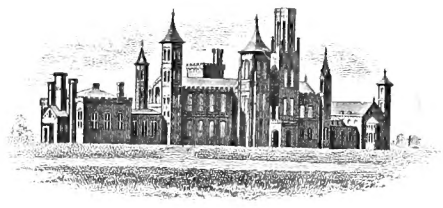

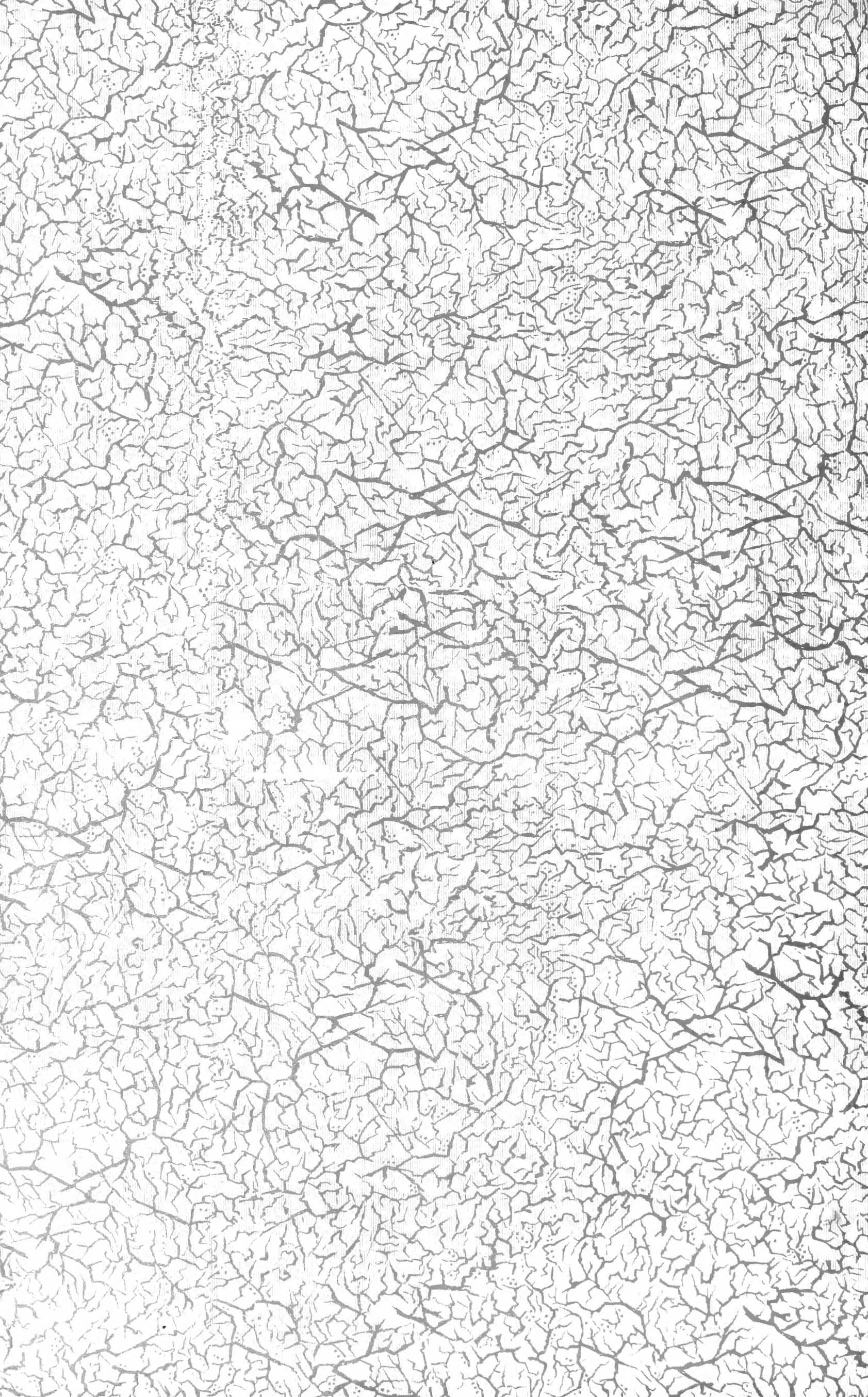

BOTANICAL WORK COMMITTEE.

RETURN to an Order of the Honourable The House of Commons, dated 24 May 1901 :—*for*,

COPY "of the Report of the BOTANICAL WORK COMMITTEE, with Minutes of Evidence, Appendices, and Index."

Treasury Chambers, 6 June 1901.

AUSTEN CHAMBERLAIN.

(Sir Michael Foster.)

Ordered, by The House of Commons, *to be Printed*,
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1901.

205.

COMMITTEE ON BOTANICAL WORK.

REPORT

TO THE

LORDS COMMISSIONERS OF HIS MAJESTY'S TREASURY

OF THE

DEPARTMENTAL COMMITTEE

ON

BOTANICAL WORK AND COLLECTIONS

AT THE

BRITISH MUSEUM AND AT KEW

DATED

11TH MARCH, 1901.

5086. 750—7/01. Wy. & S.

Copy of a Portion of a Letter from Sir Francis Mowatt, K.C.B., to Sir Michael Foster, K.C.B., M.P.

18329/99.

Treasury Chambers,
1st February 1900.

Sir,

I am directed by the Lords Commissioners of Her Majesty's Treasury to inform you that They have decided to appoint a Committee "To consider the present arrangements under which botanical work is done and collections maintained by the Trustees of the British Museum, and under the First Commissioner of Works at Kew respectively; and to report what changes (if any) in those arrangements are necessary or desirable in order to avoid duplication of work and collections at the two Institutions."

I am to express the hope that you will give Their Lordships the benefit of your services as Chairman of the Committee.

* * * * * *

I am, Sir,

Your obedient Servant,

(Signed) FRANCIS MOWATT.

Sir Michael Foster, K.C.B., &c., &c., &c.

The following appointments were also made at the same time:—The Right Honourable John, Baron Avebury, P.C., F.R.S., and Frederick DuCane Godman, Esquire, F.R.S., as representing the Trustees of the British Museum; with Stephen Edward Spring Rice, Esquire, C.B.; Horace Alfred Damer Seymour, Esquire, C.B.; Professor Isaac Bayley Balfour, D.Sc., F.R.S., Queen's Botanist for Scotland; Francis Darwin, Esquire, M.B., F.R.S., Reader in Botany in the University of Cambridge; and Sir John Kirk, G.C.M.G., K.C.B., F.R.S., constituting the Committee.

Benjamin Daydon Jackson, Esquire, Secretary of the Linnean Society, was afterwards appointed Secretary to the Committee.

REPORT.

The Committee appointed by the Lords Commissioners of the Treasury

> "To consider the present arrangements under which botanical work is done and collections maintained by the Trustees of the British Museum and under the First Commissioner of Works at Kew, respectively; and to report what changes (if any) in those arrangements are necessary or desirable in order to avoid duplication of work and collections at the two institutions."

having met on fourteen occasions, examined eighteen witnesses, and taken into consideration several documents, including those drawn up for their use by the Secretary, bearing upon the subjects referred to them by Their Lordships, beg leave to report as follows :—

Preliminary observations.

The Botanical Department of the British Museum, and the Royal Botanic Gardens, Kew, are, in their primary intention, institutions of widely different characters.

The Botanical Department of the British Museum is a collection of such objects belonging to the vegetable kingdom as can be placed in a museum, and its functions are limited to the uses of such a collection for the advancement of botanic science and for the purposes of giving popular instruction and of exciting popular interest in natural history. It does not concern itself with the applications of botany, either at home or elsewhere.

The Royal Botanic Gardens, Kew, is, in the first place, an organisation dealing with and giving assistance to His Majesty's Government on questions arising in various parts of the Empire in which botanic science is involved. So far it has a distinctly Imperial character. It is at the same time an institution for the prosecution of theoretical botanic research, *i.e.*, of botanic research carried on independent of practical ends, it is a school for advanced horticultural education, it acts as the botanic adviser of the Government on agricultural questions, and as a public garden it affords general instruction and recreation to the people.

The British Museum and the Royal Botanic Gardens, Kew, possess each of them a herbarium or collection of dried plants, together with certain botanic specimens, fruits, woody parts, etc., which cannot be "laid in" in a herbarium as ordinarily understood. For the present purposes, however, in speaking of the herbarium, we may suppose such objects to be included. These herbaria, with the libraries attached to them, are, so far as pertains to the present inquiry, the only collections of a similar character belonging to the two institutions.

The two herbaria having features in common, have nevertheless each special features.

The differences are in part due to the way in which each collection has grown up, as will be seen from the following brief historical statement :—

History of British Museum collections.

Certain botanic collections formed part of the British Museum at its institution in 1753. These were the collections of Sir Hans Sloane, consisting of dried plants, the Sloane herbaria, often spoken of in this report as the pre-Linnean Herbaria, and of woods, fruits, etc. No very large additions seem to have been made to these collections between 1753 and 1820.

The Royal Botanic Gardens at Kew, begun in the middle of the

eighteenth century by the then Dowager Princess of Wales, were very largely developed during the latter part of that century and the beginning of the next by His Majesty George III., with the assistance and advice of Sir Joseph Banks. Though the gardens were the private property of the Crown they were enriched, at the expense of the nation, by the results of various expeditions, and by specimens obtained from the Colonies and elsewhere. The living plants were cultivated in the gardens, the dried plants were retained by Sir Joseph Banks, and thus contributed to form the valuable herbarium known as the Banksian Herbarium. This herbarium Sir Joseph Banks kept at his residence in Soho Square ; but there is some evidence that a duplicate herbarium was kept in the gardens. This latter, however, subsequently disappeared.

At his death in 1820, Sir Joseph Banks bequeathed this Banksian Herbarium, together with his library, drawings, etc., "usually kept in . . ., my house in Soho Square" to his librarian, Robert Brown, for "his use and enjoyment during his life, and after his decease to the British Museum." One condition of the bequest was that Robert Brown should "assist the superintendent of the Royal Botanic Gardens at Kew as he also now does."

The Will provides that the collections might with Robert Brown's assent pass into the hands of the Trustees of the British Museum during Robert Brown's lifetime. In 1827 this transference was made, Robert Brown becoming at the same time an Under Librarian of the Museum, with the additional title of "Keeper of the Banksian Botanical Collections," he having charge of these alone, and not of the other botanical collections.

In 1835 Robert Brown became "Keeper of the Botanical Department," the whole of the botanical collections being placed under his care. The foundation of the botanical collections at the British Museum was thus supplied by the Sloane Herbaria and the Banksian Herbarium, together with fruits, woods, etc. Under Robert Brown and succeeding keepers the botanical collections were increased. The Banksian Herbarium, by the addition of new specimens, was developed into what is now known as the "General Herbarium," the Sloane Herbaria being kept distinct. In 1859 a separate collection of British plants, the British Herbarium, was formed. In 1881, when the Natural History Department was transferred from Bloomsbury to Cromwell Road, the General Herbarium consisted of 509 cabinets of specimens. Since that date large additions have been made ; the number of cabinets is now 1,560, containing 1,673,000 specimens.

History of Kew collections.

After the death of King George III. and of Sir Joseph Banks in 1820 the Royal Botanic Gardens at Kew, remaining a private garden of the Crown under the charge of the Lord Steward, though assisted by the Treasury and the Admiralty, did not for several years undergo any great development. In 1841, however, it ceased to be a private garden of the Crown. The management was transferred to Her Majesty's Commissioners of Woods, Forests, Land Revenues, Works and Buildings, and William Jackson Hooker then Regius Professor of Botany at Glasgow, was made director.

Professor, afterwards Sir W. J. Hooker, brought with him from Glasgow to Kew, and for some years kept in his own residence, a large private herbarium, described at the time as the largest in England, if not in the world. This he continued to increase.

In 1854 Mr. G. Bentham presented to the nation, on certain conditions, his private herbarium, about one-fifth the size of that of Sir W. J. Hooker. This was deposited in a house belonging to the Crown, formerly occupied by the King of Hanover, the use of it being granted for that purpose. In the following year the herbarium of Sir W. J. Hooker, still a private herbarium, was transferred to the same building. In 1865, upon the death of Sir W. J. Hooker, his herbarium was purchased by the State, and this, with the smaller herbarium given by Mr. Bentham, was the beginning of the present national herbarium at the Royal Botanic Gardens. Since the death of Sir

W. J. Hooker large additions have continued to be made to the herbarium; and it now consists of more than 2,000,000 specimens, and is the recognised official depository of all botanic collections acquired through Government expeditions.

Relative value of the two Herbaria.

In a herbarium specimens may be present which are the actual plants made use of in the description of new species by the authors of those species. Such specimens, usually spoken of as "type specimens," have a value of a different order from that of other specimens, and a herbarium may, in general terms, be spoken of as more or less valuable according to the number of "type specimens" which it contains. Owing to its mode of origin the General Herbarium of the British Museum is of special value inasmuch as it contains the "type specimens" of the Banksian Herbarium. It is also of value, though of less value, by reason of the type specimens contained in the collections acquired since 1827; the additions to it since the transference to Cromwell Road contain many "type specimens," but the increase in such specimens has not been proportionate to the general increase. The pre-Linnean Sloane Herbaria are mainly of value for antiquarian or historical researches, and the value of the British Herbarium lies chiefly in the convenience which it offers for all enquiries limited to British plants.

The Herbarium of the Royal Botanic Gardens at Kew has, on the other hand, a special value on account of its being very rich in type specimens of a date posterior to that of the Banksian Herbarium, more particularly of the plants of India and of the British Colonies and Possessions. In all these it is far richer than the Herbarium at the British Museum, so much so that, as a rule, botanists engaged in researches in systematic botany find it profitable to work at Kew in the first instance, visiting the British Museum subsequently.

Duplication of specimens in the two Herbaria.

From the manner in which the two collections have grown up it is natural that very many of the specimens contained in the one collection are exact and undoubted duplicates of specimens contained in the other collection. It may here be noted that the question of "duplicates" is a vexed one among botanists; opinions may vary in respect to a particular specimen, whether it is or it is not a duplicate of another specimen, and may vary as to the extent to which so-called duplicates ought to be retained. But, making every allowance for such difference of opinions, it may with safety be asserted that the two collections contain a very large number of duplicates, which, were the two collections merged into one, could serve no scientific purpose, and would certainly not be retained. The duplication of books in the two libraries which are attached, one to each herbarium, is of course absolute.

The real duplication of specimens between the two herbaria, which seems to have especially increased since the transference from Bloomsbury to Cromwell Road, entails duplication not only of room for housing, and of ordinary menial attendance and caretaking, but also of scientific work and hence of scientific staff. In the case of each collection, every new specimen added has to be examined by a member of the scientific staff, verified or described by him, catalogued by him, and "laid in" by him in its appropriate place in the herbarium; and members of the staff have also between them the further duty of repeatedly examining or supervising the whole collection in order that its efficiency may be maintained. Hence each actual duplicate of the two collections entails, both upon the addition of the specimen to the collection and during its remaining in the collection, a certain amount of scientific work, a certain labour on the part of the scientific staff, which serves no real scientific purpose at all; the duplication is the cause of a scientific waste.

Duplication an argument against maintenance in present form.

The existence of this waste, considered by itself, furnishes an argument against the two collections being maintained as they are maintained at present and in favour of some form of union of the two.

Other arguments for and against union of the two collections.

What other arguments can be adduced in the same sense, and what in a contrary sense? The question may conveniently be put in this form. What are the advantages of maintaining two national botanical collections within a few miles one of the other, each having a separate administration, and each being conducted with the desire to make it as complete as possible? Do these counterbalance the disadvantages of a duplication of work, involving a waste of scientific energy which might be more profitably otherwise employed?

History of previous enquiries into the advantage or possibility of union.

Such a question is not now raised for the first time.

Royal Commission of 1850.

A Royal Commission "to inquire into the constitution and government of the British Museum," appointed in 1847-8 and reporting in 1850, put to Mr. Robert Brown, then Keeper of the Department of Botany, questions relating to the desirability of his (botanical) collections being united with a botanic garden such as that at Kew. Mr. Robert Brown was of opinion that such a step was not desirable, basing his opinion on the distance of Kew, on the absence from the gardens of an adequate library, and on the slight advantage to botanic researches carried on in a herbarium of a connection with a botanic garden.

Sub-Committee of Trustees of 1858.

In 1858, upon the death of Mr. Robert Brown on the 10th of June in that year, the Trustees instituted an inquiry, by means of a sub-committee, as to "whether it may be expedient or otherwise to remove the botanical collection from the Museum, as it presents a case in some degree peculiar." The sub-committee heard the evidence of Sir W. J. Hooker, Dr. J. D. Hooker, and Dr. Lindley in favour of the removal, of Mr. G. Bentham in favour of moving the Banksian Herbarium only, of Professor Owen that the removal of the botanic collections would not be any material disadvantage to the other great natural history collections, and of Dr. Falconer, Sir Charles Lyell, and Professor Henfrey against the removal. The sub-committee, partly influenced by the conflict of opinion among the witnesses, and partly, if not chiefly, by the fact that the herbaria and library at Kew were largely private property and by the want of accommodation there, reported against the removal.

Memorial to Chancellor of Exchequer in 1858.

Towards the end of the same year a memorial signed by nine eminent Zoologists and Botanists was presented to the Chancellor of the Exchequer urging upon Her Majesty's Goverment the recommendation that the whole of the Kew Herbarium, a large portion of which was at that time private property, should become the property of the State, that the Banksian Herbarium and the fossil plants at the British Museum should be transferred to Kew, and that suitable accommodation should be made for the national scientific museum of botany so formed.

Select Committee of House of Commons of 1860.

In 1860 a Select Committee of the House of Commons appointed to consider the separation of the Natural History Collections from the rest of the British Museum, incidentally received evidence relative to the removal of the botanical collections to Kew, but in its Report merely points out the relatively small needs of the Keeper of Botany.

Devonshire Commission of 1871-1875.

In 1871 the important Commission on Scientific Instruction and the Advancement of Science generally known as the Devonshire Commission was appointed. The fourth Report of the Commission presented in 1874, and dealing with the British Museum as a whole, discusses at length proposals for dealing with "the Botanical Establishments now maintained at the expense of the State, the one at the British Museum, the other in the Royal Gardens at Kew," concerning which it had received much evidence.

Par. 47.

It says "the evidence which has been laid before us leaves us no alternative but to recommend that these two Botanical collections . . . should not be merged into one, but that both be kept in a state of efficiency, and that the special scientific direction which each has spontaneously taken should be

Par. 52.

retained." The special direction here referred to is in the case of Kew that of systematic botany, in the case of the British Museum that of botanical palæontology. The Commission were also impressed with the desirability

of having in the British Museum "a geographically arranged collection as the complement of the purely systematically arranged collection at Kew." Par. 54.

The Commission accordingly recommended

VI. That the Collections at the British Museum be maintained and arranged with special reference to the geographical distribution of plants and to palæontology, and that the collections at Kew be maintained and arranged with special reference to systematic botany. Page 23.

Recommendations of Devonshire Commission not carried into effect.

This recommendation has not been carried out. The Department of Botany of the British Museum has not been developed in the direction of botanical palæontology. The collections of fossil plants are not under the charge of the Keeper of Botany, but are under the charge of the Keeper of Geology. The general herbarium is not arranged geographically, but systematically; indeed it is actually less geographically arranged than is the herbarium at Kew, since in the latter, species within each genus are arranged geographically, whereas in the former a systematic arrangement is maintained to the end. Except for this geographical feature of the Kew Herbarium and for the fact that each herbarium contains "type specimens," which the other does not, the two herbaria may be considered as duplicates one of the other. The objects which the Devonshire Commission had in view when it recommended the maintenance of both establishments have not been attained.

Union of the two herbaria repeatedly suggested.

The question of the union of the botanical collections of the British Museum and of Kew has thus been raised again and again. Each time the question has been decided in the negative, though not always for the same reason; and the fact that the question has from time to time been raised anew may be taken as indicating either that the circumstances affecting the question have from time to time changed (which is the case), or that the previous decision did not appear to be based on convincing grounds. It is to be noted also that union at Kew has been most usually suggested, not union at the British Museum.

We may now consider the arguments for and against union of the two herbaria which have been submitted to us:—

Union must promote better research.

The first and chief function of a national herbarium is to serve as an adequate instrument of botanic research. Evidence has been brought before us that the two herbaria would perform this function far better if brought together than they do in their present separated condition. All botanists seem to agree on this point. Not only is research hindered by the inconvenience and waste of time involved in consulting first one herbarium and then the other, but we are assured that enquiry thereby suffers a greater injury than mere hindrance; by not being able to consult all the specimens available for study at the same time and in the same place the investigator is apt to be led into errors which would be avoided were the two herbaria united. The requirements of research point most distinctly to the desirability of uniting the two herbaria.

Arguments for separation.

Various arguments, however, have been presented to us in favour of maintaining the two herbaria separate in the interests of research.

It has been urged that since the two collections "are to a considerable extent in duplicate," nothing could be gained by bringing them together. An adequate reply to this is furnished by the consideration urged at the very beginning of this report, that the very large duplication involves an undesirable waste of scientific energy, and, it may be added, of public money.

Risk of fire an argument for a fire-proof building.

It has been urged that the risks arising from fire are lessened; if one herbarium were burnt, the other would still remain. This argument really applies to type specimens only, for other specimens might be replaced; but it does not hold good for these, since if Kew were burnt, type specimens, not existing at the British Museum, would be lost and *vice versa*. We cannot attach much importance to this argument. The one conclusion to

be drawn from the dangers of fire is that every precaution should be taken to make every herbarium building fire-proof; and we desire to call attention to the urgency of this at Kew.

Supposed difference in aim and result of the two herbaria non-existent.

It has been urged that the two herbaria represent the results of the study of plants from two different points of view and that their objects are fundamentally different. This appears to rest on a misconception of the facts; it seems to us that the methods and aims of the scientific study of botany are identical in the two places. The scheme of differentiation suggested by the Devonshire Commission has not been carried out, and none other has been introduced or even suggested.

Rivalry between the two injurious rather than beneficial.

It has been urged that the existence of the two establishments promotes a healthy spirit of rivalry, through which each is spurred to greater scientific activity. That a spirit of rivalry is promoted and does exist seems to be beyond question; but whether that rivalry and competition have produced beneficial effects may well be doubted. We do not, in this respect, lay much stress on the fact that the two establishments, by bidding against each other in the purchase of collections, unnecessarily increase the expenditure of public money. This may take place to a certain extent, but even at the most it is of no very great moment. A more serious evil is the following. Though naturally no very definite statement has been made to us, indirect indications clearly show that the rivalry between two establishments so very similar, each desirous to be recognised as the national botanical establishment, has led and is leading to the existence of what might be called an *odium botanicum* very prejudicial to the best interests of botanical science. So far from regarding the spirit of rivalry in question as an argument in favour of maintaining the two herbaria distinct, we are inclined to look upon it as a strong argument for union.

Views of the Trustees as to union.

The views of the Trustees of the British Museum on the subject of the union of the two herbaria are contained in their letter to the Treasury of the 12th July, 1899 (App. III., n. 11); to this, we have ascertained, they have nothing to add. We observe, however, that they make no reference either to the intrinsic increase of efficiency which must arise from the amalgamation of two institutions and staffs now doing the same work, or to the scientific advantage of having type specimens collected under one roof instead of two. Their views on other points do not appear to us to be supported by the evidence which we have had before us.

Union of the two herbaria is from every point of view desirable.

Taking so far as we have been able everything into consideration, and regarding the question from the point of view of the main purpose for which the two collections are maintained, namely, that of botanic research, and therefore dealing in the first instance in the case of the British Museum with the General Herbarium only, we have come to the conclusion that it is desirable that the two herbaria should be united into one.

Supposing union desirable, the question arises, shall the united herbaria be placed at Kew or at the British Museum?

Kew Herbarium and library cannot be moved.

The evidence of the Director of the Royal Botanic Gardens shows that the use of the Herbarium and Library there is not, as was urged by some in former inquiries, merely for the adequate naming of the plants cultivated in the garden. It is the centre of all the varied activity, Imperial and other, of the place. If it were removed or even seriously diminished, "the work of the establishment would be paralysed." The exposition of the work carried on in the Royal Botanic Gardens which has been laid before us by the Director, and the references made to it by various witnesses, can lead to no other conclusion than that any step which would injure the present activity of the Royal Botanic Gardens at Kew would be a false step; the Herbarium must not be removed from Kew.

British Museum Herbarium could be moved without injury.

On the other hand, so far as the British Museum itself is concerned, the evidence laid before us goes to show that the other Departments of the Museum would at least not suffer material injury by the removal of the General Herbarium. That Herbarium is, at the most, very rarely consulted

by the Staff either of the Zoological or of the Geological Department, though the knowledge of the botanic staff is occasionally made use of by means of personal intercourse. (The questions relating to the fossil plants and the question whether, supposing the General Herbarium removed, any botanical collections, and if so what, should be maintained, will be considered separately later on.) The Director of the Natural History Departments is of opinion that the Zoological Department would not suffer by the removal of the Herbarium, but would be a gainer by reason of the space thus set free.

Ideal "Unity of Nature" at Cromwell Road is a chimera.

It may be urged, and indeed has been urged, that the Natural History Museum is in idea a museum of objects of all the three branches of Natural History, of beasts, plants and stones, and that the removal of the plants would be a mutilation. To this may be replied that, on the one hand, there is no national zoological collection other than that at Cromwell Road, and the same holds good as to a national geological, or rather palæontological, collection (for the collection at the Museum of Practical Geology in Jermyn Street is not a national collection of objects gathered from all parts of the world, as are the British Museum collections, but a special collection brought together in order to illustrate the geological survey of Great Britain), and also as to a national mineralogical collection; while, on the other hand, the Royal Botanic Gardens at Kew do constitute a national botanical collection. Hence, unless the herbarium were removed from Kew to the British Museum, the maintenance of the botanic collection at the British Museum involves, what is not involved in respect to the other collections, the maintenance of two national collections. It can hardly be contended that two national collections should be maintained in close proximity merely to satisfy the idea of what a Natural History Museum ought to be.

Passing from the two establishments themselves to those who make use of them for the purpose of research, the question arises, which situation, Kew or Cromwell Road, is the better one in the interests of botanic enquirers.

Relative convenience of Kew and British Museum to enquirers.

The evidence laid before us shows that to a professional botanist who is engaged in a prolonged and continuous inquiry, involving the whole or the greater part of his time, the two sites are equally convenient. We have, however, evidence that for certain botanic enquiries Cromwell Road, as being nearer to the centre of London, is the more convenient. Occasional limited enquiries, more particularly perhaps in respect to British plants, are often carried on by men engaged in other occupations, who can only spare a short time to consult a herbarium. It is urged that a man for instance engaged in business in the City, or coming up to London from the country for a day, can find time to run down to Cromwell Road, but could not find time to get as far as Kew.

Enquiries of this kind ought certainly not to be discouraged; but the inconvenience which such enquiries might suffer owing to the transference of the herbarium from the British Museum to Kew, ought not, in our opinion, to have great weight in deciding the question of removal. It may be added that the facilities of reaching Kew from any part of London are increasing so rapidly, that probably within a short time this argument would cease to have any weight at all. Moreover to enquiries of the kind under consideration, which often consist in the effort to determine the name of a plant, the proximity of the herbarium at Kew to the collection of living plants in the Gardens, is a counterbalancing advantage of some importance. Botanists of the older school, it is true, have more than once insisted that the systematic botanist working in a herbarium has no need to consult living plants; but with regard to certain groups of plants, the advantages of being able to consult a botanic garden are unquestionable.

Relative expenses of removal of the collections to one or other site.

There remains the question of the expense of removal to the one site or to the other. We have not obtained, and indeed have not sought for, any exact estimates, but it is possible to make certain general statements.

Relative cost of new buildings.

The removal of the Herbarium from Kew to the British Museum, even taking into account the mode of increasing the accommodation suggested by Mr. Carruthers, would entail new buildings, and these, from their necessary architectural features as an extension of the present building, would be very expensive.

At Kew, on the other hand, the circumstances are such that a building constructed simply to fulfil the purposes of a herbarium, without any pretensions to special architectural features, might be erected at a very moderate expense.

Does absolute cost of removal justify union ?

The question of expense is not, however, a relative one only ; it ought to be regarded as an absolute one. We have to consider whether the expense entailed by the union might not be so great that the union of the two herbaria, in spite of the advantages which it offers, would be unjustifiable.

That expense will depend not only on the site, but also on the mode of union.

Methods of union.

Three methods of union have been suggested to us :—

1. Incorporation sheet by sheet.

1. By incorporation of the two herbaria sheet by sheet. This would be the most complete method, but at the same time the most prolonged and expensive, since the sheets at Kew are smaller than those at the British Museum ; the one would have to be cut down or the other enlarged. Besides, the elimination of duplicates, a work requiring very great care and judgment, would have to be carried on *pari passu* with the incorporation.

2. Contiguity of cabinets.

2. By contiguity of cabinets. By this method the two herbaria should be placed in one building, but the present cabinets of the one and of the other retained and so arranged that the Kew cabinets and the British Museum cabinets containing specimens belonging to the same groups should be placed side by side.

3. Contiguity of buildings.

3. By contiguity of buildings. That is to say the two herbaria should be kept in buildings distinct, but placed so near to each other that access from the one to the other would be easy.

Neither of the latter methods presents any very great difficulties ; neither of them would be prolonged or entail any very great expense ; either of them would allow of the elimination of duplicates being carried on gradually as opportunity might offer.

No opinion offered as to method of union.

We do not offer an opinion as to which method of amalgamation should be adopted. The selection of the best method may be left for further enquiry and consideration, but we may state that in our opinion the union of the herbaria might be effected at Kew, by a method involving an expense so moderate as not seriously to counterbalance the scientific advantages promised by the union, and that this method should be adopted.

Union at Kew recommended.

Taking, then, into consideration all the various arguments which have been adduced on the one side and on the other, we have come to the conclusion that statutory powers should be obtained for the transference of the general herbarium of the British Museum to Kew, accommodation for it and for the present herbarium at the Royal Botanic Gardens, Kew, being provided there.

Sloanean and other pre-Linnean herbaria.

Besides the General Herbarium, the British Museum possesses the Sloane collections and other pre-Linnean herbaria.

It has been urged by some witnesses that these being mainly of historic or antiquarian value should be retained at the British Museum, as being near to the Departmental Botanical Library, which is at present maintained there, and also not far from the National Library at Bloomsbury. The proximity of the Linnean Herbarium, now in possession of the Linnean Society at Burlington House, has been brought forward as a similar reason.

Historic herbaria should not be separated from the General Herbarium.

But it seems only natural that the Sloane Herbaria should as heretofore go with the Banksian Herbarium, which forms the nucleus and perhaps the most valuable part of the General Herbarium. And in respect of the

advantage of such historic herbaria being in close proximity to a library containing old botanic books, it may be remarked that if the General Herbarium is removed to Kew the chief reason for maintaining a Departmental Botanic Library at the British Museum is done away with, and the main part of the Library should follow the Herbarium to Kew. And indeed it might be further urged that steps should be taken to ensure that the National Botanic Establishment, such as Kew would then be, should be the seat of a Botanic Library as complete as possible.

Historic collections belonging to the Linnean Society.

In respect to the Linnean Herbarium, its retention in so isolated a manner by the Linnean Society would become a still greater anomaly than it is at present if the Sloane Herbaria were removed to Kew, and the same may be said of the collection of the East India Company (including the Wallichian types) also in possession of the Linnean Society. It may fitly be urged that the State ought to become the owners of the Linnean Herbarium and other historic collections now the property of the Linnean Society, if that Society could be induced to part with them, in which case they too should be transferred to Kew.

The British Herbarium at the British Museum.

There remains to be considered the British Herbarium. This is the only example of that geographic arrangement which was recommended by the Devonshire Commission as being one of special directions in which Botany at the British Museum ought to develop, and it existed antecedent to that Commission. This is a herbarium of a special character with a corresponding value. Specimens of plants found in Great Britain and Ireland are not placed in the General Herbarium; they are collected together in this British Herbarium. The British Herbarium like the General Herbarium is for the purposes of research, and can only be consulted by investigators, not by the general public.

It should not be left alone.

The objections which were referred to above as being urged against the removal of the General Herbarium to Kew on account of the distance of Kew from the centre of London, apply more closely to the British Herbarium. It is this which is most frequently consulted by the busy man spoken of above. But as we said above we cannot attach great weight to these objections; and obviously if all the rest of the herbaria are transferred to Kew the British Herbarium must go too; it could not be left alone at the British Museum.

Proposed alteration in control.

In thus recommending the transference to the Royal Botanic Gardens at Kew of so large a portion of the botanic collections at present at the British Museum, of all that portion in fact which is used for scientific research, we are recommending a course of action of a very grave nature. We are aware of the gravity of the recommendation.

Relations of the respective governing authorities.

We have to consider whether the herbaria thus united at Kew should, as part of the Gardens, continue to be administered by the First Commissioner of Works, either as heretofore, or with the introduction of some supervision or control on the part of the British Museum, or whether they should be administered by the Trustees of the British Museum, either as at present constituted, or with some modifications in the management of the British Museum. In the latter case we have further to consider the relations of the First Commissioner to the British Museum as regards the administration of the herbaria.

Different relations of the two herbaria to their surroundings.

From the evidence laid before us by the officials of the British Museum on the one hand, and by the Director of the Royal Botanic Gardens, Kew, on the other, it is clear that the relations of the Herbarium at the British Museum to the rest of the Museum are very different from those of the Herbarium at Kew to the rest of the Gardens. The Herbarium at the British Museum is solely an instrument of scientific research; its transference to Kew would not diminish, but rather increase, its scientific usefulness, and would not seriously, if at all, interfere with the scientific usefulness

of the rest of the Museum. The Herbarium at the Royal Botanic Gardens, Kew, is no less an instrument of scientific research, but it is also an instrument of economic and commercial scientific work of Imperial moment: and the latter use of it is so interwoven with the varied functions of the Gardens, that the administration of the herbarium is inseparable from the general administration of the whole establishment in its scientific aspect. The herbarium cannot be separated from the rest of the Gardens and placed by itself under the control of the Trustees of the British Museum; if it is so placed, the whole of the establishment in its scientific aspect must be so placed.

