recently been imported, bids fair to become in time an important export from the Colony. I had shown to me some Liberian Coffee from trees planted two years ago in the St. John's district. A large number of Liberian Coffee plants have been introduced into the Colony within the last three years, and they all appear to be doing well. Most of these plants were imported from the Botanical Gardens at Trinidad." Liberian Coffee was first sent to Trinidad from Kew in 1876 (*see* Kew Report for that year, p. 10), and to Grenada in 1877 (*see* Kew Report for that year, p. 17).

Natal.—Mr. Wood writes, October 6, 1882:—"The plants of Liberian Coffee appear to grow well and look well, but the berries do not seem to ripen as they ought, and remain upon the trees so long, that the monkeys, with which the adjoining bush abounds, usually forestall us in gathering the fruit."

Queensland.—Mr. Pink writes from Brisbane, November 6, 1882: —"I am sure you will be glad to hear that the Liberian Coffee plants, which I believe Sir Joseph Hooker gave to Mr. Wickham some five or six years ago, have produced a fine crop of berries this season, these being the only fruit-bearing plants of the kind in Queensland. Mr. Wickham has kindly sent me a quantity of seed for stock purposes, as fine a sample as any we have ever received from Ceylon.

"I think that there is no advantage in growing *Coffea Liberica* here at present, as the leaf disease is unknown, and *Coffea Arabica* does well, producing at the rate of 6 cwt. per acre. There are now in this colony a number of coffee planters from Ceylon who are anxious to go into coffee growing here, and the Minister for Lands is about to have a quantity of suitable land reserved for that purpose. The small farmers are likewise just discovering that coffee pays better than corn and potatoes when there is a family of children to pick the berries. Several farmers have brought and sold to the merchants of Brisbane green coffee berries at the rate of 10*d.* per lb. this season. Consequently the demand for plants has become very great, but fortunately we have an equally large supply on hand to meet it, both of *Liberica* and *Arabica*."

And subsequently, November 6, 1882:—"I send herewith a small bag of seed of Liberian Coffee from trees which I believe you gave to Mr. H. A. Wickham when in England some six years ago. Mr. Wickham having no place to plant the trees at the time gave them to Mr. F. Neame, of Macknade, on the Herbert River, who has very kindly just sent me the seed. We have several thousand plants ready for distribution, and having had a good stock I have been able to supply several cases of plants to planters in Fiji."

Mahogany.—Six casks of seeds were received from Jamaica, and have been distributed among the Botanic Gardens of Calcutta, Madras, and Queensland.

Mr. Horne reports from Mauritius:—"Nine of the mahogany trees, which were reared from seeds sent from Kew, by Sir J. D. Hooker, and planted in the gardens during 1868 or 1869, bore seeds during 1881."

Before the maturity of the seeds had attracted notice, some of the seed capsules had burst open and the seeds, which they contained, were scattered among the grass underneath the trees, and at other places near to where the trees are growing. The weather and place being favourable these seeds germinated, and about 100 young plants were picked out of the grass, the result of the self-sown seeds. This is a small matter, but it is an important one, as it indicates that when this valuable tree is introduced in the plantations, which are suitably situated for it to grow and bear seeds, it will, during favourable seasons, reproduce itself without artificial aid. Another fact, which will also greatly tend to favour its extension by self reproduction, is that the seeds begin to ripen at about the beginning of November, just before the rains of the hot season begin to fall.

Pistacia atlantica.—Through the kindness of Lieut.-Col. R. L. Playfair, Her Majesty's Consul-General at Algiers, I obtained a supply of seeds of this interesting tree. Parcels were distributed to the Botanical Gardens of the following places : — Adelaide, Cape Town, Harvard (United States), and Saharanpore.

It is a large tree, native of N.W. Africa and the Canary Islands. It is closely allied to *P. Terebinthus*, which yields the Chian or Cyprus turpentine ; also to *P. cabulica*, a small tree growing in Afghanistan and Beluchistan. The following is an extract from a memorandum by Professor Ascherson, of Berlin, on the uses of this tree :—"This terebinth, like the "European turpentine tree (*Pistacia Terebinthus L.*), is deciduous and begins to make fresh "growth again towards the end of "March. According to Krause, "the fruit of this tree is called "*gadum ;* it is eaten in the "Algerian Sahara (and very likely "also in Tripoli), notwithstanding "it turpentine-like taste. The 'bag "galls,' which are so well known "and produced in such a quantity "that the tree itself is also called "*afsie* or *afs*, have a more or less "spheroidal shape and are seated "with a small or large base upon "the midrib of the underside of the "leaflets of the pinnate leaf. They "have a yellowish colour with a "more or less red hue. Their "rather thin and fragile walls are "covered (inside) with numerous "dead aphides and their skins. "They perfectly resemble those "galls which have been known "since Clusius, which are produced "in the European turpentine tree "by *Pemphigus utricularius*."

Shade-tree for Cacao (*see* Kew Report, 1880, p. 21) :—Mr. Morris writes, January 23, 1883 :— "I do not think that except for "Trinidad, Venezuela, and other "places *outside* the range of "cyclones and heavy monsoons the "*Erythrina umbrosa*, Madre de "cacao, is the best shade tree for "Cacao. I believe it a very unsuitable tree in every respect for "places like Ceylon, India, Java, "Singapore, Mauritius, and the "Seychelles subject to strong "winds."

West Indian Cedar.—This is a valuable timber tree ; ordinary cigar boxes are made from its wood. Mr. Horne reports :—"Fine trees "of *Cedrela odorata*, which is a "native of the West Indies, sent "from the Royal Gardens, Kew, "and planted in 1876 or 77, in "suitable soil and position in the "Gardens, Pamplemousses, are now "25 feet in height. This species "also yields a timber, which is "much esteemed for a great variety

" of purposes, and it is besides a " fine shade tree."

Fiji.—The Hon. J. B. Thurston writes :—" A *Cedrela odorata* you " kindly sent at my request, and " which I planted about 18 months " ago, is now 15 feet high."

The **receipts** have been during the past year 2,561 living plants of all kinds, and 2,063 packets, bags, and boxes of seeds from 229 contributors. They are classified as follows :—

——	Ward's Cases.	Packets of Seeds.	Stove and Greenhouse Plants.	Herbaceous Plants.	Trees and Shrubs.	Number of Contributors.
Britain - -	—	543	618	327	178	109
Continent -	—	317	233	157	33	25
Asia - -	16	589	385	—	—	27
Africa - -	2	84	136	1	—	22
America - -	15	311	365	41	8	32
Australia and New Zealand.	4	219	70	9	—	14
Total -	37	2,063	1,807	535	219	229

Mr. Watson, foreman of the Propagating Department, visited under the Board's authority, in the autumn, numerous horticultural and botanical establishments in England and Scotland, with the result of adding many valuable additions to the Kew collections.

During the past year the following **plants** among others of less importance were **added to the** cultivated **collections** and are now become established :—

Adiantum lunulatum, Moore.
Agave Schottii, Hort.
Allium giganteum, Hort.
Anthurium Kalbreyeri, N.E.B.
Aralia Chabrieri, Hort.
Arum elongatum, Stev.
Aristolochia longiflora, D.C.
Beschorneria Decosteriana, C. Koch.
Billbergia amœna, var. *Leopoldii*, Baker.
Bomarea conferta, Benth.
„ *frondea*, Mast.
Bomarea Shuttleworthii, Mast.
Bolbophyllum Hildebrandtii, Hort. Berol.
Borassus flabelliformis, L.
Boucerosia socotrana.
Brainea insignis, Hook.
Caraguata lingulata, var. *cardinalis*, E. Andre.
Caraguata Van Volxemi, E. Andre.
Catoblastus præmorsus, Wendl.
Cereus enneacanthus, Engel.
„ *Fendleri*, Engel.
„ *pectinatus*, Engel.
Chusquea abietifolia, Gr.
Chamædorea stolonifera, Wendl.
Colchicum crociflorum, Rgl.
Columnea Kalbreyeri, Hook. f.
Cypripedium Spicerianum, Reichb. f.
Davallia fijiensis, var. *plumosa*, Moore.
Dendrobium Dearei, Reichb. f.
„ *revolutum*, Ldl.
Dracæna Cantleyi, Baker.
Encephalartos Barteri, Carruth.

Equisetum Martii, Milde.
Euadenia eminens, Hook. f.
Eugenia, Glazioviana, Hort. Makoy.
Eucharis Sanderiana, Baker.
Geonoma cuneata, Wendl.
Geissois racemosa, Hort. Linden.
Grammatophyllum speciosum, Bl.
Guzmannia fragrans, Hort.
Heterotoma lobelioides, Zucc.
Hyphæne thebaica, Mart.
Hypopterygium filiculæforme, Brid.
Kniphofia Leichtlini, Baker.
Lælia harpophylla, Reichb. f.
Leea amabilis, Hort. Veitch.
Leontice Albertii, Rgl.
Licuala (*Pritchardia*) *grandis*, Wendl, (large specimen.)
Lilium Parryi, S. Wats.
Lindenia rivalis, Benth.
Livistona inermis, R. Br.
Lycopodium mandiocanum, Raddi.
Mammillaria lasiacantha, Engel.
„ *macromeris*, Engel.
„ *micromeris*, Engel.
„ *pectinata*, Engel.
„ *prolifera*.
„ *pycnacantha*, Engel.
„ *tuberculosa*, Engel.
Malortiea intermedia, Wendl.
Masdevallia corniculata, Reichb.f.
„ *rosea* „
„ *Shuttleworthii* „
Nepenthes Veitchii, Hook. f.
Nymphæa zanzibarensis, Wittm.
Opuntia brachyarthra, Engel.
„ *rufida*, Engel.
„ *spinulifera*, Engel.
Ottelia ovalifolia, F. Muell.
Phalænopsis esmeralda, Reichb. f.
Piper methysticum, Forst.
Pinanga coronata, Bl.
Primula, minutissima, Jacgt.
„ *floribunda*, Wall.
Renanthera Lowii, Ldl.
„ *arachnites*.
Restrepia Falconbergii, Hort.
Rhizophora sp. (Mangrove).
Rhododendron triflorum, Hook. f.
Tacsonia Parritæ, Mast.
Telopea speciosissima, Br.
Tillandsia Jonghei, K. Koch.
„ *Sieboldiana*, Hort.
Trichomanes Hartii, Baker.
Tulipa Borszczowi, Regel.
Turnera trioniflora, Sims.
Typhonodorum, Lindleyanum, Schott.
Vitis sp. (Soudan Vine).
Willughbeia Burbidgei, Dyer.
Yucca alata, Engel.

The following is a list of the **principal contributors to the living collections** during 1882 :—

Britain.

Exchanges have been made with the following Botanic Gardens ,viz. : —Birmingham, Cambridge, Dublin, Edinburgh, Glasgow, Glasnevin, and Sheffield. From the Oxford Botanic Gardens, in addition to the usual exchanges, came a very fine collection of succulent plants, especially *Agave*, *Gasteria*, and *Haworthia*; also a collection of Stapelias, which had been presented to Oxford by the late Mr. Daniel, of Epsom.

Exchanges were also made with the following nurserymen, viz. :— Messrs. Backhouse of York, Bull of Chelsea, Cooper of Red Hill, Dickson and Turnbull of Edinburgh, Dickson and Sons of Chester, Carter and Co. of Holborn, Henderson of Maida Vale, Jackson of Kingston, Kerr of Liverpool, Low of Clapton, Laing of Forest Hill, Osborne of Fulham, Shuttleworth and Co. of Clapham, Veitch of Chelsea, Ware of Tottenham, Williams of Holloway, and with the General Hort. Company South Kensington.

The number of British contributors was over 100; of these the principal have been :—

Atkins, J.; plants of *Mammillaria senilis*.

Ball, J., F.R.S.; tubers and seeds collected in Brazil, &c.

Berkeley, Lieut.-Col.; *Rhizophora* sp., several orchids and seeds of "wild *Areca*" from Nicobar.

Boyd, Capt.; *Hypopterygium filiculæforme*.

Buchanan, P. J.; seeds of Cinchonas.

Bunbury, Sir C.; *Œsculus indica*.

Calder, J. V.; West Indian orchids.

Cameron, E. H.; seeds of *Cinchona Ledgeriana*.

Campbell, A. C.; seeds of *Cinchona Ledgeriana*.

Christy, T.; *Omphalocarpum procerum*, *Cinchona* "Verde," and "Quina Cuprea."

Clarke, C.; Australian seeds.

Clarke, Col. T.; hybrid *Begonia* and *Hæmanthus*.

Dugmore, H.; *Passiflora cinnabarina*.

Elwes, H. J.; collection of Himalayan seeds.

Harrison, G.; collection of Japanese seeds.

Hart, H. C.; *Crinum* sp. from Sierra Leone.

Henry, I. A.; *Arnebia* sp., Veronicas, Morinas, &c.

Johnson, A. S.; seeds of *Myosotidium nobile*.

Loder, E. G.; set of new *Cacti*, various herbaceous plants.

Lawrence, Sir T., M.P.; large *Sobralia* and other orchids.

Macleay, Sir G.; *Telopea speciosissima*.

Miles, F.; Japanese Nelumbiums, seeds and bulbs collected by Mr. O'Donovan in Merv.

Montserrat Company, Birmingham; Ward's case of Limes.

Nesbitt, A.; seeds *Nelumbium luteum*.

Nicholson, H. G. W.; seeds from Sandwich Islands.

Paris, Comte de; *Ophrys bombylifera*.

Peacock, J.; *Sabal glauca*, several orchids.

Roxburgh, Duke of; large *Araucaria Cookii*.

Sander, F.; *Eucharis Sanderiana*.

Stewart, Grey, and Co.; seeds of Munipur Tea.

Teschemaker, Major; seeds of *Ranunculus Lyallii*.

Varden, Mrs. B.; collection of ferns including good specimens of *Platycerium*, *Adiantum*, &c., several orchids.

White, R. B.; seeds of South American palms.

Wilson, G. F.; Liliums and herbaceous plants.

Continent.

Exchanges have been made with MM. Bruant of Poitiers, De Smet of Ghent, Godefroy-Lebeuf of Paris, Linden of Ghent, Makoy of Ghent, Van Houtte of Ghent, Vilmorin Andrieux & Co. of Paris. Also with the following Botanic Gardens, viz.: Berlin, Hanover, Helsingfors, Montpellier, St. Petersburgh, and Paris.

Contributions were received from:—

Andre, Dr. E., Paris; *Stenomesson aurantiacum*.

Baumann, J., Ghent; set of Pæonias.

Hanbury, T., Mentone; collection of seeds.

Horvarth, Dr. A., Kiew; seeds of shrubs and of *Nelumbium caspicum*.

Max Leichtlin, Baden-Baden; *Lilium Parryi*, *Beschorneria Decosteriana*, *Kniphofia Leichtlini*, *Cypripedium pubescens*, *Allium giganteum*, *Helicodiceros crinitus*, and other herbaceous plants; various shrubs and seeds.

Schlegelmilch, Dr., Coburg; Semperviums.

Asia.

Bentinck, Mrs., Bovey-Tracy; Indian seeds.

Bretschneider, Dr., Pekin; many packets of seeds of Chinese trees and shrubs, including *Illicium anisatum* (true), oaks, *Ribes*, &c.

Cantley, N., Singapore; wardian cases, containing *Dracæna Cantleyi*, *Styrax* sp., *Willughbeia Burbidgei*, *Renanthera arachnites*, *Grammatophyllum speciosum* (large specimen), seedling *Mangosteens*, &c.

Duff, Right Hon. M. E., Madras; seeds of *Michelia*, &c.

Duthie, J., Saharanpore; collection of seeds.

Ford, C., Hong Kong; wardian case, containing *Brainea insignis* (fine plants), *Rhododendron Championi*, and *Spathoglottis Fortunei*.

Gammie, J., Darjeeling; various seeds.

Henry, J. M., Baroda; seeds of *Hyphæne thebaica*.

King, Dr., Calcutta; *Cycas Jenkensiana*, *Daphne papyrifera*, *Phalænopsis sumatrana*, *Thrixspermum* sp., seeds of *Borassus flabelliformis*.

Peché, C., Moulmein; Thunias, Dendrobiums, Saccolabiums and other orchids.

Phillips, G., Formosa; *Cycas revoluta*, *Dioscorea* sp., *Phœnix* sp.