Relations of Kew to various Government Departments.

At present the resources of Kew are at the immediate disposal of the important Government Offices, Colonial, India, and Foreign. Were Kew placed under the Trustees of the British Museum, unless their control were a merely nominal one, a thing in itself most undesirable, the demands of these Government Offices on the resources of Kew would be subject to the control of the Trustees, a situation fraught with difficulties and dangers. Nor can we conceive of any change in the constitution of the trusteeship, such as the direct representation of the said Government Offices on the Board of Trustees, which would adequately safeguard these dangers, and at the same time be practicable.

The Trustees having control of the Gardens would raise difficulties.

Again, unless the Trustees of the British Museum took over the control of the Gardens as a place of public resort, a step open to the most grave objections, the position of the First Commissioner and his relations to the Trustees would be subject to even greater difficulties.

We cannot, therefore, recommend the latter of the two alternatives under consideration.

On the other hand, supposing that the Royal Botanic Gardens continued to be administered by the First Commissioner, it does not seem desirable that the collections at the British Museum should be transferred to the Royal Botanic Gardens, Kew, without some change in the organisation of the Gardens such as would give the Trustees some voice in the administration of those collections after the transference. We believe, moreover, that such a change as would bring about a definite connection between the British Museum and the Royal Botanic Gardens would be for the benefit, not only of the collections at Kew, but also of botanic science as a whole. And we shall have something further to say as to the advantages of such a connection in respect to the other collections of the British Museum when we come to deal later on with the remaining botanic collections at the British Museum.

Advisory Board

Further it must be borne in mind that, as has been urged by the present Director, the functions of the Royal Botanic Gardens have never been defined by any official statement beyond the Treasury Minute of 24th July 1872; that the present duties of the Director have gradually grown up through demands made by the several departments of Government and the public, owing to the Royal Botanic Gardens being the only source of trustworthy advice and information on applied botanic science. And we are of opinion that a change of such a character as, while not interfering with the present arrangement by which the First Commissioner is directly responsible for the administration of the Royal Botanic Gardens at Kew, would make provision in respect to the scientific functions of the Gardens of a more definite character than any at present existing, would, quite apart even from the present question, place the whole administration of the Gardens in a more satisfactory position.

Representation of the Trustees on the Board.

We have, therefore, come to the conclusion that the united herbaria should not be placed under the Trustees of the British Museum, but should form part of the Royal Botanic Gardens, Kew, subject to some such change in the administration as we have just indicated. We believe that the objects we have in view in recommending such a change might be secured if, while the relations of the First Commissioner to the Buildings and to the Gardens as a place of public resort remained as heretofore, there were established a Board or Council on which the Trustees of the British Museum should be

adequately represented, to advise the First Commissioner of His Majesty's Works or the Director of the Royal Botanic Gardens, Kew, on all questions of a scientific nature arising out of the administration of the Gardens.

We therefore recommend the establishment of such a Board.

Representation of Government Departments on the Board.

In view of the continued and large assistance which is given by the Royal Botanic Gardens to the Colonial Office, to the Foreign Office in respect to the several British Protectorates, and to the India Office, we suggest that one member of the proposed Board should be nominated by each of His Majesty's Secretaries of State for the Colonies, for Foreign Affairs, and for India.

Proposed constitution of the Advisory Board.

On the view that the number of nine would be most desirable for the total number of members, we suggest that to the above-mentioned three there be added three members nominated by the Trustees of the British Museum, two by the Royal Society, and one by the Crown. Further, since the collections at the British Museum are as a matter of fact administered by the Standing Committee of the Trustees rather than by the whole body, we recommend that the nomination of the three members of the proposed Board should be placed directly in the hands of the Standing Committee.

Duties of the Board.

The powers and duties of such an Advisory Board, as we would propose to call it, should, we think, as also the relations of the Director (who should, we are of opinion, always be a man of adequate botanical eminence) on the one hand to the Board, and on the other hand to the First Commissioner of Works, be defined by Treasury Minute :—

We are of opinion that some such regulations as the following should be contained in such a Treasury Minute :—

Annual meeting.

1. There shall be an annual meeting of the Board, at which shall be laid before it a report by the Director addressed to the First Commissioner on the scientific work carried on at the Royal Botanic Gardens under his directions during the preceding year, and also on the scientific work in progress and in prospect.

Report of annual meeting.

2. The Board shall make to the First Commissioner a report of the proceedings of the annual meeting, and shall furnish the Director with a copy of that Report.

Meetings other than annual.

3. The First Commissioner shall have power to summon a meeting of the Board at any other time that it may seem to him desirable to do so, and it shall be his duty to summon such a meeting when required to do so by a requisition in writing signed by any three members of the Board.

Appointment of chairman.

4. One member of the Board shall be appointed by the Crown to act as chairman of the Board. In his inability to attend a meeting of the Board the chairman shall appoint another member of the Board to act as his deputy.

Scope of work.

5. The Board shall have power to make representations to the First Commissioner on any question connected with the scientific work of the Royal Botanic Gardens.

Power of reference.

6. The First Commissioner shall have power to refer to the Board for advice thereon any question connected with the Royal Botanic Gardens.

Director of Kew to be summoned to meetings.

7. The Director shall receive a summons to attend each meeting of the Board.

Official adviser on botanic questions.

We may add that in our opinion it would be desirable that the Director of the Royal Botanic Gardens, Kew, should be recognised as the official adviser to His Majesty's Government on all questions involving botanic science.

The public exhibition at the British Museum.

We have now to deal with an aspect of the botanic collections of the British Museum on which we have not yet touched. So far we have been considering those collections as an instrument of scientific research ; but

they have in addition, more especially since the transference from Bloomsbury to Cromwell Road, served another purpose. Like the Department of Zoology the Department of Botany under the guidance of the Keeper has instituted and developed an exhibition of botanic objects calculated to excite popular interest and to impart popular instruction in the phenomena of the vegetable world. The exhibition so formed has also been found to serve as an instrument of education to students of botany and as a useful adjunct to the equipment of teachers in London. The botanic collections in fact consist of two distinct parts—firstly, the herbarium to which the general public is not admitted, which is exclusively an instrument of scientific research; and secondly, the popular and illustrative collection displayed in the gallery to which the general public is freely admitted; some objects serving a like purpose are also exhibited in the Central Hall.

Functions of a popular botanic exhibition.

We have already come to the conclusion that the first-named botanic collections which serve for research should be transferred from the British Museum to Kew. We have now to consider what course should be recommended in respect to the second, the popular and illustrative botanic exhibition. In doing so we may assume without discussion that a national botanic collection, paid for by the State, ought to serve the purpose of exciting popular interest in and of spreading among the people a knowledge of the vegetable kingdom.

Popular exhibition at Kew.

In considering this question we have to bear in mind the facts that at Kew the collection of living plants already serves such a purpose among others, and that the Economic Museums at Kew form in part also a popular exhibition. The installation at Kew of a popular illustrative botanic exhibition similar to that existing in the public gallery at the British Museum would be a legitimate continuation of the work already done at Kew. And the value of such an exhibition as a means of developing botanic knowledge among the people would be increased by its being placed in contiguity with the living plants. Indeed, we recommend that steps should be taken, as opportunity offers, in this direction.

Reasons for maintaining the public exhibition at Cromwell Road.

But we do not think that such a popular exhibition at Kew should be substituted for the exhibition at present existing at the British Museum. On the contrary, led by the following considerations, we have come to the conclusion that this should be maintained. In the first place, the argument based on the distance of Kew from the centre of London, though not having, in our opinion, an importance in reference to research, does seem to us to be very strong in reference to an exhibition intended for the general public. We believe that it would be a serious evil if the opportunities for learning something about the vegetable kingdom, which are now placed before the visitors to the British Museum, were done away, and such opportunities were open only to those able to make the longer journey to Kew.

Juxtaposition of animal and plant life illustrations desirable.

In the second place, we think it of great importance that in an exhibition intended to awaken popular interest in science, illustrations of vegetable life should accompany illustrations of animal life; the two should be found together in the same building. In this respect we recognise a fundamental difference between collections intended for research and collections intended for popular illustration.

Botanic specimens needed for biological exhibitions in the Natural History Museum.

It is true that so far as research is concerned the co-existence in the same building of collections of dried botanic and zoologic specimens affords no marked, or indeed appreciable, help towards the solution of problems which concern both animals and plants, problems that is of general biology; since these problems are as a rule not problems for the solution of which a herbarium and a zoologic museum constitute the chief means of enquiry; they are, as a rule, problems which have to be worked out on living specimens. Yet so far as popular instruction and popular illustrations are concerned, a museum which has the title of Natural History Museum ought in its popular exhibitions, to illustrate not merely the phenomena and

problems of animal life, but those of life in general, vegetable as well as animal.

Retention of botanic exhibition at Cromwell Road.

Therefore, while we have argued against the view that a Natural History Museum ought to contain the collections needed for botanic as well as zoologic research, we are nevertheless prepared to recommend that such a museum should contain a botanic as well as a zoologic illustrative collection. And it is hardly necessary to remark that the arguments brought forward against duplication in respect to scientific work do not apply to popular exhibitions. Within certain limits the multiplication of such exhibitions is all to the good.

Influenced by these considerations we recommend that the popular exhibition at present existing at the British Museum should be maintained. Indeed we are of opinion that it may with profit be considerably developed.

The Public exhibition to be kept supplied from Kew.

The care, maintenance, and even the extension of such a popular exhibition is not, in our opinion, rendered difficult by the removal from the British Museum of the collections used for botanic research. On the contrary, if the recommendations to which we have been led as necessarily following upon the removal of those collections, namely, a formal connection between the British Museum and the Royal Botanic Gardens be adopted, they will be rendered easier; the ample resources of Kew will be fully available for the maintenance of the popular exhibition at the British Museum. The collection of British plants displayed at present in the public gallery, which is one of the most striking and useful parts of the popular exhibition, could for instance be replenished whenever necessary by supplies from Kew, and so in other instances. But it is not necessary for us to enlarge on these details.

The future of the present staff.

On a matter of administration, however, we desire to make a distinct recommendation. The removal of the research collections from the British Museum to Kew will necessitate a modification of the staff of what is now called the Botanical Department. It will be no longer necessary to maintain the Keeper of Botany or the assistants, since their duties will in the main have ceased. We do not propose to make in reference to these any recommendations. The action to be taken in respect to them must be left for future consideration; we will only remark that, though as we urged in the beginning of this report the union of the two research collections will be a saving in scientific labour, the enlargement of the Herbarium at Kew, which will result, will necessitate an increase of the staff there.

Staff needed for the public exhibition.

The retention of the popular botanic exhibition at the British Museum will, however, render necessary the appointment of an officer to take charge of it, and of subordinates to assist him. We are of opinion that if such an exhibition is to have the value which we look to its having, and for the sake of which we have recommended its retention and further development, the officer in charge of it should be a man of considerable, and indeed, perhaps, of special scientific attainments. We therefore recommend that such an officer be appointed, with a status and emolument not less than that of an assistant keeper, that he be provided with such assistance as may be necessary, and that he have an independent position, except so far as to be responsible to the Director of the Natural History Departments.

The fossil plants at the British Museum.

The British Museum contains botanic collections other than those which we have hitherto considered, namely, the fossil plants. Concerning these we have received conflicting evidence. On the one hand, we have been told that from the point of view of scientific research the interest and value of fossil plants is greater to the botanist than to the geologist, and this has afforded a reason for transferring them as well as the herbaria to Kew; to this may be added the further reason that, in many respects at least, for the study of these fossil plants access to living plants is especially useful.

The fossil plants are not in the Department of Botany, but in that of Geology.

On the other hand, it must be remembered that the fossil plants which are preserved in the British Museum are with some few exceptions placed in, and regarded as belonging to, the Department, not of Botany, but of Geology, and it has been stated to us that the removal of the fossil plants to Kew would mean a dismemberment of the geologic collection. It must be borne in mind in reference to this question that the Geological Department of the British Museum is not in the ordinary sense a geologic collection, that is, one having relation to what is called stratigraphic geology; it is essentially a palæontologic collection. And it is by reason of this nature of the collection that fossil plants are placed in the collection together with the fossil animals. The position of palæontology in the scientific hierarchy is a peculiar one. It is often ranked as a separate science; and yet from one point of view, one namely which does not regard the geologic side of the matter, it appears as a mixture of zoology and of botany.

No recommendation regarding fossil plants made.

From the standpoint of botany it would be satisfactory were the National Botanic Collections at Kew completed by the inclusion of the fossil plants; but we feel that considering the circumstances in which the fossil plants are housed at the British Museum, we should in a certain sense be going beyond our instructions, and be taking up a definite attitude towards palæontology, if we were to recommend that fossil plants, being botanic specimens, should, together with the botanic collections, be transferred from the British Museum to Kew. We therefore make no recommendation concerning the collection of fossil plants.

Botanic gardens as necessary (or more so) for study of fossil plants as a herbarium.

One point, however, does require to be dealt with. The former Keeper of the Department of Botany in the British Museum, Mr. Carruthers, stated before the Devonshire Commission his opinion that a complete herbarium is essential to the study of fossil plants; indeed he went so far as to state that a more complete herbarium was needed for the study of palæo-botany than was needed for the conduct of a botanic garden, and he assures us that he is still of the same mind. But we have failed to find any adequate corroboration of Mr. Carruthers's views. Nor indeed have we been able to find reasons for thinking that supposing the fossil plants to be retained in the Department of Geology at the British Museum, any herbarium at all ought to be retained to assist in the study of these plants. The students of these plants are not very numerous and they are nearly all botanists. While it is true that in their studies they have to take account of outward forms, and in respect of this, have to consult or are assisted by consulting, herbarium specimens, it is no less true that they also, and indeed no less, have to take account of internal structure, and for this purpose have to consult living plants. Hence for the complete study of fossil plants, access to a botanic garden, or to some collection of living plants, is no less necessary than to a herbarium. We cannot see that the separation of the fossil plants at the British Museum from a herbarium, which would be the result of the proposed removal of the present herbarium, without any other herbarium being placed in its stead, is a greater evil than the present separation of those fossil plants from all collections of living plants. Indeed the argument that the national collection of fossil plants should be placed at Kew, is at least as strong as the argument that a herbarium should be provided for them at the British Museum.

A collection of fossil plants might be made at Kew.

The conclusion at which we arrive from the peculiar relations of the study of fossil plants is rather that, notwithstanding the retention in the interests of palæontology at the British Museum of the fossil plants now there, no obstacle should be placed in the way of forming a collection of fossil plants at Kew in the interests of botany.

Changes at Kew in consequence of the transference.

The transference we recommend of the botanic collections from the British Museum to Kew would necessitate, as we have already said, some changes at Kew, including an increased expenditure both upon the Herbarium and upon the Museums, and perhaps incidentally elsewhere. The amount of this and the method of its allocation must, as we have also

said, be left for future determination. But we feel justified in making the following recommendations :—

Special arrangements for naming of plants to be made.

Though it is part of the work of the staff at Kew to identify and to name plants sent to them for the purpose by private individuals in this country and elsewhere, we have it in evidence that a large amount of the same work is done at the British Museum. That the union of the two collections at Kew should in any way render it more difficult for anyone to get a plant identified and named, would be a result much to be regretted. It is only right that the public should derive freely such a benefit from money voted for botanic purposes; and such a naming of plants is a powerful means of stimulating general interest in botanic science. We are, therefore, of opinion that special means should be taken so to develop this side of the work at Kew, that after the proposed union has taken place, it will, if possible, be even easier than at present, for anyone who wishes to have a plant identified and named, to get his wish fulfilled.

An expert in British botany to be appointed.

Special interest is naturally attached to the botany of British plants, and since its formation the British Herbarium at the British Museum has proved itself to be of special value. We are of opinion that this British Herbarium, when transferred to Kew, should be kept separate from the General Herbarium. Further, seeing that we have in evidence indications of the want felt by those interested in British botany of the skilled assistance of some officer in the national collection specially qualified to give such assistance, we are of opinion that arrangements should be made at Kew by means of which such assistance may be given.

A British Herbarium so administered would nevertheless be not a popular exhibition, but an instrument of botanic research. We suggest rather than recommend that possibly it would be desirable to establish other geographic herbaria, not as popular exhibitions, but as means of research.

We accordingly recommend

Recommendations

1. That the whole of the botanic collections at the British Museum now administered by the Keeper of the Department of Botany under the Trustees, with the exception of the collections exhibited to the public, be transferred to the Royal Botanic Gardens, Kew, and placed in the charge of the First Commissioner of His Majesty's Works and Public Buildings under conditions indicated below, adequate accommodation being there provided for them.

2. That a Board, on which the Trustees of the British Museum, the Royal Society, and certain Departments of His Majesty's Government should be directly represented, be established in order to advise on all questions of a scientific nature arising out of the administration of the Gardens, the powers and duties of the Board, its relations to the First Commissioner and to the Director, as well as the position of the latter and the functions of the Gardens, being defined by Minute of the Lords Commissioners of His Majesty's Treasury.

3. That the illustrative botanic collections now publicly exhibited at the British Museum be maintained, and, so far as it is possible and expedient, enlarged and developed with the view of increasing popular interest, and imparting popular instruction in the phenomena of the vegetable world, and be placed under the charge of an officer of adequate scientific attainments, responsible to the Director of the Natural History Departments.

4. That upon the transference of the botanic collections from the British Museum to the Royal Botanic Gardens, such arrangements be made both in respect to the accommodation of the collections and the staff administering them, that they shall fully serve the purposes which they have hitherto served.

5. That the botanic collections consisting of fossil plants, now in the charge of the Keeper of the Department of Geology in the British Museum, be maintained for the present under the same conditions as heretofore.

We desire to express our warm appreciation of the valuable services which have been rendered to us by the Secretary, B. Daydon Jackson, Esq., Secretary of the Linnean Society. Not only has he performed his duties as Secretary with great zeal and ability, but also throughout the inquiry we have repeatedly derived great assistance from his very intimate acquaintance with the botanic collections under our consideration, as well as from his wide knowledge of botanic science and literature.

(Signed) M. FOSTER.

JOHN KIRK.

ISAAC BAYLEY BALFOUR.

FRANCIS DARWIN.

F. D. GODMAN.

HORACE SEYMOUR.*

STEPHEN E. SPRING RICE.

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* Subject to dissent from the second recommendation of this Report, as expressed in the following paragraphs.

We regret that we are unable to agree with our colleagues as to the advisability of creating a new advisory Board. If we were starting *de novo* it seems obvious that the whole of the National biological collections in and near the metropolis would be placed under one management. The Trustees of the British Museum are established by statute, and are partly selected, and partly *ex officio* members, more than one third being high Ministers of State. Those to whom the active duties of management and superintendence are entrusted possess special knowledge in the various subjects illustrated by the collections, and they appear to us to be more fitted both by their experience and their position in the scientific and cultured world to be the governing body of the amalgamated botanic collections at Kew than any other that can be built up in their place. If those collections form part of the British Museum, the Director at Kew would become an officer of the Trustees in the same manner as is the Director of the Museum at South Kensington.

It is true that in the Report it is stated, "Were Kew placed under the Trustees of the British Museum, unless their control were a merely nominal one, a thing in itself most undesirable, the demands of the Colonial, India, and Foreign Offices on the resources of Kew would be subject to the control of the Trustees, a situation fraught with difficulties and dangers." This assertion does not appear to us convincing. No example is quoted of these difficulties, the dangers are not indicated. It is far from clear why one controlling authority is more likely to produce them than a lay authority and a scientific authority with an advisory Board interposed as a buffer between them. It is impossible to suppose that a body such as the Trustees of the British Museum, already well experienced in the management of scientific collections, the results of whose control are of proved excellence, and having at heart the interests and advancement of botanic science in its various aspects, would not be as anxious to meet the demands of the public Departments referred to, and as capable of meeting them, as the existing authority. Neither does there seem to be any valid reason why the First Commissioner of Works should not continue to keep in good relations with the Trustees at Kew, as he does at present at Bloomsbury and South Kensington. It would not appear to be difficult to find at least a *modus vivendi* whether he continues to be especially charged with the care of the public gardens and grounds as at present, or the Trustees decide upon any special features to be introduced during any particular financial year, in the same manner as they now ask him to provide for additional accommodation or furniture at South Kensington. We feel that the introduction of a new Board, such as is proposed, is at least as likely to produce friction and difficulties as the present authorities, and will tend to weaken responsibility, and on this account as well as because we do not attach much reality to the "difficulties and dangers" which would arise from the substitution of the control of the Trustees of the British Museum for the present control, that we dissent from the second recommendation of this Report.

(signed) AVEBURY.
HORACE SEYMOUR.

I regret that I am unable to concur with my colleagues in their recommendation that the herbarium now in the British Museum should be transferred to Kew.

It seems no doubt at first sight an anomalous arrangement that there should be two national herbaria; firstly, on account of the expense; and secondly, because botanists in some cases have to consult two collections instead of one. But the evidence shows that the saving of annual expense through the suggested fusion would be small, and that the initial outlay for building, cabinets, etc., would be heavy. The alleged inconvenience seems to me to be exaggerated, and affects only a few of those engaged in systematic botany, who are thus obliged to consult two herbaria instead of one; while on the other hand to those engaged in other departments of botany, the existence of the two herbaria is an advantage.

I deprecate the proposals contained in the majority Report for the following reasons :—

1. The British Museum is the greatest museum in the world and is justly the pride of the nation. To dismember it, by depriving it of so integral a part as the Botanical Department would be destructive of its unique character as a fully representative museum, and specially of a natural history museum; would be vehemently opposed by many, if not most, British botanists, and as it seems to me, would be a great injury to science.

2. To London and country botanists the British Museum is much more accessible than Kew.

3. The plan proposed would separate the fossil, from the recent, plants.

4. It would involve the creation of a new Board.

If on the other hand Kew Gardens and the British Museum were brought into closer relations, as recommended in the Report which I have signed in conjunction with Mr. Seymour, several advantages would result; for instance, the officers of the Museum would have access to the living plants; while those of Kew Gardens would have access to the British Museum library and the collection of fossil plants.

(signed) AVEBURY.

8, Delahay Street, S.W.
11th March, 1901.

B. Daydon Jackson,
Secretary.

INDEX.

Advisory Board, pp. 10, 15 ;—deprecated, pp. 17, 18.
Avebury, Lord, reasons for dissenting from the majority, pp. 17, 18.
British herbarium, p. 9.
British Museum: fossil plants, pp. 14–16; history, pp. 1, 2; popular exhibition, pp. 12, 15 primary intention, p. 1; staff, pp. 13, 15; union at Kew, pp. 6, 15;—deprecated, p. 18.
Cabinet incorporation, p. 8.
Contiguous union, p. 8.
Colonial Office, pp. 10, 11.
Crown and Advisory Board, p. 11.
Duplicates and duplication, p. 3.
First Commissioner and relations with Kew, pp. 9, 10, 15.
Foreign Office, pp. 10, 11.
East India Company's Herbarium, p. 9.
Enquiries, previous, p. 4.
General herbarium, p. 8.
Herbaria, differences, pp. 1–3.
History of the two collections, pp. 1–3.
Incorporation, three methods, p. 8.
India Office, pp. 10, 11.
Kew, Director as Official Adviser, p. 11; history, p. 2; primary intention, p. 1; reasons for uniting herbaria at, pp. 6, 15;—deprecated, p. 18.
Library of the Botanical Department, p. 9.
Linnean herbarium, p. 9.
Majority report, pp. 1–16.
Minority reports, pp. 17, 18.
Pre-Linnean herbaria, p. 8.
Previous enquiries, p. 4.
Recommendations, pp. 15, 16.
Reference, terms of, p. 1.
Royal Society, p. 11.
Regulations suggested, pp. 11, 15.
Secretary, thanks to, p. 16.
Separate, reasons for keeping collections, pp. 5, 6.
Sheet incorporation, p. 8.
Sloane herbaria, p. 8.
Treasury to define duties, pp. 11, 15.
Trustees of the British Museum and their relations to Kew, pp. 10, 11, 18.
Union, reasons for, p. 6.
Unity, plea, p. 7.
Wallich collection, p. 9.

COMMITTEE ON BOTANICAL WORK.

MINUTES OF EVIDENCE

TAKEN BEFORE THE

DEPARTMENTAL COMMITTEE

ON

BOTANICAL WORK AND COLLECTIONS

AT THE

BRITISH MUSEUM AND AT KEW

WITH

APPENDICES AND INDEX

TO ACCOMPANY THE

REPORT

PRESENTED TO THE

LORDS COMMISSIONERS OF HIS MAJESTY'S TREASURY

DATED

11TH MARCH, 1901.

CONTENTS.

	PAGE.
MINUTES OF EVIDENCE - - - - - - - - - - -	1–108
APPENDIX 1 - - - - - - - - - - - - -	109–158
APPENDIX 2 - - - - - - - - - - - - -	159–170
APPENDIX 3 - - - - - - - - - - - - -	171–180
INDEX - - - - - - - - - - - - - -	181–218

LIST OF WITNESSES.

Thursday, 1*st November* 1900.

	Questions.	Page.
Mr. George Robert Milne Murray, F.R.S. - - - - - -	1–198	1–12

Wednesday, 7*th November* 1900.

Sir George King, K.C.I.E., F.R.S. - - - - - - - -	199–296	13–17
Mr. Charles Baron Clarke, F.R.S. - - - - - - -	297–337	17–19
Mr. James Groves, F.L.S. - - - - - - - - -	337–370	19–20

Thursday, 8*th November* 1900.

Mr. Edward Morell Holmes, F.L.S. - - - - - - -	371–494	20–26
Mr. Frederick Janson Hanbury, F.L.S. - - - - - -	495–522	26–27
Mr. William Fawcett, B.Sc., F.L.S. - - - - - - -	523–563	27–28
Mr. William Carruthers, F.R.S. - - - - - - - -	564–619	28–31

Wednesday, 14*th November* 1900.

Dr. Maxwell Tylden Masters, F.R.S. - - - - - - -	620–762	31–34
Professor John Bretland Farmer, F.R.S. - - - - - -	763–866	35–37

Thursday, 15*th November* 1900.

Mr. Albert Charles Seward, F.R.S. - - - - - - -	867–945	38–41
Mr. William Philip Hiern, F.L.S. - - - - - - -	946–1003	41–43
Mr. Henry John Elwes, F.R.S. - - - - - - - -	1004–1058	43–45

Wednesday, 28*th November* 1900.

Dr. Henry Woodward, F.R.S. - - - - - - - -	1059–1103	45–48
Dr. Dukinfield Henry Scott, F.R.S. - - - - - - -	1104–1137	48–49
Professor Edwin Ray Lankester, LL.D., F.R.S. - - - -	1138–1196	49–53

Thursday, 29*th November* 1900.

Mr. William Botting Hemsley, F.R.S. - - - - - - -	1197–1263	53–55
Sir William Turner Thiselton-Dyer, K.C.M.G., F.R.S. - -	1264–1372	55–108

MINUTES OF EVIDENCE

TAKEN BEFORE THE

DEPARTMENTAL COMMITTEE

ON

BOTANICAL WORK.

FIRST DAY.

WESTMINSTER PALACE HOTEL.

Thursday, 1st November, 1900.

PRESENT:

Sir MICHAEL FOSTER, K.C.B., M.P., SEC.R.S., &c. (in the Chair).

The Right Hon. Baron AVEBURY, P.C., F.R.S.
Sir JOHN KIRK, G.C.M.G., K.C.B., F.R.S.
Professor ISAAC BAYLEY BALFOUR, D.SC., F.R.S.
Mr. FRANCIS DARWIN, M.B., F.R.S.
Mr. FREDERICK DUCANE GODMAN, F.R.S.
Mr. HORACE ALFRED DAMER SEYMOUR, C.B.
Mr. STEPHEN EDWARD SPRING RICE, C.B.
Mr. BENJAMIN DAYDON JACKSON, *Secretary.*

Mr. GEORGE ROBERT MILNE MURRAY, F.R.S., called and examined.

Mr. G. R. M. Murray, F.R.S.

1 Nov. 1900.

1. (*Chairman.*) You are the keeper of the Department of Botany of the British Museum (Natural History)?—Yes.

2. You have been kind enough to send in a statement consisting of answers to questions laid before you by the Secretary of the Committee; may we assume that you are willing that that statement should be put in as evidence?—I do so put it in, exactly as it stands. I have had the opportunity of revising it.

The following is the form of questions issued by the Committee, with the answers of the Witness attached thereto:—

Committee appointed by The Lords Commissioners of Her Majesty's Treasury, "To consider the present arrangements under which botanical work is done and collections maintained by the Trustees of the British Museum and under the First Commissioner of Works at Kew, respectively; and to report what changes (if any) in those arrangements are necessary or desirable in order to avoid duplication of work and collections at the two institutions."

The information desired by the Committee may be conveniently arranged under the following heads:—

I. A general statement of the nature and extent of the collections under your charge within the scope of the present enquiry.

This statement will naturally distinguish between different kinds, general, special, etc., of collections. It will also be desirable to distinguish between:—

(a) Dried plants.

(b) Other preparations, either (1) Dry, in bottles or boxes; (2) In preservative fluid; or (3) Microscope slides,

and to give a rough or approximate estimate of the extent or number of each.

II. The duties of the keeper and of his chief subordinates.

III. The uses to which the collections are applied.

In this it will be desirable to distinguish between:—

(1) Popular instructions.

(2) Assistance given to students, *i.e.*, educational use.

(3) Assistance to research, given either to home or foreign investigators.

(4) Government requisitions.

special attention being given to the third and fourth sub-headings.

IV. The main several sources from which accessions are derived.

This should indicate in their relative proportions the accessions derived by:—

(a) Purchase.

(b) Exchange.

(c) Gift.

V. The chief additions or alterations which have been made in your collections since 1875, the date of the last Report of the Royal Commission on Science (Devonshire Commission).

VI. The approximate number of specimens received annually during the last few years.

VII. The main results, scientific or other, which have been accomplished by means of your collections since 1875.

This statement may be given as in paragraph III., thus:—

(1) Popular instructions.

Mr. G. R. M. Murray, F.R.S.

1 Nov. 1900.

(2) Assistance given to students, *i.e.*, educational use.

(3) Assistance to research, given either to home or foreign investigators.

(4) Government requisitions.

special attention being given to the third and fourth sub-headings.

VIII. The main respects in which your collections differ from similar collections at Kew.

IX. The circumstances which determine whether a particular collection is placed under your charge, or goes to Kew.

X. The annual cost of maintaining the collections, distinguishing—

(a) Administration, as salaries and wages.

(b) Purchases, of (1) Dried plants and (2) Books and Binding.

(c) Special expenditure not falling under either of the preceding categories.

XI. Whether specimens are lent to monographers; if so, on what conditions.

XII. Information is also desired on the following special points:—

1. When specimens, such as bulky fruits, or woods, cannot be incorporated with the dried plants, how and where are they preserved?
2. Whether the specimens are poisoned, or if some other preservative such as camphor is employed to guard against insect damage.
3. If the specimens are glued down and laid in at stated intervals?
4. Whether any accumulation of unmounted plants takes place, and if so, are such unmounted collections readily available for botanic use, and, further, what is the amount of such accumulation?
5. Are there any fossil plants under your charge? If so, what system is adopted in their arrangement?
6. What arrangement is followed with regard to recent plants? Under genera what is the system pursued, either of following some recognised authority, or a geographic arrangement? If the latter, state if many redundances arise in consequence of widely-distributed plants occurring in several geographic divisions?
7. Have the cabinets fixed shelves, or movable trays?
8. What is the size of the sheets on which the plants are glued? Is a special size used for such specimens as palms?
9. Have you any subsidiary collections besides the general collection? If so, what is their character, and the reason they are kept separate?
10. Can specimens be examined by boiling, or other laboratory methods?
11. Are the collections housed in a fire-proof building?
12. Have you sufficient space for your collections, or is it likely to become inadequate within the next few years?
13. What space is available for extension in connection with existing buildings or galleries?
14. How far is the collection of prints and drawings available for public use, with a view of determining plants, and thus diminishing the risk of damage by consulting herbarium specimens?
15. What publications are issued officially, by:—
    (a) The officers of the herbarium.
    (b) Specialists not themselves officers, but acting under authorisation,

    and if the cost of such publications is wholly borne by the Government, or is partially defrayed out of some other source of income?
16. What is the extent of the library in connection with the herbarium? Is it complete in itself, or dependent on some other collection of general works?
17. Is there a printed catalogue of your library?
18. What means are employed to secure the most important new publications, journals, and transactions?

Replies.

British Museum, Natural History.

I. The collection consists of—

(a^1). A General Herbarium composed as follows:

Flowering plants	-	975,000 specimens
Cryptogams	- -	513,000 specimens

in all, therefore, about one million and a-half.

(a^2). A British Herbarium composed as follows:

Flowering plants	-	50,000 specimens
Cryptogams	- -	135,000 specimens

(a^3) The Sloane and other pre-Linnean Herbaria, numbering about 90,000 specimens.

(b^1). Fruits in boxes, 11,650 specimens in the general collection; 12,523 in the Sloane Herbarium; 12,220 wood specimens.

(b^2). 1,900 specimens in preservative fluids.

(b^3). 52,000 microscope slides.

1,853,293 grand total.

II. The duties of the Keeper of the Department of Botany are the general supervision of the work of the whole staff, for which he is responsible to the Trustees. He makes a monthly report to the Trustees on the work completed and in progress. He prepares and submits to the Trustees through the Director of the Natural History departments, financial reports on proposed purchases of specimens and books, and he reports for sanction proposed exchanges of specimens and donations.

He administers the expenditure of the preparing and other similar votes, and carries out all business in connection with the preparation and publication of catalogues and guide-books.

He recommends the staff for the annual increment of their salaries and for promotion. He is, in a sense, the mouthpiece of the staff to the Trustees and his duties in all these relations with the Trustees cannot under ordinary circumstances be delegated to any member of the staff.