Playfair, G. M., China; seeds of *Wikstræmia* sp. and *Euonymus*.

Sarawak, Ranee of; seeds of *Areca Catechu*.

Thurston, Hon. J. B., Fiji; two wardian cases, containing *Veitchia Storckii* (?), Ptychospermas, *Kentia exorrhiza*, *Cycas* sp., also seeds of palms.

Treub, Dr., Java; two wardian cases, containing *Hoya Cunninghamii*, *Bolbophyllum Beccarii*, *Maniltoa gemmipara*, and Aroids; seeds *Teysmannia altifrons*.

Trimen, Dr., Ceylon; two wardian cases, containing *Piper methysticum*, *Sophora violacea*, Arisæmas, &c.; seeds of *Teysmannia* and *Hyphæne thebaica*.

Walker, Major C.; stems of *Cycas Beddomei*, Dyer, sp. nov.

Watt, Dr., Munipur; *Dendrobium*, seeds of Rhododendrons, Aroids, Lobelias, &c.

Africa.

Ayres, C., Cape Town; bulbs of Freesias.

Cameron, Comm. Gold Coast; several orchids and *Platycerium* sp.

Horne, J., Mauritius; wardian cases, containing *Typhonodorum Lindleyanum*, seedling nutmegs, &c., also various palm seeds.

Johnson and Harman, Messrs., Cape Town; collection of South African bulbs and various seeds.

Keit, W., Durban; seeds of *Calodendron capense*.

Kirk, Sir J., Zanzibar; wardian case of bulbs, ferns, &c.

McOwan, Prof., Cape Town; *Crassula pyramidalis*, *Trichocaulon piliferum*, seeds of *Protea nana*, and *Oncoba spinosa*.

Moloney, Captain A., Gold Coast; stems and seeds of *Encephalartos Barteri*.

Monteiro, Mrs.; various South African seeds.

Rumsey, Comm. R. M.; stems and seeds of *Encephalartos Barteri*, seeds of *Raphia* sp. and *Cola*.

Saunders, Mrs., Cape; seeds of new Cucurbitaceous plant.

Soyaux, H., Gaboon; seeds of *Raphia Hookeri* and *Cola*.

Templeman, R., Cape; seeds of *Nymphœa*, &c.

Wood, J. M., Natal; stems of *Encephalartos Ghellinckii*.

New World.

Berkeley, Capt., St. Kitts; wardian case of seedling Mangoes and *Artocarpus incisa*.

Castello, E. F., Bogota; *Cinchona* seeds.

Craven, C., Pernambuco; seeds of *Hancornia speciosa*.

Cunningham, —., Demerara; wardian case of rare ferns, &c.

Eggers, Baron, Dominica; Palm seeds.

Engelmann, Dr., St. Louis; seeds of shrubs, *Cacti*, &c.

Espeut, W. B., Jamaica; tubers of *Arracacha*.

Glaziou, A., Rio; wardian case of *Equisetum Martii*.

Gray, Prof. A., Harvard; seeds of wild potatoes, &c.

Hollings, G. S., Montserrat; wardian case of Mangoes, &c.

Jenman, G. S., Demerara; wardian cases, containing *Mauritia flexuosa*, *Hevea Spruceana*, *Iriartea exorrhiza*, *Œnocarpus Bacaba*, *Brocchonia* sp., and "Hya-Hya" (*Tabernæmontana* sp.).

Morris, D., Jamaica; wardian cases, containing *Chusquea abietifolia*, *Masdevallia fenestrata*, *Bletia Shepherdii*, and other orchids, various ferns; also seeds of palms, Cinchonas, &c.

Nicholls, Dr., Dominica; wardian case of plants.

Prestoe, H., Trinidad; several cases, containing *Epidendrum bicornutum* and other orchids, choice filmy ferns, *Danæa* sp. and other ferns, *Montrichardia guianensis*, seeds of palms, &c.

Sargent, Prof., Brookline; set of North American *Vitis*, seeds of *Nolina erumpens* and *Rhus cotinioides*.

Smith, W. R., Washington; *Zamia pumila*, Yuccas, &c., various seeds.

Taylor, E. B., Bahamas; wardian case of Zamias, &c.

Vansittart, —., Costa Rica; *Cattleya Dowiana* and other orchids.

Wright, W. G., California; *Hesperocallis undulata*.

Australia and New Zealand.

Abbot, F., Tasmania; seedling Araucarias and seeds of Tasmanian plants.

Brisbane, Department of Public Lands; stems of *Catakidozamia Macleayi*.

Colenso, W., New Zealand; tubers of *Ipomœa chrysorhiza*.

Dobson, W. L., Tasmania; various seeds, including seeds of *Richea pandanifolia*.

Field, —., New Zealand; filmy ferns.

Hartman, C. H., Queensland; wardian case of ferns, Dendrobiums, &c.

Kirk, T., New Zealand; seeds of Olearias.

Moore, C., Sydney; box of *Kentia* seeds.

Mueller, Sir F., Melbourne; large stem of *Macrozamia Moorei*, various seeds.

O'Shanesy, P. A., Queensland; seeds of Australian shrubs.

Pink, J., Brisbane; two large cases, containing stems of *Cycas media*, *Macrozamia Douglasii*, and other Cycads, various seeds.

Webb, W., Albany; *Cephalotus follicularis*, seeds of *Andersonia*.

Supply of Specimens for Science and Art Department, &c.

A supply of cut plants for the Art schools and of specimens for the examinations in botany of the Science and Art Department, have been regularly furnished. A large number of specimens of flowering plants, as well as other botanical materials, have been supplied for the various examinations of the University of London.

COLONIAL, &C. BOTANIC GARDENS.

Brisbane.—The Botanic Gardens appear to be beginning to be administered with some activity commensurate with the great resources of Queensland as a planting colony. Mr. James Pink writes, November 6, 1882 :—

"I am glad to say a vote has "just been passed by our Legisla- "tive Assembly for a new house to "be heated by hot water. This "will be especially useful for the "rearing of *Theobroma Cacao*, "nutmegs, and other tropical econo- "mics, for although these will not "thrive south of Cooktown land is "now being rapidly taken up for "sugar plantations further north "where such plants will, no doubt, "do well, and whence I expect a "great demand for them."

Cyprus.—There is not at present any Government Garden in the island. Under similar circumstances in other British possessions the grounds attached to official residences have often afforded a useful standing point in experimental cultivation. I have, therefore, willingly acceded to a request from the High Commissioner for a supply of seeds, and have sent 250 packets of those of American, Asiatic, and European trees and shrubs for his residence on Mount Troodos.

Glasgow.—Very important improvements having been carried out in their well-known gardens, including the construction of a fine range of plant-houses. An extensive collection of stove and greenhouse plants (750 in number) was sent at the instance of the Regius Professor of Botany, Dr. Bayley Balfour, as a contribution from Kew. Although independent of the University, the gardens afford facilities for the instruction given to his class by the Professor.

Jamaica.—Mr. Morris has introduced a new feature in the working of a Botanical Department, which, I believe, will be in the future of immense service to the West Indies. Besides taking a limited number of cadets without salary to learn the details of Cinchona cultivation, he has also organized a system of training natives to act as foremen. I quote the following from his report, dated February 22, 1883 :—

"In order to train a number of "the better class of native workmen "in the details of nursery and pro- "pagating work connected with "Cinchona cultivation, an attempt "has been made to attach a cer- "tain number to the Government "Plantations, where they undergo "a systematic course, so as to "fit them in due time to take "charge of nurseries or act as fore- "men on private plantations. The "experiment so far has worked "satisfactorily. The apprentices "for the first three months receive "only a nominal rate of pay, which, "however, is gradually increased "as they become more efficient. "When applications are received "for men to take charge of nur- "series on private plantations, the "best of these apprentices are "recommended, and they generally "receive wages ranging from 12*s.* "to 20*s.* per week. Three men "trained at the Government "establishment have lately been "appointed as foremen on private "plantations, and four men are "undergoing a course of training "to fit them for such appointments.

"By these means it is hoped the "success of Cinchona planting in "private hands will be greatly pro- "moted, and at the same time an "important service rendered to a "large class of young men hitherto "without the means of lucrative "employment."

As an independent testimony to the revolution which Mr. Morris has already effected in one portion of his department, I think it is only due to him to quote a passage from a lecture delivered in the Town Hall, Kingston, by W. Bancroft Espeut, F.L.S., as long ago as March 8, 1881, though a copy has only come into my hands since the preparation of the last report. It affords a useful lesson from which warning may be taken in other countries where Cinchona planting is undertaken.

"I cannot close my remarks on "plantations without referring to "the splendid work being done at "the Cinchona plantation. I was "taken all over this plantation last "week, and I cannot find words to "express the pleasure and satisfac- "tion I feel with all I saw there. "Eight years ago I went there to "see whether it was possible for a "private individual to embark in Cin- "chona plantation. I left it scared "by the complicated hothouses, hot "water pipes, stoves, furnaces, bot- "tom heat, glass houses, silver "sand, &c., which I was assured "were needful to propagate the "plants. About fifteen months ago "I went again and still the alleged "necessity for glass houses and "glazed frames, &c., satisfied me "that no individual could venture "on a cultivation which involved "so much attention and outlay. "Last week I found all changed. "The plantation and the method "of raising the seeds and plants has "been reduced to a practical system, "which any intelligent person can "safely venture to embark in. I "saw hundreds of thousands of "young plants, in all stages, from "the newly germinated seedlings to "the fine stalwart plants just put "out in the fields. The cost has "been reduced from pounds to "pence; and I am so satisfied "that Cinchona, as cultivated at "Belle View, is, commercially and "economically, a success, that I "have already commenced opera- "tions on a small scale myself.

"To Mr. Morris is due the credit "of the great revolution which has "taken place, and it is not possible "for the Government or public to "appreciate too warmly his admir- "able arrangements. Great credit "is also due to Mr. Nock, the "superintendent of the plantation, "for carrying out, practically, Mr. "Morris' directions and wishes; "and when we consider that the "system now in force is very "different, and indeed I may say "opposite, to the system in which "Mr. Nock was engaged for six "years previously, I think he is "entitled to immense credit for so "loyally, heartily, and earnestly "putting aside any opinion and "prejudice which he no doubt, "naturally, had for the old, in "order to carry out the new system "successfully."

Saharunpore.—The following extract from Mr. Duthie's report, dated May 30, 1883, refers to a portion of the records of the Saharanpore Botanic Gardens, which had in some unknown manner found their way to Kew :—

"A thick manuscript volume "belonging to Dr. Royle, formerly "superintendent of these gardens, "has been received from the "Director of the Royal Gardens, "Kew. It contains a long list of "plants collected by Dr. Royle and "others in North West India, and "is of great value in connexion "with the older portion of the "Saháranpur herbarium. I was "not aware of the existence of this "work until its receipt from Kew, "and I am much indebted to Sir "Joseph Hooker for having kindly "restored it."

Seychelles.—These interesting but little known islands appear to admit of a great variety of tropical cultures. I am indebted to Mr. C. Button, the Conservator of the Crown Lands and Forests, for the following notes upon the agriculture of the past year :—

The principal revenues of these islands are cocoanuts and cocoanut oil ; the latter is manufactured on all the principal islands as well as in Mahé. Since the year 1880, three different diseases have seriously affected the trees, principally in the south part of Mahé, where several large forests have been destroyed in a very short time, and had it not been for the young cocoanut trees beginning to bear, the diminution of the production, which was actually about 25 per cent. would have been more than 60 per cent.

Since the end of the year 1882, the diseases have nearly stopped their depredations, a very few trees only have died since ; the production of this year will show a much larger quantity than that of last year, as all the old trees are recovering their vigour, and a great number of young cocoanut trees are coming into bearing.

Vanilla is now cultivated with success, in every locality in Mahé, and also on some of the islands, and everywhere I have met with some small plantations ; a few proprietors, however, have lately planted on a scale averaging 12 or 15 acres each.

Cacao was formerly cultivated with success at Mahé, and afterwards abandoned ; but some new plantations have lately been made, and will, before long, add to the revenue of these islands.

Cloves, which were also formerly cultivated and planted in valleys where the soil was too rich, with a space of no more than five or six feet between them, grew with such rapidity that some trees attained a height of sixty feet, and the cloves could not be collected without cutting down branches, which, undoubtedly, is of great injury to the trees, and keeps them sometimes two years without bearing, until new branches have sprouted. If Cloves were planted in poorer soil, and the trees stopped at a certain height, Cloves could be collected without injuring the trees and their bearing would be much more productive every year.

A large portion of Clove trees which existed formerly have been destroyed without any consideration whatever, for the purpose of making timbers for houses and also firewood. What remains actually amount to about 250 acres.

The Cinnamon which grows here is said to be of an inferior quality. I sent some specimens twice to Europe, where it was not favourably reported upon ; but its strength and aroma led me to think that its inferiority can only be due to the mode of preparation.

Liberian Coffee has also been cultivated since 1880 ; the first plants were sent from Kew and distributed among a few planters by Mr. C. S. Salmon, then Chief Civil Commissioner. They grew very rapidly, and those planted in proper soil, and entirely exposed to the sun, began to bear before two years old, while others in rich ground, and at a short distance from other trees, grew with more vigour, but only began to bear long after. It has been propagated in different localities, and everywhere seems to prefer an open situation where it bears abundantly. The quantity lately planted may amount to about 100 acres.

The following **botanical appointment** has been made by the Colonial Office on the recommendation of the Director :—

W. Nock, Superintendent of the Cinchona Plantation, Jamaica, to be Superintendent of the Hakgala Gardens, Ceylon.

The vacancy thus created at the Cinchona Plantation was filled in Jamaica by the appointment of Mr. John Hart, who, for six years, had been in charge of King's House Garden and Grounds.

The following appointment was also made by the Government of Madras, on the recommendation of the Director :—

M. A. Lawson, M.A., F.L.S., Professor of Botany in the University of Oxford, to be Superintendent of the Government Cinchona Plantations, Nilgiris.

OFFICIAL CORRESPONDENCE.

Clerk in Director's Office.—To meet the increasing pressure of official work in the Director's Office, the Treasury sanctioned, April 8, 1882, the appointment of a Lower Division Clerk, the prospective need of which I pointed out in the Kew Report for 1881, p. 29. I should have preferred the employment of some person with some technical knowledge of the kind so needful in every branch of such an establishment as Kew. This, however, appeared to be impracticable under the existing constitution of the Civil Service. Mr. Alfred Abraham Barnes was accordingly nominated by the Civil Service Commission, and entered on his duties May 15, 1882. In the course of the following month he exchanged posts with Mr. John Bliss, a clerk in the Office of Works, who wished to reside at Kew.

Consulting Entomologist.—The necessity of taking some steps for putting on a proper footing the discussion of such questions of mixed botanical and entomological bearing as are from time referred to this establishment from the Colonies, and to which I referred in the Kew Report or 1880 (pp. 29, 30), has continued to be a subject of correspondence between this establishment and the Colonial Office.

The plan of providing in the estimates a permanent annual retaining fee for a consulting entomologist appeared after examination to be impracticable. The Secretary of the State for the Colonies recognising, however, the fact that the Government could not always count upon the gratuitous assistance of scientific men in matters upon which technical assistance was essential, decided that in default of any better arrangement a proper fee should be paid for any report that should be called for on behalf of a Crown Colony. This arrangement involves in every case some additional correspondence, but so far it has been found to work with little inconvenience.

Boxwood Substitutes.—Prof. Sargent, Director of the Arnold Arboretum, Brookline, Massachusetts, writes March 12, 1882, in reference to this subject (*see* Kew Reports, 1877, p. 27; 1881, p. 25):—"I have been now for a long "time examining our native woods "in the hope of finding something "to take the place of box-wood for "engraving, but so far, I am sorry "to say, with no very brilliant "success. The best work here is "entirely done from box-wood; "and some *Cornus florida* is used "for less expensive engraving. "This wood answers fairly well for "coarse work, but it is difficult "wood to manage, splitting or "rather 'cheeking' very badly in "drying. Of the unused woods I "am now experimenting with, "*Diospyros texana*, *Rhododendron* "*maximum*, and *R. californicum*.

" The first of these is the best. It " is, however, in Texas at least " rather small, scarcely six inches " in diameter, and not very com- " mon. In Northern Mexico it is " said to grow much larger."

Prof. Sargent wrote again, May 23 :—" I am sending you blocks, " prepared for engraving, of the " wood of the following :—

" 1. *Diospyros texana.*
" 2. *Cornus florida.*
" 3. *Rhododendron californicum.*
" 4. *Rhododendron maximum.*
" 5. *Eugenia procera.*
" 6. *Acer saccharinum.*

" Of these the *Diospyros* seems " the most promising. As I believe " I have already told you it grows " more abundantly and to a larger " size in Mexico than in Texas, and " could probably be obtained with " some trouble in sufficient " quantities to become an article of " commerce. The *Cornus* always " checks or opens badly in drying, " but this can be overcome by saw- " ing the logs through the centre as " soon as cut. It can be obtained in " large quantities, as can *Rhodo-* " *dendron maximum.*"

The specimens were submitted to Mr. Robson J. Scott, who was so good as to report upon them, September 23, 1882 :—" It will be well " if I give my opinion of them first " as selections of wood for the pur- " pose for which they were in- " tended. Nos. 3, 4, 5, are all very " bad selections, particularly No. 3. " Nos. 1, 2, 6, are sufficiently good " as regards the grain, but the one " that is the best looking and has " proved to be the best is much too " small for practical purposes. This " applies to No. 1, *Diospyros* " *texana*, which Mr. R. H. Keene " says 'is nearly equal to the *best* " 'Box.' No. 5, *Eugenia procera*, " he puts next in order ; he reports " 'it is suited for bold, solid, news- " 'paper work.' A better selection " would have obtained a better re- " port. No. 2, *Cornus florida*, he " says, 'is very rough ; suitable for " 'bold work' :—

" No. 3. *Rhododendron califor-* " *nicum*,
" No. 4. *Rhododendron maxi-* " *mum*,
" No. 6. *Acer saccharinum*,

" are all much alike in value, No. 4 " being, perhaps, the best of the " three, but it is such a bad selec- " tion that a finer piece of wood " might have proved much better " in the hands of the engraver ; the " last three were tested by Mr. " George Pearson."

Cacao.—The notices in the Kew Report for 1881, pp. 27, 28, have brought me several interesting communications.

COLOMBIA.—Mr. R. B. White, of Medellin, has furnished me, January 13, 1883, with the following interesting particulars as to the conditions of its cultivation in the United States of Colombia :—

" *Soil.*—The Cacao tree exhausts " the soil very rapidly. It requires " a good, rich, and thick stratum of " vegetable soil, which should over- " lie gravel or some open substra- " tum. Stagnant moisture round " the roots is prejudicial to Cacao. " At the same time it requires so " much moisture that sloping " ground does not suit it. In dry " seasons and dry climates irriga- " gation should be judiciously em- " ployed.

" *Disease.*—In Antioquia, United " States of Colombia, South " America, the Cacao plantations " have been nearly ruined by a " fungus which attacks the tree in " a similar way as *Hemileia* " *vastatrix* does the coffee. The " leaves appear spotted, then turn

" brown, shrivel up, and finally the " tree looks as if it had been " scorched. If the tree is in flower, " the buds fall off, but if it is " already in fruit, the pods shrivel " and wither and the beans become " mouldy and dry up. Hundreds " or perhaps thousands of acres of " plantations have been destroyed " by this plague. No remedy has " been found. The planter's re- " source is to clear the ground, lime " it well, and then replant from " new and sound seed, taking great " care afterwards to prune away " and destroy every branch or tree " in which the disease may appear. " It is believed that the disease was " first induced by careless and in- " discriminate irrigation during a " season when the air was more " humid than usual.

" The Cacao is such a delicate " tree that the growth of the finest " mosses and lichens on its bark " affects its health. At the proper " season the stem and branches " should be cleaned by wiping them " with a rough cloth or sacking. " Parasitic plants are very fond of " the Cacao, and are, of course, " fatal to it. They should be ex- " terminated.

" *Shade.* — The reason why " *Erythrina* is preferred as a shade " tree for the Cacoa, is because it " abstracts from the soil different " elements to those which the Cacao " requires. In fact, it is used on " the same principle as that on " which alternative crops are em- " ployed. The Guanco or *Inga* is " as moderate in its demands upon " the soil as *Erythrina*, but it " spreads too much in proportion to " its height. *Erythrina* throws " out its branches well above the " Cacao trees. Bananas should " only be employed for a couple of " years after the Cacao is planted " out. They exhaust the soil and " harbour damp. In adopting a " tree like *Manihot* for shade, the " above considerations ought not to " be lost sight of.

" *Climate.*—Although Cacao will " grow in a hot and very damp " climate like Guayaquil or the " Atrato Valley, yet it is found in " Colombia that it grows best where " the temperature (mean) is 26° " Centigrade, and where the two " dry and two wet seasons are well " marked in the year. It is possi- " ble or probable too, that a dry " season affords a better opportu- " nity of preparing the bean for the " market."

Mr. Jean Van Volxem, of Brussels, also sends me, January 27, 1883, the following remarks as the result of his observations in New Grenada:—

" To judge properly of the quality " of Cocoa beans in comparison " with those found already in trade, " attention ought to be paid to the " curing process in either case. " For the British market the beans " are separated as soon as possible " from the husk and pulp ; for the " continental market a little fermen- " tation is allowed, which spoils " their appearance and takes away " some of their bitterness, so that " you cannot mix them with such a " large quantity of flour or fecula, " as it is your wont in England. " But the fermentation develops " and improves greatly the fla- " vour."

JAMAICA.—Mr. Morris, the Director of Public Gardens and Plantations, Jamaica, has, at the request of the Governor, thrown into the form of a pamphlet, the substance of a lecture delivered under the auspices of the Institute of Jamaica at the Town Hall, Kingston, " with " the view of affording information " respecting the cultivation and " preparation of Cacao, an industry

" which it is hoped will become an " important one among the 'minor " industries' of the island." The title of the pamphlet is Cacao: How to grow and how to cure it. Copies may be obtained in London of Messrs. Silver & Co. It has been reprinted in Fiji at the instance of the Hon. J. B. Thurston.

Cinchona robusta. — In the Kew Report for 1881, pp. 25, 26, I referred to the hybrid between *succirubra* and *officinalis*, which seems in the East first to have made its appearance in Ceylon, and thence to have been introduced by seed into the Sikkim plantations.

This form has, during 1882, given rise to a rather protracted correspondence with the Madras Government. Mr. Cross, who was employed by the India Office to convey the Columbian barks from Kew to Southern India, insisted that the two supposed hybrid forms grown on the Nilgiris, under the names of *pubescens* and *magnifolia*, were not hybrids but distinct species, of which the seed had been sent by himself from the scopes of Chimborazo. After some shifting of opinion he seems finally to have settled down to the statement that *magnifolia* was the *Cinchona*, called in the Chimborazo bark district "Pata de Gallinazo," that *pubescens* was true *succirubra*, and that the *succirubra* of the Madras plantations was *micrantha* (Grey bark).

In all these identifications his recollections of plants seen no less than 20 years before seem to have misled him. Unfortunately, his views were, to a certain extent, adopted by the eminent quinologist, Mr. Howard, and it therefore became necessary to critically examine them, as such gigantic errors in nomenclature could not but very seriously affect the future policy of administration of the Madras Cinchona plantations.

Under instructions from the Madras Government, very copious and carefully prepared sets of all the Cinchonas cultivated in the Nilgiris were despatched to Kew, both by Colonel Beddome and by Surgeon-Major Bidie, the Superintendent of the Madras Central Museum. They were very thoroughly examined, and there appeared no valid reason for disputing the accepted names under which the plants had been grown or for adopting those assigned to them by Mr. Cross.

The authentic specimens of the Pata de Gallinazo, collected by Spruce, and described by him in his official report, are preserved in the Kew Herbarium. They have been subsequently identified at Kew by Spruce (confirmed by Howard) with *C. erythrantha*, Pav., and Triana the most recent monographer of the genus, has referred this species as well as Spruce's specimen to *C. pubescens*, Vahl. Neither the *magnifolia* nor *pubescens* of the Nilgiri plantations can in any way be confounded with *Cinchona pubescens*, Vahl, but are, no doubt, as has always been contended, marked members of the variable series of hybrids which appear to invariably arise in plantations where *officinalis* and *succirubra* are cultivated in proximity.

Mr. Cross's other two conclusions proved equally baseless. As, however, these questions of synonymy had excited a good deal of perplexity in Ceylon as well as in Southern India, I suggested to the Government of Madras that Dr. Trimen, the Director of the Royal Botanic Garden, Peradeniya, should be invited to visit the Cinchona plantations of the Madras Government, in order to bring about if possible some uniformity of nomenclature in the forms and species of Cinchona cultivated both in Ceylon and Madras. This

he accordingly did, and he has given the results of his exhaustive study of the whole question in a very able and lucid report (dated June 30, 1883) which, representing as it also does, the opinions arrived at by the Kew staff, appear to me to finally dispose of the whole subject. Both the names *pubescens* and *magnifolia* Dr. Trimen, for reasons which he gives, proposes to discard in favour of *robusta* which is in use on some estates in India, and "is "now commonly employed in Ceylon "for the trees in question." Dr. Trimen describes those he saw on the Nilgiris in the following words:—

"I found the forms to be just those "so common in Ceylon plantations. "Generally robust well grown trees, "larger, hardier, and healthier than "either the *officinalis* or *succirubra*, "among which they were scatterred "and often flourishing where "neither of them can thrive. Bo-"tanically, there was the same "range of variety, the extreme form "in one direction, with its dark "green smoothly shining leaves, "closely approaching some of the "large-leafed forms of *C. officinalis;* "and that in the other direction with "its larger, paler, thinner leaves "more or less pubescent beneath, "so close to the hairy form of *C. "succirubra* as to be often with "difficulty distinguished from it. "Between these, as regards colour "and pubescence, were many inter-"mediates, though undoubtedly, "with a little ingenuity, the whole "can be thrown into two groups."

He further adds:—"We have di-"rect testimony of its origin. I am "assured by planters of credit "that they have grown both gla-"brous and pubescent *robusta* from "seed of ordinary *officinalis*, and "that it is by no means unfrequent "for seedlings of them to appear in "seed-beds on estates where no trees "but *officinalis* and *succirubra* oc-"cur. I have myself seen seedlings "of *robusta* self-sown where there "are no parent trees of the sort "whence they could have been de-"rived; and at one time I was "inclined to regard it merely as a "variety of *officinalis*. There are, "I think, grounds for believing "that *succirubra* generally supplies "the pollen, and is therefore the "male parent, both in the case of *ro-"*busta* (*succirubra* and *officinalis*) "and *anglica* (*succirubra* and *Cali-"saya*)."

Coffee-disease.—In reference to the brief note in the Kew Report for 1881, p. 31, on the appearance of leaf disease in Mauritius, I now quote a fuller account from Mr. Horne's report for 1881:—"During "the year the coffee leaf disease "(*Hemileia vastatrix*) was found "to be common in the Colony. "When, or how, this pest arrived "in Mauritius it is impossible to "say. It was noticed first on some "young coffee plants growing on "Deux Bras estate, Grand Port "district, then at the Vale, Grand "Bay, next on some coffee plants "growing at the edge of the forests "at Combo estate, Savanne; and "on close inspection of the few "coffee trees growing at the Gar-"dens, Pamplemousses, all the "young leaves were found to be "thickly covered with the yellow "spots which this fungus causes. "The fungus having been noticed "within a period of about two "weeks at points so widely apart as "these gave grounds for supposing "that it was spread over all the "Colony wherever a coffee plant "existed. The correctness of this "supposition was soon verified by "the letters which from time to "time appeared in the newspapers.

"During the year it caused a loss "of about 15,000 coffee plants at "the Gardens. They were so in-"tensely infected by the disease

" and weakened in growth, that " there was no hope of their re- " covery, and they were therefore " pulled up and burned."

Esparto.—In continuation of former notes, (Kew Reports, 1880, p. 33; 1881, p. 52) on this important paper material, I quote the following from Consul-General Playfair's report on the trade of Algiers, dated Nov. 27, 1882:—" The Alfa trade has been " undoubtedly the greatest boon " which British commerce has ever " conferred on Algeria. It was " originated by Mr. Lloyd, proprie- " tor of the 'Daily Chronicle,' and " now it gives occupation to two " railways and an immense number " of workmen. Of the 80,000 tons " exported last year nearly the whole " went to the United Kingdom; " 15,000 tons are shown as exported " to Spain, but this is all destined to " be reshipped to England under the " name of Spanish Esparto grass."

India-rubber.—*Castilloa.* In October 1882, the Director of the Royal Botanic Gardens, Dr. Trimen, Peradeniya, forwarded to Kew a sample of the rubber of *Castilloa elastica* grown in the Experimental Garden at Heneratgoda, Ceylon. This was sent from Kew in 1876 (*see* Kew Report, 1876, p. 9). The sample was submitted to S. W. Silver, Esq., F.L.S., who very kindly reported upon it:—" On working " and drying a portion of this " sample, the loss is 12·3 per cent.; " it is necessary to use warm water " in washing this rubber; it becomes " on drying much darker and " shorter than Para rubber. It has " a bitter taste, which is not re- " moved on washing. The unwashed " sample yields 1·9 per cent. ash, " the washed sample gives 1·2 per " cent. The shortness of this " rubber would restrict its use to " some extent where tensile strength " or tenacity is required." It was valued December 8, 1882, as worth 2*s.* 9*d.* to 3*s.* a lb.

Ceara.—Dr. Trimen came to England on leave in 1882, and brought withim him a sample of the rubber of *Manihot Glaziovii*, which was the first of bulk suited for experimental purposes yielded by the trees at Peradeniya. These were obtained from the stock established at Kew in 1876 from the importation of Mr. Cross, acting under the instructions of the India Office (*see* Kew Report, 1876, p. 9).

The sample was submitted to S. W. Silver, Esq., F.L.S., who reported:—" Has a dry and compact " appearance, is free from extraneous " impurities, and from its tolerably " uniform condition has been col- " lected with care. It agrees in all " respects with Ceara rubber of " good and sound quality. When " washed and dried gives a loss of " 8 per cent. This loss is much " less than is met with in Ceara " rubber of the finest quality, and " may probably be accounted for by " the small bulk and facilities " offered by time, mode of packing, " and transit, to the escape of the " natural moisture of the product. " On incineration it yields 4·13 " per cent. mineral ash, which agrees " in its chemical composition very " closely with the ash obtained from " Ceara rubber, the ash from which " amounts to 4 or 5 per cent." This sample was valued June 29, 1882, as worth from 2*s.* 9*d.* to 3*s.* per lb.

Hevea.—In October 1882, Dr. Trimen forwarded to Kew at the same time as the *Castilloa* rubber already referred to, a sample of the rubber of *Hevea brasiliensis*, grown like the former in the Experimental Garden at Heneratgoda, and which was also sent to Ceylon from Kew in 1876 (*see* Kew Report for that year, p. 8). This was likewise referred to Mr. Silver. He reported:

—"As far as chemical examination "goes, this rubber differs in no "respect from the better descriptions "of Para bottle rubber, except, "perhaps, in having a little more "water imprisoned in it than is "usual with well-seasoned Para. "A portion of this rubber, well "washed and dried, gave a loss of "18·7 per cent. The amount of "ash obtained on incinerating a "portion of the unwashed sample "is 0·7 per cent., which is about "one-half that from the Brazilian "product. There is a great "similarity in the composition of "the ash of the Hevea and the "Para bottle rubber. The ash from "the washed and dried Hevea is "0·6 per cent. The sample is "almost entirely free from ex-"traneous matter. On digestion in "alcohol it yields a slight color-"ation. Like Para rubber, its "fresh-cut surfaces show a slight "acid reaction, easily removed by "washing. The washed product is "free from taste and smell, and "turns a dark colour on drying, "similar to ordinary Para rubber. "As far as can be determined on "so small a sample, there is reason "to believe that as regards strength "and elasticity, it would be fully "equal to good Para india-rubber." It was valued December 8, 1882, as worth about *4s.* a lb.

The task initiated by the India Office has now been successfully accomplished. A stock of authentic plants of the species yielding the three most important South American rubbers has been introduced into the East, and it has been shown that they are capable of yielding under the conditions of Indian climate products in no respects inferior to those produced by them in their native countries.