In the case of the present Keeper, his time when not employed in these duties is devoted to a section of the Herbarium especially the Algae, and in this respect he differs in no way from that of the staff of assistants.

The assistants, both of the first and second classes, have each a section of the Herbarium in their charge, for the arrangement, naming and incorporation of specimens. In this a great degree of initiative is necessarily allowed them, and each records his daily work and hours of attendance in a diary. These diaries are read every month by the Keeper, who uses them in his monthly reports, and (with other records) in preparing the Annual Report.

All members of the scientific staff are required to attend on visitors and students and have a considerable scientific correspondence—the purely business matters being attended to by the Keeper.

III. (1). The galleries are frequently visited by parties from natural history societies, schools, &c., which in many cases are conducted by some member of the staff who expounds and illustrates the subject of study.

(2.) The collections, both in the galleries and herbaria are constantly made use of by students from colleges, *e.g.*, the Royal College of Science, University College, Royal Veterinary College, the Birkbeck Institution, Toynbee Hall, &c. Special exhibitions have frequently been made on behalf of students at the Royal College of Science and University College. The staff are also consulted daily by private persons in search of botanical information. In fact, the Botanical Department has become widely known as a centre of reference and is so used by all classes. The collections, the library, and the expert knowledge of the staff are used by students of botany and others in much the same way as the literary and journalistic profession use the Reading Room of the British Museum.

(3.) This is of an extensive character and consists not only in giving facilities and help to investigators on the spot, but also in correspondence with botanists working in all the important colonial and foreign centres. Travellers are frequently instructed in the collection and preparation of specimens, and a pamphlet has been printed for their use. This has resulted in valuable collections being presented to the Museum.

(4.) Since the main object of the Botanical Department is the study and illustration of pure, and not applied botany, the instances of work under Government requisition are naturally rare.

IV. During the last nine years the following accessions have been received :

By purchase - -	154,199	specimens.
By exchange - -	8,620	„
By gift - - -	79,515	„

V. Owing to the removal from Bloomsbury to Cromwell Road, the Department secured much additional space, permitting of extensive growth and development in all directions, but particularly in the Cryptogamic Herbarium, which in 1875 barely existed; in the creation of a great botanical library, used extensively by the public, and the formation of the teaching collections, exhibited to the public.

The facilities for study and reference have been enormously increased and visitors have appreciated the fact by an attendance which has more than doubled since 1875. (In 1875 the visitors were 1,118 in number, in 1899 they were 2,649 in number.) The teaching collections formed under the direction of my predecessor and myself, and being still steadily improved and added to, are plainly a most useful guide to the students of botany. I rarely pass through the Central Hall or the Botanical Gallery without seeing serious use being made of these collections by students or parties of students working together. Students using these public collections are not included in the annual return of visitors to the Herbarium for consultation and research.

VI. During the last nine years the figures have been as follows :—

1891 - - -	39,440	specimens.
1892 - - -	31,953	„
1893 - - -	50,541	„
1894 - - -	10,427	„
1895 - - -	20,303	„
1896 - - -	33,815	„
1897 - - -	13,084	„
1898 - - -	16,916	„
1899 - - -	25,855	„

During the same period the number of specimens incorporated into the Herbarium were—

1891 - - - - -	41,875
1892 - - - - -	29,658
1893 - - - - -	17,677
1894 - - - - -	20,670
1895 - - - - -	17,720
1896 - - - - -	19,438
1897 - - - - -	22,827
1898 - - - - -	28,340
1899 - - - - -	20,800

Mr. G. R. M. Murray, F.R.S.

1 Nov. 1900.

VII. To a large extent this question has already been answered under paragraph III., but the following additions may be made :—

(1.) In addition to the official catalogues, which are in reality monographs for the use of expert botanists, there have been published cheap guide-books to portions of the collection. Of one Guide, viz., to "Sowerby's Models of British Fungi," an edition of 2,000 was sold in a few years; and another, Lister's "British Mycetozoa" has an extremely satisfactory sale. Further guides, especially to the illustrations of Plant Adaptations, are at present designed.

(2.) A list of visitors to the Herbarium for consultation and research since the opening of the Natural History Museum is given. This takes no account of those who visit the teaching collections of the exhibited series of British plants.

Return of number of visitors to the Herbarium for scientific research and enquiry :—

Year.	Number.	
1881	704	
1882	803	
1883	1,023	
1884	993	
1885	1,105	
1886	1,026	
1887	1,483	
1888	2,214	
1889	1,344	During these years there was repainting, &c., going on, first in one herbarium, then in the other, and the reconstruction of the Cryptogamic Room.
1890	1,244	
1891	2,226	
1892	2,585	
1893	2,274	
1894	2,129	
1895	2,206	
1896	2,555	
1897	2,718	
1898	2,940	
1899	2,649	

(3). The assistance to research is continuous and of daily occurrence. It is impossible for any systematist to carry out an investigation of any extent without consulting the Museum herbarium personally or by correspondence, and assistance of both kinds is constantly acknowledged by botanists of this country and abroad with great cordiality. The accessibility of the herbarium from its situation in London makes it useful to the large class of botanists who are engaged daily in their own professions, and who are often dependent on occasional hours of leisure to prosecute their study.

VIII. The possession by the British Museum of the pre-Linnean herbaria (such as the Sloane Herbarium) on which Systematic Botany is largely based, and the herbaria of Sir Joseph Banks, Robert Brown, and others of the end of the last, and earlier portion of the present century, which make the collection a continuous record of Systematic Botany to the present time.

The association of the plants in the same building with the palæontological collection.

The arrangement of the fruits and woods in cabinets adjacent to the corresponding cabinets of the general herbarium, thereby greatly facilitating reference.

IX. It is recognised by those responsible that certain collections go more fitly to Kew, and others to the British Museum. For example, collections of living seeds have occasionally been transferred to the Royal Gardens, Kew, and the Director of those Gardens a few years ago transferred Ferro's pre-Linnean herbarium to the British Museum. The circumstances are, however, in general, almost entirely of a personal character. Our collectors are different from the Kew collectors, and are largely gained by the association of this Department with the other Natural History Departments in the Museum.

X. (a.) Salaries and Wages, £2,880 (for 1899).
(b[1].) £400.
(b[2].) Purchase of Books, £180; reduced to £15 this year.
Binding, £45.
(c.) Preparing, £450.
Printing Catalogues, £350.
Furniture, Fittings, and service of Carpenter £300 raised to £350.

Mr. G. R. M. Murray, F.R.S.

Nov. 1900.

XI. No. According to the Museum Act of Parliament, no specimens of any kind (except duplicates in exchange) are allowed out of the building; and although this may occasionally cause inconvenience, it secures (which is of far greater importance) the permanent integrity of the collections.

XII. 1. They are placed in drawers adjacent to the corresponding section of the Herbarium.

2. They are not poisoned, but camphor is employed.

3. They are not *glued* down but gummed and the process of incorporation is continuous.

4. There are about 150,000 specimens of dried flowering plants which are at present unmounted, but they are readily available for use, being sorted systematically and arranged in close proximity to the allied mounted specimens. This series is being reduced rapidly by mounting and incorporation, and especially recently great progress has been made with this work.

5. The fossil plants at present retained in the Department are exhibited in order in the Public Gallery. The extensive collections of Robert Brown, Sir Joseph Banks, Sir Joseph Hooker, Mr. Carruthers, and many other palæontologists were, by arrangement with Sir W. Flower, deposited in the Geological Department, so that the whole British Museum collection might be arranged in one great series. The condition of this transference was that then the whole should be placed under the Keeper of Botany.

6. The arrangement of the recent Phanerogamous plants is in one series following the sequence of Orders in Bentham and Hooker's "Genera Plantarum." Under Genera the arrangement is usually that of the most recent Monograph. The Ferns are arranged according to the "Synopsis Filicum"; the other vascular Cryptogams by Baker's "Fern Allies"; the Mosses by Jaeger and Sauerbeck; the Hepatics by the "Synopsis Hepaticarum," but at present under re-arrangement according to Stephani; the Algæ according to Agardh, but being re-arranged according to De Toni; the Fungi according to Saccardo; the Mycetozoa according to Lister, and the Lichens under re-arrangement. The ordinary geographical arrangement is under species, but exceptions occur among the Flowering Plants, where a geographical arrangement under larger groups is convenient. No redundancies occur.

7. They have moveable trays.

8. Size of sheets, $17\frac{1}{2} \times 11\frac{1}{4}$ in. Palms, Ferns and Cycads, $21 \times 12\frac{3}{4}$ in.

9. The pre-Linnean collections, such as the Sloane and the British Herbarium, are the only subsidiary collections. The incorporation of the former would be destructive to its historical and practical value; and the British plants are kept separate for the convenience of the numerous students of the British Flora.

10. There is every convenience for the examination of plants after boiling, and by all other known laboratory methods. A well equipped laboratory is provided in the department.

11. Yes.

12. There is sufficient space for the growth of the collections. It is not likely to become inadequate during the next few years.

13. The completion of the Museum by the building of the East Return Front would give to Botany adequate room for a United National Herbarium.

14. There is a very large and useful collection. They are fully available and are constantly consulted in the same way as the Herbarium.

15. (a) Catalogues and guide-books.

(b) Ditto - ditto.

It is borne by Government.

16. It contains 14,803 volumes,

335 volumes of MSS.,

3,931 tracts bound in 241 volumes,

1,461 tracts unbound.

This does not include transcripts prepared for use in the Herbarium by the staff; nor does it include the large number of botanical papers published in academies, and transactions, readily accessible in the general library.

17. There is a written slip catalogue available for the use of workers.

18. The staff are generally on the alert and many donations are made. Messrs. Dulau & Co. have been and are of very great service to the staff both in making known new publications and in finding rare books, and their expert knowledge is very highly appreciated.

(Signed) GEORGE MURRAY.

10th July, 1900.

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3. (*Chairman.*) In your answer to Question I., speaking of the collection, you say the herbarium consists of flowering plants, 975,000 specimens. May I ask what you exactly mean by "specimens?" Does that mean species?—No. Each species may be represented by many specimens illustrating the geographical distribution of that species throughout the world. We attempt, as far as possible, to completely illustrate by actual specimens, carefully vouched for, and properly ticketed, the distribution of the different species of plants, both flowering plants and cryptogams.

4. In your answer to question (II.) you speak of the staff. Will you kindly state more explicitly what the staff is?—I am speaking here principally of the scientific part of the staff, not the attendants and others. The scientific staff consists of two senior assistants, three junior assistants, and, for the present, one temporary assistant whom I have permission to employ annually from the Treasury.

5. He is under an annual engagement?—Yes; it is an annual application through the Trustees. Three of the permanent assistants are concerned with the different groups of flowering plants, as is also the temporary assistant. Two are concerned with the cryptogams, as I am myself in whatever time I can spare from my official work.

6. We gather from your answers to II. and III. that the use of the collection and the nature of the work done may be considered as coming under one of three heads:—(1) Popular instruction, with the view to exciting interest in Botany among people generally, and furnishing general information to the public not specially studying Botany, this we will speak of as the popular work of the Museum; (2) the collections are used and work is entailed in what we may speak of as the educational aspect—students from various parts who come to learn Botany for examination purposes or for other reasons; (3) the use of the collections for research and inquiry in Botany. I understand from (4) of III. that the collection is used for inquiry in pure and not applied Botany; Economic Botany does not enter into the case at all. Now, would you kindly state more explicitly than you have done in your answers what provision is made, what work is done, and how the members of the staff are employed under these three heads, beginning with the popular instruction or general exposition?—The popular instruction is, as necessarily it must be, of a casual kind. It is not organised in any way. But we always feel ourselves at the command of any body—a field club, naturalists' club, or minor society—which requests one member or more of the staff to be placed at its disposal as a guide to the exhibited collections.

7. But you have certain galleries, have not you, devoted to that purpose?—Yes. I was speaking first as to the popular side of the matter.

8. You have galleries which are arranged, either wholly or partly, with the view to popular instruction?—Yes, with the view both to popular instruction and to meeting the requirements of students of Botany. The gallery appeals to both, firstly, in the systematic series representing all the natural orders, and, secondly, in other cases, showing the adaptation of plants of a more popular character. Both of those teaching collections, as we call them, appeal equally to the public and to students who are learning Botany. In addition to that we offer ourselves as guides to the collections, giving short explanatory statements to field clubs and other public bodies, who we consider have a claim upon our services.

9. By we, do you mean all the members of your staff?—Yes. Sometimes one and sometimes another. I need not say that it makes no great inroad on our time, as such visits are generally paid on a Saturday afternoon, or on a holiday. It is not a daily matter. For example, if a school requested such instruction I should consider very carefully what its claim was, as that would be interfering with the regular teaching institutions close at hand.

10. So that does not take up any appreciable quantity of the time either of yourself or your assistants?—No. A very small share of our time, and that chiefly on Saturdays.

11. Does that apply both to the popular instruction and to the more distinctly educational use of the collection?—It applies to it so far as we are personally in relation with the public. As to the time we have to spend in arranging and re-arranging the galleries, and making the cases, I am afraid it takes a good deal of our time. Under the policy of Sir William Flower that side of our work in the Museum was very much encouraged and advanced very greatly to the good of the teaching collections and to the good of the public itself, who appreciates it, as is to be seen by the larger number who visit our galleries.

12. Your efforts are being continued in that direction, so that we may say an appreciable proportion of your time is now taken up in preparing these galleries for public exposition and for educational use?—A very considerable proportion of the time of the staff has been taken up in recent years in carrying out this policy which Sir William Flower introduced, and it has involved a great deal of —not so much re-arrangement—labelling. That has consumed a great deal of time, especially in those cases illustrating adaptations of plants. That, I may say, has taken up a good deal of my time, but I anticipate it will not take up so much after the next year or two.

13. You think it is approaching completion?—I think that in the course of the next year or two it will be in such a state that we shall only have to keep it going instead of going in for extensive alterations.

14. You are now going to speak with regard to the popular exposition and the educational use to students who want to learn Botany for examination purposes?—That is restricted entirely to the gallery. If a student applies to me for a student's ticket for access to the library, and confesses he is going to use it for the purpose of passing an examination, I invariably decline his application, or I persuade him, rather, not to apply for it, because there are institutions where he may be taught botany close at hand. We, as a public institution, cannot compete with teaching agencies.

15. May I, in relation to that, ask exactly what the sentence means in (2) of III.: "Special exhibitions have frequently been made on behalf of students at the Royal College of Science and University College." Do you mean that exhibitions have been made at the Museum for students of those colleges?—Yes. It began with Dr. Scott, who was one of the Professors of Botany at the College of Science. He gave advanced courses of instruction which were inadequately illustrated by material at his command, and by arrangement with him we very frequently made a special exhibition from our resources, limited to a day, and allowed him to conduct his own students through, sometimes with a little aid from ourselves. I made similar exhibitions for Professor F. W. Oliver at University College. But these are only done at the request of the teacher, because there is a certain amount of risk in exposing a great number of the specimens.

16. Then we are to understand that for students who are preparing for examination, and so on, the opportunities offered are confined to the galleries?—Yes, with those small exceptions which I have noted.

17. Then what have you to say with regard to research, taking that in its wide sense of anyone who wishes to make inquiries of any kind, to learn certain facts in botany independent of examinations?—The Institution, the Herbarium, and the Library, are entirely at the disposal of such students, as well as the services of the staff. We have students of various degrees of expertness. Professional botanists who are engaged in writing a monograph come to the library attendant, who knows where to find a book, and saves them a great deal of trouble. Such a man borrows books by card just as if he were a member of the staff. There are others not so expert, for whom a good deal of the staff's time is required in finding specimens, but not explaining them. That is really the main work of the staff, that and naming and incorporating new collections for that purpose.

18. May we distinguish in this latter class between the man who comes simply to identify a plant which he has and a man who is engaged in some botanical problem, great or small?—We may distinguish between them. The man who is engaged in a botanical problem takes practically no time of the staff, but the man who comes to identify a plant, or make some casual inquiry, very frequently takes up a good deal of our time.

19. As a matter of fact, some considerable portion of the time of yourself or of your assistants is taken up in helping persons to identify plants by means of the herbarium?—Certainly.

20. And do all the members of the staff take part in that according to the particular plant which is in question?—Yes.

21. In your answer to Question VII. (2) you give a list of visitors to the Herbarium for consultation and research. Does that include these two classes of which you have just been speaking?—It is entirely confined to those two classes. Every man signs his name in a book, and at the end of a stated period, generally a month, I go through those books myself, and carefully take out all responsible people's names. I know most of them, or I inquire of my staff. I take out all those names and report only those who have actually come for consultation and research at the end of my monthly report to the Trustees of the Museum.

22. In arriving at your number how do you treat the case of a man who is consulting the herbarium in connection with some complicated problem, and who visits it every day for a long period?—I count his daily visits.

23. So that these numbers given in sub-section (2) of VII. are daily visits?—Yes, daily or casual visits.

24. Have you any means of knowing the number of persons who have visited the Herbarium in the year for the purpose of research?—It would be quite possible to make such a return. I could get the information quite easily, because, as I say, every visitor signs his name.

25. What is the relative proportion of the two classes, the man who simply comes to identify a plant, and the man who comes for what may be called more serious research?—That would be an extremely difficult question to answer off-hand. I could find out the exact figures.

26. We only want it quite roughly. Are there as many, for instance, visiting the Herbarium for the simple purpose of identifying a plant as for continued research, or are there more or fewer?—Speaking quite irresponsibly at the present moment I should say the numbers were very nearly equal, but if you will give me time I can send you the exact figures for a year or several years. I should take it that they are very nearly equal.

27. I see that in the year 1875 the number was 1,118; in 1881 it has dropped to 704?—Yes. That figure is very easily explained. In 1881 we were engaged in moving the collections from Bloomsbury to South Kensington. For the greater part of two years the Herbarium could be easily consulted, but it was in a state of re-arrangement, and naturally the number of visitors dropped.

28. So that the normal figure for that period appears first in the year 1883?—I should say so. As some sort of guide to the previous question you asked me, I might say that the 704 during that year were nearly always serious botanists, as the casual visitor had not yet found his way to South Kensington.

29. In VII. (1) you speak of a Guide to the British Mycetozoa?—You asked me a question under III. and IV. which has not yet been answered (unless you wish to postpone it) as to the work of the department being pure and not applied botany. With regard to that, I should say that questions constantly come to us in applied botany, economic botany. People come from the City, importers of drugs and plants, and where we can answer them we do so. Many of those questions many botanists might answer off-hand, but if it is a serious question of economic botany I invariably refer the applicant to the museum staff at Kew. Casual questions we deal with as any botanist can deal with them, but we make no special arrangements for them, and have no collection illustrating economic botany. If such a collection came into my hands I should forward it to Kew.

30. The time taken up by the members of the staff is to a small extent devoted to popular exposition and instruction?—To a small extent.

31. And to some extent preparing for popular exposition?—To a larger extent than the first.

32. And to a still larger extent assisting enquirers and answering enquiries?—Yes, both personally and by letter.

33. Then there remains what may perhaps be called the main work, the naming and arranging of the specimens?—That is certainly the main work.

Mr. G. R. M. Murray, F.R.S.

1 Nov. 1900.

34. And that takes up the greater part of their time?—Yes.

35. You speak of the publishing of a Guide and of Lister's "British Mycetozoa": were those published by the Government?—They were published by the Trustees.

36. Turning to VII. (3) you say "It is impossible for any systematist to carry out an investigation of any extent without consulting the Museum Herbarium." Does that mean that you have collections which do not exist elsewhere?—Undoubtedly. Type specimens must be seen by any systematist who is making a monograph of any group of any size. He is bound either to come himself or to ask some of us to make an investigation for him; and of course a good deal of that is done both for botanists in the country and for botanists residing abroad.

37. Have you in the Museum a very large number of type specimens?—An enormous number, especially of earlier times. Before the establishment of the Kew Herbarium in 1841 practically all the types published by British botanists were lodged in the Museum. There is a certain number in Edinburgh and a certain number in Dublin, but comparatively speaking small numbers compared with the British Museum. Since then we have tried to keep abreast of matters.

38. Have you added to your type specimens since then?—They are constantly being added to.

39. So that it is, may we say, a common or usual occurrence that a person carrying out an investigation, having worked for some time at Kew, for instance, finds that his work is incomplete, and that he must come to you in order to complete his work, because you possess the type specimens which are not to be found in Kew or elsewhere?—It is a constant occurrence.

40. And the pre-Linnean herbaria of which you speak are used occasionally or frequently not for purely antiquarian purposes, but as an item in botanical investigation?—Undoubtedly they are so used, but I may say that we ourselves often refer back to such specimens and often have visitors to them. There are, however, periods when that is not very frequently done, while there are other periods in which a worker may be laying these herbaria under constant contribution. But such collections I may say are invariably consulted only by professional botanists who are engaged in serious undertakings. They are not of any popular interest whatever.

41. They are, I suppose, largely consulted for what we may call simple antiquarian purposes; but in addition to that, I suppose they are also consulted as part of botanical investigation?—Yes; but I should like to substitute the word "historical" for "antiquarian"—the history of botany.

42. In your answer to VIII. you speak of the herbaria of Sir Joseph Banks and Robert Brown, as, with the pre-Linnean herbaria, constituting a continuous record; but is the Banksian herbarium kept separate?—No.

43. Are they all fused?—Everything post-Linnean.

44. Fused in your general herbarium?—Yes.

45. So that for historical purposes the man would not find the Banksian specimens all together, but he would have to search in the general herbarium?—Yes, everything since Linnæus.

46. With regard to the British Herbarium and the General Herbarium, does the latter also contain British plants, so that you have British plants in duplicate?—No. British plants exist only in the British Herbarium.

47. Then with regard to the association of plants in the same buildings with the palæontological collection, I understand from your reply to Question XII. (5) that apart from those which are exhibited in the Public Gallery the fossil plants are placed in the Geological Department, but under you?—I ought perhaps to answer this a little more fully. There were two collections of plant fossils in the Museum until a few years ago: there was the general collection in the palæontological department, and there was an excellent collection in the Botanical Department, chiefly, however, illustrating the morphology, fossils preserving their internal microscopic structure. There was a large collection made by Robert Brown, another by Sir Joseph Hooker, and another by Mr. Carruthers. These were all placed in the Botanical Department. At the time when the Williamson collection was purchased by the palæontological department—half the purchase money I found from my department to enable this to be purchased—I agreed with Sir William Flower—I am afraid the agreement was verbal—that these things should be all put together in one series in the interests of research. There being no room in the botanical department, and plenty of room in the palæontological gallery, these were transferred for the purpose of putting them in as good order as possible, arranging them all into one great series. I am afraid very little progress has been made with that since then. Mr. Seward has been engaged in the work, but his leisure is very small, and I have repeatedly urged that this part of the botanical collection of the Museum should be taken more in hand. But unfortunately it is a matter which concerns two departments, and an initiative which concerns two separate departments is not so easily made. That, I think, is at present in a somewhat unsatisfactory state, but there is no difficulty in getting at any of the specimens. They are all available for research, but they are not in the order which I should like to see, or comparable with the herbarium.

48. Are they under your charge?—They are under my charge. Not the whole of them. Those collections temporarily deposited from my department in the Geological Department are distinctly under my charge, because the removal of them, I think, has never been sanctioned by the Trustees. If the Trustees had been asked for their sanction and had granted it they would have passed beyond my control, but it was a mere temporary arrangement. It would have been presented to the Trustees in the form of a report, but, unfortunately, owing to the death of Sir William Flower the matter did not get so far, but no doubt it will eventually be done.

49. Is that the meaning of the word "then" in the sentence: "The condition of this transference was that then the whole should be placed under the Keeper of Botany?"—Certainly. Sir William Flower said to me if that were to be done he would himself apply to the Trustees that the whole of those collections, those belonging to the palæontological department as well as the botanical ones, should be placed under the direction of the Keeper of Botany, even though they might occupy the gallery at present belonging to the palæontological collection. On that statement I had the plants transferred, but they were never transferred with the sanction of the Trustees.

50. The meaning of the sentence is: that the condition was made at that time that the whole should be placed under the direction of the Keeper of Botany, but it has not been carried out?—It has not been carried out. The specimens are together with a view to their being arranged, and when a scheme is devised the sanction of the Trustees will be asked. All these matters are governed by a strict Museum procedure.

51. Is Mr. Seward an official of the British Museum?—No; he is, I understand, employed very much as my temporary assistant is employed, and is paid for the time at a definite rate sanctioned by the Treasury—say half-a-crown an hour.

52. He is in the temporary employment of the Trustees?—Yes, of the Geological Department—either under that kind of vote or it may be that he is paid under the preparing grant. I am not quite sure what his arrangement is.

53. Can you state what has been the use made of this association of the fossil plants with your herbaria in the same building during the time you have held office?—During the time that I have held office there have been comparatively few workers. They have been confined to one or two men, Dr. Scott, Mr. Seward, and to some extent Professor Bower, who was investigating a famous cone that Robert Brown had previously described. He then made use of the herbarium as well as the actual fossil preparations in illustrating the structure.

54. May we say that it was a great advantage to him to have, while undertaking that investigation, the fossil plants and herbarium close together so that he could pass from one to another?—I should say so, certainly. I might add that I can scarcely imagine a fossil botanist who had not access to a collection of dried plants doing good work in botany any more than in zoology.

55. It is not mere access to the collection, but having the collection in the same building?—I should say there is an enormous convenience in having the collection in the same building. It is not absolutely necessary. I might illustrate that answer more fully by saying that in the exhibition series in my gallery I still retain

illustrative fossil specimens side by side with the living plants.

56. Part of your collection consists of fruits, and so on: is that fairly complete? You speak of the advantage of fruits being in close proximity to the herbarium specimens: is your carpological collection fairly complete?—It is a matter which is a little difficult to explain. When the fruits of the plant are small enough to be included with the specimens in the herbarium they are so included. When they are too large for that they are put in a special class of box.

57. What I rather meant was this: In the case of your herbaria the fruit is in all cases to be found, whether or no it is desirable that the fruit of the plant should be in a preparation by itself?—As often as it has been found, because sometimes we may have only a flower for example.

58. But you may speak of your carpological collection, the addendum to the herbarium, as being fairly complete?—Yes, and illustrative. I look upon, and I think every botanist must look upon, a separate carpological collection as a necessary evil, but we have done our best to make it complete.

59. Perhaps this is rather out of your region, but is your collection of fossil plants largely used by the ordinary geologist?—At one time I understand stratigraphic geologists paid more attention to the occurrence of plants in different layers or beds, and determined from the nature of the fossils—used these fossils as evidence more or less of the antiquity of particular beds. But I understand that that has ceased to be so fashionable a method among geologists. It is occasionally used, but not so much as formerly.

60. In your experience while you have been keeper, apart from the distinct palæo-botanists, you find that the collection of fossil plants is not so largely used by other geologists?—Not so largely as formerly.

61. In your answer to No. IX. you refer to the collections without going into any detail. Are additions made to the Museum every year?—Yes. I think I give the actual figures under VI. for the last nine years.

62. Is that figure reached by a small number of large collections, or by a large number of relatively small ones?—The figures vary from year to year in that respect. We have a steady number of small collections, and that number is very nearly constant, ranging from one specimen to a series of plants. The fashion still exists—it is one which botanists to a certain extent deplore—for certain botanists to issue series of plants, especially in the cryptogamia. We purchase these regularly, as they come out, just as we purchase published books. One year we may have a large bequest, or make a large purchase, and another year we may have no opportunity of doing that. Therefore when the figures are very large it is generally owing to a purchase or bequest of a large herbarium.

63. Do the figures you give in VI. include exchanges?—Yes. For example, I might point to the years 1893 and 1894. 50,000 specimens were acquired in 1893, and only 10,000 odd in 1894. That was owing to both bequests and purchase of large collections. I looked into that very carefully.

64. Then in No. XII. (4) you speak of 150,000 specimens of dried flowering plants not as yet incorporated into the herbarium?—Yes.

65. You say they are readily available for use, being sorted systematically. Might we ask what that exactly means?—It means that there are collections that have been acquired which, at the time of their acquisition, were fairly well arranged, and required but a little more arrangement from us.

66. Were they named?—Yes. These have been retained by ourselves in the original sheets in which they were acquired, frequently loose between sheets of brown paper, and they are gradually being taken in hand. Recently we have made great progress with the work, and what we select as desirable is incorporated in the study set, and what we reject is sent to the duplicate room of the Museum. It is especially for the purpose of reducing them that I seek the assistance of the temporary assistant. We have made great progress with them, and I hope in a year or two that that work will be practically finished.

67. You make no statement with regard to the cryptogams?—We have no arrears in the cryptogams practically. For example, we have now purchased a collection of over 14,000 specimens that will take some time to get in order, but my staff will be quite ready to begin on them as soon as they are delivered.

Mr. G. R. M. Murray, F.R.S.

1 Nov. 1900.

68. You speak of the duplicate room: is that the room in which you store all duplicates with the view to their distribution?—Yes, chiefly by exchange. I use these duplicates very considerably for exchanges with Berlin, or other institutes abroad, and I acquire very valuable considerations in return for them. At other times, with the sanction of the Trustees, specimens are given to institutes where it is deemed that they will be of service.

69. Then you say that this series of 150,000 specimens of flowering plants is being reduced rapidly?—It is being reduced rapidly. Twenty years ago, to speak within my own memory, it was a very much larger series than that.

70. Taking the figures in VI., I see the additions to the Museum amount to 242,000, and the specimens incorporated 219,000?—We have incorporated fewer than we have acquired.

71. So that your total of unincorporated specimens is increasing instead of being reduced?—No, these are being set aside as duplicates in large numbers. That I think you will find will bring the balance of figures to the other side.

72. So that these figures give us no just idea of the rate at which you are incorporating your arrears?—Except that I can tell you quite distinctly, beyond doubt, that the incorporation is kept well up with the acquisition, because the reduction in that series has been proceeding. Then, again, of course, the specimens acquired are estimated at the time of the acquirement of the collection, but many of them we find are perfectly worthless specimens which we would never think of incorporating. The figures of specimens given as acquired are taken from the estimate of the number at the time—not afterwards.

73. There seemed to be a little discrepancy?—There is a leakage in two directions which, not having been enquired for, is not stated there.

74. In your collection have you any large number of plants embracing any particular geographical area which are not to be found anywhere else in Great Britain and Ireland?—It would be very difficult to answer that question exactly in the terms in which you put it. If I may vary it a little I think perhaps I can say something. Roughly speaking, for example, we say that in Indian botany Kew is enormously ahead of us, owing to the great attention paid by Sir Joseph Hooker and other Indian botanists to that subject in their work at Kew. They have gained very much on us in Indian botany. In African botany I should think that in certain large areas we are better than they are. In certain other areas they are ahead of us, and so elsewhere.

75. That is to say, you have a much larger number of type specimens?—In particular areas, say in Africa, in some places they predominate; in others we do.

76. Does that apply chiefly to the type specimens, or to all specimens?—To all specimens in the study series, illustrating geographical distribution as well.

77. For instance, then, in a certain area you have not only far more type specimens than Kew, but you also possess actual specimens which are not to be found in Kew at all?—That is quite true in a given area. It would be difficult to map out such areas—it would be impossible—except that we know broadly within given districts how the matter stands. I was giving you an illustration in saying that in India, for example, to take a large area, they are well ahead of us.

78. (*Lord Avebury.*) If I understood you correctly, you said that the convenience for study was confined to the galleries; will you please explain what you mean by the galleries?—The convenience for the public for popular instruction, and for those who are learning botany in any elementary way, is confined to the teaching collections exhibited to the public. I mean the public gallery in both the central hall and the botanical gallery.

79. Have not botanists free access to the private galleries?—Undoubtedly, and tables and chair and instruments of research are provided for him at once. He need bring none with him.

80. Is every facility given to him?—Everything, even microscopes.

81. Wherever it is a question of anything which can be

Mr. G. R. M. Murray, F.R.S.

1 Nov. 1900.

called research, the work is generally carried on under those conditions, is it not?—Yes.

82. You said also that a good deal of the time of the officials of the British Museum was taken up by help that was given to botanists who came to the Museum for the purpose of research; do you think it would be a serious loss to botany if that assistance was withdrawn?—A most serious loss.

83. Then you said, if I heard you correctly, that British plants were only in the British herbarium—did you mean British specimens?—British specimens only, not British species.

84. As regards comparison, it is very important, is it not, in comparing plants, or animals either, that you should have specimens near to one another in order to make the comparison, without having to go a considerable distance from one place to another?—Most important.

85. Then you expressed the opinion that fossil plants were not so much used as they were formerly in the study of geology; is not that rather, perhaps, in most strata the animal remains are so much more numerous and so much better preserved?—Yes.

86. But there is no falling off of the interest of geologists in fossil plants, when they can be obtained, is there?—I think not. I think this is more or less an accidental circumstance. In recent years there have been fewer workers at this particular group, and in another few years they might be more numerous than ever. We find in all parts of the Museum—it is not confined to my department—that certain studies become more or less fashionable for definite periods, and then there is a run in another direction. Probably that accounts for this to some extent. Then there is the suggestion which had escaped me entirely, that animal remains are so very much more useful in this particular work of stratigraphical geology.

87. May I take it from you that, where plant remains are preserved as well and as numerously, they would be as carefully studied by the geological enquirer?—Undoubtedly they would. I might cite as an instance the recent study Mr. Seward has made of the flora of the Wealden, which has been published in two volumes by the Trustees of the Museum. In the carrying out of the work in connection with that flora of the Wealden Mr. Seward has constantly laid us under contribution for expert advice in the botanical department. That is an exact illustration which I should like to append to my answer.

88. I should like, if I can, to form some idea of what saving would be effected by the amalgamation of the two collections, assuming that the same amount of botanical research was to be carried on, and the same number of specimens obtained and arranged, and so on, to see if possible what the saving would be by their being in one collection instead of in two. I see in your answer the furniture, fittings, etc., are put at £350. I suppose, with anything like the same number of species to be preserved, you would not be able out of that to save more than £100 or something of that sort?—Might I answer the question generally first, and then come to any particular item? I have looked at the question as a whole, and from the point of view of pure economy, dissociating it entirely from my own opinion as to the scientific desirability of the step. Looking at it only from the point of view of economy, it appears to me that there would be first an enormous initial cost in building a proper building for the accommodation of these two herbaria, a very large cost indeed, because the building would have to be constructed very carefully, and would have to be fire-proof. It would have to be carefully watched and policed, and there would be a large initial cost for furniture and fittings in addition. I believe it would lead to no reduction whatever of the staff or salaries.