Jalap.—The cultivation of this drug in Jamaica (*see* Kew Report, 1881, p. 50), is progressing. Mr. Morris reports, December 31, 1881: —"The jalap plantation, consisting "of about five acres, is in good "order. The trial crop harvested "last year consisted of about 3,400 "pounds of green tubers, yielding "1,077 pounds of cured jalap. As "the careful drying and curing of "the crop has been the chief "difficulty, special attention was "devoted with the view of solving "it. Some tubers were dried at "Spring Garden in an American "fruit dryer, and the experiment "answered well; although the "application of too much heat was "apt to change 'the character of the "'starch grains and convert them "'into an amorphous mass.' The "small tubers were dried whole, "while the larger ones were sliced "or gashed. The sliced and gashed "tubers were not liked in the "English market, the brokers re-"porting 'we would recommend "'that the tubers be not sliced as "'this is a form we never see "'Mexican jalap in; it always "'arrives in bulbs.' In the New "York market the sliced and "gashed tubers fetched higher "prices than in the London market, "and no remark was made re-"specting their condition. The "smaller tubers were dried in the "sun at the Parade Garden, King-"ston, and although a considerable "number was lost owing to fer-"mentation and mouldiness, the "process was on the whole en-"couraging. These same dried "tubers realized *8d.* per lb. in the "London market. In Mexico it "appears that the jalap is chiefly "collected in small quantities by "the Indians and dried in the smoke "over wood fires." And again, subsequently, February 22, 1882: —"The plantation is in good order "and a large crop is anticipated "during the coming year. Owing

" to the drought and to the ad-
" visability of testing whether the
" tubers increase in value with age,
" the usual crop during the past
" year was not taken up. In the
" analysis of Jamaica-grown jalap
" made by Mr. H. J. Greenish,
" F.C.S., it was suggested that
" further cultivation and a more
" matured state of the tubers would
" probably yield large per-centages
" of resin. These conditions having
" now been fulfilled, the tubers will
" once more be submitted for analy-
" sis, and trial shipments be sent,
" as before, to the English and
" American markets."

Lacquer-tree of Japan. — The revision of the Kew Museums brought into notice the fact that they did not contain a single specimen illustrative of the lacquer-industry of Japan. Though the products of this beautiful art are so well known in Europe, scarcely anything was authentically ascertained as to its details. From the statement of Kæmpfer (1712) it has been generally accepted by botanists that the varnish, which is the basis of all lacquer work, was obtained from incisions in the three year old stems of a tree indigenous to Japan, known as *Rhus vernicifera*. But beyond the fact that the tree is cultivated as coppice wood, the information of Kæmpfer does not go, and up to the present time our knowledge of the subject has been a complete blank. Balfour, in his Cyclopædia of India (1873), states that " the manner of preparing the " varnish, and the mode of apply-" ing it, is and is likely to remain a " secret."

Having drawn the attention of the Foreign Office to the matter, a very careful inquiry was instituted in Japan into the whole subject. The result will be found in a report by Mr. Quin, the Acting Consul at Hakodate, dated Tokio, January 13, 1882, which has been printed and laid before Parliament. A very complete collection, illustrating every detail of the processes described in the report, from the collection of the varnish to the last touch in the decoration of the most finished objects, was also got together by Mr. Quin, and was transmitted to Kew, where it is now exhibited in the Museum of Economic Botany (No. I.). A portion of the expense incurred by the Foreign Office in getting it together has been defrayed from the grant made to this establishment by the India Office for the sustentation of the economico-botanical collections relating to India.

The collection has been pronounced by experts in Japanese art to be of exceptional interest, and quite unique of its kind. It, for the first time, affords materials for the study of the processes by which Japanese lacquer is produced.

Phylloxera. — M. Tisserand, the French Minister of Agriculture, in a report on the progress of the Phylloxera and of the measures for combatting it during the year 1882, which has been communicated to Kew by the Foreign Office, sums up the situation as follows:—Fifty departments have been attacked; 764,000 hectares of vines have been destroyed; 642,000 are more or less seriously injured. A million and a half of hectares (or about half the total area of vine cultivation in France) are still free from the pest, and the champagne district is untouched; the most important districts of Burgundy and the Gironde are infected, but the Phylloxera has been so far held in check.

Soy Beans.—The extensive use by the Chinese of this leguminous seed (*Glycine Soja*)) is only recently beginning to attract attention.

I quote the following from the proceedings of the Agri-Horticultural Society of India, January 5, 1883 :—

"The large white pea is deserving " of notice, since it forms the staple " of the trade of Changhair or " nearly so, to the astonishing " amount of 10 millions of dollars, " or 2½ millions sterling. The peas " are ground in a mill and then " pressed, in a somewhat compli- " cated, though as usual in China, " a most efficient press, by means of " wedges driven under the outer " part of the frame-work with " mallets. No description would " suffice without a drawing. The " oil is used both for eating and " burning, more for the latter pur- " pose, however, and the cake " packed like large Gloucester " cheeses, or small grindstones in " circular shape, is distributed " throughout China in every direc- " tion both as food for pigs and " buffaloes, as also for manure."

Specimens of the beans, as well as of the oil and one of the cakes weighing about 60 lbs., may be seen in the Museum of Economic Botany of the Royal Gardens.

Toothache remedies in Natal.—Colonel Bowker has sent to Kew specimens of plants used by the natives of Natal as remedies for toothache.

The following have been identified : — *Azima barlerioides*, the Isikumugala bush ; the root is used ground up and inserted into the hollow tooth.

Cycnium adoense ; the root pounded is also used for toothache ; Lower Tugela.

Museums.

During the year 1882 the gradual renewal of deteriorated specimens and the better labelling and improvement in the display of the collections was preceded with. The detailed **revision,** with a view to the removal of duplicates so as to relieve crowding, which has been in progress for the last six years, as time would admit, under the superintendence of the Assistant Director, has been finally concluded with the collections relating to the Petaloid Monocotyledons in Museum No. 2 (*see* Kew Reports for 1876, p. 27 ; 1877, p. 44; 1878, p. 50; 1880, p. 56).

In Museum No. 1, a little **additional space** has been gained by the enlargement of two cases (*Ericaceæ* to *Sapotaceæ*) on the middle floor. In Museum No. 2, the new room on the ground floor (*see* Kew Report, 1881, p. 53) has been fitted with cases as well as the wall space on the landing above the descent staircase.

The **distribution of duplicates** has been continued. The largest receipients have been :—

Adelaide, Botanic Garden.

Brookline, United States ; Arnold Arboretum ; Indian, Australian, and New Zealand timbers.

Cambridge, United States ; Botanic Gardens of Harvard College.

Mauritius, Botanic Gardens ;

Sydney, Australian Museum.

Washington, United States ; National Museum.

The **principal contributors** received during the last year have been :—

Ayrton, W. S. ; Chinese bean cake (*Glycine Soja*), and oil obtained from the seeds.

Bailey, F. M. ; bag of Pituri (*Duboisia Hopwoodi*), as sold by native Australians to other tribes, also a skin in which the Pituri is carried for use.

Bancroft, Dr. ; two bags for holding Pituri.

Birdwood, Sir George ; opium smoking apparatus, from Singapore,

and opium pipe and lamp from Shanghai.

Blacklaw, A. Scott; candles made in Brazil, of the wax of *Copernicia cerifera*.

Bourne, F.S.A.; wood of the Camphor tree (*Cinnamomum Camphora*), and of the Nanmu the (*Persea Nanmu*), and lacquered box made of Nanmu wood.

Bretschneider, Dr.; numerous Chinese vegetable products.

Brightwen, Mrs.; bag made of twine from cottony under-side of leaves of *Gerbera lanuginosa*, used by the Jampanees or carriers in India for carrying meal.

Burgoyne, Burbidges, Cyriax, and Farries, Messrs.; fine sample of Cuprea bark (*Remijia* spp.), birch bark oil, and various drugs of vegetable origin.

Buchanan, T. J.; various samples of Cinchona bark, fine specimens of medicinal rhubarb and Kousso (*Hagenia abyssinica*).

Cameron, Commander,; miscellaneous fruits from the Gold Coast.

Chantré, C.; fine samples of Aleppo Scammony white Anime, and various other products.

Christy, T. & Co.; various vegetable economic products.

Colnaghi, D. E.; collection of straw plaits, and articles made from straw from Florence.

Eichler, Prof.; numerous fruits, seeds, &c.

Fry, J. S. & Sons; samples of Cocoa and Chocolate.

Ford, C.; instruments used in collecting Cassia bark (*Cinnamomum Cassia*) in China; photographic views in Botanic Garden and neighbourhood of Hong Kong.

Grabham, Dr.; large bowl cut from a trunk of *Ocotea fœtens* in Madeira, and spoons made of wood of *Clethra arborea*, used by the people to stir and eat Indian meal.

Henriques, J. A.; box and hat made of cork, used in Portugal.

Howard, Messrs. & Sons,; one pound sample of Cinchona febrifuge from Red bark.

India, Government of; sample of white linseed from Nagpur.

Japan, Her Majesty's Legation; a very fine and extensive collection illustrating the lacquer industry of Japan.

King, Dr.; sulphate of quinine from Calisaya bark made at Mungpo; Crystalline febrifuge and ordinary Cinchona febrifuge; and mats made from *Sesbania aculeata* and *Typha elephantina*.

Loder, E. G.; walking sticks made of stems of *Opuntia arborescens*.

Moloney, Capt.; fine sample of Accra Copal.

Morren, E.; portraits of various botanists.

Morris, D.; vegetable products from Jamaica.

Mueller, Sir F.; numerous Australian woods and seeds and photographs of Cycadeous plants.

Ordnance, Surveyor General of the; two lances as used in the British cavalry, the shaft of one made of ash, the other of *Dendrocalamus strictus*.

Percival, C. G. G.; trunks of the Pin maritime (*Pinus pinaster*), showing the mode of collecting turpentine at Bordeaux, and instruments used in the collecting.

Pharmaceutical Society of Great Britain; numerous vegetable products used as drugs.

Queensland, Government of; bag used for holding Pituri and sample of Pituri.

Rooke, Spence, and Co., Messrs.; specimens of Quercitron bark from Philadelphia and Baltimore; and English refined cotton oil and palm oil.

Sargent, Prof. C. S.; numerous specimens of American woods and coniferous Cones.

[*From* "THE GARDENERS' CHRONICLE," *December* 3, 1881.]



THE "NORTH" GALLERY IN THE ROYAL GARDENS, KEW.

Satow, Ernest, ; twelve fine specimens of Japanese woods.

Thomas, W. H.; series of commercial samples of English grown Hops.

Thurn, E. F. im; Snake nuts (*Ophiocaryon paradoxum*); Balata (*Mimusops globosa*) and articles made from it.

Washington, U. S. National Museum; portion of trunk of *Pinus australis* with pocket cut for collecting turpentine, also instruments used in the collection, and samples of turpentine and other resinous products of the tree.

Washington, Department of Agriculture; a fine collection of fruit-spikes of *Sorghum saccharatum*, or sugar millet.

Watters, T.; a large collection of vegetable products of China.

Zimmermann, Messrs.; fine specimens of Orris root.

Jodrell Laboratory.

During the year 1882 one of the microscope rooms was occupied for some months by Mr. F. O. Bower, M.A., F.L.S., Lecturer on Botany at the Normal School of Science, South Kensington, for various researches in vegetable morphology and histology. Amongst these was an investigation "On Plasmolysis and "its bearing upon the relation be-"tween cell-wall and Protoplasm," published in the Quarterly Journal of Microscopical Science for January 1883 (pp. 151–168, with plate viii.).

From February to November the chemical rooms were occupied by Messrs. C. F. Cross, and E. J. Bevan, who have furnished me with the following brief account of their work :—

The investigations were directed to the chemical study of cellulose and its derivatives in reference chiefly to the phenomena of lignification. The following were the lines of inquiry pursued: (1.) The elaboration of cellulose in fodder plants. (2.) The constitution of jute fibre selected as the type of lignification. (3.) The composition of other well-known bast fibres (after isolation by the process of retting, which appears to cause no essential change in composition), and monocotyledonous fibro-vascular bundles considered in relation to jute fibre. (4.) The constitution of the aromatic bodies obtainable from lignified fibres as products of decomposition of the fibre substance (lignose). The results of these investigations are fully detailed (1) in the Rothamstead reports of Messrs Lawes and Gilbert, under whose auspices this inquiry was instituted, (2), (3), and (4) in the Journal of the Chemical Society for January 1883.

The main results of these researches went to show (1) That the non-nitrogenous, non-cellulose constituents of herbaceous tissues are made up of substances closely allied to cellulose. (2) That jute fibre, of all the more generally known fibrous substances, is best adapted to serve as the basis for the chemical study of lignification. (3) That the aromatic bodies formed from lignose exhibit a general connexion with the tri-hydric phenols (pyrogallol).

North Gallery.

The accompanying illustration, for the use of which I am indebted to the proprietors of the Gardener's Chronicle, represents the exterior of the North Gallery after its completion. A porch, affording accommodation for an attendant to take charge of umbrellas, &c., was subsequently added at Miss North's expense.

The arrangement and hanging of the pictures was accomplished under Miss North's personal superintendence, and the gallery with its contents was handed over to my charge on behalf of the public on June 8.

The collection of separate pictures amounts in number to 627.

The following are the principal regions of the earth's vegetation which we owe to Miss North's skilful pencil, vivid and accurate impressions: — Teneriffe, Brazil, Jamaica, United States, California, India, Ceylon, Singapore, Borneo, Java, Japan, Australia, New Zealand.

Before the gallery was opened to the public Miss North caused a descriptive catalogue to be prepared by Mr. W. Botting Hemsley, A.L.S. Of this an edition of 2,000 copies was printed at her own expense, and she has expressed a wish that the proceeds of the sale should be devoted to the improvement of the small library kept up for the use of the young gardeners and open to them in the evening. The official publication of subsequent editions of the catalogue has been taken over by the Stationery Office.

Herbarium.

Attendant.—The development of the work of the Herbarium having kept pace with the increased activity of other branches of the establishment, the Treasury sanctioned April 8, 1882, the appointment of an attendant to perform minor clerical duties. John Frederick Jeffrey having been certified by the Civil Service Commissioners, entered upon his duties on July 1 following.

Principal additions.—1. The collection of European and exotic lichens formed by the Rev. W. A. Leighton, B.A., F.L.S., of Luciefelde, Shrewsbury, has been presented by that gentleman. It represents the labours of a lifetime devoted to this difficult group of plants, and is of great extent (it is contained in 500 cardboard portfolios lettered on the back with the contents). It is particularly important in a National Herbarium containing as it does the types of Mr. Leighton's numerous writings, more especially of his Lichen Flora of Great Britain, Ireland, &c., of which a third edition was published in 1879, and of his British Angiocarpous Lichens published in 1852. In species and specimens from all parts of the kingdom it is probably the most complete in existence; and as supplementing the collections of Withering, Turner, and Borrer, the fathers of British Lichenology, which are deposited at Kew, it has a special value.

2. An interesting portion of the Herbarium formed by the late Mr. Wilson Saunders, F.R.S. has been transferred to Kew from the Oxford Botanical Gardens, to which it had been presented by his relatives. It contains 271 species of plants for the most part figured in Mr. Wilson Saunders's Refugium Botanicum.

3. The Botanical Record Club has presented to Kew its herbarium of British plants, containing 1,340 species, and innumerable specimens illustrating the local floras of the British islands.

4. In respect to scientific novelty and interest, the most interesting accession to the Herbarium, and indeed to our knowledge of botany generally, has been the Madagascar collections of the Rev. R. Baron. These contain 1,137 species of flowering plants and ferns, very many of which are new to science; adding to them the 633 specimens received from this gentleman in

1881 and the 300 received in 1880, the total probably exceeds that formed by any other collector in the island.

Mr. J. G. Baker, F.R.S., First Assistant in the Herbarium, has already published many of Mr. Baron's Madagascar novelties, together with others collected by the late Dr. Hildebrandt, Mr. Parker, and Mr. Kitching, and is engaged in examining others preparatory to their publication. Except New Guinea, no island of any considerable extent is so little known botanically as Madagascar; but it is a curious circumstance that (if we except small quantities of Raphia fibre and some india-rubber) no product of the vegetable kingdom affords an export of any consequence.