89. Can you give us any idea what the cost of the furniture and fittings has been for the British Museum collection of plants? Because that would give us some idea of the expense?—I am afraid I do not remember. I can get the initial cost when we moved to South Kensington, which was a very large one. It varies annually considerably, but it is steadily diminishing. For example, in the next estimates I shall need very little in the way of furniture and fittings, because my gallery is almost as full as it will hold of these things. But if the whole thing were to be moved it would need an enormous cost for furniture and fittings, both to accommodate our collection and the Kew one. I am confining myself now to the initial cost of such amalgamation. More herbarium cabinets and exhibition cabinets would be needed, in addition to the first cost of the building, and would amount to a very large sum.

90. Practically, I suppose, it would be very difficult to utilise the existing cases?—There is this very great difficulty, that the Kew sheets and cabinets are smaller than ours. Their specimens would go into our cabinets, but ours could not conceivably go into theirs; so that we should need a new set.

91. I suppose in each case the furniture is fitted to the peculiarities of the building, and probably would not suit another building?—The herbarium cabinets would suit another building quite well, and could be removed, but new cabinets of the calibre of ours would have to be made in large numbers, because both our specimens and the Kew specimens would have to be fitted in the same cabinet. There would be the cost of new cabinets to the extent of the present cabinets in the Kew herbarium. With regard to working expenses, the largest sum is salaries. If these herbaria were to be incorporated together, and botany was still to proceed, we should need our present staff and additional assistance to carry out the more mechanical part of the work of incorporation, if it were desired to do it in a comparatively small number of years, and avoid unutterable confusion. That would be another source of expense. Ultimately I do not think any definite economy would come about, because the largest item, salaries, would, as I say, remain about the level it is now.

92. When they were amalgamated; but for the first term of years at least you think there would be a considerable addition?—Yes, so I take it.

93. It would, I suppose, be an immense labour to incorporate one with the other?—Yes. With regard to the cost of books and so on, there would be a little saving in the purchase of new publications. But the library grant, £150 to £180 a year, that I spend, is one of the smallest of the grants, and the economy there would be a very small one. For example, all new publications and periodicals are now bought at both institutions, and they would then be bought in one institution, but as I point out, that is a comparatively small sum per annum.

94. Would it be necessary for the Natural History Museum, even if it had not the existing plants, to have most of those periodicals, bearing in mind that they would have the fossil plants still remaining?—If they had the fossil plants still remaining they would require a certain number of them, but not so many. A lot of the periodical literature does not appear under the vote for my library, but appears under the vote for the general library. All the transactions of societies, and other works which deal with more than one department are deposited in the general library of the Museum in Cromwell-road, and not paid for out of the botanical funds.

95. Where a valuable collection is acquired for the public, if it were not acquired for the Natural History Museum it would be probably desirable it should be acquired for Kew, or wherever the general collection was?—That is so. It is probably bought by one institution or the other.

96. Would there be any saving in that?—Taking that into account the saving would not be a very great one. It varies from one year to another, and it is a little difficult to give any figures in the matter, but it has frequently happened that Kew has acquired a collection which, if they had not acquired it, I should have been very glad to recommend to the Trustees for purchase. It is also frequently the other way about.

97. Most of the money spent on purchases both at Kew and the Natural History Museum, is for collections which it is desirable to secure for the country, whether we have one museum or two museums?—Undoubtedly; there is very little overlapping indeed. With regard to the printing of catalogues, etc., a certain amount of that money comes back through the sale of those catalogues, and that would, I take it, be in no respect lessened. Such work would go on in connection with any amalgamation, just as the publication of the Cape Flora is proceeding at Kew. The small item of binding can be put with the purchase of books, and that exhausts the figures, except with regard to preparing. There would be no diminution there. The preparing grant covers a great multitude of small matters, printing labels for the gallery, payment for minor services rendered, carriage, and things like that, A great many things come under this head which would

certainly be going on just the same whether the two institutions were amalgamated or not.

98. If I understand aright, your evidence on that point comes to this, that there would be a very large initial expense, and for the first few years there would be a considerable increase in the expenditure, and that after that, the saving would be a very small one?—A very trifling saving ultimately. And placing all that against the disturbance that would take place in the course of amalgamating them, and the ultimate possible convenience to men of science of having the collection in one series, it appears to me that it would be rather an extravagant step to take. There is one other point which is perhaps embraced in your enquiry, and that is, that just as there are disadvantages in the collection being in separate buildings, there are also disadvantages in their being in one building. One of them is that a herbarium very much resembles a powder magazine or box of tinder, and the danger from fire is one very rarely absent from the minds of those responsible for a very large herbarium. From that point of view the existence of two great herbaria in the country is a somewhat desirable thing. It is quite possible that if a very expensive building was put up the danger from fire would be reduced to a minimum, but at present in the Natural History Museum we get the advantage of the careful patrolment of the Museum, and the excellent character of the building, and we feel ourselves therefore remarkably safe. Our herbarium is patrolled at intervals of a few hours all night, from the time the Museum closes until it is opened again in the morning. To make a building for the two herbaria which shall be quite sufficiently patrolled and watched would cost a good deal of money.

99. I think it practically comes to this, that the salaries and wages would have to be largely increased for the first few years?—I would not say largely, but it would have to be increased while the amalgamation was in progress.

100. And if the same amount of scientific work were to be done afterwards, there would be practically no saving in that respect?—I should deplore very much any cutting down of the staff, in the interest of efficiency.

101. But with regard to purchases, which amount to £400, the saving would be very trifling, because in most cases that amount is given for collections which it would be desirable to acquire in any case, whether the herbarium is at Kew or in the Natural History Museum?—That is so.

102. With regard to the purchase of books, the £150 might be reduced by £50 or even a £100?—£50 to £100.

103. And the £45 might be halved?—Yes.

104. But as regards preparing, practically that would be the same in any case?—Yes.

105. The catalogues which are printed you say would remain as they are?—Yes.

106. And lastly in the case of the furniture and fittings, you would require the same cases and so on, but there would be a considerable initial increase, and you do not see that there would be very much saving?—There would be no ultimate saving, but a large initial cost under that head.

107. Therefore it seems to me to come to this, that there would be a considerable initial increase of expenditure, and there might be a saving of £300 or £400 a year eventually?—You have exactly arrived at the figures which I arrived at—a saving of £300 or £400 a year at the end.

108. (*Mr. Godman.*) I do not quite understand why palæontologists working at the botanical specimens had of necessity to come to consult the herbaria?—They consult perhaps the botanical staff more than the herbarium. They very frequently appeal to us for an opinion on the structures.

109. Not the herbarium itself?—Not so much the herbarium as the staff. They do consult the herbarium, as in the case of the instance I gave to Lord Avebury, of the Wealden Flora, but they appeal more to the staff.

110. Have you much room for expansion now in your present galleries?—I have room for normal expansion for a considerable number of years, except in the cryptogamic rooms. I am afraid that the herbarium has been growing rather fast, but I think I can provide for it with a little structural alteration at a very trifling expense.

111. (*Mr. Seymour.*) You said just now you thought there might be an ultimate saving of £300 or £400 a year: did you mean by that on your own vote, or on the vote for Kew as well?—I meant by the combination of both establishments. I arrived at these figures in that way.

112. (*Lord Avebury.*) That would be subject to the interest on the initial expenditure?—Yes.

113. (*Mr. Seymour.*) Apart from the question of expense, your own opinion is not in favour of amalgamation, I understand?—I admit it is a very difficult question, and I admit the validity and strength of many arguments in favour of combining the two herbaria from a scientific point of view, but I see other objections. I take the view that if these two herbaria were once combined it would be a magnificent herbarium, and one no doubt of which everybody must be extremely proud. At present I see advantages in keeping them apart on the grounds of safety and otherwise. It has always been the endeavour of the staff at Kew, as it has been of mine, to reduce the disadvantages of their being apart to a minimum. We constantly know what is being done by the staff at Kew, and they know what we are doing. Students pass from one to the other, many of them engaged in monographs and so on. We are in constant communication with each other, so that we reduce the disadvantages of their being apart to a minimum. We know what is going on, and can communicate with each other. We frequently visit Kew, and their staff frequently visit us. On the other hand, of course, if there were to be a combined Herbarium, I hold very strongly that it should be in London, and that it should be very readily accessible to members of the public. I have, I think, stated in one part of my answer that there are many professional men who are botanists or interested in botany, in London, or who make short visits to London, who come to us for a few hours' or a day's work, to whom a herbarium outside London would be almost inaccessible, and that class of student, who does a great deal of valuable scientific work in the country, would meet with serious inconvenience.

114. (*Lord Avebury.*) Does not that apply to provincial botanists who have to come up to London?—It applies most strongly to them, and occasionally medical men in practice interested in botany, who make flying visits to us for the study of a few plants. It applies very largely to provincial and foreign botanists.

115. (*Mr. Seymour.*) Do I understand that your chief objection to amalgamation is the question of fire?—That is the chief objection, and, if I might add, the recognition of the fact that there would be practically no economy in amalgamating. I wish you clearly to understand that the £300 or £400 a year would, as Lord Avebury reminded me just now, entirely disappear in interest on the large initial cost of building a new herbarium and equipping it. It would be subject to that reduction.

116. (*Professor Balfour.*) Have you any idea whether you have more what I may call unique type specimens than they have at Kew?—I will put it this way, that Kew has certainly more unique type specimens in flowering plants than we have, considerably more; and that we have very considerably more in cryptogams than they have.

117. I understand you give special attention to cryptogams?—There has been a great growth of the cryptogamic herbarium in the past twenty years. We have made many acquisitions. It was very imperfectly represented before, both at Kew and the British Museum, but we have enormously increased our specimens.

118. You say you have practically made it since 1875?—There were older collections, and they were not in very good order, and putting them in order led to more acquisitions, so that practically we have made it since 1875.

119. Has the work of your men at the British Museum been hampered by the want of the unique specimens they have at Kew?—I think not. When it is desired to see certain types at Kew the member of the staff in question goes off, reporting the nature of his visit before he goes, and he may attend there for a day or only for an hour or two. I think we suffer little or no inconvenience from that. For example, when Sir Joseph Hooker was describing the grasses of the British India Flora, he desired Dr. Rendle's assistance, and with the

Mr. G. R. M. Murray. F.R.S.

1 Nov. 1900.

permission of the Trustees I allowed him a large measure of leave. After reporting himself in the morning he would frequently go to Kew for the whole day.

120. And has it been the same in their coming to you?—Undoubtedly. Last week I had three members of the Kew staff working at the same time in the department, while two of my people were at Kew.

121. In connection with the work of your assistants, have you any rules with regard to their doing research work?—The doing of research work is not recognised at all by either institution, but the men, of course, cannot be held back, and in the naming of new collections of plants, when new things come up, they very frequently work extra time by way of preparing papers to be published by the Linnean Society, or in other periodicals.

122. You do allow them to work extra time?—Yes, but they are not paid for it.

123. They work of their own accord?—Yes; they may stay as long as the place is open, and do so, but the Trustees do not empower me to engage them in original research. They are not paid for that in any way.

124. When they are laying in specimens that have not already been incorporated, do they identify them always before laying them in, or do you just put them into before laying them in, or do you merely put them into their genera?—We identify them. Nothing is put into the study series without being identified, unless the circumstances are exceptional. Formerly the things were put in at the end of the genus, but we discourage that now so much that that accounts to some extent for the 150,000 plants that are mentioned.

125. (*Chairman.*) What do you mean by the study series?—The general herbarium.

126. (*Professor Balfour.*) With regard to your accessions is there a large number of duplicates in the collections that you buy? Probably, may there not be in a collection only two or three specimens you really want, and thus the bulk of it be duplicates?—We rarely make purchases on such conditions, but bequests practically sometimes contain a proportion very much like that.

127. Does Kew do the same?—It has the very same practice, I understand.

128. Does it ever happen that you and Kew come into competition for collections?—In my own time I cannot recall such a thing. In the very first days of my responsibility there was a case in which certain questions arose as to whether we should have the first set of a collection and Kew the second, or the other way about, and it was settled by Sir Michael Foster in an interview which we had with him at the Royal Society. You will remember, sir, it was the Scott Elliot collection. There we were able to make almost two equal sets; there was very little to choose between them, and both parties were satisfied.

129. I suppose it is on the ground of your being able to distribute a number of these duplicates to different institutions that you refuse to students the right of coming into the herbarium to work, using the term student in the sense of men who want to work up for an examination?—I would not for a moment remain responsible for the direction of any herbarium to which a student in that uneducated state had access. There would be disorder and destruction constantly. Moreover, a herbarium is an instrument of research, and not one for teaching students, I take it, unless in a very limited degree, the degree being quite well known to you, sir, as I understand you use to some extent herbarium specimens for teaching.

130. Would it be possible to have, if you found the demand was sufficient, a students' herbarium, or do you trust to the student seeing these things in the galleries?—I trust to them seeing these things, as far as possible, in the galleries, and I have always encouraged teachers to have at hand a small herbarium for teaching purposes in the institutes of which they themselves are servants. In the Public Gallery there is a set of British plants illustrating the whole of the British flora, from the flowering plants right down to the fungi, so that a student who wanted to name a British plant has only to go there to do it. By providing that, I have kept down the number of visitors for consultation and research, because we keep no record of those who visit the Public Gallery.

131. (*Chairman.*) Can he examine specimens?—Yes, he can name his plant just as well there as inside.

132. (*Professor Balfour.*) In the galleries you have apparently arranged a systematic collection, having first of all a series of plants arranged according to the Genera Plantarum in the several families, and then you have this series of illustrations of the British flora. Now you are developing a morphological and œcological collection?—Yes.

133. How far do you intend to go with that?—All work in connection with the morphological collection has been stopped since the appointment of the present Director of the Museum, under whose charge it is. It was never under the Keeper of Botany, but always under the Director of the Museum, and the annual vote for its maintenance and progress was made to the Director. The actual scientific responsibility of it was committed to the Keeper of Botany, but a special man was employed by Sir William Flower, and paid by him. It was always understood, however, that he would appeal in any difficulty to the Keeper of Botany for advice, and that this assistant should be accommodated as far as possible with specimens and material from the duplicate material in the botanical department, and that so far as supervision went the supervision should be exercised by the staff of the Department of Botany. The expense was to be borne by the Director, in whose department it was included, and he had charge of the funds. It was the wish of the present Director that that should not be developed, and as he had charge of the funds it has not been developed since then.

134. Practically that work is stopped just now?—Yes, for the last eighteen months.

135. You are referring now to the work in the morphological section in the Central Hall?—Yes, and that only.

136. The œcological series, such as the illustration of the climbing plants, is entirely yours?—Yes, and that I am developing, and it will be only limited by the cases I can get.

137. Would you yourself like to see the morphological series extended?—I deplore very greatly its being stopped.

138. I notice that in the collection in your galleries you have a great number of models of plants; do you prefer this method to actual plants in fluid?—I find that people are attracted more by them, and while specimens in fluid with illustrative drawings would be preferred by a botanist who is pursuing a line of inquiry, we have to a certain extent, in making things attractive to the public, formed a popular exhibition. We have to make it as bright as possible, and we must appeal to that part of the public. We must not in any way throw an obstacle in the way of anyone inquiring into the subject, and it has seemed to me that the models, although they are expensive things, have a great advantage in that they have attracted people.

139. Then the reason of adopting that system has not been from any difficulty in getting fresh material?—Not at all. The models have been made in every case from fresh material.

140. How do you distribute your assistants between the work in the Museum, the Galleries, and the Herbarium?—Sometimes some members of the staff may go on for a year or two without doing any work in the Galleries at all, being continuously employed in the Herbarium. I like to save them the gallery work as far as I can. In the last few years the youngest member of the staff and I have practically done the whole of the gallery work to save the time of the others in the herbarium.

141. Is there any other public institution in London with an exhibition like yours?—None.

142. In the Royal College of Science at South Kensington they have a teaching collection?—A teaching collection to which students who are either Science Department students or paying students alone have access. It is not a public institution in any sense.

143. Your museum, if it were completed on the lines that you wish, both the morphological and œcological sections, would practically supply all that is wanted by the students of the Royal College of Science in that line?—Certainly it would.

144. Have you any system of distribution of duplicates?—There is no system. People who desire duplicates of a particular collection, or from a particular area, make application by writing to me, and I consider the question as to whether they would be well bestowed in this particular place, or whether I can get anything in exchange for them, or whether the exchange would be adequate, and I report in one of these

senses to the Trustees. No duplicate may be taken out of the Museum without their sanction.

145. You refer to the well-equipped laboratory that you have in the building; that, I suppose, is for work in connection with your cryptogamic plants?—Almost entirely, but not wholly.

146. And any work done in that is entirely of a systematic character, is it not?—Almost entirely. Occasionally a morphological point crops up, the solution of which presents an irresistible temptation, and therefore it is settled, but the work is almost entirely systematic.

147. Then the morphological side is not the prominent side?—No, nor is it the aim of the Department to do that. The laboratory, I may say, has been useful as a factory so to speak, in making these exhibitions, particularly the morphological exhibition which is in the hall at present.

148. Do you prepare microscopic preparations for your collection in the laboratory?—Frequently, but that work, of course, is irregular, depending upon the collections which are being incorporated.

149. (*Mr. Darwin.*) Can you tell me how far the exhibition of objects in the public galleries, the educational series, compares with those in similar museums elsewhere in other parts of England and Europe?—I should find it exceedingly difficult to answer that question, there are so many excellent collections, but I think they are of smaller scope as a rule. Ours is larger and perhaps fuller, and in many respects we have tried to make it a little more attractive, particularly from the point of view that was involved in my answer to Professor Balfour. We have had command of a little more money to do it, and we have been able to make good models to illustrate things in a more attractive way.

150. In these collections do you aim rather more at the learner who has some knowledge of botany, than at what may be called the man in the street?—We have aimed more in recent years, I think, at the man who has been taught a little botany, and we have worked along lines which have, I believe, been parallel with those of the usual course of instruction in botany. There still remains a certain number of specimens which might attract without perhaps instructing very much the man in the street.

151. I rather wanted to make out your point of view with regard to one of the questions Professor Balfour asked. Does not the fact that you aim at the man with some botanical knowledge accentuate your regret at not being able to extend the morphological section?—Yes. I should be very glad to do so. It is not complete in many of its details. As a matter of fact it is my present intention to offer to complete that out of departmental funds if the space will be left to me. But that is a matter on which I must address the Trustees.

152. Is it possible to say how far the daily work of yourself and your assistants includes the dealing with plants that have come straight from the collector, and been through no other hands before?—Yes; that varies also from time to time. Collections straight from the collector, which are not named, take a very much greater time to deal with than the named ones, but, on the other hand, the men naturally are exceedingly eager to get such collections, because it gives them an opportunity of describing new forms, and attracts them, and adds to our knowledge of the distribution of plants, and so on. Perhaps more time is given to that than ought to be given, but that is inevitable in any herbarium where trained men of science are working. It varies constantly from time to time. I am very much struck by the way the matter is managed in Berlin by Professor Engler, and I have endeavoured in the last few years to organise the work of the men as a whole, to concentrate it, and, so to speak, throw it at a single object. In taking a collection in hand I prefer to have it done straight away. Rather than let one man be describing a casual bit of a collection from one part of the world, and another another, I have tried to bring the forces together, so to speak, and enable a man to address himself to one particular thing, if necessary, at a time. I am very much struck with the success Professor Engler has met with in that, and I endeavour to imitate him.

153. I also wanted to ask how far what might be called semi-incorporation of two herbariums is possible. Supposing all your cabinets from the British Museum were moved bodily, and placed in a building which formed part of the Kew Herbarium, would not that be an extreme advantage to workers at Kew without involving a very great outlay?—Ultimate incorporation, I take it, would be inevitable. I have heard it very strongly advocated by a well known botanist that there would be a very great advantage in mere proximity, without the collections being incorporated, and I pressed him for reasons, which he gave me. This botanist was anxious that this should be done. He was a constant visitor to both institutions, and he told me that he himself would find it a great advantage, because it was near his place of abode. On the other hand, he was exceedingly disappointed at having to live out of London at all, and he only lived near Kew because he had to do so. He preferred that the collection should be in London. Possibly this gentleman may give evidence, and so I do not give you his name, but I merely state that as an illustration of the point.

Mr. G. R. M. Murray, F.R.S.

1 Nov. 1900.

154. (*Mr. Spring Rice.*) With regard to the question of cost, discussed between you and Lord Avebury, I did not notice that you made any allowance for the fact that if you could in one way or another throw the two herbaria into one you would be able to eliminate a very large number of duplicates?—Yes, if they were incorporated, but if they existed side by side, as Mr. Darwin has suggested, those duplicates would not be eliminated. If they were to be incorporated ultimately a large number of duplicates would be eliminated, but the question of what is a duplicate would be an extremely serious question. Botanists have worked at our herbarium, and at the Kew Herbarium, and they have based their determination of plants on the specimens in both institutions. They have written their opinions on the sheets of the actual specimens, and although they may be the same thing from the same place, they must remain and be kept as monuments of the opinion of these botanists. The plants examined by Sir Joseph Hooker in one institution, and by Robert Brown in another, can in no sense be considered duplicates; both must be kept to illustrate their determinations and remarks. But even then there would still remain a considerable elimination of duplicates.

155. But not so many as would appear at first sight?—Not by any means. There are almost as many opinions as to what is a duplicate as there are botanists.

156. Taking the present state of the two herbaria, the one at Kew and the one at the British Museum, there is no attempt, apparently, to treat them on distinguishable lines; each of you get as many additions as you can?—Yes, we each of us get as many additions as we can. There was one answer I gave to Professor Balfour which I think is incomplete. He asked me if there was any rivalry. I think there is a certain amount of healthy rivalry, but there is certainly no competition in the ordinary sense of the word. The fact that there are two institutions makes us both, perhaps, look out a little more sharply for collections than we otherwise would. If we existed without competition we might lapse. The present condition of the Paris Herbarium is a very good illustration of that. If there was some competition in Paris possibly the Herbarium there would awake. The British Museum Herbarium was in a somnolent condition at one time, until the establishment of Kew woke it up.

157. I was asking with a view to results, because you mentioned that with regard to India, Kew was stronger than you are?—Undoubtedly.

158. And possibly for some other part of the world you are stronger than Kew?—Yes.

159. Is not the position even more complicated than that? Is it not quite conceivable that you have some Indian plants which are not in the Kew collection?—Yes, certainly, I have not the slightest doubt that we have Indian types they have not got, but a comparatively small number.

160. And perhaps *vice versâ* with regard to Australia?—Yes. There is that sort of overlapping practically all over the world.

161. So that if a student wishes to specialise about Indian flora, in the first place you have to advise him to go to Kew?—He generally resides there, because Kew is so valuable to him. We may take Mr. Clarke, for example, as an Indian botanist, whose principal

Mr. G. R. M. Murray, F.R.S.

1 Nov. 1900.

interest is in Indian botany. He resides in Kew, but he comes, as he says, and "pitches his tent" with us sometimes for a month at a time. But being an Indian botanist he resides at Kew, which quite overwhelms us with the excellence of its Indian collection.

162. And *vice versa*, an Australian student might come to you?—Not so much. I could not point to any large region of the earth where we completely outclass Kew in flowering plants, but there are areas here and there where we have certainly a better collection than they have. In the division of the cryptogamia, right through, everywhere on the face of the earth, I should say we largely predominate.

163. And similarly, if a person comes for advice generally, one institution or the other might be better able to give him that advice?—As a rule, I think that a man who came for quite casual advice would be equally well served in either place. It is to the researcher that these inequalities are apparent.

164. I mean that probably with regard to a good many of the colonies, the West African colonies for instance, there is much more knowledge at the staff at Kew than among your own staff?—Because that involves economic botany. All these questions are economic questions, and anyone making serious enquiry of the sort, who should come to me, I would advise to go to Kew. I give advice on colonial questions occasionally, but only occasionally. For example, I have a letter from the Agent for the Crown Colonies, and letters from other inquirers, but they have been always more or less casual.

165. It appears that the overlapping between the two places is not systematic or logical, but rather accidental and irregular?—The overlapping with regard to economic questions practically does not exist. We do not touch that point at all, whereas it is the primary object at Kew. The overlappings have arisen naturally and unintentionally in the course of the progress of botany, and answer very much to the character of the men who have been employed in the two places. For example, if one man has specialised on a subject, he has advanced the institution to which he belongs very greatly in that respect. That has come about without design.

166. You probably have considered for yourself whether it would be possible to lay down any more reasonable lines of demarcation between the two institutions supposing they were kept up separately?—I have considered it without ever arriving at a definite scheme.

167. Do you know the recommendations made in the report of the Duke of Devonshire's commission?—A definite recommendation was made that Kew should attend to one kind of botany and the British Museum to another, but, as a matter of fact, I think the institutions have progressed almost in the very teeth of those recommendations. It was never found to be practicable.

168. Have those recommendations been carried into effect?—It has been found impossible to do it.

169. (*Chairman.*) Was there any attempt to carry them into effect?—I think both institutions did try, but the intention has probably lapsed. Might I ask you to read the recommendation.

170. (*Mr. Spring Rice.*) Their first recommendation was, "That the collections at the British Museum be maintained and arranged with special reference to the geographical distribution of plants and to palæontology; and that the collections at Kew be maintained and arranged with special reference to systematic botany"?—In the illustration of geographical botany I should say that Kew has made great progress indeed.

171. The next is, "That all collections of recent plants made by Government expeditions be, in the first instance, sent to Kew, to be there worked out and distributed, a set being reserved for the British Museum, and that all collections of fossil plants made by Government expeditions be sent to the British Museum"?—That has been carried out.

172. (*Chairman.*) Do you mean that the first part has been carried out, "That all collections of recent plants made by Government expeditions be, in the first instance, sent to Kew, to be there worked out and distributed, a set being reserved for the British Museum"?—That has been carried out. It was on that very matter that you, sir, decided the question of the Scott Elliot collection, but you took into account the fact that Mr. Scott Elliot had expended a deal of money, and, as we thought, you very justly recommended the collection to be made as equal as possible, according to his expressed wishes. This recommendation says that they should be worked out, at Kew, but that has not been invariably carried out. We have made, in the interests of economy I think, unwritten working arrangements. If we have a man strong at one particular group, I think almost unintentionally this man would work that group out; it has not happened often, but it has happened to my knowledge.

173. (*Chairman.*) But since the Devonshire Commission, have you received in the first instance collections made by Government expeditions?—No, except a case of cryptogams collected by myself as the naturalist to an eclipse expedition. Those I made and sent a set to Kew I think.

174. (*Mr. Spring Rice.*) Broadly speaking, those recommendations have not been carried into effect, except in a small measure?—No. I was referring to Paragraph VI. when I said there was an impossibility of carrying that out.

175. You consider that No. VII. has been carried out?—Yes, very loyally.

176. With regard to your library, you mention in No. V. of your answers that since the removal to Cromwell Road there has begun the creation of a great botanical library, but is it not a fact that there was already in the General Library at Bloomsbury a large number of botanical books?—They remained there. We attempted to get the Banksian library with us, as we understood Sir Joseph Banks had bequeathed it, never contemplating the possibility of its separation from the herbarium, but we could not get it.

177. The removal has involved the purchase of a duplicate botanical library to some extent, has it?—To a large extent.

178. That refers not merely to the working library of your department, but to the library of the whole building?—To the whole building. The libraries of the zoological and other departments of the Natural History Museum are in the same position as ours, and the General Library. Most of those books exist at Bloomsbury.

179. You have got at South Kensington a general scientific library, and also a working library in the Botanical Department as in the Geological?—We have a working botanical library—a very excellent one—in the department, and in the General Library there are only those books which are common to more than one department.

180. Then the number of volumes in your answer XII. (16) refers to your special botanical library, does it?—The special Botanical Library only.

181. In buying the books for that do you confine yourself to books of living scientific interest, leaving the more historical works alone?—The historical works have already been acquired, but when we went to South Kensington, a considerable amount of money had to be spent on getting those historical books. We are now very well off in that way, and it very rarely happens that we buy any such books. I attribute to that the fact that during the last few years I have been able to effect a considerable reduction in my purchase of books.

182. Have you any standing arrangement with the Royal College of Science as to the use of your collections or your library by any other professor or under his direction?—There is no standing arrangement at all. We meet each other almost daily and there is a general disposition to help each other along and to help them along, but there is no official relation whatever.

183. Speaking without committing you, would you say it was fair to state that the study of botany in the College of Science has the advantage of having your library and collection at hand and always accessible?—It is an advantage to those students to have the department at hand, because they are amongst our frequent visitors.

184. Would you say that the collections and the library were practically always accessible to them?—Yes, that is so.

185. (*Chairman.*) You mean the public galleries?—No, very frequently the library. Professor Farmer, the Professor of Botany in that institution, has very frequently research students, and these have free access to our library and collection, because they are in a state of tuition so far advanced that they can avail themselves of it.

186. It is confined to the professor and the research student?—Yes. The private part of the Herbarium and the Library is confined to them. The casual students who attend lectures, and are being taught, confine themselves to the public galleries and to the morphological collection in the Hall.

187. Have they any access to the Library?—No.

188. (*Mr. Spring Rice.*) Do you allow any professors to take a class into your private gallery?—Certainly not. Such groups as pay us visits are field clubs and so on, and they are invariably addressed. The lecture or instruction is given by one of the members of the staff of the Botanical Department. I do not think that a private lecture has ever been given in the herbarium.

189. Have you never allowed even the Government Professor of Botany over the way to give a lecture in your place?—If he specially proposed such a thing I should not object to it. I know that on the occasion of the visits of Dr. Scott and Professor F. W. Oliver, and occasionally Professor Farmer, the instruction to the students has been of a more or less conversational character. I have not the slightest doubt that they addressed their students in that way, but not in the sense of giving a lecture or expositions to the class as a whole.

190. (*Chairman.*) Would you allow him to use the Herbarium as a lecture theatre?—No, because he would be disturbing so many other students.

191. You would allow him to use your Herbarium as one connected with an institution?—No, it would be mischievous.

192. (*Lord Avebury.*) Would it not be the case that the outside collection is very much better adapted for a lecture of that sort, and that he is likely to use that more than the other?—Undoubtedly. I could not imagine a lecture in the Herbarium profitable to a student.

193. (*Mr. Spring Rice.*) Do you recognise that the position of Professor Farmer, and the College as a Government Institution, give him, if anything, special treatment?—No, certainly not: we treat all institutions in absolutely the same way. *Mr. G. R. M. Murray, F.R.S.*

194. (*Lord Avebury.*) You express a very strong opinion in favour of having one collection in London, but you would recognise, would you not, that it is very necessary to the work of Kew that they should have a collection?—Undoubtedly. It is necessary that they should have a collection for the purpose of naming plants in the garden. They have such collections in Edinburgh and university towns where botany is taught. It is necessary to have a herbarium for that purpose, but the herbarium needed for that is one that need not have type specimens, and might be, as compared with the present herbarium at Kew and the one at the British Museum, a mere skeleton of a herbarium. That is done in institutions scattered all over the Continent, and in this country as well. 1 Nov. 1900.

195. I suppose if any special facilities were to be given to the authorities of the Royal College of Science, it would be a matter rather for the Trustees in the first instance?—It would have to be done with their sanction.

196. I think I am correct in saying that the Trustees have never refused any application made by the Royal College of Science?—Never.

197. (*Professor Balfour.*) What would you think of the proposal involving—if there was any separation in the herbaria—the maintenance of the cryptogamic collection in one place and the phanerogamic collection in another?—It would lead to what I might call a mutilation. There are very strong objections to it. Personally I see great objection, especially in the description of new collections. If you had cryptogams in one part of London and flowering plants in another, I think it would lead to great popular inconvenience; people would never know where to go to get a plant named.

198. Paris, perhaps, is not a good place to quote for convenient access to collections, but there is a separation there?—That is a disastrous separation, I think.

SECOND DAY.

WESTMINSTER PALACE HOTEL.

Wednesday, 7th November, 1900.

PRESENT:

Sir MICHAEL FOSTER, K.C.B., M.P., SEC.R.S., &c. (in the Chair), afterwards Sir JOHN KIRK.

The Right Hon. Baron AVEBURY, P.C., F.R.S.
Sir JOHN KIRK, G.C.M.G., K.C.B., F.R.S.
Professor ISAAC BAYLEY BALFOUR, D.SC., F.R.S.
Mr. FRANCIS DARWIN, M.B., F.R.S.
Mr. HORACE ALFRED DAMER SEYMOUR, C.B.
Mr. STEPHEN EDWARD SPRING RICE, C.B.

Mr. BENJAMIN DAYDON JACKSON, *Secretary.*

Sir GEORGE KING, K.C.I.E., F.R.S., retired Superintendent of the Royal Botanic Gardens, Sibpur, Calcutta, called and examined.

199. (*Chairman.*) You have, I think, held an official position in India?—Yes, I was superintendent of the Botanical Gardens at Calcutta for twenty-seven years, and Director of the Botanical Survey from its foundation.

200. And your whole life, I believe, has been devoted to systematic botany?—Yes.

201. Have you made constant use of various herbaria?—I have.

202. Have you made use of the herbarium at Kew and the herbarium at the British Museum?—I have made use of both, but chiefly of that at Kew.

203. Can you say that you have used the one herbarium for certain purposes and the other for other purposes, or that you used them both for the same purpose?—I have used them both for the same purpose.

204. Is it, in your opinion, of interest that the two herbaria should be maintained in their present condition?—Not in their present condition. *Sir G. King K.C.I.E., F.R.S.*

205. What change do you think is demanded in the interests of botanical science?—In the interest of systematic botany, which is the only interest I am concerned with, there ought, in my opinion, to be one herbarium for scientific work. 7 Nov. 1900.