5. Special mention should be made of the combination of the Brazilian collection of A. Glaziou, Director of the Public Garden at Rio de Janeiro, who has, up to the end of 1882, contributed no fewer than 13,300 beautifully prepared specimens to the Kew Herbarium.

The following is a list of the names of the **other Principal Contributors** to the Herbarium during 1882.

Europe.

Arnold, Dr. F.; Lichens (86).

Brotherus, V. F.; Finland Mosses (100, purchased).

Cooke, Dr. M. C.; British *Fungi* (32); sundry do. (20).

Groves, H.; Italian plants (145).

Henriques, Dr. J. A.; Portuguese plants (164).

Hooker, Sir J. D.; mosses, chiefly German (132),

Husnot, T.; French mosses (50).

Kanitz, Dr. A.; European plants (285).

Kunze, J.; *Fungi* (100, purchased).

Lacaita, C. C.; Italian plants (18).

Lange, Professor; Danish, &c. plants (68).

Nicholson, G.; Roses, &c. (9).

Nylander, Dr.; Lojka's Lichens (332, purchased).

Oliver, D.; British plants (4).

Pasquale, Prof.; Italian cultivated plants (7).

Reverchon, E.; Sardinian plants (247, purchased).

Vize, Rev. J. E.; British Fungi (100, purchased).

Wittrock, V., and Nordstedt, O.; Fresh water *Algæ* (100, purchased).

Asia and Indian Archipelago.

Aitchison, Surgeon-Major; Punjab, &c. plants (63).

Alabaster, H.; Siamese plants collected by Mr. Murton (147).

Beccari, Od; Bornean plants (3).

Beddome, Col.; Deccan plants (20).

Bourne, F. S. A.; Chinese plants (6).

Bretschneider, Dr. E.; Chinese plants (30).

Bureau, Professor Jardin des Plantes, Paris; Abbé David's Chinese plants (297).

Bushell, Dr.; Chinese plants (3).

Cantley, N.; Malayan plants (220).

Carpenter, Lieut., H.M.S. Magpie; Orsima plants (15).

Cooke, Dr. M. C.; Siberian, &c. *Fungi* (10).

Duthie, J. F.; North Indian plants (302).

Forbes, H. O.; Malayan plants (3).

Ford, C.; Chinese plants (51).

Hance, Dr.; Chinese plants (7).

King, Dr. G.; Indian plants (23).

Murray, J. A. ; Kurrachee *Algæ* (16).
Parish, Rev. C.; Burmese plants (19).
Phillips, G. ; Chinese plants (3).
Pierre, L.; Cambodian and Cochin China plants (709).
Riedel, M.; Buru and Timor Laut plants (40).
Suringar, Dr. ; Malayan plants (14).
Talbot, W. A.; Canara plants (219).
Trimen, Dr. H.; Ceylon plants (19).
Veitch, Messrs.; Indian, &c. plants (18).
Wall, G.; Ceylon plants (50).
Watt, Dr. G.; Munnipore plants (101).
Watters, T.; Formosan plants (97).

Africa.

Blagrave, Lieut.-Col.; Cape plants (30).
Burton, Capt., and Cameron, Comm. ; Gold Coast plants (151).
Drummond-Hay, Miss; North Morocco plants (13).
Feilden, Capt. H. W.; Cape Lichens.
Godefroy-Lebœuf; Soudan vine.
Hart, H. C.; Sierra Leone plants (13.)
Kirk, Sir John; Zanzibar plants (3).
McKenzie, Mrs. ; Zululand plants (83).
MacOwan, P.; South African plants (43).
Moloney, Capt. A. ; Gold Coast plants (12).
Rumsey, Comm., R.N. ; West African plants (15).
Schweinfurth, Dr. F.; East African plants (11).
Slade, Dr., H.M.S. Fawn ; Red Sea plants (21).
Soyaux, H. ; Gaboon plants (350).
Wood, J. M.; Natal plants (243).

Mauritius, Madagascar, &c.

Baron, Rev. R.; Madagascar plants (1137).
Coppinger, Dr. R. W.; Amirante and Seychelles islands plants (88).
Horne, J. ; Mauritius plants (11).
Parker, Dr. G. W. ; Madagascar plants (136).

North America.

Allen, Dr. F. ; *Characeæ* (20).
Cooke, Dr. M. C. ; *Fungi* (54).
Curtiss, A. H.; Floridan plants (243, purchased).
Davenport, G. E.; Unalaska plants (14).
Eaton, Professor, D. C. ; Ferns (5).
Ellis, J. B.; *Fungi* (900, purchased).
Gray, Dr. A. ; various (175).
Haydon, Walter ; Hudson's Bay plants (52).
Lange, Professor J. ; Greenland plants (84).
Lemmon, J. G. ; California plants (12).
Pringle, C. G.; Pacific States plants (124).
Ravenel, H. W. ; *Fungi* (200, purchased).
Sargent, Professor C. S. (198).
Vasey, G. ; California plants (589).

West Indies and Guiana.

Eggers, Baron ; West Indian plants (199).
Jenman, G. S. ; Guiana plants (742).
Prestoe, H. ; Palms (3).
Syme, G. ; Jamaica plants (4).
Taylor, Mary ; Jamaica plants (22).

South America.

Coppinger, Dr. R. W.; Extra-tropical South American plants (188, exclusive of lower Cryplogams).

Cranwell, W. B.; Monte Video, &c. plants (50).

Glaziou, A.; Brazil plants (943).

Gregory, H. K.; Brazil plants (18).

Markham, C. R.; Cinchona (3).

Reynell, —; Brazil plants (1288).

Veitch, Messrs.; Cross's Chimborazo plants (47).

Warming, Dr. Brazil plants (4).

White, R. B.; New Grenada plants (6).

Australia.

Coppinger, Dr. R. W.; Torres Straits, &c. plants (90).

Lawson, Professor; Tasmanian plants.

Mueller, Sir F.; Australian plants (78).

Schomburgk, Dr. R.; Australian plants (117).

New Zealand.

Cheeseman, T. F. (15).

Green, Rev. W. S.; Mt. Cooke plants (6).

Hector, Dr. (92).

Kirk, T. (25).

Polynesia.

Arundel, S. T.; plants from various islets (31).

Comins, Rev. R. B.; Solomon Isl plants (28).

Coppinger, Dr. R. W.; various plants (26).

Davenport, G. E.; Sandwich Island plants (7).

Gill, Rev. W. Wyatt; Samoan, &c. plants (10).

Collection of Drawings.

Berkeley, Rev. M. J. B.; *Fungi* (19).

Clarke, C. B.; lithographs (32).

Fitch, W.; plant portraits (23).

The following persons have, amongst others, prosecuted **studies in the Herbarium** during the past year:—

Aitchison, Surgeon-Major; has finished the determination of the second collection which he made as Botanist to the Kuram Valley Field Force, and the duplicates have been distributed under the authority of the Secretary of State for India.

Balfour, Professor Bayley; Flora of Socotra, to be published in the Transactions of the Royal Society of Edinburgh.

Ball, John; Mediterranean plants.

Beddome, Col., late Inspector of Forests, Madras; studying his extensive Indian collections, and preparing a work on the Ferns of India.

Berkeley, the Rev. M. J.; cataloguing his collection of Fungi, which he presented to the Herbarium. (*See* Kew Report, 1878, p. 52.)

Broome, C. E.; *Fungi*.

Bennett, Arthur; *Potamogeton*.

Braithwaite, Dr.; British Mosses, in preparation of his British Moss Flora.

Clarke, C. B.; Flora of British India; monographs of *Cyrtandraceæ*.

Crombie, the Rev. J. M.; Indian, &c. Lichens.

Ettingshausen, Baron von; comparing recent with fossil plants from the Isle of Wight, &c.

Forbes, T. B.; Chinese plants.

Groves, H. and J.; *Characeæ*.

Hemsley, W. B.; Mexican and Central American plants for Salvin and Godman's Biologia Centrali-Americana; collections of the Challenger Expedition.

Herschell, Major; Indian ferns.

Holmes, E. M.; officinal plants, and *Algæ*.

Howard, J. E.; *Cinchona*.

Hartog, Marcus; *Sapotaceæ*.

Jackson, R. Daydon; compiling a new Edition of Stendel's Nomenclator Botanicum. *See* Kew Report, 1881, p. 55.

Jenman, G. S.; Jamaica ferns.

Lacaita, C. C.; Italian plants.

Lawson, Professor M. A.; exotic, &c. mosses.

Masters, Dr. M. T.; *Passifloraceæ*, &c.

Maw, G.; preparing a monograph of the genus *Crocus*.

Murray, Rev. R. P.; Flora of Somerset.

Mangles, J. H.; Indian Rhododendrons.

Martindale, J. A.; Lichens.

Micheli, Professor; *Leguminosæ* of Paraguay.

Morren, Professor C.; *Bromeliaceæ*.

Parker, Dr. G. W.; Madagascar plants.

Preston, Rev. T. A.; selecting duplicates from the Joad Herbarium for that of Marlborough College.

Trail, Professor; South American palms.

Townsend, F.; Botany of Hampthire.

Urban, Dr.; *Turneraceæ*, for Martius's "Flora Brasiliensis."

BOTANICAL PUBLICATIONS prepared in connexion with the work of the Herbarium.

The Assistant Director has contributed a "Note on the orgin of "Cassia Lignea" to the Linnean Society (Journal, vol. xx., pp. 19–24).

Surgeon-Major J. E. T. Aitchison, F.L.S., has communicated to the Linnean Society the second part of the results of his researches "on "the Flora of the Kuram Valley" (Journal, vol. xix., pp. 139–200, with map and 30 plates. The cost of publication was borne by the India Office).

Mr. J. G. Baker, F.R.S., First Assistant in the Herbarium, has contributed to the Linnean Society an account of "a collection of Ferns "made by the Rev. R. B. Comins "in the Solomon Islands" (Journal, vol. xix., pp. 293–297); also to the Journal of Botany (January to September) "contributions to the "Flora of Central Madagascar," and on "Four new Bromeliads and a new "*Stegolepis* from British Guiana;" and to the *Flora Brasiliensis* descriptive enumerations of the *Inuloideæ* and *Asteroideæ*.

Mr. Bentham, F.R.S., in conjunction with the Director, has nearly completed the concluding part of the "Genera Plantarum."

Mr. N. E. Brown, A.L.S., Senior Second Assistant in the Herbarium, has contributed to the Journal of Botany and the Gardener's Chronicle critical papers especially relating to *Aroideæ*.

Mr. C. B. Clarke, F.R.S., has contributed to the Linnean Society papers "on a Hampshire "*Orchis* (*O. incarnata*, Linn.) not "represented in English Botany" (Journal, vol. xix., pp. 206–208) and "on two Himalayan Ferns errone-"ously treated in the Ferns of North-"ern India" (Journal, vol. xix., pp. 289–291).

The Director has edited the 108th volume of the Botanical Magazine, containing illustrations and descriptions chiefly of plants which

have flowered in the Royal Gardens (see *supra*, pp. 11, 12); also Icones Plantarum, vol. xiv., part iv.; Flora of British India, part ix., vol. iii., pp. 449–712 (part viii., vol. iii., pp. 193–448, omitted in the last report, was issued in 1881); and has communicated to the Linnean Society a paper "on *Dyera*, a new "genus of Rubber-producing plants "belonging to the natural order "*Apocynaceæ* from the Malayan "Archipelago" (Journal, vol. xix., pp. 291–293).

Mr. W. B. Hemsley, A.L.S., has published parts 11–14 of the Botany of Godman and Salvin's Biologia Centrali-Americana; he is also continuing in the Gardener's Chronicle a list of all cultivated *Orchidaceæ* commenced in 1881.

Dr. Masters, F.R.S., has contributed to the Linnean Society a notice of "a new species of *Gos-* "*sypium* (*G. Kirkii*) from East Tro- "pical Africa," discovered by Sir John Kirk at Dar Salam (Journal, vol. xix., pp. 212–214).

Dr. George Watt, F.L.S., Professor of Botany, Bengal Educational Service, has contributed to the Linnean Society a paper "on "some undescribed and imperfectly "known Indian species of *Primula* "and *Androsace*" (Journal, vol. xx., pp. 1–18, with 18 plates).

I have, &c.

(Signed) Jos. D. Hooker, *Director.*

To the Right Honourable
The First Commissioner of Her Majesty's Works and Buildings.

APPENDIX I.

Number of Visitors in the Year 1882, *as compared with* 1881.

	1881.	1882.
Total number on Sundays - - -	411,512	606,935
Total number on weekdays - - -	425,164	637,232
	836,676	1,244,167
Greatest monthly attendance (May) - - - -		255,148
Smallest monthly attendance (December) - - -		7,758
Greatest weekday attendance (May 29th) - - -		95,300
Smallest weekday attendance (December 1st) - - -		27
Greatest Sunday attendance (July 2nd) - - -		32,505
Smallest Sunday attendance (January 8th) - - -		207

Number of Visitors in each month.

	1881.	1882.
January - - -	5,634	10,190
February - - -	9,687	23,567
March - - - -	26,510	41,719
April - - - -	90,032	153,426
May - - - -	104,608	255,148
June - - - -	182,404	130,032
July - - - -	145,730	193,680
August - - - -	149,459	239,365
September - - -	73,545	119,076
October - - -	27,527	56,576
November - - -	13,076	13,630
December - - -	8,464	7,758

APPENDIX II.

List of **Palms** *cultivated in the Royal Gardens, Kew.*

In the following enumeration the genera are classed under the Tribes and Subtribes adopted in the "Genera Plantarum." For convenience the species are alphabetically arranged. The figures in brackets after the habitat indicate the height over all of the largest specimen at Kew.

Tribe I. **Areceæ.**

Leaves pinnate, leaflets with the sides reflexed before unfolding. Flowers unisexual, often in threes (one female between two males).

Subtribe I. Euarecæ.

Spadix flowering below the leaves; spathes 2, rarely 3. Flowers monœcious, males unsymmetrical with hardly imbricate sepals; females with imbricate petals. Ovary 1-celled, 1-ovuled. Fruit with terminal stigmas.—Unarmed palms of the old world.

Genus I. Areca, *Linn.*

1. A. Aliciæ, *F. Muell.*
   Tropical Australia.
2. A. Catechu, *Linn.* "Betel nut Palm." (North Gallery; paintings n. 320 and 423.) (Museum No. 2. Seeds, &c.)
   Tropical Asia and its Islands, cultivated as far north as the Eastern Himalaya (only known in cultivation?).
3. A. concinna, *Thwaites.*
   Ceylon.
4. A. glandiformis, *Gieseke.*
   Moluccas.
5. A. triandra, *Roxb.*
   Bengal and Assam from the foot of the Himalayas to Burma and the Andaman Islands.

Genus II. Pinanga, *Blume.*

1. P. coronata, *Blume.*
   Java.
2. P. Kuhlii, *Blume.*
   Java.
3. P. latisecta, *Blume.*
   Sumatra.
4. P. maculata, *Porte.*
   Hort. Verschaffelt.
6. P. malaiana, *Scheff.*
   Penang and Malacca.
6. P. patula, *Bl.*
   Sumatra. (9 ft.)
7. P. ternatensis, *Scheff.* (*Areca gigantea*, Hort).
   Moluccas.
8. P. Veitchii, *Wendl.*
   Boreno.

Genus III. KENTIA, *Blume.*

1. K. costata, *Beccari.*
New Guinea.

Genus IV. HYDRIASTELE, *Wendl. & Dr.*

1. H. Wendlandiana, *W. & D.* (*Kentia Wendlandiana*, F. Muell.)
Tropical Australia.

Genus V. VEITCHIA, *Wendl.*

1. V. Storckii, *Wendl.* (*Kentia Storckii*, F. Muell. *K. elegans*, Hort., not of Brongn.)
Fiji Islands.

Genus VI. KENTIOPSIS, *Brongn.*

1. K. macrocarpa, *Brongn. & Gr.* (*Kentia Lindeni*, Lind.)
New Caledonia.
2. K. oliviformis, *Brongn. & Gr.* (*Kentia gracilis*, Lind.)
New Caledonia.