206. No doubt you have been led to that by your own experience?—Yes.

207. Will you kindly tell the Committee what your experience has been in working at the two herbaria which has led you to this opinion?—I have prepared monographs of certain genera, and I am now employed in writing a flora of the Malay Peninsula. I work at Kew

Sir G. King, K.C.I.E., F.R.S.

7 Nov. 1900.

by preference, because the best collection of Indian and Malayan plants is there. But all the specimens of Malayan plants are not there, so that after having finished at Kew, I have to go to the British Museum to see if there is anything there which I have not seen at Kew. To do that properly, and to arrive at conclusions which have some chance of being accurate, you must take your material with you. If you are working at a large order that means that you have to take a lot of plants up to the British Museum to compare them, and all that would be saved if the two collections were under the same roof. There is, of course, a waste of time, and also much inconvenience. If you do not go to the British Museum you are apt to make mistakes. You ought to have all the possible material before you, so that you can piece out the whole thing at one time. Of course, you cannot work simultaneously at two places, and you have either to begin at Kew and go on to the British Museum, or begin at the British Museum and go on to Kew. Therefore, the separation is very inconvenient, and a source of possible mistakes.

208. Confining yourself at present to the General Herbarium of the British Museum, because I imagine that is the one that you consult?—Yes, that is the one I consult.

209. Would you recommend that the whole of that herbarium should be transferred to Kew?—In the General Herbarium do you mean to include the Herbarium of British Plants?

210. I was distinguishing between the General Herbarium and the British Herbarium?—The General Herbarium ought to be put in the same place with the contents of the Kew Herbarium. Wherever you locate the present two collections they ought to be in one building or in contiguous buildings, buildings so near that it is possible to go from one to the other without much trouble.

211. Would it be sufficient, in your opinion, if the present Kew Herbarium was in one building and the present General Herbarium of the British Museum in another building, provided those buildings were contiguous and easy of access from one to the other?—Hardly.

212. It is not necessary, in your opinion, that the whole of the two collections should be absolutely incorporated together?—I do not know about incorporation, but it would be much better to have them side by side. For instance, in the elaboration of any natural order at Kew, take an illustration. Suppose that I am working at the Liliaceæ. The specimens of Liliaceæ that are now in Kew ought to be close by the specimens in the British Museum of that Order. That is the best possible arrangement—to have them together. But it is complicated by the fact that the two herbaria are mounted on different sizes of paper. The British herbarium is on a larger sized paper than that of Kew, and they would not incorporate well. You would either have to cut down the British Museum specimens and put them on sheets the size of Kew, or paste the Kew sheets on to paper of the British Museum size, in order to incorporate them.

213. Would that mean a considerable labour and considerable expense?—In this matter I never consider expense, because it is a trifling thing. We are such a rich country that I do not think it is worth listening to questions of expense or entertaining them.

214. But you would be quite satisfied with a mere location of the two herbaria in two contiguous buildings?—I would be satisfied, but I would be much better satisfied if you put the natural families together—if you incorporated them. That would be the best possible arrangement. Short of that it would be better to put them together, the cabinets with the Liliaceæ of the British Museum in one place, and those of Kew of the same family by their side, so that anyone examining them would not have to walk a long distance to go from one to the other.

215. That is, a common housing without absolute incorporation?—Yes, but do not put them in different rooms or buildings if you can help it. Do not divide them up; put the cabinets side by side, or as near to each other as possible. Of course, that is the second best plan. The best plan of all is absolute incorporation. But, as I have just said, that implies the remounting or cutting down and putting on different papers. To take the specimens off the present paper and put them on new paper would be the worst thing you could do, because it would spoil the specimens.

216. Supposing that your views were carried out, and that the two collections were put together at the British Museum in Cromwell Road, would you be content that Kew should be left without any herbarium?—Certainly not. Kew Gardens ought to have a large and good herbarium, with all the species represented in it. You cannot work a big botanical garden without a herbarium; the thing is impossible.

217. That is to say, in the case of the two herbaria being placed together in Cromwell Road, it would be absolutely necessary that there should be prepared in connection with Kew a complete Reference Herbarium; is that what you mean?—I do not quite know what you mean by "Reference Herbarium." Every herbarium is a reference herbarium.

218. Yes, but a herbarium consists, does not it, to a certain extent, of types which have to be consulted by the monographer?—Yes.

219. Do you wish under those circumstances that a collection of types should be maintained at Kew?—If there was any difficulty about a name at Kew, and the type was at the British Museum, the man working would not be on safe ground in naming his plant without going and seeing the type. The big reference herbarium, the working herbarium, the scientific herbarium, ought, in my opinion, to be near the botanical garden.

220. That is to say, in your opinion these two herbaria of which we are speaking should be put together, not at Cromwell Road, but at Kew?—Yes, at Kew.

221. Then supposing that were done, and the whole of the general herbarium at present at the British Museum were removed to Kew, and placed there under the circumstances that you desire, would it be sufficient to leave at the British Museum, in the interests of botanical science, and the interests of the nation generally, simply the galleries for popular exposition?—No, I would not say that. I would leave the galleries for popular exposition—if by them you mean the galleries in which there is a mounted set of British plants?

222. Yes, and various illustrations in botany?—I would certainly leave these, and would attach to them as near as possible a full and complete British herbarium, a well-named collection of British plants. That, I think, is only fair to the public. There are a great many people who might have an hour or two on a Sunday afternoon, or on a Saturday afternoon, to spend, who could not go to Kew, and who could find what they want at the British Museum, especially if it was kept open in the evening.

223. But do you think that should be limited to the British herbarium?—No, certainly not. I would have a representative herbarium of India, and of every British Colony, and I would have them in separate cabinets, so that a man wanting to see the plants of Australia would find them in a limited number of cabinets, and would not have to toil through a herbarium arranged systematically irrespective of geography; so that a man wanting to get an idea of the flora of India could do it with as little trouble as possible. I would have these collections accessible to the public without any restriction, such as being seen only between 3 and 5, or 5 and 7, or any nonsense of that kind. They should be open all day, and I would allow people to handle the plants. That, of course, would imply a certain amount of wear and tear among the specimens, and such destruction would have to be made good from Kew, or wherever the big herbarium is located.

224. These naturally would not be valuable specimens?—No, the collection would be a popular one, considering the present state of neglect into which systematic botany has fallen, this ought certainly to be done. The collection need not be located in the Natural History building: there is a college of science somewhere there in sheds, but when they get better accommodation there might be a herbarium there, if necessary.

225. But why would you limit this to a British herbarium and to those of India and the Colonies? For instance, ought not the flora of Europe to be there?—That might be done, certainly, but I thought expense was an important feature. For instance, I would have myself a flora of Switzerland.

226. All these floras would be more or less geographical, would they not?—They would be arranged geographically. That is to say, you would have the plants of Switzerland in a certain number of cabinets, the plants of Great Britain in other cabinets: so

that a man who had been to Switzerland and collected a number of plants and wanted to know their names, might take them down and compare them with the Swiss herbarium, and thus name his plants himself.

227. Would you allow these herbaria to be freely used by the public, without any restriction?—I would not allow them to take pieces off and carry them away.

228. But is it not possible that a person unaccustomed to the use of dried plants would very speedily do a great deal of injury?—I daresay he would, but plants are not expensive. You can buy a very complete flora of Switzerland for a very small sum.

229. You do not think there would be any advantage in having, either in place of the arrangement you propose or in addition, a herbarium arranged not geographically, but, for instance, according to the orders, and so on?—That would be provided in the big herbarium, wherever it is to be.

230. But supposing your herbarium was at Kew—I am not speaking now of the herbarium which would be used by scientific botanists, but a herbarium which would be used by a person wishing to identify a plant—do you think that your geographical arrangement would be perfectly ample for that, that there would be no advantage whatever in having one arranged according to natural orders?—I do not think so, because that is provided already at Kew. Of course, inside the geographical arrangement you would have the systematic arrangement. The plants of Switzerland would be arranged in the Natural Families, the Ranunculaceae, for example, in one place, and the different species in separate covers. Each herbarium would be completely equipped as far as it went, but I would not mix them.

231. Then there are at the British Museum certain historic herbaria, the pre-Linnean herbaria, for example?—In my opinion, all the historic herbaria, all the herbaria with types, ought to be with the general collection. I do not know whether the Linnean Society might be got to transfer the Linnean collections, but if so, so much the better. I would have everything in one place.

232. And you think that in the interest of botanical science and all that depends upon botanical science, the steps which you are recommending would be justifiable, even if they entailed very considerable expense?—Certainly; the expense would be nothing.

233. You do not think the expense would be very great?—Certainly not. I do not know anything about the estimates for the buildings, and so on, but it need not be great.

234. We have now, as you are aware, the two institutions, and it has been represented that that is an advantage in this respect, that the competition increases the activity of the one place or the other; that the activity, for instance, at Kew favours activity at the British Museum, the one does not wish to be out-done by the other, and that really in that way one gets more scientific work than one would in a single establishment where men would be left entirely to themselves?—Speaking generally, there are great uses in a little emulation, but I have not lived steadily in England, and I do not know the conditions. I could not form an opinion on that point. I have worked at intervals when I have been at home on furlough, but I cannot say what the state of matters is in that direction.

235. Then I understand this is your view, that it is most desirable in the interests of botanical science that the present General Herbarium at the British Museum should be moved bodily to Kew, and, so to speak, interpolated by arranging all the cabinets in the herbarium there?—Either by that or by sheets.

236. Or you would be satisfied with their being placed together in two contiguous buildings?—I would not be so well satisfied.

237. You would not be so well satisfied, but that would be desirable?—Yes.

238. There would be a very great difference between that and your plan of arranging the cabinets in proximity in the same building?—There would be a decided advantage in interpolating sheets, putting the specimens together.

239. You think there is a very great difference between having the two herbaria in two contiguous buildings, and your plan, not of absolute incorporation, but of having the cabinets put side by side?—Yes, there is a great difference.

240. A very great difference?—Yes, a very great difference. The difference between walking from that picture on the wall to the next one on the wall, and between going to another room or to another building altogether.

241. That, I imagine, would necessitate new buildings at Kew altogether?—Certainly. The present herbarium at Kew is stuffed so that you cannot move in it.

242. In any case you think that an increase of buildings is required at Kew, even if no amalgamation takes place?—Most certainly. The present building at Kew is much too small. The accretions are so great, and come in so steadily, that I do not see where the plants now coming in can be put.

243. These steps having been taken, you think there should be arranged either at Cromwell Road or in the Royal College of Science—somewhere in London, of ready access to those living in London, without any railway journey—a general herbarium arranged geographically?—Yes.

244. Which can be consulted without any stint by anyone wishing to do so?—Yes. I would, however, rather that things stayed as they are if there is not to be a fire-proof building erected. At present the collections that are housed in the British Museum are comparatively safe from fire, but the collections at Kew are exposed to fire every minute of the day. If there is to be no provision of a proper fire-proof building I would not have any change at all. Not having any change, leaves you one part of your collection safe. If you put all the things at Kew in a building of the sort the present collection is in, then you put all your collections into a very dangerous position as regards fire. If I were not absolutely sure that a really good-fire-proof building was to be put up, I would say let things remain as they are.

245. Have you any idea of what would be the expense?—Not the slightest idea. I have a general impression that the expense would not be great.

246. What do you mean by great?—£150,000, but I do not know. I am not a builder, and I have not the slightest idea. We put up an excellent fire-proof building in Calcutta, absolutely fire-proof, for about £3,000. But what your prices are in this country I have not the slightest idea, and I would not venture to offer any opinion about the price. But if the new building were to cost £150,000 I think it would be cheap. The Kew collections are the finest and most valuable botanical collections in the world. For a nation such as we are, rolling in wealth, to niggle over a couple of hundred thousand pounds is contemptible, I think.

247. How long has the herbarium existed in Calcutta in the present building?—About 15 years.

248. Was it erected under your supervision?—Yes, after seeing Kew.

249. And are you satisfied with it?—Perfectly satisfied.

250. In many respects, in its arrangements and so on, it might be spoken of as superior?—It is fire-proof.

251. In other respects?—In other respects it is well arranged. It is a building from my designs, so that perhaps I ought not to say much about it, but it is designed after the Kew galleries. The flooring of the galleries is iron.

252. The chief feature, you say, is that it is fire-proof?—Yes. That is the only feature I claim any merit for. The British Museum galleries I should think are pretty nearly fire-proof.

253. Is the table space adequate at present at Kew?—Not at all. The new building ought to provide large table space. Many more tables are wanted for laying out large collections. There is now no room to lay them out, and you cannot see things.

254. You are speaking now of what ought to be in any herbarium?—Yes.

255. Is there table space at the British Museum?—Not enough.

256. And you say it is conspicuously absent at Kew?—Yes. Originally there was space in the middle of the lower floor, but that is all filled up with cabinets. The table

Sir G. King, K.C.I.E., F.R.S.

7 Nov. 1900.

space now consists of a table between each block of cabinets, about seven feet long.

257. That is not a small matter of convenience, but it is essential to your duly working out your results?—Certainly. If you are working at a critical genus or species you want to put all your specimens on the table at once, so that you can walk along and look at them carefully without any effort, or turning over papers or taking things out of a wrapper, and all that. You want to see a hundred specimens in some cases at once, and you cannot do that at Kew. I do not know what area of table space they want, but a very great deal. Tables are cheap. There is one thing I have forgotten. In the provision that I propose for the herbarium, I forgot to say that there ought to be some arrangement for palæontologists. There ought to be collections at Cromwell Road such as they could consult if they desire.

258. (*Mr. Seymour.*) If your idea was carried out, of bringing the herbarium at the British Museum under the same roof, or contiguous to the one at Kew, would there not be a very great duplication of specimens?—Yes.

259. Would you weed them out, or do you propose to keep them in their duplicate condition?—I would not give away a single duplicate to begin with. As a natural family gets worked up by a man whose eye is in for it, who is an expert in it, I would let him pick out what he thinks are duplicates. It is very difficult to say what is a duplicate. You may have two sheets shown to one botanist, and he might say these are the same things: these are duplicates, and one should be given away. But the other man would say they are not duplicates, but different things. There is dreadful danger in giving away duplicates hastily. I would take the whole collection over as it stands, and not attempt to reduce space, or to save money by giving away duplicates wholesale. I would certainly give duplicates away ultimately, but slowly, after the order to which they belonged has been worked up by a competent botanist. Almost every order in a herbarium gets some day into the hands of a competent man, and I would leave that man to pick out and say "This is a duplicate, and may be given away."

260. (*Professor Balfour.*) This common housing of the collections that you suggest might take place without incorporating them, would be practically very much what they have at the British Museum, where now the British herbarium and the general collection are kept quite separate, so that if a person wants to work out some European plant which is British he must go to two different collections. Therefore practically there would be no more inconvenience in that than there is at the British Museum at the present time?—There would be no inconvenience. You would be saved the labour of walking, that is all.

261. Your reference has been chiefly to the Phanerogamic collection?—Entirely. I have not worked at Cryptogams at all.

262. Supposing that the transference you suggest was made in the Phanerogamic collections, have you any opinion as to whether it might be desirable to leave the Cryptogamic collections at the British Museum?—I cannot say much about the Cryptogamic collections, because I do not know the kind of people who consult them; but probably it would be better to have the Cryptogamic collection under the same roof too. However, I am not so strong about that, because I have no experience of it.

263. Have you looked particularly at the so-called popular collection there?—Yes.

264. Do you think that is a valuable series?—Yes, very valuable.

265. Might it be considerably extended?—Yes.

266. So that, in fact, your recommendation would be that that popular line of exposition should be extended, and that the herbarium should be placed on exactly the same popular lines, and that all the real scientific research and investigation should be transferred to Kew?—Yes. I do not say to Kew, but to a new building.

267. Separate from that in which the popular collection remained?—Yes.

268. But you would have all these popular collections in London?—Yes.

269. At Cromwell Road?—Yes; there they could be easily consulted. They are now in the British Museum, but I would see no objection to having them in one of the neighbouring buildings. There is to be a College of Science building, I believe, and that would be a very good place for them. All I would hold out for is that they should be easy of access, and easily consulted.

270. As I understand you, you said before that at Kew there must be maintained a herbarium as complete as possible?—Yes.

271. Does not that point to the fact that at Kew there would require to be a research herbarium? That Kew would be the place where you would put it?—Yes. All new specimens coming in I would have treated at Kew, and if duplicates were wanted for London let them come from Kew. Let it be part of the duty of that herbarium to send up what specimens are wanted.

272. Do you think that the fact of the research herbarium being placed at Kew would interfere in any way with the work to be done?—In some cases I daresay it would. A man living in Cromwell Road would find it more convenient to work at the British Museum than to go to Kew, but he would find a larger collection at Kew. A man's business is to do the best work he can, and he will go to the place where the best material is, and in my opinion the scientific material ought to be all in one place.

273. But the inconvenience to individuals that would ensue from the transference of the whole to Kew would be more than compensated for by the advantage to scientific men of having the whole thing under one roof?—Certainly. People who know London—I do not profess to do so—say that Kew is not so much out of the way.

274. In working both at the British Museum and at Kew, do you find that you can make equally easy use of both herbaria?—No. If I am going to work at Kew, it simplifies matters to live at Kew, and in working at Cromwell Road it simplifies matters to live there.

275. Supposing you go to Kew, you find all your collections arranged so that you can readily get your plants; when you go to the British Museum herbarium, do you find you can as readily get your plants there?—Yes; they are well arranged.

276. Are they well arranged in both cases?—Yes.

277. (*Mr. Darwin.*) There is one point I want to get at, and that is the distinction between a research herbarium and a herbarium designed for use in a botanical garden. Supposing you have an ideal herbarium for the use of the garden, would it or would it not at the same time be an ideal research herbarium?—Yes.

278. I understand you would practically make the herbarium at the British Museum a popular herbarium, it would no longer be anything that could be called a scientific herbarium?—It would be scientific to a certain extent—the plants in it ought to be accurately named.

279. But it would be nothing at all of the character of a research herbarium?—No, not in the highest sense.

280. Supposing you were Dictator, would you still have a competent botanist at the British Museum?—Certainly.

281. Would not the loss of anything that might be called a research herbarium be a certain drawback to the work of such a botanist?—He would have to concern himself with other matters than large groups of plants. In his new position he could not do that.

282. But he would want something more than a herbarium simply arranged on geographical lines, representing picked places of the world. I want your opinion whether he would not possibly need something more complete, a representative herbarium of the whole world, say?—But he could not have it. There is not material to have a large herbarium containing plants of the whole world, in two sets. The British Museum collection does not represent all the plants of the whole world now: neither does Kew, but Kew will do so more when it gets the British Museum herbarium.

283. Would it not be possible to supply the British Museum with what may be called a representative herbarium from Kew?—It would be possible, but it would take up a frightful lot of time, and where would they put it in the British Museum? There is no room for it.

284. (*Mr. Spring Rice.*) You spoke in rather strong terms about the danger of fire to the herbarium at Kew. Are you aware that the building is completely isolated?—Yes; and I am aware also that it is completely built of most inflammable pine wood, that the galleries and roofs are varnished, and that the windows of the lower storey are within the reach of any evilly disposed person, who has only to break a window and shove in a bunch of shavings and a little petroleum, and Kew herbarium in half an hour will not exist.

285. Apart from such a highly improbable contingency as somebody wishing to set it on fire, can you suggest

any means by which it might be set on fire, except by lightning?—Yes, a match.

286. Are you aware that no lights are admitted?—I am painfully aware of that. There is only one place where you can light a spirit lamp to boil a plant for dissection.

287. I am quite aware of the structure and its defects, but what I want to bring out is, that apart from improbable contingencies, there is no real risk of its being set on fire?—But improbable contingencies are just the things that happen.

288. But apart from those. I do not wish to discuss it too far, but I want to put it this way: compared with a building which is full of inhabitants and fires, and where people sleep, it is on a very different footing?—Yes; it is on a different footing from that. It is quite different from a house where there are a good many fire places, housemaids, muslin curtains, and so on. But the possibility of fire, I think, is not at all a remote contingency.

289. (*Lord Avebury.*) I should like to get an idea in what condition you would leave the Natural History Collection in London?—I have just suggested that I think a full British collection should be there.

290. Nothing but a British collection?—Flowering plants and Cryptogams for a complete British collection, and representative collections, not complete, but giving specimens of the important and striking plants of India, and of all the British Colonies, and I have suggested that these should be arranged in several suites of cabinets, the English plants in one set of cabinets in their natural families, arranged as at Kew, within covers, and so on. Then the plants of India in another, the plants of Australia in a third, and I would also have a set of specimens that might help palaeontologists.

291. That would involve the formation of an entirely new collection?—There is a British collection, as I understand, now in the British Museum, and that could be just left there.

292. I am speaking of the second part of your answer?—The collection would have to be brought together. I would have only small collections. The one of India might represent specimens of the chief plants, well known things like teak, various oaks, figs, and so on; the leading plants—not by any means a complete herbarium.

293. Do you not think that, in an institution like the British Museum, it might be very misleading to the public to have selected collections of that kind?—I do not think so.

294. Then you said, I think, that it was very important that collections should be most easy of access, and easily consulted. Would they not be more easy of access and more easily consulted in London than anywhere outside of London?—The reason for putting the big collections at Kew would be this, that you must have a large herbarium at Kew in order to properly work the botanical gardens. You need a collection which contains a good number of type specimens, a typical collection. You could not work Kew with an imperfect collection, because plants are sent to Kew to be named from various parts of the world, and it would be a bad result if wrong names were given, simply from want of standard specimens with which to match the specimens sent for identification.

295. That, you think, outweighs the other considerations?—Yes. There is plenty of room.

296. (*Sir John Kirk.*) Unless there is anything further you wish to state, that will complete what we shall require from you?—There ought to be good arrangements for boiling and dissecting plants in the new building. At present in Kew there is only one place where you are allowed to light a spirit lamp to boil a specimen, and there ought to be a great deal more facility in the new building. I think that is all.

Mr. Charles Baron Clarke, F.R.S., formerly of the Bengal Civil Service, and Acting Superintendent of the Royal Botanical Gardens at Sibpur; called, and examined.

297. (*Sir John Kirk.*) You have been working at the preparations of floras and botanical monographs for some considerable time?—Yes.

298. Can you give us an idea of how many years that may have extended over?—I have been home thirteen years, and I was at home on duty for six years at work on the flora of British India, so that I have practically been home nineteen years, four-fifths of which I spent at Kew, and one-fifth at the British Museum.

299. You have made use both of Kew and the British Museum?—Certainly.

300. You have been present and heard the evidence of Sir George King?—Yes.

301. Generally speaking, do you agree largely with him?—I agree with him largely, but not wholly by any means.

302. I only put that question that we might save time, perhaps, so as to concentrate on a few questions?—It struck me that with a Committee constituted like this, it would be better for me to tell you in three minutes how I have done my last piece of work, because I always work in the same way. The last piece of work I did was to draw up the account of the Acanthaceæ for the flora of the South African Colonies. I had to draw up the account as far as our herbaria would enable me to do so, and I took them in two batches of about 150 species each. I took the first 150 at Kew, and of course I had to write them out provisionally. That is a great nuisance, with only part of the material, to write a provisional account of genera with descriptions of many critical species. If I had had the British Museum at Kew, I should have finished the thing straight off in five weeks, and done it much better than it is now. After having drawn up this provisional list, I went to the British Museum, and worked through their material, and practically I had to re-write the whole. I had to work all day reconstructing many of the species and so on, which took me another fortnight, and then I went to Kew to have another look, and finally I got nicely muddled. I have to carry a sufficient description backwards and forwards to identify species closely allied, and I cannot do it properly. Mr. S. L. Moore, who is at the British Museum, had made a species and published it. I had a plant which I got at Kew, and said it was the same. Mr. Moore went to Kew and looked at it, and thought it was not the same. I said, "What are we to do?" Mr. Moore said, "The specimen cannot be moved, and you must make a minute drawing of it," and that would have taken me a quarter of a day. And even when I have made the drawing and carried it down, the doubt still remains. If we could put the plants side by side, we should know in a minute. Not only would it save us a large percentage of time, but I should do my work so much better if I had the whole series before me at once. This work is what I have been doing the whole of these nineteen years.

303. Are you ever allowed to take away specimens from Kew for the purpose of comparison?—We are not so absolutely tied up as at the British Museum, but that is not what I want. I want in forming a genus to have all the material in one place.

304. Then it is your opinion that it would be to the advantage of science that the two herbaria should be somehow combined?—Certainly.

305. If the change should be made, what would you recommend in order to bring about what you wish?—I wish to give evidence now from my own experience. All I want is that the two, up-to-date, should be completely amalgamated and fused. What I should like would be to have all the sheets of specimens arranged in one series; not to touch the sheets, but to put the small sheets on bigger pieces of paper. The whole thing should be systematically consolidated. It is nothing to me where that is done, whether the consolidated herbarium is at Kew, at the British Museum, or even in Edinburgh. They would be all equally convenient to me.

306. Do you think that would be equally convenient for others?—No. As I have said, I am narrowing my evidence to my own experience, exactly what I have done myself.

307. You would have one complete herbarium?—Yes. There is one thing I should say in explanation of Sir George King's views. I want all the existing material, the old Kew herbarium, everything up-to-date, brought together. As regards future material it does not matter. I have no objection to forming any supplemental material, or imperfect herbarium in London. But we want particularly all the herbaria up-to-date, because

Mr. C. B. Clarke, F.R.S.

7 Nov. 1900.

they have gone through the hands of writers and botanists. If a new collection were sent from India that neither Mr. Bentham, nor Sir Joseph Hooker, nor Sir Joseph Banks had see, it does not so much matter to to me whether it is in London, in a popular institution, or where it is, but I do not want any part of the present material put in a separate institution. I want the existing or old material all drawn together. In the same way I am most savagely opposed to getting rid of a single duplicate. I have been entrusted at Kew by two successive curators to distribute every duplicate I found as I worked through the orders. During the past year I have ordered to be distributed eleven sheets of Kew, and about 45 of other herbaria that are being consolidated. Knowing this question was coming up, I counted them yesterday morning. These 56 sheets, out of all that have passed through my hands in one year, are all that should be distributed as duplicates.

308. There is an historical herbarium deposited at the British Museum; what would be the proper place for that?—I have often to go back to that to find the original name, and if I have done my work at Kew I have to travel up, and from my notes look at these old plants, and probably find, as I did the other day, that the name one has written over and over again, and many botanists have employed, is all wrong. I might have found that out at first if the historical herbarium had been at Kew.

309. Do you think there would be great expense in doing this?—I cannot say at all what the expense would be. I should like, if you asked me to design the thing, to have galleries, not a great square room. I should like low galleries with the plants stored in them.

310. Do you find the library at Kew sufficient for your work generally?—It is sufficient generally, but I have to take notes of books I can only see at the British Museum. I want both libraries very badly indeed. I want not only the books in the botanic library, but the journals. I ought to have books more often than I do from what the Museum call their General Scientific Library. We want a proper series of the journals at Kew. Kew has sometimes only got extracts from separate papers, or things of that kind.

311. (*Lord Avebury.*) You suggested that it would be necessary, as it no doubt would be if the two collections were to be amalgamated, that the plants should be transferred from the small sheets and put on to larger papers?—Exactly so. If that was meditated, I should propose at once to set on a staff of girls with paper to remount the whole of Kew in preparation for the amalgamation four or five years hence.

312. That would involve the remounting of the whole Kew collection, would it not?—Yes, and I think it would be a great advantage in many ways.

313. Would not that require fresh cabinets?—Certainly. You would require four times the cabinets we have now. The Kew cabinets are worth nothing; they are made of the commonest material, and cost but very little. When you talk of expense, I have not made any calculation, but I suppose, in any case, you would want a whole quantity of new cabinets.

314. If I understand you correctly, it practically comes to this, that there are no duplicates, or so few, that they might be entirely neglected?—Not only that, but we have duplicates and duplicates. It has been said that you do not want two duplicates of one number. That is true of a certain very limited amount of numbers; there are certain collectors who only put their numbers on one collection. You may say you do not want a duplicate of that, but if you take the numbers of Hewett Watson you will find that nearly all European collections, to begin with, are numbered out of catalogues. These numbers are a great source of error. A man putting a number on puts a name on; it represents some name in the London Catalogue or Schultz. They are a source of error. It is the duplicate numbers that I always particularly want in Wallich's numbers. We would not get rid of these for the world.

315. Should I correctly represent your views if I were to say that you would not consider the same plant in different conditions, one in fruit and the other in the younger state, as duplicates?—Certainly not. If you have ever so many duplicates, one, perhaps, shows the character you want to work with and not the other. The set at the Museum may be better than the set at Kew. They often show stipules and things we want to see which the Kew does not.

316. Another point to consider is the locality from which they come, is it not?—Yes. At Kew we are called upon to give the distribution of plants, and you require a very large series of specimens to do that, even for one country, as for India. As a matter of fact, the Kew herbarium is very imperfect in its representation of some large areas, as of Eastern Europe.

317. Are those the main considerations which lead you to the opinion that there are practically very few duplicates?—Yes, those are the main ones.

318. I gather that the gist of your evidence is that you want to see the two collections amalgamated, and as to where the amalgamated collection is put you have not expressed any view?—Yes, that is so.

319. Probably you will say that the existence of the garden at Kew might give some advantage to Kew, and on the other hand, that the accessibility and existence of the great libraries in London give some advantage to London?—It would unless our library at Kew was strengthened. We should have to travel up. I have sometimes to come up to the Royal Society, which has some books which are neither at the British Museum nor at Kew. But of course I should propose to strengthen the library at Kew very much.

320. You are aware that botanists come up from the provinces a good deal to use the collections in the Natural History Museum?—Yes.

321. And it is more convenient to them having the collections in London than if they had to go to Kew?—Yes, to many of them.

322. (*Mr. Seymour.*) Do you mean that the specimens at Kew require remounting in any case, or only if there was an amalgamation?—Only if there was a complete amalgamation. What I think is that with these old historic plants which have been used in books, and the types of certain citations if not of the species, it is a great protection to have them on doubled paper. Future ones coming in would, of course, be mounted on single sheets. It would facilitate the handling of the whole thing if we had a certain percentage of the plants doubly mounted.

323. You think that would not injure them?—Not in the least. They would not be touched. I would have it done entirely by girls, who would simply paste the present sheet on the larger sheets. The margin might be used for drawings, notes, etc., and it would be very convenient.

324. (*Professor Balfour.*) If you did that it would be rather an advantage to the Kew Herbarium, because the present cases are not dust-tight?—It would. We ought to have totally different cases.

325. The whole construction of the cases is of the cheapest and simplest kind, is it not?—I understand that some of the officials have said, "We have only got bedroom furniture at Kew."

325*. If these specimens were remounted and put in new cases, dust-proof, it would be an advantage to the Herbarium, you think?—Certainly.

326. You say you have spent four-fifths of your time in this country at Kew, and one-fifth at the British Museum?—That was a very rough shot.

327. That would seem to show that for your work you find Kew the most valuable herbarium?—Yes, I certainly have. I should mention that I have grown into the work at Kew. I was obliged to work at Kew for the Flora of British India, and I believe the real reason I work there is because I know the library.

328. Have you any conception how long, working it in the way you propose, this amalgamation you propose would take?—It would depend entirely on how many girls you employ. I think the plants might easily enough be ready as soon as the buildings are, say three to five years.

329. Then you said it was a matter of indifference to you personally where the collection was placed, but I suppose you will admit there must be always a collection at Kew for the garden?—I have never seen it, but I believe there is a garden collection somewhere in the gardens now.

330. That is for the convenience of the gardeners, but you admit that it is of vital importance to Kew Gardens that there should be a good herbarium and library kept up there?—Practically, I never heard of any botanic gardens where one did not grow up, because they find it so essential for their own purposes.

331. Is there any such valid reason for a good herbarium of the kind being kept up at the British Mu-

seum?—London is the most central place, and on the whole, the most convenient, for the foreigners who come over. They do not, however, complain of Kew. I see nearly all the foreigners who come to work at my sort of work, and they all complain bitterly of the two herbaria, but I do not think many of them complain much of coming to Kew.

332. As a matter of fact, to a person coming to London the difference between going to Kew and going to Cromwell Road is not really very much now, with the underground railways and the increased facility of travel?—That depends very much what station they come to. If they come to Liverpool Street they can get to Kew very nearly as quickly as to the British Museum.

333. The fact of its being essential to keep up a herbarium at Kew, does it not rather point in the direction of Kew being the place where the combined herbarium should be?—Yes, so far it does; there is the analogy, and analogy proves something, of Berlin. At Berlin they are at work moving the herbarium from the town down to a place quite as far from Berlin as Kew is.

334. In working at Kew or the British Museum, do you find frequently that they have not got the books you want? Have you to use the Linnean Society library, for example?—No, never. I sometimes go to the Royal Society for books neither have got, but between the British Museum and Kew I can generally get everything I want. I have to send down for books at the British Museum to what they call their General Library. The botanical library is very good, but they have a general scientific library which, as a rule, contains all that I want.

Mr. C. B. Clarke, F.R.S. 7 Nov. 1900.

335. (*Mr. Darwin.*) There is one statement which you have made which I do not understand. You said that you desire to have the incorporation of the two collections up to date, and that you did not mind about new things. Does not that mean allowing the same state of things to grow up?—I was speaking purely from my own selfish point of view. I have generally narrowed my evidence to that. We cannot possibly catch every collection. If a collection was sent from China tomorrow and sold in the market, I should not care so much what became of it for my purpose. It has not been named or quoted in books. I travel about Europe. I have been to Geneva many times, to Berlin, and to all sorts of places to see their herbaria, but I cannot possibly capture everything new. I am expected to work up old material in this country.

336. If you looked beyond your own point of view, you would not approve of that?—I would rather not express any opinion.

337. How far would the kind of incorporation spoken of in the questions put to Sir George King have saved you time, merely having the cabinets side by side?—It would save me a great deal of time. It would be the second best thing to complete amalgamation.

Mr. James Groves, F.L.S., called; and examined.