Genus VII. HEDYSCEPE, *Wendl. & Dr.*

1. H. Canterburyana, *W. & D.* "Umbrella Palm." (*Kentia Canterburyana*, F. Muell.)
Lord Howe's Island (32 ft.).

Genus VIII. NENGA, *Wendl. & Dr.*

1. N. pumila, *W. & D.* (*N. Wendlandiana*, W. & D. *Pinanga Nenga*, Blume.)
Malay Islands.

Genus IX. LOXOCOCCUS, *Wendl. & Dr.*

1. L. rupicola, *W. & D.; Bot. Mag. t.* 6358. (*Ptychosperma rupicola*, Thwaites.)
Ceylon.

Genus X. ARCHONTOPHŒNIX, *Wendl. & Dr.*

1. A. Cunninghamiana, *W. & D.* (*Seaforthia elegans*, Hook. Bot. Mag. t. 4961, excl. figs. 9–11; *Ptychosperma Cunninghamiana*, Wendl.) (North Gallery; painting n. 582.)
Queensland and N. S. Wales. (45 ft.)
2. A. Alexandræ, *W. & D.* (*Ptychosperma Alexandræ*, F. Muell.)
Queensland. (10 ft.)

Genus XI. RHOPALOSTYLIS, *Wendl. & Dr.*

1. R. Baueri, *W. & D.* (*Areca Baueri*, Hook. f.; Bot. Mag. t. 5735.)
Norfolk Island. (10 ft.)
2. R. sapida, *W. & D.* "Nikau Palm." (*Areca sapida*, Forst; Bot. Mag. t. 5139. *Kentia sapida*, Hort.) (North Gallery; painting n. 455.)
New Zealand. (20 ft.)

Genus XII. DICTYOSPERMA, *Wendl. & Dr.*

1. D. aureum, *W. & D.* (*Areca aurea*, Hort.)
Rodriguez Island (Mauritius group).
2. D. album, *W. & D.* (*Areca alba*, Bory. *A. borbonica*, Hort.)
Mauritius and Bourbon. (15 ft.)
3. D. rubrum, *W. & D.* (*Areca rubra*, Hort.)
Mauritius.
4. D. furfuraceum, *W. & D.* (*Areca furfuracea*, Hort. *Areca pisifera*, Lodd.)
Mauritius.

Subtribe II. Ptychospermeæ.

Characters of *Euarecceæ*, but male flowers symmetrical, with broad rounded widely imbricate sepals.—Unarmed palms of the old world.

Genus XIII. Ptychosperma, *Labill.*

1. P. Drudei.
   Hab. ?
2. P. filifera, *Wendl.*
   Fiji Islands.
3. P. gracilis, *Lab.*
   New Ireland.
4. P. Macarthurii, *Wendl.* (*Kentia Macarthurii*, Hort.)
   Tropical Australia ?
5. P. Normanbyi, *Wendl.* MSS. (*Areca Normanbyi*, F. Muell; *Cocos Normanbyi*, W. Hill.)
   Queensland.
6. P. Seemanni, *Wendl.*
   Fiji Islands.

Genus XIV. Cyrtostachys, *Blume.*

1. C. Renda, *Blume.* (*Areca erythropoda*, Miq. *Ptychosperma coccinea.* Hort.)
   Malay Archipelago.

Genus XV. Drymophloeus, *Zippel.*

1. D. ceramensis, *Miq.*
   Ceram.
2. D. oliviæformis, *Mart.* (*Ptychosperma Rumphii*, Bl.)
   Moluccas.
3. D. Rumphii, *Hort. Lind.*
   Moluccas.
4. D. singaporensis. (*Ptychosperma singaporensis*, Hort.)
   Singapore.

Subtribe III. Oncospermeæ.

Spadix flowering below the leaves; spathes 2. Flowers monœcious; males symmetrical or not, with broad imbricate sepals, females with imbricate petals. Ovary 1-celled, 1-ovuled. Fruit with excentric lateral or basal stigmas.—Old and new world palms, often spinous.

Genus XVI. Cyphosperma, *Wendl.*

1. C. Vieillardi, *Wendl.* (*Kentia robusta*, Hort. Lind. *K. Vieillardi* Brongn. & Gr.)
   New Caledonia.

Genus XVII. Oncosperma, *Blume.*

1. O. fasciculatum, *Thwaites.*
   Ceylon.
2. O. filamentosum, *Blume*, "Nibung Palm." (*Areca Nibung*, Mart. *A. tigillaria*, Jacq.)
   Java.

Genus XVIII. Euterpe, *Gartn.*

1. E. acuminata, *Wendl.* (*Œnocarpus utilis*, Kl. *Oreodoxa acuminata*, Willd.)
   Venezuela.
2. E. edulis, *Mart.* "Assai Palm."
   Tropical America.

3. E. oleracea, *Mart.* "Mountain Cabbage Palm." (*Areca oleracea*, Hort.) (Museum No. 2. Baskets of the leaves.)
Tropical America.

Genus XIX. Œnocarpus, *Mart.*

1. Œ. Bacaba, *Mart.*
Rio Negro (Amazons).
2. Œ. Batana, *Mart.* "Patana Palm." (Museum No. 2. Arrows made of the woody bundles in the petioles; comb with teeth of the same.)
Rio Negro (Amazons).

Genus XX. Acanthophœnix, *Wendl.*

1. A. crinita, *Wendl.* (*Areca crinita*, Bory.)
Mauritius and Bourbon. (6 ft.)
2. A. rubra, *Wendl.* (*Areca rubra*, Bory.)
Mauritius and Bourbon.

Genus XXI. Prestoea, *Hook.* f.

1. P. pubigera, *Hook.* f. (*Hyospathe pubigera*, Griseb. & Wendl.)
Trinidad.
2. P. ? montana, Hook. f. (*Euterpe montana*, Grah. in Bot. Mag. t. 3874; *Areca montana*, Lodd.)
Island of Granada.

Genus XXII. Oreodoxa, *Willd.*

1. O. granatensis, *Hort. Bull.*
New Grenada.
2. O. oleracea, *Mart.*
West Indies. (10 ft.)
3. O. regia, *Kunth.* "Royal Palm." (North Gallery; paintings n. 25, 77, 79, 99.)
West Indies.

Subtribe IV. Iriarteæ.

Spadix flowering below the leaves; spathes numerous. Flowers monœcious; males symmetrical with broad imbricating sepals; females with imbricating petals. Ovary entire, 3-celled, 3-ovuled. Fruit 1-seeded with terminal lateral or basal stigmas.—Unarmed American palms, with wedge-shaped leaflets.

Genus XXIII. Iriartea, *Ruiz. & Pav.*

1. I. deltoidea, *R. & P.* (*I. robusta*, Hort.)
Peru.

Genus XXIV. Socratea, *Karst.*

1. S. exorhiza, *Wendl.* "Zanona Palm." (*Iriartea exorhiza*, Mart.) (Museum No. 2. Aerial roots studded with small spines, used by the Indians as a Cassava grater.)
Guiana, Amazons River.

Subtribe V. Wettenieæ.

Spadix flowering below the leaves; spathes numerous. Flowers diœcious, or if monœcious on separate spadixes; males unsymmetrical with broad imbricating sepals; females with imbricate or valvate petals. Ovary deeply 3-lobed, style from between the lobes with 3 long stigmas. Fruit with basilar stigmas.—Unarmed American Palms with wedge-shaped leaflets.

Genus XXV. Catoblastus, *Wendl.*

1. C. præmorsus, *Wendl.*
Venezuela.

Subtribe VI. Linospadiceæ.

Spadix unbranched, flowering amongst the leaves; spathes 1 or 2. Flowers monœcious; males symmetrical with broad imbricating sepals; females with imbricating petals. Ovary 1-celled, 1-ovuled. Fruit with the stigmas terminal.—Unarmed palms of the old world.

Genus XXVI. Calyptrocalyx, *Blume.*

1. C. spicatus, *Bl.*
   Moluccas. (12 ft.)

Genus XXVII. Bacularia, *F. Muell.*

1. B. monostachya, *F. Muell*; *Bot. Mag. t.* 6644. "Walking-stick Palm." (*Areca monostaycha*, Mart.; *Linospadix monostachya*, Wendl.) (North Gallery; painting n. 554.)
   N. S. Wales and Queensland.

Genus XXVIII. Howea, *Beccari.*

1. H. Forsteriana, *Becc.* "Flat, or Thatch-leaf Palm." (*Kentia Forsteriana*, F. Muell.; *Grisebachia Forsteriana*, Wendl. & Dr.)
   Lord Howe's Island. (8 ft.)
2. H. Belmoreana, *Becc.* "Curley Palm." (*Kentia Belmoreana*, F. Muell *Grisebachia Belmoreana*, Wendl. & Dr.)
   Lord Howe's Island.

Subtribe VII. Ceroxyleæ.

Spadix flowering amongst the leaves; spathes numerous. Flowers diœcious, or if monœcious on separate spadixes; males subsymmetrical with a 3-toothed calyx; females with subvalvate petals. Ovary entire, 3-celled, 3-ovuled. Fruit 1-seeded with basal stigmas.—Unarmed palms of America, with acuminate leaflets.

Genus XXIX. Ceroxylon, *Humb. & Bonpl.*

1. C. andicola, *H. & B.* "Wax Palm." (*Beethovenia cerifera*, Engel.) (Museum No. 2. Wax, raw, moulded and made into candles; Mus. No. 3, portion of trunk with wax.)
   New Grenada and Venezuela. (20 ft.)

Genus XXX. Juania, *Drude.*

1. J. australis, *Drude.* (*Ceroxylon ? australis*, Mart.; *Morenia Chonta*, Philippi; *Glaziova insignis*, Hort.?)
   Juan Fernandez.

Subtribe VIII. Malortieæ.

Spadix flowering amongst the leaves, digitately branched; spathes 2. Flowers monœcious; males subsymmetrical with broad imbricate sepals; females with imbricate petals. Ovary imperfectly 3-celled, 3-ovuled. Fruit 1-seeded with terminal stigmas. — Dwarf unarmed palms of America with acuminate often confluent or perforated leaflets.

Genus XXXI. Malortiea, *Wendl.*

1. M. intermedia, *Wendl.*
   Costa-Rica.
2. M. gracilis, *Wendl.* (*Geonoma fenestrata*, Hort.)

Subtribe IX. Iguanureæ.

Spadix flowering amongst the leaves; spathes 2. Flowers monœcious; males with broad imbricating sepals; females with imbricate petals. Ovary 1–3-celled, 1–3-ovuled. Fruit 1-seeded, with excentric lateral or basal stigmas.—Armed or unarmed palms of the old world.

Genus XXXII. Heterospathe, *Scheff.*

1. H. elata, *Scheff.* (*Metroxylon elatum*, Hort.)
   Amboyna.

Genus XXXIII. Nephrosperma, *Balf. fil.*

1. N. Van Houtteanum, *Balf. fil.* (*Oncosperma Van Houtteanum*, Wendl.; *Areca nobilis*, Hort.)
   Seychelle Islands.

Genus XXXIV. Stevensonia, *Duncan.*

1. S. grandifolia, *Duncan.* (*Phœnicophorium sechellarum*, Wendl.; *Areca sechellarum*, Hort.)
   Seychelle Islands. (9 ft.)

Genus XXXV. Verschaffeltia, *Wendl.*

1. V. splendida, *Wendl.* (*Regelia Princeps*, Hort.)
   Seychelle Islands.

Genus XXXVI. Dypsis, *Noronh.*

1. D. Hildebrandtii, *Hort. Van Houtte.*
   Madagascar.
2. D. madagascariensis, *Hort.*
   Madagascar.
3. D. pinnatifrons, *Mart.* (*Areca gracilis*, Thou.)
   Madagascar.
4. D. sp., ?
   Madagascar.

Subtribe X. Chamædoreæ.

Spadix flowering amongst or below the leaves; spathes numerous. Flowers usually dicœcious; male, calyx minute; female, petals valvate or imbricate. Ovary 3-celled, 1–3-ovuled. Fruit small with basal stigmas.—Unarmed or rarely armed palms of the old and new worlds.

Genus XXXVII. Chamædorea, *Willd.*

1. C. amazonica, *Hort.*
   Amazons river.
2. C. Arenbergiana, *Wendl.* (*C. latifrons*, and *latifolia*, Hort.)
   Guatemala.
3. C. Caspariana, *Klotzsch.*
   Guatemala.
4. C. concolor, *Mart.*
   Mexico.
5. C. corallina, Hook. f. (*Morenia corallina, Karst.*)
   Venezuela (8 ft.)

6 C. Deckeriana, *Wendl.* (*Morenia Deckeriana, Stachyophorbe Deckeriana*, Kl.)
   Guatemala.

7. C. desmoncoides, *Wendl.*
   Mexico. (10 ft.)
8. C. elatior, *Mart.* (*C. Karwinskiana*, Wendl.)
   Mexico.

9. C. elegans, *Mart.*; *Bot. Mag. t.* 4845.
Mexico. (10 ft.)
10. C. elegantissima, *Hort. Lind.*
Mexico.
11. C. Ernesti-Augusti, *Wendl.*; *Bot. Mag. t.* 4831–4837.
New Grenada. (12 ft.)
12. C. formosa, *Hort. Bull.*
Hab. ?
13. C. fragrans, *H. J.* (*Morenia fragrans*, Ruiz. & Pav.; Bot. Mag. t. 5492.)
New Grenada and Peru.
14. C. geonomæformis, *Wendl.* (*Nunnezharia geonomæformis*, Hook. f. Bot. Mag. t. 6088.)
Guatemala.
15. C. glaucifolia, *Wendl.* (? *C. crucifolia*, Hort.)
New Grenada. (20 ft.)
16. C. graminifolia, *Wendl.*
Costa-Rica.
17. C. Lindeniana, *Wendl.*
Mexico and Guatemala. (12 ft.)
18. C. Martiana, *Wendl.*
Mexico.
19. C. microphylla, *Wendl.*
Chiriqui. (6 ft.)
20. C. oblongata, *Mart.* (*C. lunata*, Liebm.)
Mexico.
21. C. pygmæa, *Wendl.*
New Grenada.
22. C. Ruizii, *Wendl.*
Peru ?
23. C. Sartorii, *Liebm.* (*C. mexicana*, and *Hartwegii*, Hort.)
Mexico. (12 ft.)
24. C. scandens, *Liebm.*
Mexico. (12 ft.)
25. C. stolonifera, *Wendl.*
Hab. ?
26. C. tenella, *Wendl.* (*Nunnezharia tenella*, Hook. f. Bot. Mag. t. 6584.)
Mexico.
27. C. Wendlandi, *Wendl.*
Mexico.

Genus XXXVIII. SYNECHANTHUS, *Wendl.*

1. S. fibrosus, *Wendl*; *Bot. Mag. t.* 6572.
Guatemala. (10 ft.)

Genus XXXIX. GAUSSIA, *Wendl.*

1. G. Ghiesbreghtii, *Wendl.* (*Oreodoxa* and *Chamædorea ventricosa*, Hort.)
Hab. ?
2. G. Princeps, *Wendl.*
Cuba.

Genus XL. ROSCHERIA, *Wendl. & Dr.*

1. R. melanochætes, *W. & D.* (*Verschaffeltia melanochætes*, Wendl.)
Seychelle Islands.

Genus XLI. HYOPHORBE, *Gærtn.*

1. H. amaricaulis, *Mart.* (*Areca speciosa & Hyospathe amaricaulis*, Hort.)
Round Island (Mauritius group) (8 ft.)
2. H. Verschaffeltii, *Wendl.*
Rodriguez (Mauritius group) (12 ft.)

Genus XLII. Chrysalidocarpus, *Wendl.*

1. C. lutescens, *Wendl*, (*Hyophorbe indica*, Gærtn. *H. Commersoniana*, Mart.; *Areca lutescens*, Bory.)
Mauritius & Bourbon (15 ft.).

Genus XLIII. Ravenia, *Bouché.*

1. R. Hildebrandtii, *Bouché.*
Comoro Islands.

Subtribe XI. Genomieæ.

Spadix flowering amongst the leaves; spathes 1–2, rarely more. Flowers diœcious, or if monœcious on separate spadixes; perianth dry; males unsymmetrical, much compressed with petals connate below; females with imbricate petals. Ovary 3-celled, 3-ovuled. Fruits small with basilar stigmas. —Unarmed palms of the old and new worlds.