337*. (*Sir John Kirk.*) You have been engaged largely in the work of the British flora, I think?—I have.

338. Have you made use of both the Kew Herbarium and that of the British Museum in that work?—I have constantly used the British Museum, but only occasionally Kew.

339. Can you distinguished the different uses you have made of these two—what leads you to go to one or the other?—I go to the British Museum to consult books and specimens, mostly in connection with British plants, and to Kew for those I cannot see at the British Museum.

340. Is it that the one is more convenient to you than the other in locality?—Yes.

341. But not so much for the material that you get?—No, purely from the locality.

342. You have been present and have heard what has been said. What do you think of the proposal that the two herbaria should be united?—From my point of view it would be very much more convenient if they were united, provided they were in London. But if they were united at Kew for myself and people situated as I am, it would be highly inconvenient.

343. So that you would recommend, if any change were made, that the amalgamation should take place by moving the Kew collections to the British Museum?—Certainly.

344. Have you had to make use of the pre-Linnean collection at all in your work?—Not to a great extent; but in connection with the Characeæ we have had occasion in past years to do so.

345. Have you studied the question from beyond the limited field of British botany?—I have worked at the Characeæ of the world, and incidentally in connection with British plants I have worked at European, but not to a great extent at extra-European plants. It seems to me an important point that people coming up to London, as many country botanists do, for a day or two, should be able to consult specimens at the British Museum, and, from a logical point of view, too, I think that the great collections should be in the capital of the country, and not 10 miles away.

346. (*Lord Avebury.*) In fact, the same considerations that apply to you would apply to London and provincial botanists generally; they would prefer the great collection being in London rather than elsewhere?—I think so. I am a business man, and have very little time to spare, so that I am obliged to hurry off to the British Museum immediately after leaving business on the Saturday afternoon in order to secure any daylight. It is during the winter I do almost all my herbarium work. Botanists coming up to London on business or for any other purpose would not usually care to go to Kew to look up perhaps a few odd plants.

347. You think they would be very reluctant to see the botanical section moved out of London. I think they would, certainly.

Mr. J Groves, F.L.S

348. (*Professor Balfour.*) You think it would be a practical inconvenience to have to go down to Kew?—Yes.

349. When the natural history collections were moved down to Cromwell Road from Bloomsbury, did that make any difference?—Not to me, it was about the same distance.

350. Probably to some botanists it makes it slightly more inconvenient?—It would entirely depend on where they were staying in London.

351. People arriving on the north side of London would not find it much further to go down to Kew—people arriving at St. Pancras or King's Cross?—Yes.

352. The difference in time is now very slight in going down to Kew as compared with the British Museum, is it not?—I think it is considerable. It is for anyone with my small leisure; but not, perhaps for him who has the whole day in front of him.

353. It would take half an hour or so, would it not?—Quite half an hour.

354. Supposing there were a transference and amalgamation made at Kew of the flowering plant herbarium, would it be any advantage to maintain the cryptogamic herbarium at the British Museum—Cryptogams below Pteridophytes, that is to say, the mosses and the Thallophytes?—I think it would be better to have the collections together.

355. If there is an amalgamation?—Yes.

356. You do not think it would be an advantage to keep the Cryptogams at the British Museum?—I think not. It would be a little more convenient for me, because I happen to work at a group of cryptogams.

357. But do you think it would be a mutilation of the collection at all?—No. I do not think there is really any essential connection between the collections of Phanerogams and Cryptogams, except in the matter of literature. In dealing with the Characeæ three-quarters of the books one uses are in the phanerogamic herbarium at the British Museum.

358. (*Mr. Darwin.*) Have you any idea as to how far your case is a common one? Are there many people like you engaged in the serious study of systematic botany who are also engaged in some profession which takes up a large part of their time?—Not very many, I should say.

359. You do not think it is a common case?—No, but the total number of visitors to the herbaria is not very large judging from the visitors' books. I know one other man very similarly situated to me, because he generally goes to the Museum in the same train as I do.

360. But you do not at the moment think of many cases?—No.

Mr. J. Groves, F.L.S. 7 Nov. 1900.

361. (*Mr. Spring Rice.*) I believe you work mostly on British plants?—Yes.

362. Supposing at Cromwell Road a thoroughly complete series of British plants was retained, your difficulties as to shortness of time would be very much diminished, would they not?—No, scarcely at all, because I am mostly consulting the Continental plants, for the sake of comparing with British plants, besides which the library is much more useful to me than the herbarium.

363. But, apart from the library, you require a herbarium wider than the British?—Yes.

364. And do you require it to be as complete as possible outside the British flora, or do you only require a typical collection?—One would require it as complete as possible outside the British flora, because one never knows what may be British. One has to refer to all the species bordering on the British species—the Western European and Scandinavian especially.

365. Do you consider that the present British collection at the British Museum is fairly perfect as a British collection?—By no means.

366. I gather that it has some gaps, for which you have to go to Kew?—I should say there is probably no British Phanerogam quite un-represented at the British Museum, but it is by no means perfect in having reliable or complete specimens of all of them.

367. Have your studies ever brought you into a position in which it was convenient to have the live plants near the herbarium?—No.

368. So that you are not in a position to judge of the importance of that consideration?—No. I have never used the gardens in connection with my work.

369. But if you ever had occasion to use fresh plants, is it not much better to have them at hand?—I have never seen any plants in the gardens at Kew that would be of assistance to me. I should explain, perhaps, that I have a large number of dried plants sent to me to determine from correspondents all over the country, and a good deal of my work at the Museum consists in comparing them with specimens there. So that I have dried plants to compare with dried plants.

370. And are you satisfied with that arrangement?—Yes, quite.

THIRD DAY.

WESTMINSTER PALACE HOTEL.

Thursday, 8th November, 1900.

PRESENT:

Sir MICHAEL FOSTER, K.C.B., M.P., SEC.R.S., &c. (in the Chair).

The Right Hon. Baron AVEBURY, P.C., F.R.S.
Sir JOHN KIRK, G.C.M.G., K.C.B., F.R.S
Professor ISAAC BAYLEY BALFOUR, D.SC., F.R.S.
Mr. FRANCIS DARWIN, M.B., F.R.S.
Mr. HORACE ALFRED DAMER SEYMOUR, C.B.
Mr. STEPHEN EDWARD SPRING RICE, C.B.

Mr. BENJAMIN DAYDON JACKSON, *Secretary*.

Mr. EDWARD MORELL HOLMES, F.L.S., called; and examined.

Mr. E. M. Holmes, F.L.S. 8 Nov. 1900.

371. (*Chairman.*) You are the present Curator of the Museum of the Pharmaceutical Society?—Yes.

372. I believe that Museum is in part a botanical one?—Yes, it contains a botanical collection of medicinal and British plants.

373. And you have been for many years engaged in study and research in botany?—For twenty-seven years I have named all the plants that have been sent to our society, whether from abroad or from home, both cryptogamic and phanerogamic plants. I have made a special study of cryptogamic plants as a hobby, but the phanerogamic plants have been a matter of my profession.

374. In the course of your studies have you had occasion to make use both of the herbarium at the Royal Gardens, Kew, and the Herbarium at the Natural History Museum, Cromwell Road?—Yes.

375. Are you able to say that you visit the one for particular purposes, and the other for other purposes?—When the botanical collection was near me at Bloomsbury, I used to frequently go there, but since it has been at South Kensington it really answers my purpose to go as a rule to Kew, because it takes only a quarter of an hour longer to go there, and the collection at Kew is far more complete, and access to it much more easy than it is at the South Kensington Museum. I have also found that if I go to South Kensington Museum first, as a rule I have to go to Kew afterwards, because the collection is so much poorer at the Museum than it is at Kew. But there are a few collections at the British Museum, such as those of Triana and Welwitsch, and so on, which one is obliged to consult, because they have not got the same specimens at Kew. The British Museum obtained the collections in their entirety, and simply distributed the duplicates.

376. You visit Kew because, on the whole it is richer in plants, and because it is more easy of access. You say there are collections there which are not at the British Museum; but that you have to visit the British Museum because there are collections there which are not at Kew?—There are special collections there which are not represented at Kew.

377. Might I ask what you exactly mean by the material at Kew being more easy of access than at the British Museum?—For instance, there is plenty of room; there are tables all round which are not crowded with parcels and books, where you can lay out your specimens and examine them carefully. There is a book, the "Genera Plantarum," put on the tables here and there, which refers to the genera in the immediate neighbourhood. I find, as a rule, I get more civil treatment, more ready help, at Kew that I do at the other institution. As a rule, they seem to have business of their own at South Kensington, more than they can attend to. I do not know what is the cause of it.

378. You think you get more assistance at Kew?—Yes. I always get more assistance at Kew than I do at the Museum.

379. Speaking now not only from the point of view of your own studies, but in the interests of botanical science in general, do you think it would be desirable that the two herbaria should be maintained in their present condition at the two places?—It is a considerable inconvenience to visitors to have to go to two places. In going to two places instead of one they

waste both their time and their money. That is the general feeling I have in the matter. Personally, I should much prefer for any kind of botanical work to go to one place only, and to be able to there settle the work at once. Very often a correspondent wishes to get an answer for a lecture or something of that sort, and it means a considerable waste of time to go to two places. But as far as I can observe, if you ask my opinion as an opinion, I generally see the same botanical workers at both places. Of course, occasionally you see one who does not go to both places, which intimates to me that they are obliged to work at the two places instead of the one.

380. Does that strengthen you in your view that it would be desirable if it could be arranged, that the collections should be in one place?—I think so, certainly.

381. In fact, would you go so far as to say that that is a change which you would recommend?—Certainly. I say nothing about the place. I simply say have the collections in the one place.

382. Have you any view as to what amount of amalgamation would be adequate for the purpose of botanical study? There seem to be three courses:—One is that the two herbaria should be completely incorporated, sheet by sheet; another course is that the herbaria should be kept separate in adjacent buildings; and there is an intermediate course, that they should be amalgamated to the extent that they should be all in one building—that the incorporation should not be sheet by sheet, but that cabinets belonging to one herbarium should be placed side by side with the corresponding cabinets of the other herbarium. Do you understand what I mean?—I think so; either that the whole should be amalgamated together, or that the two herbaria should be in separate buildings, or that they should be amalgamated in one building by the cabinets being placed side by side.

383. That, of course, does not preclude a certain weeding out, if necessary, but it is a distinction between amalgamation by sheets and amalgamation by cabinets. Is that, in your opinion, a feasible thing?—Are you asking from the side of the convenience or inconvenience to visitors to the herbarium?

384. I am asking this: If there were no other objections would it be, in your opinion, in the interest of botanical science preferable to have the complete incorporation?—I should say certainly not. For instance, take a genus like *Piper*, where we have about 300 species. Already at Kew we have to go through a number of countries to find out a particular specimen we want, and if you have half a dozen specimens from the same locality, representing no difference in detail, you simply have a surplus that is only a hindrance to those who visit the Museum, without being any help to them. What one wants is an absolutely complete collection of all known plants, and all varieties of those plants, and in addition to that, such specimens as have been described in books, we will say the Flora of India, or works of that sort. When those specimens are marked as at Kew "Flora of British India," such and such a page, you know that those are the specimens that have been de-described by the author of the work. With the very best botanists some mistakes will occur, so it is necessary to refer to specimens which have been described in books; and specimens which have been described in floras—that is, the type specimens—should, I think, be retained at the one National Herbarium, and they should be marked, of course, as types, so that people might know them as such.

385. I had better put the question in this way. You are of opinion that it would be desirable that the two herbaria should be brought together?—Certainly, in the first place.

386. Might I ask you what manner of bringing them together you would recommend as being the one which is most desirable in the interests of botanical science on the one hand, and which could be carried out practically with the least disturbance?—That is to say, if I had the work to do, how would I do it?

387. Yes?—I should say that it would be preferable to take from the specimens in the British Museum all those which are lacking at Kew, and to place those in the Kew Herbarium so as to make them easily referable and easily consulted.

388. Are you aware that the sheets in the two herbaria are of different sizes?—I think that is not so much a matter of very great importance. In the herbaria of the Pharmaceutical Society, for instance, half the sheets which come in are of a certain size, and our sheets are larger, and I just make four little insertions, fasten them in, and gum them behind. There is no need to touch the specimens at all. It is simply a matter of fitting them to the sheets. It must of course occur when sheets come from other museums, that something of the kind must be done in order to make them fit the particular sheets used at Kew, because, unfortunately, although there is a normal size, which I have mentioned in my article "Herbaria," in the "Encyclopædia Britannica"—I think it is 17 by 11—it is not used in all herbaria. Specimens occur which are gummed on, and the sheets must be utilised by being gummed on to larger sheets, as the case may be. That would be my view. Then, with regard to the duplicate specimens, those which already exist at Kew and the British Museum might be utilised for making a reference collection to be placed in the Royal College of Science, or wherever they would be found most useful.

389. Or left at the British Museum?—If thought proper. There should be a reference collection somewhere where it is most likely to be used by ordinary students. I do not mean students from other countries, like professors from museums abroad, and so forth, but ordinary students who wish to obtain some idea of the natural orders of plants, and the species and types contained in them.

390. You mean a herbarium left rather for educational purposes than research purposes?—Exactly so.

391. Then I gather that you are in favour of what I spoke of a little while ago, as a complete incorporation?—Yes, excluding duplicates.

392. Sheet by sheet?—Yes.

393. You are aware, of course, that the sheets at Kew are smaller than the British Museum?—I was not aware that they were smaller.

394. So that the process you advocate would have to be inverted?—In that case I suppose it would be necessary to use separate cabinets, unless, of course, the specimens allowed of being cut down.

395. Supposing that the plan which you have just now put before us should not prove practicable, would it answer the purpose of your research if what I spoke of as the third method was adopted, simply putting the cabinets containing the specimens which it was determined to retain in this collection side by side, so that there would be no need of any question of the size of sheets?—Each cabinet would contain a certain collection, certain Natural Orders, or divisions of Natural Orders, placed side by side with the cabinet containing the same Natural Order or division from Kew?—Yes. If you want to find out what is in a certain genus, for instance, if the species of the British Museum were placed close by those of Kew, it seems to me there would be very little difficulty in referring to them. It would be quite different from having them in a place some miles distant.

396. Then really such a course would, to a very large extent, meet your wishes in botanical research?—It would be a very great help if one could see the whole of the specimens in a place close by.

397. I understand from what you said just now that supposing the collection for the purpose of research now existing at the British Museum were transferred to Kew, you would still leave, either at the Royal College of Science or at the British Museum, a complete reference herbarium, not having in its items authentic or type specimens, but simply a reference herbarium to be mainly used for educational purposes?—Yes. For instance, recently one of our students wanted to see a species of *Psilotum*, or some rare plant allied to it, and went to the British Museum collection to see it. A good many men going in for science degrees or as science teachers in botany wish to get some idea of the natural grouping of plants and the extent of the different natural orders with their variations, and so forth, in an instructive and comparatively easy way. It is impossible for them at such a large herbarium as Kew, to form an idea of the different groups of plants: they cannot afford the time to examine such a number of species. But a key collection or reference collection would be very useful to those engaged in work of that kind.

398. Would you have such a collection freely open to the public in the same way that the collections at present existing in the public galleries are open? Or would you

Mr. E. M. Holmes, F.L.S.

8 Nov. 1900.

have access to it restricted?—I have hardly given enough thought to the subject, but from my point of view it would be very useful if it could be seen on the recommendation of any teacher of botany.

399. You think it should be under certain restrictions, without going into what those restrictions should be?—I think so. As I pass through the rooms at the British Museum I notice that the people there look round at the specimens in a sort of casual way. Comparatively few really study them. Of course, a few do study them, and they would do that much better if they could see them under slight supervision.

400. Have you had occasion to study fossil plants at all?—No.

401. So that the course you recommend has no reference whatever to the use of such a herbarium left in the British Museum for geological and palaeontological purposes?—Geology is to a certain extent outside the work of ordinary botanical students; it only comes within the reach of just a few, those who live in districts where such fossil plants can be obtained.

402. From what we said just now, we were taking it as it were for granted that the two collections, if amalgamated together, should be amalgamated at Kew, but now I have to ask you distinctly the question: Supposing the proposed amalgamation takes place, do you think it should be at Kew or do you think it should be at the British Museum in the Cromwell Road?—My opinion is that it would be preferable at Kew, for this reason, that there are certain plants which you cannot show in a herbarium, such as the Cacti. It would be impossible to give the Cacti in a herbarium, but in gardens like Kew, where they grow the majority of the fleshy plants like Euphorbias and Cacti, *Aloë* and *Stapelia*, they can be seen fresh. The fleshy plants, as a rule, are far better seen in the live state than they can possibly be in the herbarium. So that as the two things occur at Kew, I should think Kew would be decidedly the best place for really efficient work.

403. May we give this form to your answer, that regarding the herbarium as a means of botanical research, it is of importance that that herbarium should be contiguous with the collection of living plants?—That is exactly my meaning.

404. And for that reason you would prefer, in the interests of botanical science, that if an amalgamation of the two collections took place, the place where the two collections were shown together should be at Kew?—I think that would entirely express my feeling in the matter.

405. Do you think that in the interests of botanical science and botany it would be sufficient to leave, as you suggest, at the British Museum, a reference herbarium arranged according to the natural orders that you spoke of a little while ago?—I think that a reference museum for teaching purposes should unquestionably be arranged in the systematic orders of plants. Botanical students want to get some bird's-eye view of the general arrangement of plants—that is one of the first things students of systematic botany want to know.

406. But your proposition entails this, does it not, that everyone engaged in botanical problems, even of a simple character, would have to go to Kew, and could not find what he wanted at the British Museum?—I do not quite understand what you mean by the word problem.

407. I mean, for instance, the distinct identification of a plant?—I think in any case that would be necessary. Even if there was the collection at the British Museum that there is now, it is still necessary to go to Kew, because there are so many plants not represented at the British Museum. I went there the other day to find out a plant I gathered near Guildford, but they could not recognise it at the British Museum. It was apparently a *Sinapis*. It would be necessary, I think, in any case, if you wanted to absolutely identify a plant, to consult Kew as well, unless it were a common plant. If it were a common or ordinary plant you might find it in the collection at the British Museum. If it were in some cases a special plant, like one of the Central African plants collected by Welwitsch, you would have to go to the British Museum to identify it, because it would not be at Kew. It would, in the majority of cases, be a waste of time to go first to the British Museum and then to Kew. In the interests of botanical science, and in the saving of time and the facilities afforded, Kew, in my opinion, is the best place to have a National Herbarium. But for teaching purposes, one which would enable teachers to get a good idea of the different natural orders, I think a reference collection somewhere in the City would be found to be most useful, and is a thing that is really wanted.

408. Are there not persons who do not give the whole of their time to botanical study, persons engaged in business or otherwise for the greater part of the day, and who spend some of their leisure time in the study of botany, who find it a very great convenience to have a collection so near at hand as that of the British Museum, which does not necessitate a long journey?—The difficulty is that, as a rule, people who are only amateurs bring specimens which are not sufficient for identification. They certainly cannot identify them themselves as a rule. Of course, in some cases you can identify a plant by a picture, but very often these people are not quite sure about it. A great many people send such specimens to the journals, as to the "Gardeners' Chronicle," or to our own "Pharmaceutical Journal," and get them named through the editors. That saves an immense amount of trouble and time to the botanical establishments. It would be a great waste of energy if the officials in botanical establishments had to answer the queries of all sorts of people who bring all sorts of plants, very often do not know where the plants came from, and have no idea of their geographical origin. It may be a garden plant or a weed they have picked up. A botanist like myself, who knows all the British plants practically by sight, could tell probably from the leaf what the plant is likely to be, and thus save an immense amount of trouble to those establishments. I do not think it is possible at any reference collection for a visitor who is not a systematic botanist to identify all the plants that he brings. He may identify some.

409. Do you think it would be simply sufficient to have an educational herbarium, such as you have suggested, arranged according to the natural orders, or would it be also very desirable to have a collection arranged geographically also for educational purposes?—An additional geographical collection might be an advantage, but it already exists at Kew. They are arranged geographically there.

410. But I am speaking of such a collection retained at the British Museum or elsewhere for educational purposes, not for research purposes?—I can conceive that a collection of types geographically arranged might be useful, but a complete geographical arrangement, it seems to me, would be so extensive and so puzzling to the ordinary student that it would be practically useless.

411. There are at the British Museum certain old collections, pre-Linnean collections; supposing the two collections were united together, would you advise that they should go to the united collection?—There are also some of the same kind at Kew, but they are known, so to speak. At the British Museum one does not always know what there really is. Some years ago a gentleman had occasion to make enquiry, and he found a collection there that had been lost sight of, a very interesting collection indeed*. I think if those special collections were put in a separate wing of the building at Kew, where those who have to refer to historical specimens could utilise them, it would be to the best advantage. Sometimes a question crops up in this way: you want to ascertain what the plant of an old writer really was, because it may be a question of terminology, whether the name given by the old author should be used, or something given since, and on reference to the old specimens it sometimes turns out that it is quite a different plant from what it was supposed to be. Therefore it is very useful for reference to have the old herbarium close to the General Herbarium in order to determine questions of this kind.

412. Supposing the union takes place, you think that they should not be left at the British Museum, but should be transferred to Kew?—They would be most useful at Kew, certainly.

413. The plan which you recommend, of the uniting of the two collections into one complete national collection, would probably entail very considerable expense. Without being able to say what the expense would be, but taking it that it would be great, are the advantages of such a special character as to justify a demand upon the public purse for that expense?—I think the advantages to the scientific public are quite sufficiently important to justify it.

414. It has been represented to us that in the interests of research there is a certain advantage in having two institutions like the one at Kew and the one at the British Museum doing more or less the same work. It is represented that the competition or rivalry between the two keeps both of them more active than either of

*This statement (cf. Q. 451, 452, 477 *et seqq.*) led to the correspondence given in Appendix III., pp. 177-179.

them would be if they were left entirely to themselves. Do you think there is any force in that argument?—I think none. I think the best answer is simply to refer to the works published by the British Museum, and those published by Kew. I think you will find that the enormous amount of work that has been done at Kew has by no means stimulated the other establishment to rivalry that leads them to produce such work or anything like as much work as is done at Kew. That is a matter that can easily be decided by reference to the work that has been published.

415. You have, I believe, certain views as to the details of the way in which such a general collection should be arranged. You have written an article, have you not, on the arrangement of museums and herbaria?—I wrote that for the Museums Association. It was a paper read to the Museums Association a year or two ago. I thought it might be useful to bring together some view of what is done in foreign herbaria and various museums, so that it can be compared with what is done in the museums in Britain, pointing out as far as possible the advantages of the methods adopted in different museums over our own, or of our own museums over the museums abroad.

416. That probably has no distinct bearing upon the particular question in hand, namely, the desirability of amalgamating the two herbaria?—No, only on the actual working. Difficulties have been found in working herbaria, which I thought might be done away with, and the facilities for using the herbarium improved.

417. You are, I suppose, very distinctly of opinion that the collections should be in fire-proof buildings?—Unquestionably, without any doubt whatever. I think that is a most important thing.

418. (*Lord Avebury.*) I should like to get a rather more distinct idea of what your suggestion would be as regards the collections which you propose should be formed in the British Museum. You spoke of it as a reference collection; would you mind giving the Committee a rather more distinct idea as to what you contemplate?—It is a matter that does not, I was going to say, concern myself, except in so far as I have taught botany occasionally, and I have found that students just have a few typical orders, 24 orders as a rule, asked for at a science examination. If a doctor, for instance, goes abroad he is very much puzzled to know what natural orders the plants he meets with in his travels belong to. He has only learned a few. He meets with orders like the Proteaceæ, and the Epacridaceæ, which he has not seen. There are no means in the ordinary way of his getting a glimpse of the types of the orders, so that he might see a sort of family likeness in the plants he meets with, nor does he know how to examine them properly. It seems to me that in a reference collection you want exhibited, somewhat in the same way as in that very nice public botanical room at the British Museum, in a way that a man can get a bird's-eye view of the subject, the types of each Natural Order, preferably by pictures, but if you can put a piece of the same plant by the side of the picture, so much the better. Pictures will, however, give him an idea of what the general look of the Natural Order is. He learns in his studies what the actual characters are by which he can distinguish them.

419. You do not confine it to the English orders at all?—No, the larger English orders are, of course, much more generally known, and better known, than the foreign ones.

420. How would that differ from the collection which is at present in the Public Gallery of the Natural History Museum?—I do not think it would differ, except that if you have a series of the actual plants themselves, and also types in cabinets, they might be useful to refer to in case the man did not understand the drawing. But apart from that I think for teaching purposes the way I have mentioned is the easiest.

421. Take a large order like the Compositæ, would you say there is a type of that order?—A number of types, for instance, *Ambrosia* and *Xanthium*.

422. Then you would represent the order by a number of types?—Yes.

423. Would you go as far as the most important genera?—Yes, unquestionably, or any genera that showed marked differences from or connection with other genera.

424. Then would you have one or two representatives of each genus?—You would extend it as far as it is useful for practical purposes.

425. How can one find what would be a practical purpose from that point of view. For practical purposes you generally want several species of genus when you are making any research?—It would be largely a question of room, I think.

426. I am endeavouring to ascertain your views as to what should be done?—My idea would be to give the most striking types in each Natural Order, with a reference collection in cupboards of the types there was not room to show.

427. I understood you to say just now that you would give the most striking types of each genus?—If it were a large genus, and there were great differences in the genera, but not else. In the reference collection you would give all as far as you could that were fairly representative types of the family or genera that a visitor might want to see.

428. And does not it come to this, that it would be rather difficult to determine where you would stop if you came down to the principal types of each important genus?—In that you would be guided by the men who teach botany.

429. How would you understand their types? Must not you leave that to the Keeper of the Department of Botany?—You have the Royal College of Science close by, where they teach botany, and where they know practically what is wanted. You have your examiners, who know practically what groups they ask about. I think the examination papers are an excellent guide as to what is wanted in one direction, and the teachers of botany in another.

430. Supposing a person is engaged in a research on fruits, or pollen, or leaves?—That is one of the things I pointed out in the paper that I wrote, that a collection of fruits is very desirable. There is no museum at present where you have a complete collection of fruits. Fruits are constantly coming into commerce, and we do not know what they are. There is a cupboard at Kew, for instance, containing unnamed fruits.

431. We have a large collection of fruits at the British Museum. Would you propose to transfer them to Kew?—Yes, and also to make them a complete collection as far as possible.

432. In that case should we not have to begin by making another collection of fruits?—There would be duplicates of a good many. One specimen of a fruit, or section of fruit, fairly well mounted, would answer the purposes of teaching, but you would want rather more for those who were studying professionally.

433. But would not you have a collection of fruits in the Natural History Museum?—I think it would be very useful, if consisting of characteristic types.

434. To a person engaged in study, not merely for educational purposes, but in making a study with the view to the progress of botany, would the collection you contemplate be one sufficient for his purpose, or do you propose he should go to Kew?—He should go to Kew.

435. How would you propose that the Natural History Museum should get the specimens under the arrangement you suggest?—I suggest that Kew should provide duplicates.

436. You would practically make the Botanical Department of the Natural History Museum an offshoot of Kew?—Yes, for practical purposes. Supposing a man in the City, for instance, finds a fruit sent into commerce, and does not know what it is. I do not mean to say that the rarer fruits and rarer seeds that do not come into commerce need be at the British Museum, but all the ordinary things that come in or are frequently met with should be there, so that the majority of people who do not know them might very easily refer to them at the British Museum.

437. I do not wish to put anything in your mouth, but from the point of view of organisation I rather gather from the answer you gave just now that you would propose the Natural History Museum should be supplied from Kew?—Yes.

438. That would be making the botanical collection in the Natural History Museum really an offshoot of Kew, would it not?—Practically; I presume so, at least. I am only answering from the point of view of what seems to me useful and practical, and when I say practical, I mean of practical use to the British public.

Mr. E. M. Holmes, F.L.S.

8 Nov. 1900.

439. Would you propose to leave the fossil plants in the British Museum?—I really have not thought about the matter at all, but I think they should be where the most complete collection is, and that, I presume, would be at Kew.

440. You would transfer the fossil plants to Kew as well as the existing plants?—I think that Kew should represent, as far as possible, all that is known of plants.

441. Would not that be very inconvenient to the student of palaeontology. At present the fossil plants are with the fossil animals?—Would not they have a collection at the Geological Museum?

442. Are you aware that there is no such collection at the Geological Museum?—I was not aware of that, but I should think that is where one ought to be.

443. If by the Geological Museum you mean the museum of the Geological Society, it has no collection?—I should have thought that would be the proper place.

444. (*Chairman.*) Do you not mean the Geological Department of the British Museum?—I should have said perhaps a geological museum.

445. (*Lord Avebury.*) Do you think there would be a great practical disadvantage in separating the fossil plants from the fossil animals?—I should think for the purpose of botanical students and for the scientific purposes of systematic botanists it would be better to separate them. That is my own opinion, but I am not a student of fossil botany.

446. That is the present arrangement, and you are proposing to alter it. At present the fossil plants are in the palæontological galleries of the British Museum, but you are proposing to transfer them from the palæontological galleries to Kew, where they have no other fossils?—I was not aware that they were in the Geological Department of the British Museum. I am not prepared to say much about geological botany.

447. You do not know what would be the effect on geology of the separation of the fossil plants from the fossil animals?—For geological purposes it seems to me the fossil plants would be better in a geological museum than a botanical one.

448. You said just now that you would transfer them from the Natural History Museum to Kew; that would be taking them away from a geological museum and transferring them to a botanical museum?—If that would be an advantage to botanists I think they should be at Kew. If not they should be at the geological museum. But as I say, I am not prepared to give an opinion because I have not studied fossil botany, and I cannot give a practical answer at all. As far as my own personal experience goes, I have never had to refer to them, and therefore they are of no use to me in a Botanical Department. But, theoretically, I should think that where plants are represented as a whole there should be a collection of fossil plants as well as other plants. But I do not feel competent to offer any opinion on that matter.

449. You said just now that you took a species which you thought was *Sinapis* to the British Museum, and they were not able to identify it there?—That is so.

450. Have you taken it to Kew?—No.

451. You spoke of a very important collection in the British Museum which you said nad been lost sight of. Would you mind telling the Committee what collection you are referring to?—It was looked at by a friend of mine, and I am afraid I cannot tell you the name off-hand. It might have been Forster's, but I would not like to speak positively. I can furnish you with the name later on in the day.

452. Perhaps you will ascertain it and put it into your evidence?—I will.

453. (*Sir John Kirk.*) You live, I believe, out of London?—Yes.

454. And you consult Kew rather more than the British Museum?—Yes.

455. Is it a more tedious journey or more troublesome to get to Kew than to get to the British Museum?—No; it is easier if anything. I simply change at Waterloo and go to Kew.

456. So that when you are living in the Southern Counties it saves time?—I save time.

457. Yours, I believe, is chiefly economic botany connected with drugs?—Not purely. For instance, Captain Burrows brought me a poisonous plant from the Congo, and I get a great many things from abroad.

458. Do you make use of the living plants frequently at Kew?—Yes; only the other day I wanted to find a Cactus which was not in the herbarium, and I found it in the collection.

459. Do you find it an advantage to have the herbarium close by the living plants?—Certainly; it is a saving of time.

460. Otherwise you would have to go from the Gardens after consulting the living plants to the Museum?—No, not usually.

461. Do you ever consult the economic collection of drugs, fibres, and other products in the Museum at Kew, the medicinal or economic plants?—Yes; such as would come under the class of drugs, resins, dyes, and articles of that kind.

462. Do you have to identify the plant yielding those products at all?—Yes.

463. For that you require, I suppose, the herbarium?—Exactly.

464. (*Professor Balfour.*) You spoke about having a key collection or reference collection kept in London after the other things were moved, and you said "In the City." Did you contemplate any other place except Cromwell-road?—All I know is that it is a great inconvenience as a rule to City men who wish to identify anything—and they get a great many products from abroad—to go to the British Museum, because in the first place very often they cannot get the things identified there. They have generally, as a rule, to be sent to Kew. But I think if there was what I might call a commercial museum in the City where things of that kind could be shown, it would be a great advantage, and if there was also a collection of all economic, medicinal, and fibrous plants in the City it would be a very great advantage, not only to science, but to commerce.

465. It is the case at present at the Cromwell-road Museum, that they do not take any account of economic botany at all?—Is it not the case that economic things are all left at Kew?—So far as I know.

466. Kew does the economic work, and the museums at Cromwell-road are mainly for teaching and study; is not that the idea you would gain from looking at them?—I should think so. I do not know.

467. Are you not a teacher in London now?—I taught botany at Westminster Medical School for some years, but I do not do so now.

468. Have you ever taken your pupils to the British Museum?—No. They used to go to the Botanical Gardens at Regent's Park to study the plants there, but now the students have the plants brought to the School, and have to dissect them, and use a microscope for them at the School itself. Some of our men go in for the B.Sc. Examination, and then, of course, plants are asked about which are not of medicinal interest, and they sometimes go to the Botanical Department at South Kensington to see if they can find a specimen in the outside room.

469. You have taken a great deal of interest in the arrangement of herbaria, and their utilisation. There is one point that crops up in connection with both the British Museum and Kew, and that is, that when they receive new collections of plants these collections are gradually laid into the herbaria, and the specimens are as far as possible identified. New specimens are described, but they are usually published, are not they, in the publications of Societies?—I believe so, in the first place.

470. Do you think that that is a good way to have our National collections utilised?—Do you not think that they might be utilised in a better way than that?—I think so, unquestionably. It seems to me you are obliged to get the transactions of various societies when you want to find anything, for instance, if you want to find the "Flora of China." Those things ought to be published at the national expense.

471. Have you found inconvenience from that?—Certainly. I have had to hunt through journals, and find out where the things are described. The Chinese Flora, for instance, runs through two volumes of the Linnean Society's Journal.

472. You have given a great deal of attention to cryptogamic botany, have you not?—A good deal.

473. Where do you find the best collections, at Kew or at the British Museum?—I do not think there is any comparison. At Kew the specimens have been

examined by experts, and you get them as a rule far better named than you do at the British Museum. In the British Museum I have seen three or four species on one sheet. They were sent in under the same name, but they are not the same things, and because they have the same name they are put on the same sheet. When a stranger goes in, or a person who does not know the plants, he really does not know which is the specimen he wants to see, that is, the actually authentic specimen, because they have been laid in by men who are not responsible for the naming.

474. Do you find the same thing at Kew?—In a few cases; in the Algae I have found specimens which have been laid in a great many years ago, from the "Challenger" Expedition. These were named apparently by somebody who did not understand the Algae, and they are not, of course, correct. But, as a rule, taking the two herbaria together, there is no comparison; those at Kew are far better named.

475. If there were a transference of a portion of the herbarium, what would you say to the retention of the cryptogamic herbaria at South Kensington, and the transference of the flowering plants to Kew?—What ought to be done would be that an outside expert should be called in who was acquainted with each particular branch, say Crombie for the Lichens, a man who knows the plants, and he should be appointed to go through the specimens, and see that the authentic specimens, and no others, are on one sheet, so that one might be quite sure of finding an authentic specimen for comparison.

476. But apart from the method of doing it, would the breaking of that collection into the two groups of Phanerogams and Cryptogams be a bad thing to do, or be an advantage? Would it be of any advantage to retain the cryptogamic collection in London if the phanerogamic collection were transferred to Kew?—There are comparatively few cryptogamic botanists as compared with the phanerogamic, and I think as a rule they would prefer to go to a place where they know they can see everything. You do not want to go to two places even to determine a Cryptogam.

477. (*Lord Avebury.*) You referred just now to one or two cases in which there were three or four species on the same sheet, but I think you explained afterwards that that was the way in which they had come into the British Museum?—No. For instance, the Museum purchased a collection from Dr. Dickie, of Aberdeen, and some of those are wrongly named. They were not authenticated by the Museum officials before they were put on sheets, and having the same name they were placed on the sheet bearing that name.

478. What you mean is that the identification was not an identification by the officials of the British Museum, but by the person who sent the collection?—That is so.

479. When you have a considerable botanical authority, is it not an advantage that you should know what his views were when he has named a species?—I have always understood that one of the advantages of these typical collections was that you had the criticism of distinguished botanists on the plants?—The point is this:—It seems to me that when a specimen comes in it should be as far as possible identified. The original label should not be removed, but the plant should be put where it really belongs. If you like to give a cross-reference on the sheet above the name the specimen bears, to the species to which it really belongs, it would be giving all that is wanted. But when you go as a student who wants to find out a plant, and you have a sheet before you with four different plants on it, how can you know which is the right one?

480. You have been all the way through giving evidence from the point of view of a person who wants to find out the name of a plant?—Every botanist wants to do that.

481. That is the first step, no doubt, but that is only the beginning. I understand that one great advantage of these typical collections was that you had specimens which were named by distinguished botanists, and you had their views? I want to get it clear whether you think the authorities of the British Museum should have altered those names, or whether it was not better to keep them as they were named by the particular botanist from whom the collections were received?—If they had a sheet of authentic specimens, and you could tell it was so, it would not matter at all how you arranged the others. If the officials in the Herbarium liked to put all with the same name, although they were different plants, on the same sheet, as representing the views of different botanical authorities, or the mistakes of different people, very good; but it seems to me it does not further botanical science to make it so difficult to find out which is an authentic example of a species or variety, or whether the author is wrong or not.

482. Do you propose that the officials of the British Museum should alter the names given to particular specimens by the authorities who collected them, and give them the names which they think to be correct—is that what you are advocating?—I always understood it was so important to know what the views were of the botanists, so that in many cases you could correct the names they had given to plants, and be able to say they had given a name which was now abandoned?—I will tell you what is done at Kew.

483. I am only wishing to ascertain what your view is, and how far you are wishing to criticise the officials of the Museum?—I do not wish to criticise them at all, but only the mode in which the things are done. I have nothing to say about the officials themselves.

484. Do you think the names should have been altered by the officials?—I think if the practice which is followed at Kew were followed at South Kensington it would be a great advantage. When the plant is found to be wrongly named, the correct name is put above it, and the specimen is put in the place where they think the plant really belongs. If you keep a lot of plants wrongly named in a herbarium, it seems to me you are obstructing botanical science, that is, if there is no indication on the sheets that they are wrongly named.

485. Certainly, unless it is an authoritative name. But if it is a name given by an authoritative botanist, what then?—Those I have in my mind at the present moment are the collection of Dr. Dickie, of Aberdeen, sea weeds, with his own writing on them. Some of those were not examined by him, because I know he sent many of them to the late Mrs. Mary Merrifield, of Stapleford, near Cambridge; but his writing is on those specimens, thus giving his authority to them. Personally I know that many of them are wrongly named. I have on one occasion spoken to Mr. Carruthers about the matter, and asked him if he would like me to write in pencil what I considered the proper names to be, and he said "Yes," but subsequently the collection came under other hands, and I found there was an objection to my doing so.

486. The particular case you refer to was Dr. Dickie's collection?—That is the one I had in my mind, but it is not the only one. Now that Mr. Crombie has gone through the Lichens they are splendidly named; and Mr. Gepp at the Museum has a key collection of Mosses, so that if you want to see a typical specimen of Moss you can compare it without going through hundreds of sheets of specimens, many of which may or may not be correctly named.

487. You do not think, in fact, that Dr. Dickie's collection was of sufficient importance to be left in the condition in which it was received?—There are many collections of that kind which come into museums. There are often collections coming into museums which bear names, and those names, in my opinion, ought to be criticised, and it ought to be seen whether the specimens are right before they are mounted on a sheet with an authentic specimen.

488. You think Dr. Dickie's authority was not sufficiently great for the names to be left?—At the time, he was practically the authority for the Algae in Great Britain.

489. The British Museum officials left the names on Dr. Dickie's authority, as he left them, and I understood that you were contending that they ought not to have done so, but that they ought to have altered the names which Dr. Dickie had given?—Yes, to the correct ones, but not erasing his label, if they put them on a sheet already bearing the correct name. Supposing a sheet of *Delesseria alata* was found, and it was thought it should be *Delesseria angustissima*, they ought not to have one name on the same sheet by the side of the other, or one on the top and the other below.

490. In your view, Dr. Dickie's authority was not sufficient to justify the Museum in retaining his name

Mr. E. M. Holmes, F.L.S.

8 Nov. 1900

to the specimens?—I am only giving him as an instance of a thing that crops up in all sections of Cryptogams. I an merely saying that the public who go there require help.

491. Do you mean to say that it is a very frequent occurrence in the Natural History Museum that several different species are on the same sheet, and wrongly named?—I will say two or more different species on the same sheet.

492. Do you mean it often happens that two or more species are on the same sheet?—Yes.

493. (*Chairman.*) I should like to be quite clear with regard to the fossil plants. I understand you to be of opinion that if there were one collection, for instance, at Kew, speaking as a botanist, you would like to see fossil plants there too?—Yes.

494. But you yourself have not sufficient knowledge of either palaeontology or geology to give an opinion as to whether it is desirable that the fossil plants should be retained in connection with the geological specimens, or transferred to the botanical collection?—I have no critical knowledge of fossil botany at all. Of geology I have only a slight knowledge, but that knowledge would lead me to say there ought to be in the National Geological Department, wherever that may be, a collection of fossil plants as well as at Kew, if it be possible.

[Supplementary Observations by this witness will be found in Appendix III.]

Mr. Frederick Janson Hanbury, F.L.S., called; and examined.

Mr. F. J. Hanbury, F.L.S.

495. (*Chairman.*) You are Managing Director, I believe, of Allen and Hanburys?—I am.

496. And you are part author of "The Flora of Kent"?—I am.

497. And you have a very considerable critical knowledge of the British forms of the Genus *Hieracium*?—I have to some extent.

498. And you are the possessor of the British and European herbaria formed by the late Mr. Boswell?—I am.

499. You have paid very considerable attention to botanical science; have you made use both of the herbarium of the British Museum, and the herbarium at Kew?—Very little of Kew, but a good deal of the British Museum.

500. When you consulted the herbarium at Kew, was it for a different purpose, or different reason, from those which led you habitually to consult the herbarium at the British Museum?—No. I merely went there to see if it gave me any additional localities or threw any light on the *Hieracia*, after I had looked through most of the British Museum things. But I found much more difficulty at Kew, because the herbarium is a general herbarium of the world, and it is like looking for a needle in a haystack to work there. What I wanted was more of a local herbarium.

501. Were you studying British plants?—Yes.

502. And for that you found what you required at the British Museum?—Yes, I found it very much more convenient.

503. You have not received any great aid from Kew?—No. I ought not to speak disparagingly of Kew, I have used it so little, but I really do not get any valuable help there for the kind of work I want.

504. Are you in a position to form any opinion as to whether it is desirable to maintain the two collections, the one at the British Museum and the other at Kew, in their present condition?—Speaking personally, and also from remarks made by many friends, I should like to have them both maintained. The chief thing is that for busy people the British Museum, although less accessible than it was when at Bloomsbury, is far more accessible than Kew. If one came from abroad to study a particular thing, and could take a lodging at Kew, that would be a different matter, but if one has only an hour or two to find out some point, it is very much easier to get to South Kensington. It is much more central for everyone, I think.

505. Would you regret the transference of the main collection of the British Museum to Kew?—I should regret it very much indeed.

506. But you would approve of the transfer from Kew to the British Museum, as being a more central situation?—No. I think Kew wants a herbarium for reference—it is absolutely necessary. You want two kinds of herbaria, the one they have at Kew, which is a herbarium of the whole world systematically arranged, and a more specialised herbarium for people wanting to work at the floras of certain districts. The British Museum has a most excellent British Herbarium, and there is nothing of the kind at Kew beyond the herbarium left by Hewett Cottrell Watson, which is a most scrappy herbarium for showing the distribution of plants, and not at all good for study.

507. Do I understand that it would meet your view if the collection at Kew were maintained, and possibly increased by the transference of certain specimens from the British Museum, provided there were left at the British Museum a complete British Herbarium, and also a Geographical Herbarium?—I cannot say to what extent the one herbarium would be robbing of the other. I do not see any objection to that so long as a really good herbarium for people who want it for reference and study, is left in a more accessible position at South Kensington. I saw a question about the types. I should see no objection if it is desired to keep them together at Kew, so long as there is a really reliable reference herbarium left at the British Museum.

508. It would meet your views if there were at Kew a complete collection with all the type specimens, provided there were left at the British Museum a sufficient number of herbaria, British and other, to meet the demand of busy men living in London?—Yes, I think so, so long as we could equally rely on the specimens left at the British Museum being correctly named.

509. Authentic, but not typical?—Yes. I do not know whether it is competent for me to bring forward another little matter. I think we are lamentably wanting in the British Museum some real authority on all our own critical plants. It is really badly wanted. Anyone who has got the grasp of the flora of the world that our great botanists have, admits that it is absolutely impossible to keep pace with the critical work in the more difficult genera like *Rubus*, *Rosa*, *Hieracium*, Willows, and things like that. I do think we ought to have a first-rate British botanist who would save many people a great amount of trouble. I get flooded with parcels of *Hieracia* from all parts of the country, and am asked to name them. I really cannot do it, and I am obliged to send them back. I do think the nation should provide someone who is really an expert on our own native flora. It is not, I think, saying anything derogatory to the botanists we have at the Museum, and I think they would be the first to acknowledge that they are not up to such work, and that it is a really crying want. I thought I would mention it to the Committee, because it is in the mouth of every working botanist in the country what a need there is of an expert to whom they could refer specimens. As it is, we now have to send critical plants to particular men who privately make a study of them, and ask as a favour to get our things looked at.

510. An expert at the British Museum?—I think he would be more useful at the British Museum, because a good British Herbarium is at present there, and working country botanists who have a few hours in London run up to South Kensington, who could not go to Kew.

511. (*Lord Avebury.*) You said you found it very convenient having a collection at South Kensington, and would very much regret its being transferred to Kew. Do you think that would be the general feeling among London botanists, and those who come up from the country?—I am sure it would be. Men like my friends Mr. Marshall, or Mr. Linton, and others who come to town on special business, and manage to bring with them from Bournemouth and other places a little parcel of plants that they want to compare, run down to the Museum, and catch their trains much more easily than if they had to go to Kew.

512. If I understand your view correctly, I think you would not object to what we call the typical

specimens being sent to Kew, if it was thought advisable: but you would still desire that authentic specimens of those species should be retained in the Natural History Museum?—Yes, the British Herbarium in many genera is entirely unreliable. They get hold of collections of plants, which are incorporated with the collections without anyone being competent to say whether the names are correct. I find numbers of errors in the herbarium. That is why I think it is essential to have a good botanist who would not trouble about the foreign work at all. I think it is a shame that no botanist paid by the Government has any special knowledge of our own botany.

513. That is not a question of the amalgamation of the collections, but of the staff?—No, except that it would be more convenient to have such a man.

514. Would you rather have such a man in the Natural History Museum than at Kew?—Yes.

515. (*Sir John Kirk.*) I understand you have not had occasion to do any special work in foreign plants or Colonial plants?—No. I possess about two-thirds of the plants of Europe in my herbarium, but I have only worked at them as an amusement, not seriously studying those plants.

516. Have you had occasion to study American, African, or Indian plants?—No.

517. (*Mr. Seymour.*) Do you say that what you consider necessary is that the British Herbarium should be retained at South Kensington only?—No, I do not think that. I think you would want a general herbarium there. I was speaking more of my personal work.

Mr. F. J. Hanbury, F.L.S.

8 Nov. 1900.

518. You would not be in favour of the removal of the European Herbarium to Kew?—Not at all. You often want to see the European Herbarium for something bearing on British plants: you want to see to what extent they are modified by being further north or south, and so forth.

519. (*Professor Balfour.*) The busy people you speak of as going down to the British Museum are almost all concerned with the British plants, are not they?—Mainly.

520. If you had at the British Museum a perfect collection of British plants with an expert attendant, and had these representative floras, would not that give them everything they wanted?—With a representative herbarium of other parts of the world, I think so. I think it would be a great convenience to keep all the types together at Kew or elsewhere, but I am hardly in a position to judge of that.

521. You would not object much to the removal of the type specimens to Kew?—Personally, I should not.

522. And do you think that would meet the views of others who, like yourself, make so much use of the British Museum at the present time?—Yes, I should think so.

Mr. William Fawcett, B.Sc., F.L.S., called; and examined.

523. (*Chairman.*) I believe you are now the Director of the Public Gardens, Jamaica?—Yes.

524. You were, I think, once attached to the British Museum?—I was there for five years.

525. And you have spent a considerable number of years in the study of botany?—Yes.

526. You are familiar with the collections both of the British Museum and of Kew?—Yes.

527. Have you any views as to whether it is desirable to make any change in the maintenance of those two Herbaria in their present condition—whether it is desirable that both of them should be maintained as they are at present, or do you think that some change might be properly introduced?—I think it is very much better that they should be kept distinct on their present lines; perhaps at Kew they should pay attention to arranging the collections according to Colonies, Kew being the head of all the Colonial Gardens.

528. Would you very much regret the transference of the main collections at Kew to the British Museum?—Yes, I think they are better where they are.

529. Do you think, supposing there were other advantages, there would be any great objection to removing from the British Museum type specimens, so as to make the collection at Kew quite complete for the purpose of botanical research, leaving at the British Museum a collection of authentic specimens which could be used for reference, not only a British herbarium but a general herbarium, consisting not of types, but of authenticated specimens, such as would be useful for the identification of plants by persons who are unable to go down to Kew?—No, I do not think that plan would do at all. From my point of view, I think that the two establishments are doing each their own work, and I do not see that they are interfering with each other. I am inclined to think that if you put the whole of the men under the same roof, with their collections combined, no better work would be done. I think there is a sense of rivalry between the two establishments to a certain extent, and that they are very keen that each should uphold the honour and dignity of its own collection.

530. Do you think that is beneficial for the progress of botanical science?—I think it is.

531. Do you think there is any very great difficulty in the fact that there are certain groups at Kew not at the British Museum, and at the British Museum there are certain groups not so fully represented at Kew, so that it happens from time to time that an investigator is obliged first to go to Kew and then to the British Museum, and then sometimes back to Kew, losing, as he does, time which would not be lost if all the specimens he had to consult were in one place?—Of course there is a very great deal to be said for that view, but on the other hand I do not know that there is as much loss of time as may be imagined. For instance, in my case I have been working at Jamaica orchids at the British Museum and Kew. I have gone principally to the British Museum, because it is more convenient for me, and I work through a particular genus there, and then I go down to Kew to see what types or extra specimens they have there. It takes me very little time to run through the whole of the specimens of that genus there.

Mr. W. Fawcett, B.SC., F.L.S.

532. You spoke just now about the two collections having more or less different functions. Could you very briefly state what are the differences between the two?—I should think that at Kew, as they have been doing for very many years, attention should be specially directed to the colonial floras. The "Flora of India," for instance, has been published. Sir Joseph Hooker told me himself that it wanted considerable revision in parts, and he is doing it. It is the same with other colonies; the floras of some of them have been already published, but they no doubt want additions and revisions. There are a great number of colonies that require floras, and I think that ought to be the special work of Kew. Perhaps at the British Museum more general work might be done, the monographs of certain families or genera might be there worked out.

533. That is to say, you would make Kew in the main a colonial establishment?—Yes.

534. And would leave the main progress of botanical science to the British Museum?—I think so.

535. (*Lord Avebury.*) It has been suggested to us that the type specimens might be removed from the British Museum, and taken down to Kew, and duplicates left in their place. Would it not be a very great discouragement to the keeper of any museum to have interesting and important specimens removed in that way?—I think it would be most discouraging to have the type specimens removed from either of the establishments to the other.

536. You think that no other authentic specimens could ever be of the same absolute importance?—They could not be.

537. (*Professor Balfour.*) You spoke of the rivalry between the two establishments; does not that rivalry lead to unnecessary expense sometimes in the way of purchase of collections, and might it not also lead to competition?—It might lead to competition in the purchase of specimens, but I should not imagine the amount of money spent in that way would be very large. If Kew were to confine itself principally to colonial work, I do not think there would be that competition, or, at any rate, not so much.

538. Suppose that this idea of working the floras at Kew and the monographs at the British Museum were carried out, would it not involve the people at Kew not only doing their work there, but also working at

Mr. W. Fawcett, B.SC., F.L.S.

8 Nov. 1900.

the British Museum? They would have to go there to see certain specimens?—Yes.

539. And *vice versa*?—Yes.

540. So that there would be a great deal of cross work between the two, no doubt?—If Kew confined itself to colonial floras, there would not be the same necessity for people working at the British Museum to go there. Of course they would have to go to see the collections they have already there, but I think they would be probably in both places. I think it is a very great advantage to have the two establishments, because the Director of one and the Keeper of the other are in touch with a different set of people, and may get collections which otherwise they might not get if there were only one establishment.

541. Why should not the Director of the United Establishment be in touch with them all. He would get the past connection, if the two things were amalgamated through the previous officers?—Very often it is a case of personal regard. I know, for instance, that when Sir William Hooker was at Glasgow he had a great many collections there from old pupils all over the world. They sent them to him because they knew him and had been taught by him. I daresay it is the same with you at Edinburgh.

542. Do you think if you combined the two herbaria it would be hurtful to the national collections, and that they would not get the same collections as they have hitherto?—I think so. It would be better if the other herbaria, Edinburgh, Glasgow, Oxford, &c., were made and kept up to date, so that there would be a multiplication of work going on.

543. You would like to have decentralisation rather than centralisation?—Not exactly decentralisation, but an improvement in the herbaria in other centres.

544. If you have new collections at Oxford or any of these places, would not that interfere very much with the convenience of workers in this country? A person who is engaged upon a monograph would first have to go to Kew and the British Museum, as he has now, and then he would have to go elsewhere?—He has now; he has to travel all over the Continent.

545. And you would increase that within the bounds of Great Britain?—I think it would be worth while.

546. In the case of the flora of tropical Africa, which can be hardly called a colonial flora, what would you do with that?—I would have it worked at the British Museum, I think.

547. Not at Kew?—No.

548. That is to say, you would have the work overlapping. At the British Museum they might be doing the tropical African flora, and at Kew they would be doing the floras of colonies that come into tropical Africa, and so you would have the work twice done by different men?—Yes.

549. Would not that be very inconvenient?—I do not know that it would be; I cannot see it myself. The flora, for instance, of the West Coast of Africa, which consists of different tropical regions, might be worked up in districts, and I do not think it would interfere with the large flora. In fact, I think it would have to be done in that way.

550. (*Mr. Darwin.*) You were speaking of the idea of limiting Kew to the colonial work; would not that be a very serious loss to the general breadth of some of the work that has gone on at Kew? If that had been done in past times, for instance, one would not have a Genera Plantarum?—I did not mean to limit work to that, but I thought special attention should be paid to the colonial floras.

551. You mean without checking the other line of work?—Yes.

552. You said that you did not see that the British Museum and Kew interfered with each other, but I do not think you referred to the question whether the existence of the two is a serious interference with botanical work. How far, in your opinion, is it a hindrance to, at any rate, rapidity of work?—There is a certain amount of loss of time in going from Kew to the British Museum.

553. Did you not find that you had to carry your actual specimens backwards and forwards between the two places to compare them?—I did.

554. That was at any rate inconvenient?—Yes; I have to carry certain specimens. I did not require to carry the whole lot down to Kew.

555. (*Mr. Spring Rice.*) Taking your own view as to what the distinction between the two should be, would you press it to the conclusion that a suitable collection intended for the nation should be so to speak compulsorily assigned to a more suitable place; for instance, a colonial collection to Kew, and not to the British Museum?—I do not quite understand.

556. You are aware that at present, without saying that the two departments compete, they each get what they can without any appreciable discrimination, and it is quite a matter of chance whether a given collection of a given traveller goes to Kew or to the British Museum?—Yes.

557. If your view were carried out, that Kew should in the main specialise on colonial floras, would you pursue that to the conclusion that the traveller who presented a colonial collection to the British Museum should have his collection handed on to Kew, or would you leave the present haphazard state of things?—A traveller always collects more than one specimen of each plant, and the plants could be very well divided, I imagine.

558. On the whole, then, you would leave the present haphazard arrangement as it is?—I think so.

559. You are not afraid of the consequences?—No; for instance, I am collecting in Jamaica, and I send almost all my specimens to Berlin, for the reason that the Assistant-Director at the Berlin Gardens is working specially at the West India flora. We are in close correspondence about the Jamaica plants, and it is very important they should have their collections there. I do not send the whole of my collections to the British Museum or to Kew, but only send them new species. In collecting, I collect several plants of each kind.

560. You exercise discrimination with knowledge?—Exactly.

561. But I think we have had evidence to show that the way in which collections come over to the British Museum or Kew is not done with knowledge or discrimination?—I do not know anything about that.

562. (*Chairman.*) You send your new species both to the British Museum and to Kew?—Yes; equally.

563. (*Lord Avebury.*) Has any case come to your knowledge in which expense has been created by the rivalry between the British Museum and Kew?—No.

Mr. William Carruthers, F.R.S., called; and examined.

Mr. W. Carruthers, F.R.S.

564. (*Chairman.*) You were, I believe, for several years Keeper of the Department of Botany at the British Museum?—I was keeper for 24 years.

565. We have before us the evidence which you gave before the Devonshire Commission, and also some papers which have reached us put in by yourself afterwards. I do not know whether you have a pretty clear recollection of what you said there, as to whether one would be justified in asking you if the views you then expressed are held by you now?—I think they are. I am not aware that I have changed my mind with regard to anything, or that there are any facts to correct in those statements.

566. The main question before us is as to whether it is in the interest of botanical science that the two herbaria should be maintained in their present condition, or whether any change should be made, and if so, of what character. Do you think that the present herbaria should be maintained as they are in their present condition, or do you think that a change should be made?—It seems to me that there are advantages in both directions, but, as far as I can judge, the gain to science is more in the retention of the two herbaria as they at present exist.

567. The collection, of course, at Kew is a very large one, and has increased very much since the time you gave your evidence before the Devonshire Commission?—No doubt.

568. I think I am right in saying that one may gather from your evidence at that time you thought that what was required at Kew was a herbarium chiefly in illustration of and in connection with the collection of living plants?—That was in the event of a combination of the two herbaria. Then it was my judgment that the

collection of dried plants should be in London, but that it would be undesirable to deprive Kew entirely of a herbarium, which would enable the officials connected with the gardens to determine the species of plants growing in the gardens.

569. The collection at the British Museum is not a complete one in this sense, that it again and again occurs that a botanist engaged upon research is compelled, in order to complete that research, to consult also the collection at Kew as well as that of the British Museum?—Would you permit me to say that there is no herbarium in the world that in any sense is a complete one, and if a botanist is engaged in an investigation and wants to reach finality, he must not only consult Kew and the British Museum, but he must consult the other large herbaria throughout the world. It would not be sufficient for a botanist to complete his work at Kew or the British Museum. Every great herbarium contains material that the others do not possess.

570. But quite apart from that, it has been represented to us that there is not only loss of time, but, to a certain extent, injury to research, and that a botanist engaged in research has, as I have just said, after visiting the British Museum to visit Kew, or after visiting Kew to visit the British Museum, and it has been represented that botanical research would be much assisted by the two collections being under certain conditions amalgamated together?—I think there can be no doubt about that. It would be easier for any botanist to consult the two collections in one house than if they were separated eight or ten miles from each other.

571. But in your opinion the advantages which would thus be gained would be more than counter-balanced by certain disadvantages which would result from the union of the two, either in one place or the other?—The matter that has impressed me in considering the question of the one or two herbaria was mainly the possibility of loss by fire of either herbarium. If the two were put together, and such a calamity as that were to happen, it would be absolutely irreparable. Nothing could be done in the future to make up for such a tremendous loss. But if one herbarium was lost by fire, that would be a great calamity, but it would not be so serious as if both were lost.

572. Is that your main reason for keeping up the two separate herbaria?—No; it is not the main reason, but it is to me a very important reason.

573. What other reasons are present in your mind for keeping the two distinct?—I think that the two herbaria represent different views of the Vegetable Kingdom, and consequently are of great importance in the study of botany. I think that any herbarium which excludes the fossil plants which are a part of the flora of the world will exhibit an extremely imperfect view of the Vegetable Kingdom. At present there is no collection of fossils at Kew. The only place now where plants of the living flora and of the fossil flora can be compared is in the Natural History Museum. Then I think the breaking up of the great national biological collections of South Kensington by removing any part of them to any distance from that building would be a calamity to biological science, and that the separation of a herbarium from the other divisions of the organic world would be a serious calamity to science.

574. That is to say that quite distinct from the question of the fossil plants and their special relation to geology, you think it is of fundamental importance that the collections of all divisions of the living world should be placed together?—Certainly.

575. Have you any other reasons?—Probably there are, but I did not know in what direction you would ask questions, and have not thought over the matter sufficiently.

576. Although you would admit there would be certain advantages in having the two collections together, so that they might be studied at the same time by an investigator, you think that these advantages are altogether counter-balanced by the fact that with the two collections there is an extra protection against destruction by fire or otherwise, and that it is essential that the fossil plants should be studied in connection with the recent forms, and in general that it is most undesirable to separate the main botanical collection from the other collections of living things?—That is so. I have also been thinking about the locality in which such a combined herbarium would most properly be located.

577. You are opposed to the combination, but supposing the combination were effected, may I ask you whether, in your opinion, it should be at Kew or the British Museum?—With regard to foreign botanists it is quite a matter of indifference where the collection is. Of course, foreign botanists have complained that they had to go to Kew to work, but I know that generally it is a matter of indifference to them whether the united collection is at Kew or the British Museum. A man coming over to work at plants would take his lodgings or go to an hotel at Kew, and continue there to do his work. But to English botanists scattered all over the country or living in London, where there is a population of something like six millions of people, it is extremely inconvenient, as has been expressed to me at innumerable times, for them to have to go to Kew to consult the herbarium. A man coming up to conduct an examination, or a botanist who is in business in the country coming up, or professional men who take up botany as a by-study in the City, would find it extremely inconvenient if the only collection of plants they could examine were to be so far from the place they were living at as Kew. I have in my mind men who have added important contributions to botany, who could not have done so if they had of necessity to go to Kew. Mr. Miers, for instance, the famous South American botanist, was in business in the City, and was a fairly regular attendant at the British Museum Herbarium when it was at Bloomsbury, but he could only spare an hour or two, because he had his London business. He has told me again and again that it would have been impossible for him to do this work and attend to his business if he had to go on every occasion to Kew to consult the herbarium. I know there are professional men who are in the same position, men who find the information they want at the British Museum, who would be prevented from getting it if they had to go to Kew.

578. In the event of the two being amalgamated together in the British Museum, it would still be necessary to leave a herbarium at Kew to be utilised in connection with the living plants. That is an opinion I think you stated before; do you still hold it?—The position that was taken up then by Mr. Bentham, and, I think, Sir Joseph Hooker, was that a herbarium named at Kew, and put into the cases at the British Museum by one who need not be an expert, would be sufficient material for the collection of fossil plants which, in their judgment, should be retained at the British Museum. I pointed out that such a collection would be amply sufficient for the naming of living plants, which were perfect and complete, but would be useless for the determination of fossil plants, which are fragmentary, and difficult to determine. You will find, sir, if you look at my evidence, that it was with regard to a scientifically arranged collection, represented, perhaps, by single specimens of each species, that I put it in evidence that such a collection would be sufficient for a garden, but not sufficient for fossil botany.

579. Would not the correct use of a public garden and the right naming of all the plants lead possibly to researches which would not be covered by such a simple herbarium as you have in mind? Would you not have to refer to authentic specimens of the types?—If they were sufficiently named by the officials in the united herbarium on their authority, it seems to me that everything would be supplied that could be needed for the naming of plants in a garden.

580. (*Lord Avebury.*) If I understand your position, it is that the collection required to facilitate the working of Kew is really not so great a collection as that required to facilitate the working of the palæontological collections in the Natural History Museum?—That is my decided conviction.

581. (*Sir John Kirk.*) In the event of the Kew collections being transferred to the British Museum, do you think there is sufficient accommodation at present, or would it require an expansion of the Botanical Department to accommodate the whole?—It would be impossible to accommodate them in the present room.

582. Are there unoccupied galleries that could be devoted to it?—The original design of the building, which is incomplete at the British Museum, is to retire the building with a face to the Royal College of Science, and that building, which is very much needed in the Geological Department, would afford ample accommodation for what is needed for the herbarium.

583. Then, until a new building or an extension of the building was carried out, they would be hardly able to accommodate the whole Kew collection in the event of a transfer being decided on?—I think not.

Mr. W. Carruthers, F.R.S.

8 Nov. 1900.

584. Would that building have to be kept up in the same architectural style as the British Museum?—Yes. The present building is an incomplete one. The original plans were only partially carried out.

585. Have you any idea what the cost of the Natural History building was?—I did know it at the time, but it is so long ago that I have forgotten.

586. (*Mr. Seymour.*) The collections paid for by the State in connection with botany are duplicates to a great extent. There are two bodies, one at the British Museum and one at Kew. Is it not the fact that botany is the only science that has got a double establishment?—My friend Professor Balfour has a State-supported herbarium, which is, as far as it goes, a duplicate, at Edinburgh.

587. I am only asking you in comparison with other branches of scientific knowledge, whether there is any science that requires at the hands of the State a double establishment except botany? I do not mean, of course, in the sense of Edinburgh, because there you have other collections as well, but in Kew and London, which are practically the same, you have double establishments?—I am not aware that there is any other branch of science in the same way supported by the State. I would not say that it is actually so, as I have not investigated the matter.

588. Is there any particular reason why botany should be distinguished in that way, why it should have a double establishment of that kind?—I think as long as the collection of fossil plants and other biological sections in the British Museum exist, it is absolutely necessary to have a collection of plants.

589. But it has grown up to a certain extent by accident, has it not?—I think not, quite. I believe I went into my knowledge of the history in the evidence now before the Commission.

590. (*Professor Balfour.*) With regard to the exhibition portion, I believe the present lines of the exhibition at Cromwell Road were laid down by you,—the morphological series you have there?—Yes.

591. We have had it in evidence that the lower portion of the hall is not under the control of the Keeper of Botany at all?—It was under my control, but the funds which enabled me to carry out that exhibition were supplied by the Director.

592. That is to say, it was prepared by you, but you could only do it with the money supplied by the Director?—I could not go beyond the money allowed me by the Director in carrying it out.

593. It was not a part of your vote?—It was quite different from my vote. I had no control at all over the vote from which the money came.

594. I suppose you laid very great store by that morphological exhibition?—Very great store, and I was exceedingly anxious to carry it on.

595. Did you find it was very much consulted and used by students generally?—It was outside the Department, and I cannot speak of how much it was used, but I know it was used.

596. Was it framed with the idea that it would be used?—Undoubtedly. Sir Richard Owen in the first instance began the work, and meant to exhibit there a continuous morphological series of both the animal and the vegetable kingdom. I had a conference with him about it. He began with the higher animals, and came down to the lower animals; and I began in the next compartment with the lower plants, and proceeded to the more highly organised. That was done so far as the materials could be obtained, and money to meet the accommodation of the materials was at my disposal. But, of course, as the money was used to a large extent for the zoological exhibition, and that was more extensive, there was not so much for my botanical exhibition.

597. Would it be very much better that it should be entirely in the hands of the Keeper of Botany?—It was absolutely in my hands.

598. But the money would have been better in your hands?—I should have been able to finish the work sooner.

599. The reason I have asked you about that is, that over the way at the Royal College of Science they have a small teaching collection, and I suppose it would be entirely a duplication if they were to extend that collection and open it to the public?—I think not. The morphological collection we are making is not the sort of collection that would be used for teaching. I think it is a great gain as a supplement to a teaching collection, but the teaching collection would not be a duplicate of what exists there.

600. Your idea is that that morphological collection should not be extended as a teaching collection for students?—It has its own purposes. It is pure morphology, and so far as possible it ought to be completed. The work is still being carried on.