Genus XLIV. Geonoma, *Willd.*

1. G. Carderi, *Hort. Bull.*
Hab.?
2. G. chiriquensis, *Hort. Lind.*
Hab.?
3. G. cuneata, *Wendl.*
Costa-rica.
4. G. gracilis, *Wendl.*
Costa-rica.
5. G. microspatha, *Spruce.*
Amazons.
6. G. macrostachys, *Mart.*
Japura river. (Amazons.)
7. G. obovata, *Wendl.*
Costa-rica.
8. G. Pohliana, *Mart.*
Brazil.
9. G. Princeps, *Hort. Bull.*
Hab.?
19. G. pumila, *Lind. & Wendl.*
New Grenada.
11. G. Schottiana, *Mart.*
Brazil, Guiana.
12. G. Seemanni, *Wendl.*
Nicaragua.
14. G. Spixiana, *Mart.*
Rio Negro (Amazons).
14. G. vaga, *Griseb. & Wendl.*
Brazil & W. Indies.

Genus XLV. Asterogyne, *Wendl.*

1. A. Martiana, *Wendl.* (*Geonoma Martiana, Wendl.*)
Nicaragua.

Genus XLVI. Calyptrogyne, *Wendl.* (including Calyptronoma, *Griseb. & Wendl.*).

1. C. elata, *Wendl.*
Hab.?
2. Ghiesbreghtiana, *Wendl.* (*Geonoma Ghiesbreghtiana*, Wendl.; Bot. Mag. t. 5782. *G. magnifica*, Lind. *G. Verschaffeltii*, Hort.)
Mexico.
3. C. sarapeguensis, Wendl.
Hab.?

4. C. spicigera, Wendl.
Guatemala.
5. C. Swartzii, *H. F.* "Mountain Thatch Palm." (*Calyptronoma Swartzii*, Gr. & Wendl.)
West Indies.

Genus XLVII. WELFIA, *Wendl.*

1. W. regia, *Wendl.*
New Grenada.

Genus XLVIII. BENTINCKIA, *Berry.*

1. B. condapanna, *Berry.*
Travancore.

SUBTRIBE XII. CARYOTIDEÆ.

Spadix flowering amongst the leaves; spathes usually many. Flowers monœcious in the same or separate spadixes; male with free or connate imbricate sepals; female with valvate petals. Ovary 3-celled, 3-ovuled. Fruit 1–3 seeded with terminal or excentric stigmas.—Unarmed palms of the old world, with often cuneate leaflets.

Genus XLIX. WALLICHIA, *Roxb.*

1. W. caryotoides, *Roxb.*
Eastern Bengal, Chittagong, & Burma.
2. W. densiflora, *Mart.*; *Bot. Mag. t.* 4584.
E. Nepal.

Genus L. DIDYMOSPERMA, *Wendl. & Dr.*

1. D. distichum, *Hook f.* (*Wallichia disticha*, T. Anders.)
Sikkim Himalaya.
2. D. nanum, *W. & D.* (*Wallichia nana*, Griff.)
Assam & Khasia Mts.
3. D. porphyrocarpon, *W. & D.*
Java.
4. D. tremulum, *W. & D.*
Philippine Islands.

Genus LI. ARENGA, *Labill.* (SAGUERUS, *Rumph.*)

1. A. Bonnetti, *Hort. Rollison.*
E. Indies.
2. A. obtusifolia, *Mart.*
Java, Sumatra.
3. A. saccharifera, *Labill.* "Gomuti Palm." (Museum No. 2. Fibres, ropes, sandals, sugar, spirits.)
Malay Archipelago & Moluccas, Burma (15 ft.).
4. A. Wightii, *Griff.*
Malabar.

Genus LII. CARYOTA, *Linn.*

1. C. Alberti, *F. Muell.*
Tropical Australia.
2. C. Blancoi, *Hort. Veitch.*
Philippine Islands.
3. C. Cumingii, *Lodd.*
Philippine Islands (15 ft.).
4. C. elegans, *Hort. Lind.*
Hab. ?
5. C. furfuracea, Bl. *var.* timbala. (*C. javanica*, Zipp.)
Java (15 ft.).

6. C. majestica, *Hort.*
   Hab. ?
7. C. maxima, *Blume.*
   Java.
8. C. ochlandra, *Hance.*
   China.
9. C. obtusa, *Griff.*
   Upper Assam.
10. C. Rumphiana, *Mart.*
    Borneo & Moluccas (45 ft.).
11. C. sobolifera, *Wall.*
    Arracan & the Andaman Islands to Malacca (27 ft.).
12. C. speciosa, *Hort.*
    Hab. ?
13. C. urens, *Linn.* "Wine Palm." (North Gallery; painting n. 402.) (Museum No 2. Sugar, spirits, starch.)
    E. Bengal & Malay Peninsula (50 ft. before being removed).

Genus LIII. Orania, *Zipp.*

1. O. macrocladus, *Mart.*
   Malacca (15 ft.).
2. O. regalis, *Blume.*
   New Guinea.

Anomalous Genera of Arecæ.

Genus LIV. Manicaria, *Gærtn.*

1. M. saccifera, *Gærtn.* "Bussu Palm." (Museum No. 2. Caps made of fibrous leaf-sheath.)
   N. Brazil to Central America.

Genus LV. Nipa, *Wurmb.*

1. N. fruticans, *Thunb.* (North Gallery; paintings n. 370, 411.) (Museum No. 2. Spirits from sap.)
   Tropical estuaries from the Sunderbunds to Australia.

Genus LVI. Phytelephas, *Ruiz & Pav.*

1. P. macrocarpa, *R. & P.* "Ivory nut Palm." (Museum No. 2. Nuts as imported and as manufactured into buttons and other articles.)
   New Grenada (20 ft.).
2. P. microcarpa, *R. & P.*
   Peru.

Tribe II. **Phœniceæ.**

Leaves pinnate; leaflets with the sides inflexed before unfolding. Spadix flowering amongst the leaves; spathe 1. Flowers diœcious; males with valvate petals; females with imbricate petals. Ovary of 3 distinct carpels. Fruit of one 1-seeded carpel with a terminal stigma. Old world palms.

Genus LVII. Phœnix, *Linn.*

1. P. acaulis, *Roxb.?*
   Central India, Bengal to Burma (12 ft.).
2. P. dactylifera, *Linn.* "Date Palm." (North Gallery; paintings n. 24, 41.) (Museum No. 2. Walking sticks and crates made of petiole and rachis of leaf; baskets of leaves, sugar, spirits; various forms of ripe fruits.)
   N. Africa (? known in cultivation only) (30 ft.).

3. P. farinifera, *Roxb.*
   The Deccan (7 ft.).
4. P. Hanceana, *Naud.*
   China.
5. P. Ouseleyana, *Griff.*
   Central India.
6. P. paludosa, *Roxb.*
   The Sunderbunds and along the tidal coast to the Andamans.
7. P. reclinata, *Jacq.*
   S.E. Africa (56 ft.).
8. P. rupicola, *T. Anders.*
   Sikkim Himalaya.
9. P. spinosa, *Thon.* (*P. leonensis*, Lodd.) (Museum No. 2. Mats made of leaves.)
   West tropical Africa (9 ft.).
10. P. sylvestris, *Roxb.* "Khajoor." (Museum No. 2. Mats, hats, baskets, sugar, spirits; fishing nets made of the petiole.)
    India. Cult. in Chittagong & Ava (40 ft.).
11. P. tenuis, *Hort. Lind.*
    Hab. ?
12. P. zeylanica, *Hort.*
    Ceylon.

Tribe III. **Corypheæ.**

Leaves fan-shaped, plaited, many-cleft, divisions with the sides inflexed before unfolding. Spadix flowering amongst the leaves; spathes numerous. Flowers hermaphrodite or polygamous, rarely diœcious. Ovary of 3 free or more or less connate carpels. Fruit 1–3-celled and-seeded, with distinct or connate terminal or basal styles.

Genus LVIII. Corypha, *Linn.*

1. C. Gebanga, *Blume.* "Gebang Palm." (Museum No. 2. Sleeping mats made of the leaves.)
   Java; (Cultivated in Burma, &c.).
2. C. macropoda, *Kurz.*
   Andaman Islands.
3. C. umbraculifera, *Linn.* "Talipot Palm." (North Gallery; paintings No. 304, 492.) (Museum No. 2. Bags, umbrellas, fans, brooms, and tent cover of leaves.)
   S. India & Ceylon. (Cultivated in Burma.)

Genus LIX. Sabal, *Adans.*

1. S. Adansoni, *Guerns.* "Dwarf Palmetto."
   Southern U. States.
2. S. cœrulescens, *Hort.*
   West Indies ?
3. S. glaucescens, *Lodd.*
   Trinidad (15 ft.).
4. S. mauritiæformis, *Griseb. & Wendl.* "Savanah Palm."
   Venezuela, Trinidad.
5. S. Palmetto, *Lodd.* "Cabbage Palmetto." (*Chamærops Palmetto*, Michaux.)
   Southern U. States (15 ft.).
6. S. Princeps, *Hort. Versch.*
   Hab. ?
7. S. Sanfordii, *Hort. Lind.*
   Hab. ?

8. S. umbraculifera, *Griseb.* (Museum No. 2. Hats, mats, baskets, bee-hive made of hollowed piece of trunk.)
West Indies (36 ft.).
9. S. Blackburniana, *Glazebr.* (*S. umbraculifera*, Mart.) (Museum No. 2. Hats, fans, brushes, baskets, and plaited work.)
Bermuda.

Genus LX. WASHINGTONIA, *Wendl.*

1. W. filifera, *Wendl.* (*Pritchardia filifera*, Lind. *Brahea filamentosa*, Hort.)
South California.

Genus LXI. NANNORHOPS, *Wendl. & Dr.*

1. N. Ritchieana, *W. & D.* (*Chamærops Ritchieana*, Griff.) (Museum No. 2. Ropes, caps, and sandals.)
N.W. India, Affghanistan, S.E. Persia.

Genus LXII. TEYSMANNIA, *Reichb f. & Zoll.*

1. T. altifrons. *R. & Z.*
Sumatra (10 ft.).

Genus LXIII. CHAMÆROPS, *Linn.*

1. C. humilis, *Linn.* (*C. elegans*, Hort.) (Museum No. 2. Hats, mats, baskets, fans, and brushes from the leaves.)
S. Europe and N. Africa (20 ft.)
2. C. macrocarpa, *Tenore.*

Genus LXIV. RHAPIDOPHYLLUM, *Wendl. & Dr.*

1. R. Hystrix, *W. & D.* "Blue Palmetto." (*Chamærops Hystrix*, Fraser.)
Southern U. States.

Genus LXV. ACANTHORHIZA, *Wendl.*

1. A. aculeata, *Wendl.* (*Chamærops stauracantha*, Hort. *Trithrinax aculeata*, Liebm.)
Central America.
2. A. arborea, *Drude.* (*Thrinax arborea*, Hort.)
Hab. ?
3. A. Mocinni, *Wendl.* (*Chamærops Mocinni*, Kth.)
Central America.

Genus LXVI. BRAHEA, *Mart.*

1. B. dulcis, *Mart.* (*Thrinax tunicata*, Hort. Verschaff.? *Livistona occidentalis*, Hort.)
Mexico.
2. B. glauca, *Hort.*
Hab. ?
3. B. lucida, *Hort.*
Mexico.
4. B. nobilis, *Hort. Rolliss.*
Hab. ?

Genus LXVII. TRITHRINAX, *Mart.*

1. T. brasiliensis, *Mart.* (*Thrinax Chuco*, Hort. Lind.)
Brazil.

Genus LXVIII. SERENOA. *Hook f.*

1. S. serrulata, H. f. "Saw Palmetto." (*Sabal serrulata*, R. & S.)
Southern U. States.

Genus LXIX. ERYTHEA, *S. Wats.*

1. E. edulis, *Wats.* (*Brahea edulis*, Wendl. *B. Roezlii*, Hort.)
Guadeloupe Islands (Coast of California).

Genus LXX. COPERNICIA, *Mart.*

1. C. cerifera, *Mart.* "Carnauba Palm." (Museum No. 2. Wax and candles made from it, mats of leaves, polished wood.)
   Brazil.
2. C. tectorum, *Mart.*
   Venezuela and W. Indies.

Genus LXXI. PRITCHARDIA, *Seem. & Wendl.*

1. P. aurea, *Hort. Lind.*
   Hab.?
2. P. Gaudichaudii, Wendl.
   Sandwich Islands.
3. P. macrocarpa, *Lind.*
   Hab.?
4. P. Martii, *Wendl.*
   Sandwich Islands.
5. P. pacifica, *Seem. & Wendl.*
   Fiji Islands (10 ft.).

Genus LXXII. LICUALA, *Thunb.*

1. L. acutifida, *Mart.* "Penang Lawyer." (Museum No. 2. Walking sticks of stem.)
   Singapore and Penang.
2. L. amplifrons, *Miq.*
   Sumatra.
3. L. elegans, *Blume.*
   Sumatra.
4. L. horrida, *Bl.*
   Java?
5. L. peltata, *Roxb.*
   Bengal, Assam, Burma, Tenasserim, Andaman Islands.
6. Rumphii, *Bl.* (*L. spinosa*, Bl.)
   Moluccas, Borneo.
7. L. grandis, *Wendl.*, Bot. Mag. 6,704*l*. (*Pritchardia grandis*, Hort.)
   New Britain.

Genus LXXIII. PHOLIDOCARPUS, *Blume.*

1. P. Ihur, *Bl.*
   Moluccas.

Genus LXXIV. LIVISTONA, *Br.*

1. L. altissima, *Zoll.*
   Java.
2. L. australis, *Mart.* (*Corypha australis*, Br.) (North Gallery; paintings n. 549, 582.) (Museum No. 2. Hats and platted work of leaves.)
   Eastern Australia, temperate and tropical (10 ft.).
3. L. chinensis, *Mart.* (*L. mauritiana*, Wall. *Latania borbonica*, Lamk.)
   South China (56 ft.).
4. L. Drudei, *Wendl.*
   Hab.?
5. L. Hoogendorhii, *Teysm. & Binn.*
   Hab.?
6. L. humilis, *Br.* (*L. Leichardtii*, F. Muell.)
   Tropical Australia (30 ft.).
7. L. inermis, *Br.* (*L. Ramsayi*, F. Muell.)
   Tropical Australia.
8. L. Jenkinsiana, *Griff.*
   Assam and Sikkim (10 ft.).
9. L. olivæformis, *Mart.*
   Java.

10. L. rotundifolia, *Mart.*
Malay Islands, Moluccas, Penang.
11. L. subglobosa, *Mart.*
Java.

Genus LXXV. TRACHYCARPUS, *Wendl.*

1. T. excelsus, *Wendl.* (*Chamærops excelsa*, Thunb.)
Japan (24 ft.).
2. T. Fortunei, *Wendl.* (*Chamærops Fortunei*, Hook. Bot. Mag. t. 5221.) (Museum No. 2. Hats, brooms, brushes, cordage, sandals, and whole dress made of the fibrous sheaths of old leaves.)
China (31 ft.).
3. T. khasyanus, *Wendl.* (*Chamærops khasyana*, Griff.)
Khasia Mts. and Burma.
4. T. Martianus, *Wendl.* (*Chamærops Martiana*, Wall.; *C. tomentosa*, Morr.)
Himalaya (26 ft.).

Genus LXXVI. RHAPIS, *Linn.* f.

1. R. flabelliformis, *Ait.* (*R. aspera*, Wendl.)
China (8 ft.).
Var. foliis variegatis.
2. R. humilis, *Blume.* (*R. Sirotsik*, Hort.)
Japan (6 ft.).
3. R. cochin-chinensis, *Mart.*
Cochin China.

Genus LXXVII. THRINAX, *Linn.*

1. T. argentea, *Lodd.* "Silver-Thatch Palm." (Museum No. 2. Leaves as imported and made into baskets, hats, and mats.)
West Indies.
2. T. barbadensis, *Lodd.*
Barbados and Guadeloupe.
3. T. excelsa, *Lodd.*
Jamaica (20 ft.).
4. T. gracilis, *Hort.*
Hab. ?
5. T. Martii, *Griseb.* (? T. parviflora, *Wendl.*)
Cuba.
6. T. parviflora, *Swartz.* (T. elegans, Hort. Herren.)
West Indies (8 ft.).
7. T. Pumilio, *Lodd.*
Jamaica.
8. T. radiata, *Lodd.* (*T. elegans* & *T. elegantissima*, Hort.)
West Indies (10 ft.).

TRIBE IV.—Lepidocaryeæ.

Leaves pinnate or fan-shaped, segments or divisions with the sides reflexed before unfolding. Spadix terminal or flowering amongst the leaves; spathes many, rarely one or few. Flowers hermaphrodite, monœcious or diœcious. Ovary completely or incompletely 3-celled, 3-ovuled. Fruit clothed with reflexed hard shining closely appressed scales; stigmas terminal.—Armed or unarmed palms, chiefly of the old world.

SUBTRIBE I. CALAMEÆ.

Leaves pinnate. Ovary incompletely 3-celled.—Usually climbing armed palms of the old world.

Genus LXXVIII. CALAMUS, *Linn.* (including DÆMONOROPS, *Blume.*)
"Rattan canes." (North gallery ; painting n. 434.)

1. C. adspersus, *Blume.*
Java. (34 ft.).
2. C. andamanicus, *Kurz.*
Andaman Islands.
3. C. asperrimus, *Blume.*
Java, Assam, and Chittagong? (20 ft.).
4. C. australis, *Mart.* (*C. obstruens*, F. Muell.) (Museum No. 2. Walking sticks of stem.)
Tropical Australia.
5. C. calicarpus, *Griff.*
Malacca.
6. C. calolepis, *Miq.*
Java.
7. C. ciliaris, *Blume.*
Sumatra, Java, Borneo.
8. C. cochin-chinensis, *Hort. Lind.*
Cochin China.
9. C. delicatulus, *Thwaites.*
Ceylon.
10. C. erectus, *Roxb.*
Silhet, Chittagong, Pegu. (15 ft.).
11. C. farinosus, *Hort. Lind.*
Hab.
12. C. fissus, *Blume.*
Borneo.
13. C. Flagellum, *Griff.*
Sikkim Himalaya and Assam.
14. C. floribundus, *Griff.*
Upper Assam.
15. C. heteroideus, *Blume*, var. refractus.
Java.
16. C. Hystrix. *Mart.*
Malacca, Java.
17. C. Jenkinsianus, *Griff.*
Assam, Sikkim Himalaya (15 ft.).
18. C. latifolius, *Roxb.*
Chittagong, Pegu, Burma, Tenasserim, and Andaman Islands.
19. C. leptospadix, *Griff.*
Khasia Mts., Sikkim Himalaya, and Assam (8 ft.).
20. C. Lewisianus, *Griff.*
Penang (26 ft.).
21. C. marginatus, *Blume.*
Borneo.
22. C. melanochætes, *Wendl.* var. macrocarpa.
Java.
23. C. montanus, *Anders.*
Sikkim Himalaya.
24. C. Muelleri, *Wendl.*
Tropical Australia.
25. C. Nicolai, *Hort. Rollis.*
Hab. ?
26. C. Oxleyanus, *Teysm. & Binn.*
Hab. ? (10 ft.).
27. C. pachystemonus, *Thw.* (Museum No. 2. Baskets of stems.)
Ceylon (24 ft.).
28. C. palembanicus, *Blume.*
Sumatra.
29. C. periacanthus, *Miquel.*
Sumatra (15 ft.).

30. C. Rotang, *Linn.* (C. Roxburghii, *Griff.*) (Museum No. 2. Baskets of strips of stem.)
Bengal, Assam, and Coromandel.
31. C. Royleanus, *Griff.*
Tropical Himalaya, westward to Kumaon (the western and northern limit of the genus).
32. C. rudentum, *Lour.* (Museum No. 2. Basket-work of strips of stem.)
Java.
33. C. schizospathus, *Griff.*
Sikkim and Khasia Mts.
34. C. tenuis, *Roxb.* (Museum No. 2. Basket-work of split stems.)
Silhet, Assam, Pegu, Chittagong.
35. C. trichrous, *Miq.*
Sumatra.
36. C. viminalis, Willd.
Celebes.
37. C. Wightii, *Griff.*
Deccan.

Genus LXXIX. ZALACCA, *Reinwdt.*

1. Z. edulis, *R.*
Java, Moluccas.
2. Z. sp. ?

Genus LXXX. KORTHALSIA, *Bl.*

1. K. Junghuhnii, *Miquel.*
Java.
2. K. scaphigera, *Mart.*
Andaman Islands, Malacca.

Genus LXXXI. CERATOLOBUS, *Blume.*

1. C. glaucescens, *Bl.*
Java.

Genus LXXXII. PLECTOCOMIA, *Mart.*

1. P. assamica, *Griff.*
Assam.
2. P. elongata, *Blume.*
Java, Malacca, Penang.
3. P. himalayana, *Griff.*
Sikkim Himalaya.
4. P. spectabilis, *Hort.*
Hab. ?

Genus LXXXIII. PIGAFETTA, *Becc.*

1. P. elata, *Becc.* (*Metroxylon elatum*, Mart. *Hyospatha elata*, Hort.)
Celebes.

Genus LXXXIV. METROXYLON, *Rottl.*

1. M. vitiense, *Wendl.* (*Sagus vitiensis, and Cælococcus vitiensis*, Wendl.) (Museum No. 2. Sago from the stem.)
Fiji Islands.
2. M. amicarum, *Wendl.* (*Sagus amicarum*, Hort.)
Friendly Islands.

SUBTRIBE II. RAPHIEÆ.

Leaves pinnate. Ovary completely 3-celled.—African armed or unarmed palms.

Genus LXXXV. Raphia, *Beauv.*

1. R. longiflora, *Mann & Wendl.*
Corisco River (Western Africa).
2. R. Ruffia, *Mart.* (Museum No. 2. Mats, delicate plaited and woven fabrics, cloth, hats, &c.).
Madagascar.
3. Raphia sp.
W. Africa.
4. Raphia sp.
W. Africa.

Genus LXXXVI. Ancistrophyllum, *Mann & Wendl.*

1. A. secundiflorum, *M. & W.* (*Calamus secundiflorus*, Beauv.)
W. Africa.
2. A..... ? (*Laccosperma* sp.)
W. Africa.

Subtribe III. Mauritieæ.

Leaves fan-shaped. Ovary completely 3-celled.—Erect palms of the new world.

Genus LXXXVII. Mauritia, *Linn.*

1. M. flexuosa, *Linn.* f. "Ita Palm." (North Gallery; painting n. 119.) (Museum No. 2. Hats, mats, and baskets made from leaves.)
Brazil and Guiana.

Tribe V. **Borasseæ.**

Leaves fan-shaped, plaited, many-cleft, divisions with the sides inflexed before unfolding. Spadix flowering amongst the leaves; spathes numerous. Flowers diœcious; males minute, clustered in cavities formed between the closely imbricating bracts of the spadix, emerging one by one; females large, scattered along the branches of a very stout spadix. Ovary 3-celled, 3-ovuled. Fruit large, 1-3-seeded; stigmas terminal.—Tall robust unarmed palms of the old world.

Genus LXXXVIII. Borassus, *Linn.*

1. B. flabelliformis, *Linn.* "Palmyra Palm." (North gallery; paintings n. 269 and 524.) (Museum No. 2. Mats, baskets, umbrellas, books made of leaves, sugar, spirits, wooden boxes, illustration of taking toddy from tree.)
Tropical Africa (cultivated in India).

Genus LXXXIX. Lodoicea, *Labill.*

1. L. sechellarum, *Lodd.* "Double Cocoa nut" "Coco de Mer." Germinating fruit only. (North gallery; painting n. 488.) (Museum No. 2. Utensils made of nuts, various forms of nut, hats, fans, baskets, plaited work, artificial flowers made of leaves.)
Seychelle Islands.

Genus XC. Latania, *Comm.*

1. L. Commersonii, *Linn.* (*L. rubra*, Jacq.)
Mauritius & Bourbon (7 ft.).

2. L. Loddigesii, *Mart.* (*L. glaucophylla*, Hort.)
Round Island (Mauritius group) (10 ft.).
3. L. Verschaffeltii, *Linn.* (*L. aurea*, Hort.)
Rodriguez Island (Mauritius group) (7 ft.).

Genus XCI. HYPHÆNE, *Gærtn.*

1. H. thebaica, *Mart.* "Doum Palm." (Museum No. 2. Fruits used a food.)
Upper Egypt, Nubia, Abyssynia.

Genus XCII. MEDENIA, *Pr. G. v. Wurtemb.*

1. M. Argun, *Wendl.* (*Hyphæne Argun*, Mart.)
Nubia.

Genus XCIII. BISMARCKIA, *Hildeb. & Wendl.*

1. B. nobilis, *H. & W.*
Madagascar.

TRIBE VI. **Cocoineæ.**

Leaves pinnate; leaflets with the sides reflexed before unfolding. Spadix flowering amongst the leaves; spathes 2. Flowers monœcious on the same spadix. Ovary 3 rarely 4-6-celled, cells 1-ovuled. Fruit 1-rarely 2-or more-celled and-seeded, endocarp marked with as many pits as there were cells to the ovary, of which 2 cells are usually suppressed, and the third marks the position of the embryo in the fertile cell.—Armed or unarmed almost exclusively new world palms.

SUBTRIBE I. BACTRIDEÆ.

Spinous usually slender palms of the new world. Endocarp with 3 pores at or above the middle of the fruit.

Genus XCIV. BACTRIS, *Jacq.* (North Gallery; Painting n. 173.)

1. B. baculifera, *Hort.*
Hab. ?
2. B. Binoti, *Hort.*
Hab. ?
3. B. Caraja, *Hort.*
Hab. ?
4. B. elatior, *Wallace.*
Amazons River.
5. B. elegans, *Hook.*
Brazil.
6. B. Maraja, *Mart.*
N. Brazil.
7. B. minor, *Jacq.* "Peach Palm." (*Gulielma speciosa*, Mart.)
W. Indies.
8. B. obovata, *Wendl.*
Hab. ?
9. B. Plumeriana, *Mart.* "Prickly-pole Palm."
West Indies.
10. B. simplicifrons, *Mart.*
Trinidad to Brazil.

Genus XCV. DESMONCUS, *Mart.*

1. D. granatensis, *Hort. Bull.*
   New Grenada.
2. D. major, *Cruger.*
   Trinidad.
3. D. minor, *Hort.* (? D. mitis, Mart.)
   West Indies ?
4. D. polyacanthus, *Hort.*
   Brazil & Guiana.

Genus XCVI. ASTROCARYUM, *G. W. Mey.*

1. A. aculeatum, *Mey.* "Gri-gri Palm," of Trinidad.
   Guiana.
2. A. aureum, *Griseb. & Wendl.*
   Trinidad.
3. A. filare, *Hort. Bull.*
   Hab. ?
4. A. Malybo, *Karst.* (*A. argenteum*, Hort. Bull.)
   New Grenada.
5. A. mexicanum, *Liebm.*
   Mexico.
6. A. Muru-Muru, *Mart.*
   Brazil (10 ft.).
7. A. rostratum, *Hook. f.*; *Bot. Mag. t.* 4773.
   Brazil, (18 ft.).
8. A. vulgare, *Mart.* (Museum No. 2. Fibre from leaves, box of do. indian hammock with border of birds feathers.)
   Brazil.

Genus XCVII. ACROCOMIA, *Mart.* (North Gallery; painting n. 94.)

1. A. lasiospatha, *Mart.* "Great Macau Palm."
   Jamaica, New Grenada, Venezuela.
2. A. sclerocarpa, *Mart.* "Macau Palm."
   Brazil & W. Indies (15 ft.).

Genus XCVIII. MARTINEZA, *Ruiz. & Pav.* (*Aiphanes*, Willd.)

1. M. Aiphanes, KL. (*Aiphanes aculeata*, Willd.)
   Caracas.
2. M. caryotæfolia, *Humb. & Kth.*
   New Grenada (12 ft.).
3. M. disticha, *Hort.* (*M. leucophæa*, Hort. ?)
   Hab. ?
4. M. erosa, *Hort. Lind.*
   W. Indies.
5. M. Lindeniana, *Wendl.*
   New Grenada.

SUBTRIBE II. ELÆIDEÆ.

Unarmed palms of Africa and America, endocarp with 3 pores above the middle of the fruit.

Genus XCIX. ELÆIS, *Jacq.*

1. E. guineensis, *Jacq.* "Oil Palm." (North Gallery; painting n. 50.) (Museum No. 2. Nuts, oil, candles, and various preparations.)
   West tropical Africa (7 ft.).
2. E. melanococca, *Gærtn.*
   Central America.

Subtribe III. Eucocoineæ.

Unarmed Palms of the New World (except *C. nucifera*, which is also of the Old.) Endocarp with 3 or more pores towards the base, except *Jubœa*.

Genus C. Diplothemium, *Mart.*

1. D. campestre, *Mart.*
   Brazil (8 ft.).
2. D. caudescens, *Mart.* (*Ceroxylon niveum*, Hort. Lind.)
   Brazil (10 ft.).

Genus CI. Cocos, *Linn.*

1. C. amara, *Jacq.* (*Syagrus amara*, Mart.)
   West Indies.
2. C. australis, *Mart.*
   S. Brazil.
3. C. Blumenaui, *Hort. Lind.*
   S. Brazil.
4. C. Bonneti, *Hort. Lind.*
   Hab.?
5. C. botryophora, *Mart.* (*Attalea grandis*, Hort.)
   Brazil.
6. C. Butæi, *Hort.*
   Hab.?
7. C. campestris, *Mart.*
   Brazil.
8. C. comosa, *Mart.*
   Brazil.
9. C. coronata, *Mart.*
   Brazil.
10. C. flexuosa, *Mart.*
    Brazil (56 ft.).
11. C. insignis, *Mart.* (*Glaziova insignis*, Mart.)
    Brazil.
12. C. mikaniana, *Mart.*
    Brazil.
13. C. nucifera, *Linn.* "Cocoa-nut Palm." (North Gallery; paintings n. 170, 243, 265.) (Museum No. 2. Oil, candles, and other products, mats, brushes, hats, and numerous other articles.)
    Tropics (12 ft.).
14. C. pernambucana, *Lodd.*
    Brazil.
15. C. plumosa, *Lodd.*
    Brazil (25 ft.).
16. C. Procopiana. *Hort.*
    Brazil.
17. C. Romanzoffiana, *Cham.*
    S. Brazil (20 ft.).
18. C. Sancona. (*Syagrus Sancona*, Karst.)
    Brazil.
19. C. schizophylla, *Mart.*
    Brazil (10 ft.).
20. C. Weddelliana, *Wendl.* (*Glasiova elegantissima*, Mart. *G. Martiana*, Glaz. *Leopoldina pulchra*, Hort.)
    Brazil (7 ft.).
21. C. Yuramaguas, *Lind.*
    Brazil.

Genus CII. Maximiliana, *Mart.*

1. M. caribœa, *Griseb. & Wendl.*
   W. Indies.

2. M. Martiana, *Karst.* (*M. regia*, Mart. *Attalea Marapa*, Wendl.)
N. Brazil & Guiana (20 ft.).

Genus CIII. SCHEELEA, *Karst.*

1. S. excelsa, *Karst.*
Venezuela.
2. S. Unguis, *Karst.*
Venezuela.

Genus CIV. ATTALEA, *H.B.K.*

1. A. amygdalina, H.B.K. (*A. nucifera*, Karst.) (North gallery; painting n. 55.)
New Grenada.
2. A. Cohune, *Mart.* "Cohune nut." (Museum No. 2. Oil from nuts.)
Honduras to Guiana (20 ft.).
3. A. compta, *Mart.* "Pindova Palm."
Brazil.
4. A. funifera, *Mart.* "Piassaba Palm." "Coquilla nut Palm." (Museum No. 2. Fibre of leaf-sheaths, mats, ropes, &c., necklaces, tops, boxes, &c., made of Coquilla nut.)
Brazil.
5. A. maracaibensis, *Karst.*
Venezuela.
6. A. spectabilis, *Mart.*
Amazons River.

Genus CV. JUBÆA, *H.B.K.*

1. J. spectabilis, *H.B.K.* "Coquito nut Palm." (North Gallery; painting n. 425.)
Chili (16 ft.).

LONDON: Printed by EYRE and SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty.
For Her Majesty's Stationery Office.
[19272.—750.—3/84.]