601. You do not think it would take the place of anything that could be made at the College of Science?—No.

602. Do you think, if they were to make a museum at the Royal College of Science, it should be made independent of yours?—Quite. I do not think it could be made open to the public at the College of Science. It is a sort of private collection for the students of the college Besides the College of Science we have many other institutions in London which teach botany, and the collection is as open to these institutions as to the College of Science. Of course, for such purposes the public gallery was to a large extent prepared with the view of being useful to students, although the public were kept in view, and the exhibition was made as interesting as dried plants can be made interesting to the public.

603. But you do not allow students into the herbarium?—Not students who are learning, but students who have got past the learning stage are of course freely admitted there.

604. Do you think it would be possible to have a students' herbarium for learners?—I think a learner would probably not go beyond the British plants. I do not know that there is in existence any better student's herbarium than the one which is exhibited in the Public Room, where every British flowering plant and even the cryptogamic plants are exhibited, and any student can examine and compare them there.

605. (*Mr. Darwin.*) I understood you to say that you consider that for the use of a palæo-botanist an absolutely complete herbarium is required?—My belief is, that no herbarium can be *complete* for the use of palæontological botanists, because you never know where you have to go in search of affinities or allies of the plants that you are dealing with. You cannot make a too complete herbarium for a man who is studying fossil botany.

606. Is it not a fact that the recent developments of work in fossil botany have depended largely on microscopic work?—That is true, but it has been to the injury of systematic botany. We cannot have a view of fossil plants if that is entirely confined to these plants in which the structure is preserved. The immense majority of the fossil plants which have been carefully determined have been determined from external impressions where the substance of the plants has been converted into coal and where the information is entirely obtained from external characters. That is true of palæozoic plants and mesozoic plants, and it much more true of Tertiary plants.

607. In the use of the herbarium for palæontology it is chiefly in the leaf form, is it not?—No. You must have materials for invetigating the structure as well.

608. In what sense?—If you are dealing with stems, you must have material for a histological investigation.

609. That would not be herbarium material, but fresh material that you would want?—The herbarium does not consist of a collection of plants, or portions of plants, with fruit or flowers, but it has two parallel series, one of woods or stems and one of fruits, and this parallel series are an integral part of the herbarium, and anyone investigating has free access to these. In such investigations as have been more recently the fashion in fossil botany these will be utilised.

610. Those have been utilised rather than separate specimens or fresh?—You must run down your things in some way, and you would not begin with living plants in your search for the allies of a fossil. You must begin with specimens you can handle, and when you have run them down you may try and get fresh material. But you must have some general knowledge of where you are likely to find the structures you are looking for.

611. You spoke of Mr. Miers as an instance of a man in business who had not much time to spare and who found it more convenient to go to the British Museum. In the case of the other institutions that you know of are there similar workers or are there more British botanists? It is possible to say that that type of work is

generally done by a British botanist?—To a large extent he is a British botanist, but not entirely.

612. But a considerable percentage would be British botanists?—Certainly.

613. (*Chairman.*) You were speaking of the great importance of a complete herbarium for the study of fossil plants. Are there not also very great advantages in the study of fossil plants in a collection of living plants, or is that a matter of quite secondary consideration?—I think when you are investigating structure it is desirable to have living plants that you can cut up in a fresh state; but fossil botany is pursued also as a systematic work, and systematic botanists do not use, as a matter of fact, living plants. You will find in the evidence you have before you one or two illustrations of this. I asked, by letter, Mr. John Smith, who was curator of the gardens at Kew, and an authority on living ferns, if he could tell me to what extent Sir William Hooker used the living ferns in the preparation of his "Species Filicum," and Mr. Smith in a letter, which I believe is in the British Museum in charge of my successor, Mr. Murray, said that Sir William Hooker never used on any occasion the living ferns for that work. You will find also in the evidence given by Mr. Bentham before the Devonshire Commission that he never used growing plants for systematic work though he was working at Kew. As a matter of fact, systematic botany is in the hands of harbarium botanists, and there seems to be no connection between a herbarium and a botanical garden save the help that the dried plants should be to the gardeners or curators in getting the correct names for the plants.

614. That you think holds as good now as it did at the time?—I think if such systematic botanists as Sir William Hooker and George Bentham found it so it would most likely govern the worker of the present day.

615. (*Professor Balfour.*) For instance, a garden is very useful in connection with Cacti?—In my own judgment I think a garden would be very important for many groups of plants, but I submitted these statements as matters of fact. The systematic study of Cacti must be carried on to a very large extent in the herbarium.

616. (*Chairman.*) Then with regard to the evidence which we have taken from the Devonshire Commission, would you be willing that our Secretary should place in your hands what we have taken of your evidence?—Certainly. I have not recently read over that evidence, but as far as my memory of it goes I adhere to what I then said. Coming up in the train this morning I made one or two notes. I noted that it was very important to have the collections in London because those who maintain them, the taxpayers of the country, have more easy access to them. It has been objected that collections in London must suffer from soot or other impurities, but that is not the case. We have in the herbarium the collections of Sir Hans Sloane, which have been there for 150 years, and they are in as good a condition now and as free from soot or dust as the collections of the past year. I do not know that there is anything else important except that I may be allowed to refer again to the terrible calamity which would befall the study of fossil plants, which are of so great importance in geology, by the removal of the herbarium with all its accessories, its fruits and its woods, to a distance from the collection of fossil plants.

Mr. W. Carruthers, F.R.S. 8 Nov. 1900.

617. Does that remark apply to the type specimens or would your purpose be met with a complete herbarium of simply authentic specimens?—Certainly not. If the thing were not kept up as a working scientific herbarium, it would be always an indifferent and unsatisfactory one for these purposes.

618 But for the purpose of the study of fossil botany, what you are arguing for are specimens to which he may refer, and it would be sufficient for that purpose if the specimens were authentic—not type specimens which are used in botanical research?—Botanical research deals with fossil plants as well as recent plants, and such a collection could not be of real service unless it were maintained as a working scientific herbarium. You could not otherwise get the necessary material together.

619. That is what I want to know. For the purpose of fossil botany you would require not simply a herbarium of merely authentic specimens, but a herbarium of type specimens such as is used by a scientific botanist who is pursuing a research with regard to living plants?—That is my conviction.

[A memorandum subsequently received from this witness will be found in Appendix III.]

FOURTH DAY.

WESTMINSTER PALACE HOTEL

Wednesday, 14*th November*, 190(

PRESENT:

Sir MICHAEL FOSTER, K.C.B., M.P., SEC.R.S., &c. (in the Chair).

The Right Hon. BARON AVEBURY, P.C., F.R.S.
Sir JOHN KIRK, G.C.M.G., K.C.B., F.R.S.
Professor ISAAC BAYLEY BALFOUR D.SC., F.R.S.
Mr. FRANCIS DARWIN, M.B., F.R.S.
Mr. HORACE ALFRED DAMER SEYMOUR, C.B.
Mr. STEPHEN EDWARD SPRING RICE, C.B.
Mr. BENJAMIN DAYDON JACKSON, *Secretary.*

DR. MAXWELL TYLDEN MASTERS, F.R.S., Editor of *The Gardeners' Chronicle*, called; and examined.

620. (*Chairman.*) I believe you have been for the greater part of your life engaged in the study of botany, and I think you have been for many years the editor of *The Gardeners' Chronicle*?—Yes.

621. Therefore you are able to speak to us on the one hand as a botanist, and on the other hand as one specially acquainted with the interests of horticulture, with regard to the two institutions with which we have to deal, the Gardens at Kew and the Botanical Department of the British Museum?—Yes.

622. You are acquainted with the Herbarium at Kew and the Herbarium at the British Museum?—Yes.

623. Have you used both of them?—Yes.

624. As a botanist, can you say that there are special purposes for which you use the one and special purposes for which you use the other?—Yes; not absolutely, but generally so. I go to the British Museum if I want to consult the "old masters," or some of the old collections, and I go to Kew if I want the more modern things, and things connected with the gardens and horticulture.

Dr. M. T. Masters, F.R.S. 14 Nov. 190

625. As a botanist, you go to Kew for research, which does not entail any historical points?—Exactly; speaking generally, of course.

626. Do you find the collection there richer for your purpose?—Much richer.

627. Is it because it is richer in the particular division

Dr. M. T. Masters, F.R.S.

14 Nov. 1900.

of the vegetable kingdom in which you are engaged?—Certainly.

628. I believe it is the Coniferæ that you pay special attention to?—Yes, latterly.

629. Have you always found, outside mere historical research, all that you want at Kew?—Yes.

630. Have you had from time to time to go to the British Museum for material which you could not find at Kew in connection with modern research?—Never.

631. Then as a horticulturist you attach very great importance to the herbarium at Kew?—Certainly.

632. Can you say in what respect it is important? I take it it is obviously important as a means of correctly naming the living plants in the gardens?—Yes.

633. Is it used in other ways by horticulturists?—Yes, certainly. If one had to prepare a monograph one would go to Kew, in the first instance, and consult the herbarium there. He would simply go to the British Museum to sweep up anything that might be left.

634. If a proposal were made to unite in a certain way the two herbaria, what are the relative advantages and disadvantages of the union taking place, on the one hand at Kew and on the other hand at the British Museum?—It is rather a large question to answer.

635. Let me rather take first the general herbarium of the British Museum and the herbarium at Kew. Supposing that it was desirable to effect that union, what is your opinion as to the place where the united herbaria should be situated?—Kew, decidedly.

636. For what reasons?—Because it is so much more convenient. The collections are already much larger there, the arrangement is easier, the books are better, and obtained with greater facilities. For all those reasons I should certainly say Kew.

637. You find that not only is the collection richer, but the work of consulting the herbarium, on account of the arrangements, is carried on with greater facility at Kew than at the British Museum?—That is my opinion.

638. You do not think that the greater distance of the journey to Kew than that to the British Museum is of importance?—No; I do not think it makes any difference. A botanist who has got work to do does not care whether he travels a few miles more or a few miles less, seeing the much greater convenience there is at Kew.

639. You do not think that is a matter of practical importance, the somewhat greater distance of Kew from the centre of London?—That is my opinion.

640. I take it, then, that, supposing the union should be desirable, that union, in your opinion, should take place at Kew?—Yes; of course, I am speaking generally.

641. Such a union might take place in two or three ways. There might be a complete incorporation; there might be a union in this way: that one herbarium should be put in a building close by, quite separate from the other; and there is a third, a middle course, that the allied cabinets might be placed side by side, without actual incorporation of the sheets. Which method of union do you think is the one to be recommended?—It is a question of expense. It would involve great extension of space, and the Government would have to put up fresh buildings. The herbarium building at Kew is not big enough now.

642. But of the three methods, do you think that having two separate buildings, with the Kew collection in one and the British Museum collection in the other, is the best arrangement, or having one building in which the cabinets are kept separate, or do you think the third plan of total incorporation is the best?—I prefer the second plan, that of putting the cabinets side by side. That is supposing you have room.

643. In your opinion that would meet all the necessary requirements of the persons who are conducting investigations in the herbarium?—I think so.

644. They would have really as much advantage, or nearly as much advantage, from that as from actual incorporation of the sheets?—Yes; actual incorporation would be almost impossible.

645. You mean on account of the difference in the size of the sheets?—Yes.

646. And it would be a matter, I suppose, of very great labour?—Yes; the time occupied would be enormous.

647. The collection of the British Museum consists, as you know, of a general herbarium, the British herbarium, and certain historical pre-Linnean herbaria?—Yes.

648. Do I understand that you recommend that the British herbarium and the pre-Linnean herbaria should be left at the British Museum?—I think so.

649. Why do you think so?—Because they are nearer to the British Museum main Library, and, again, they are near to the Linnean collections at the Linnean Society, and it is to a certain extent a different class of students who go in for historical botany.

650. That is to say, of the men who are carrying out at Kew researches in modern botany there would be relatively few who would have occasion to appeal to the historical herbaria?—That is so.

651. Would you be satisfied, at a botanist, that the botanical collection at the British Museum should be limited to the popular Educational Exhibition in the public galleries, to the historical herbaria, and to the British Herbarium?—Yes, and the educational.

652. Do you mean by the educational anything more than the public galleries?—Yes, representatives of each natural order, for instance.

653. Does that exist now?—It exists now in a much larger form.

654. But you would have the present British herbarium maintained as it is?—Yes.

655. You would have the historical herbaria maintained as they are?—Yes.

656. In addition to that, you would have a new herbarium for educational purposes of a limited character, and not intended in any way for research?—Yes.

657. You think it would be an advantage, then, to transfer the general herbarium to Kew, so that they might be together at hand at one time, and in one place, for the investigator?—I think so, but it is conditioned by the enormous expense.

658. Are the advantages of such a change, in your opinion, such as would justify any large expense?—No, I do not think they are.

659. It has been represented that the interests of botany are forwarded by having two institutions in London, at both of which botanical research is being carried on, at Kew and the British Museum, that is to say, the rivalry is a stimulus to enquiry. Do you think there is any moment in that consideration?—No. I think that is more a question of the man, the worker. An earnest worker would not be influenced by such considerations as those.

660. We are all of us more or less influenced by rivalry and competition, are we not?—To a certain extent we are.

661. But you do not think that in a question of botanical research is a matter of serious consideration?—No, I do not think it is.

662. (*Lord Avebury.*) You spoke of the greater richness of the Kew collections. Is that due to some extent, at any rate, to the fact of the collections made by Government expeditions having been sent to Kew of late years more than to the Natural History Museum?—I should think it is.

663. Did you wish to imply that there had been any greater energy on the part of the authorities at Kew, or any laxity on the part of the authorities at the British Museum?—Certainly not. I make no imputations whatever on the officials.

664. The greater richness of Kew is not owing to any undue energy on their part?—Certainly not.

665. Why do you consider it is easier to carry on botanical research at Kew?—Because everything is nearer to one's hand. The arrangement is better. The plants are all arranged in geographical order, instead of being according to their botanical sequence, and the books are more easily got at.

666. The collections are arranged at Kew in geographical order, and the arrangement at the British Museum is according to the natural orders?—Yes.

667. Would you consider there is some advantage in having two different collections, arranged in a somewhat different manner?—Certainly, if you can afford it.

668. But having got them, you think it would be inadvisable to sacrifice that advantage?—Certainly.

669. If the two collections were amalgamated the collection of the British Museum would have to be redistributed according to the localities, and that would be a serious undertaking?—Very serious. Owing to the difference in size of the sheets, they would have to be cut, or the specimens remounted.

670. Do you consider there is an advantage to bo-

tanical science in having the two collections arranged one according to geography and the other according to the natural orders?—Undoubtedly there is an advantage.

671. Is there not greater facility in the Natural History Museum in the matter of tables and space than there is at present in the Kew herbarium?—I should not say so. There is much more light and much greater facility at Kew for working. I am not making any imputation on the authorities.

672. It has nothing to do with the officials, but it is the nature of the building that makes it easier?—Yes.

673. You do not attach importance to the greater facility of access, but is it not for London botanists and provincial botanists who come up to London a considerable advantage to have a collection which can be got at with less expenditure of time than at Kew, in going to which they have to look out trains, and so on?—I think for purposes of botanical research to earnest students that is a trifle. For amateurs and dilettanti the Museum is more important.

674. If you have important research which is taking a fortnight, or a month, or a long space of time, then it does not very much matter; but without being merely a dilettante you may be a serious student, and have certain points you wish to look up which would not take very long. Do you not consider that the greater accessibility of the British Museum is an advantage?—It would be in that case.

675. (*Sir John Kirk.*) If the historical collections were to be kept in London are there any historical collections at Kew which might be removed from Kew to the Natural History Museum?—I cannot answer that question, but I do not think there are.

676. (*Mr Seymour.*) I think you said the library at Kew was more accessible than at the British Museum: in what respect?—It is side by side with the herbarium, and one can go to the library and take down a book with the greatest ease. At the Museum you may not do that. You have to ask one of the assistants to get it for you, and perhaps it is not in that room, and they have to send elsewhere for it. I am only speaking of my own experience.

677. That is merely a question of arrangement?—Yes.

678. (*Lord Avebury.*) That refers to the books in the General Library, but is there not a working library in the actual room?—I am speaking now of the working library.

679. The working library at the Natural History Museum is in the botanical collection?—Yes, but it is not so easily consulted—at least I do not find it so.

680. (*Mr. Seymour.*) You do not yourself advocate any change in the present arrangement?—I think it is a matter of expense.

681. Otherwise you think things are satisfactory as they are?—Yes, I think they are. If we were beginning again there is, of course, no doubt what should be done, but as the Museum is there and Kew is there it is better to go on as we are, unless we are prepared to spend an enormous amount of money.

682. Does the present system involve much work being done twice over?—No, I think not.

683. (*Professor Balfour.*) With regard to the richness of the collections, it is not only in the Coniferæ, but in all the flowering plants you consider that of Kew the richer?—Yes.

684. You said the collections at Kew were arranged geographically, and those of the British Museum after the natural orders; are they not in the natural system at Kew, with a subordinate geographical arrangement?—Yes.

685. At the British Museum there is no geographical sub-division?—None at all.

686. That used to be the case at Kew, was it not?—Yes, I think so, many years ago.

687. At Kew at present there is a combination of both the geographical arrangement and the natural system?—Yes.

688. At the British Museum there is only the natural system?—That is so.

689. You say that practically it is expense that would prevent you urging an amalgamation of the two. If the amalgamation could be carried out with small expense do you think it would be an advantage?—Certainly.

690. Supposing you retain the historical collections at the British Museum, having amalgamation of the others, what about the library? Do you think there should be kept up as big a library at the British Museum as there is now?—I should not add to it; I should keep it as it is, except in the case of the books that had a bearing upon the "old masters."

691. You would not add any new works that came out?—No, except purely educational books; not research books.

692. Apart from the advantage of a rivalry, it has been pointed out to us that it is important to keep the botanical collections at the British Museum as they are on account of the unity resulting from having all the natural history collections together; do you attach much importance to that?—Not practically; theoretically, yes. Practically it is of no consequence.

693. Then with regard to the visits of the London botanists, you do not attach any importance to the distance of Kew from London?—I do not think it is material at all.

694. Are you quite satisfied that research students all go to Kew now in the first instance?—I believe so, speaking generally.

695. And then they go back to the British Museum, as you say, "to sweep up"?—Yes.

696. That involves again another visit to Kew, does not it?—Yes, usually.

697. So that there is a good deal of oscillation?—Yes.

698. That would be all removed if you amalgamated the two herbaria?—Yes.

699. If you keep the British herbarium alone at South Kensington that would probably supply the needs of all those botanists who make casual visits?—Yes.

700. Would that be quite sufficient from your point of view?—I think so.

701. Can you tell me what is the practice of most of the horticulturists in London if they want to get plants named; do they go to Kew or the British Museum?—To Kew. I am only speaking generally; I do not say all.

702. Is that because of the garden being there, or is it because, like yourself, they find it is easier to get the plants named?—The garden, of course, is a most important thing.

703. Do you think that the garden, apart from the herbarium, influences them in going there?—Certainly.

704. Do you know the arrangement of the specimens at the Museum at South Kensington?—Yes, in such orders as I have worked at.

705. Apart from the herbarium, you know that there is a systematic arrangement of plants there and certain morphological collections?—Yes.

706. Do you know if these are much used by teachers in London?—Yes, I think so.

707. Are you a teacher yourself?—I used to be, many years ago.

708. Did you use them then?—Yes.

709. Did you take your students there?—No.

710. Did you use the present museum at Cromwell Road, or was it the old museum at Bloomsbury?—I have used both.

711. Did you find it very useful?—Yes.

712. Do you think that is an element which is much wanted in London?—Certainly.

713. And would it be an advantage to have something like that extended?—Certainly.

714. There is one branch I believe in which you yourself are very much interested—teratology; that is not at all represented just now, is it, at South Kensington?—I think not.

715. That would be a branch which ought to be represented?—Decidedly.

716. And it would be very attractive, would it not?—I think so.

717. And interest people very much?—Certainly.

718. (*Mr. Darwin.*) I am not sure that I quite understood the sort of proportion you make between the collections at Kew and those at the British Museum. I rather had the impression that you felt the Kew Herbarium was so overwhelmingly more important that it was not a matter of very much importance whether you went to the British Museum or not?—I should not like to put it in those words.

Dr. M. T. Masters, F.R.S.

14 Nov. 1900.

719. You gave me rather that impression. I felt rather at a loss to understand why you were in favour of amalgamation at all if you felt the British Museum collection was unimportant?—That was not quite what I meant. The Kew collections are more important than those at the Museum in my opinion.

720. Does the little use you have made of the British Museum depend on the nature of your particular work?—In all the monographs I have been engaged on I have used the Museum.

721. (*Chairman.*) There are groups of plants which are far better represented at the British Museum than at Kew, are there not?—I should not say so.

722. That does not come within your knowledge?—No. I am speaking of flowering plants; of the cryptogams, I know nothing and can say nothing.

723. (*Mr. Spring Rice.*) I gather that what you, and other workers like you, most desire is a collection as complete as possible?—Certainly.

724. And if they have the collection as complete as possible it does not very much matter within reasonable limits where it is—it does not matter whether it is five miles off or ten miles off?—No.

725. Are you aware that under the present system there are two institutions each trying to get a collection as complete as possible—Kew and the Natural History Museum?—Yes.

726. And that one sometimes gets a novelty or unique object and the other sometimes gets it, and that there is no principle on which these things are arranged?—Yes.

727. Do you think that is conducive to the scientific progress of one or other collection?—I think it is a pity, and that it should be obviated in some way or other.

728. You think then that that form of competition is not one conducive to the interests of science?—No, it is not.

729. Assuming there ought to be only one collection absolutely complete, can you suggest any function for separation, short of its being complete?—I think I should put all these unique things you speak of at Kew, and should stop the enlargement of the British Museum Herbarium—keep it as it is, but not increase it. All new things might go to Kew.

730. As between one of two institutions, one of them has got at present things which the other has not, and *vice versa*. Would you think it scientifically desirable to rectify that state of things?—No; I do not think it makes any difference.

731. I ask because one scientific witness said that he had to begin work at one institution, it does not matter which, then go to the second to correct his results, and then go back to the first to adjust them. Does not that put friction in the way of scientific progress?—I think not.

732. Do you attach importance to that?—Practically none.

733. Taking things as they exist, you say that if you had to do it again you would not allow that state of things to grow up?—Certainly not. If I was starting a fresh one, I would have one collection and one only.

734. Do you think it is possible in the future to aim at having only one complete collection?—Yes.

735. One that aims at completeness, because we know that it can never be complete?—I think so.

736. You have not answered my question that supposing you had only one, and there were reasons for having another of sorts, whether you could lay down an aim for the second one short of completeness?—I should make the aim in the second one purely educational, and the aim of the other for research purposes.

737. (*Chairman.*) Surely in botanical research it is not only waste of time but really introducing imperfections in the research having to go backwards and forwards from one place to another and never being able to get the whole of your material before you at any one moment?—In practice I do not think it makes much difference. One goes occasionally to the Museum and more frequently to Kew. The occasional visit to the Museum does not make much difference.

738. Kew, you say, is very largely consulted by horticulturists?—Certainly.

739. And the British Museum occasionally only?—Occasionally, as far as I know.

740. You have had very large experience of horticulturists, and from your experience might one say rarely or occasionally?—Occasionally, I think, is the best word.

741. (*Lord Avebury.*) Has Kew a special teratological collection?—No, it had once.

742. (*Prof. Balfour.*) What has become of it?—The collection is now in the Museum of the Royal College of Surgeons. I had a very large collection, which I could not keep, and so I gave it to Kew, but after many years I found it at the College of Surgeons, where it had been transferred.

743. (*Lord Avebury.*) Under what authority was that done?—I do not know; I suppose Sir William Dyer's. He was turning some things out at Kew, and I was surprised to find it at the College of Surgeons.

744. (*Chairman*). How long ago was that?—Several years ago. The College of Surgeons asked me to make a catalogue of it, which I did about five or six years ago.

745. (*Prof. Balfour.*) Is that much used now by students at the the College of Surgeons?—I can hardly tell you.

746. Is it accessible?—Perfectly accessible.

747. (*Lord Avebury.*) Would you transfer the fossil plants from the British Museum?—No.

748. Is it not rather important to have fossil plants and recent plants together for the purpose of study?—One could easily go to Kew once to see the plants.

749. Would you propose to leave the fossil plants?—Yes, with the geological collections.

750. You do not think a separation of the living from the fossil plants would be any practical inconvenience?—No; you could easily go to Kew to see the living affinities.

751. In arranging the fossils is it not important to have a collection of living forms for the purpose of comparison?—Certainly.

752. From that point of view it would be desirable to have living forms wherever the fossil plants were, would it not?—Yes, but it would be only a few, and that could be easily managed.

753. Do I understand that you would have a collection of living forms so far as was desirable for the purpose of the study of the fossil ones?—Certainly.

754. Therefore you would not merely keep an educational collection at the British Museum, but you would have a collection of living forms, such as would be desirable for the purpose of comparison with the fossil forms?—Yes; it would come under the Educational Department.

755. Would it not be very difficult to say beforehand what collections of living forms you would want for the purpose of comparison with fossil ones, because new fossils are continuously turning up belonging to a great number of the natural orders?—The Director could always apply to Kew and get special ones up.

756. (*Prof. Balfour.*) From the journalistic standpoint you have no doubt a large number of specimens constantly sent to you by correspondents who wish for their names. Do you find that the fact of having the British Museum in Cromwell Road is any advantage?—Yes; the authorities of the British Museum are kind enough to name things for me.

757. What I meant was, do journalists, members of your staff, for instance, go to the British Museum to get them named, or do you find that Kew is near enough for you?—Latterly we have sent everything to the British Museum, and sometimes I go myself.

758. Did you send them to be named by the staff?—Yes.

759. Of course it would be as easy to send them to Kew as far as that is concerned?—Yes.

760. (*Mr. Spring Rice.*) Those would be British plants chiefly?—No.

761. (*Prof. Balfour.*) They would be plants of all sorts?—Yes, garden plants.

762. Why do you not send them to Kew if you find Kew is so much better arranged?—Because I find there is too great friction. We always used to send them to Kew, but the Director objected, and there was so much friction that we have lately sent them elsewhere.

Professor JOHN BRETLAND FARMER, F.R.S., Professor of Botany, Royal College of Science, called; and examined.

763. (*Chairman.*) You are Professor of Botany at the Royal College of Science?—Yes.

764. Which is a Government institution?—Yes.

765. Speaking on the one hand of your researches in botany and on the other hand of your functions as professor and teacher, you are acquainted both with the Royal Gardens at Kew and with the Botanical Department of the British Museum?—Yes.

766. Limiting oneself first to your own researches, have you used both of them for that purpose?—Yes, especially Kew.

767. You have more recourse to Kew than to the British Museum?—My particular line of work renders it easier to get fresh material at Kew.

768. Limiting oneself now to the herbaria, have you had occasion to make use of that at Kew and that at the British Museum for the purposes of research?—For small research, yes.

769. Have you used both one and the other indifferently.?—I naturally use the Natural History Museum if I can, because it is nearer.

770. Probably it has a little indirect bearing on the present inquiry, and therefore I may ask what is your outfit for teaching and research at the Royal College of Science?—It includes laboratories, of course, and a small teaching collection, and a very small herbarium.

771. A general herbarium?—No; it is mainly British, with a few other European types, but it is a very small one.

772. That is entirely for the purpose of teaching?—Yes.

773. That is your complete outfit?—Yes.

774. Have you had occasion to make use for educational purposes of either Kew or the British Museum, or both?—Both.

775. Do you use them in the same way or in different ways; could you explain what use you have made of Kew and the use you have made of the British Museum?—As regards Kew, I have mainly used it to take classes round the gardens to see the plants in the houses, and so forth. There is also a small students' garden attached to Kew which we have used. That is practically all. We have done a certain amount of work in the museums at Kew, but we have used the Natural History Museum to a greater extent, that is, the collections which are displayed in the galleries. We very frequently use them in the course of the year, and the herbarium also. We have never attempted to use the herbarium at Kew, but we have used the Natural History Museum herbarium, particularly for seaweeds and objects of that kind.

776. The general herbarium as well as the British herbarium?—The general herbarium at the Natural History Museum.

777. You make use of the educational series in the gallery?—Yes.

778. That is to say, do you take your pupils there, or are certain of the objects allowed to be taken to your laboratory for use there?—No, I take the pupils over there.

779. You have derived great advantage then from the opportunities which are afforded by the British Museum?—Yes, very great advantage indeed.

780. Do you think that those advantages might be with profit enlarged?—Certainly I do.

781. In what direction, for instance, would you like to see enlargement?—I should like to see more of the kind of things which there are at present. Of course at present the collections are necessarily somewhat limited as regards space and so forth, but still they have been, and are, to us quite invaluable for teaching purposes. My advanced students go over frequently, both when I take them myself and on their own account, to see the collections which are displayed in the galleries.

782. Supposing it were decided, for this reason or that reason, to transfer the general herbarium at the British Museum to Kew, or a certain or large part of it, would that interfere with the usefulness of the Herbarium of the British Museum to you for teaching purposes?—To some extent. We would still require access to some collections, sea-weeds, and so forth, which we do not keep ourselves, and have no means of keeping, and it would be necessary for us to go down to Kew to see them.

Prof. J. B. Farmer, F.R.S.

14 Nov. 1900.

783. Your purpose would be met by the retention at the British Museum, instead of the general herbarium, which contains a very considerable number of type specimens, of a more limited herbarium, not consisting of type specimens, but specimens which can be used for reference?—Certainly.

784. It would answer all your purposes?—I think so, provided, of course, that the students had access to similar collections at Kew when they wanted them, which is not very often.

785. Do you wish a double inspection?—Sometimes it is useful for special work to really go back to the type specimens, but that does not very often happen.

786. That is rather in the nature of research, and not purely educational purposes?—I like to show the advanced students the original things when possible.

787. But those occasions are relatively few, are they not?—Certainly.

788. So that there would be no great hardship, in that case, in having to make a journey to Kew to see those particular type specimens?—No, I do not think there would.

789. Because you are, as you say, in the habit of making journeys to Kew in order to study the living plants?—Yes.

790. And the general use of the British Museum for your educational purposes would be satisfied by a general reference herbarium?—I think it would.

791. Together with the educational series in the galleries, and so on, enlarged as you suggest?—Yes.

792. (*Lord Avebury.*) In preparing such an educational exhibition as you desire for your special purposes, is it not very important that the officials should have a large general collection from which they might feed the educational one?—I am not quite clear that I understand your question.

793. You contemplated that there should be an educational exhibition such as there is at present, which you wish to see enlarged?—Yes.

794. But would it be easy to arrange that unless there was a larger collection behind from which it could be fed?—They must have sources for feeding it, but what their sources might be I really cannot say.

795. But it would be necessary that they should have a collection behind them, as it were, from which the educational collection might be fed?—Yes, they must certainly have sources for feeding.

796. Do you attach much importance to keeping the fossil plants and the living plants in one great collection?—We have never studied the fossil plants very much.

797. I am not asking you so much from an educational point of view as from your opinion as a botanist. Do you think it is desirable to keep the extinct and living forms together?—It is more convenient for educational purposes.

798. For the purpose of naming the fossils, do you consider it important to have a collection of the living forms side by side with them with which they might be compared, and by which they might be named and determined?—Do you mean to name the fossils from the existing living forms?

799. I mean, assuming that the fossil plants would remain at the Natural History Museum in any case, I wish to elicit your opinion whether it is important that the collection of living plants and the fossil plants should be together?—I do not think that matters very much, so long as they are sufficiently near for a person to go readily from one to the other. On the whole, perhaps, it is better they should be in series, but I do not think it is a very great disadvantage so long as they are not far remote from one another. Fossil plants after all, although they come into a series, are pretty distinct from any living series at the present time—at least most of them are.

800. Say, for example, that the Natural History Museum, so far as the living plants are concerned, was amalgamated with Kew: it would then be necessary for the officials of the British Museum to go down to Kew to name their fossil plants from time to time, would it not?—I do not imagine that

Prof. J. B. Farmer, F.R.S.

14 Nov. 1900.

it would be necessary to go down, but I have no very special knowledge on that point.

801. Do you think it would be necessary to compare fossil leaves, for instance, with existing leaves, or fossil fruits with existing fruits, to determine the species?—It might be on certain occasions.

802. (*Mr. Seymour.*) Do you make use of other collections besides those of the British Museum and Kew for the purpose of your education at the College of Science?—Yes, for live plants. We draw on the Chelsea Physic Garden as well.

803. Do you make any use of the Botanical Gardens at Regent's Park?—Hardly ever. In practice it wastes too much time to send up there, because it is rather inaccessible to us.

804. In connection with the College of Science, have you a botanical library?—A small one.

805. Do you consult the library at the British Museum?—Yes.

806. And at Kew?—Yes, whenever I am down at Kew.

807. Do you find any difference between Kew and the British Museum in respect to accessibility of the library—is one more readily consulted than the other?—I do not think so.

808. (*Prof. Balfour.*) Speaking of using such things as seaweed which you get at the British Museum, do you get the specimens out?—Yes, when we are taking seaweeds, for example, in the course, I generally ask the keeper to let me have access to those things, and say what particular kind of things I want to see, and he very kindly gets out a large number of specimens so as to save us time and render them more easy of inspection.

809. Then you go to the cryptogamic room, and look at them there?—Yes.

810. Do you get any of their duplicates sent you for use in your establishment?—We have had a few.

811. There is no general system of distribution?—Not so far as I know.

812. And you cannot depend on the supply?—No.

813. On the supply of cryptogamic or flowering plants?—No.

814. What is your conception of an educational herbarium?—That is a very big question to answer.

815. It is; but you used the expression, I think.—I do not remember doing so.

816. You thought that an educational herbarium might be maintained. The question I wish to ask you is this: You have in your establishment no students' herbarium?—Only a very small one, almost limited to British plants, and with hardly anything outside Europe at all.

817. It would be a distinct advantage for you to have a larger one?—As I think I said to the Chairman, we do consult the Natural History Museum to make good the lacunae in our own.

818. It would be convenient for you, would it not, to have it nearer your work?—Yes. Of course it involves the sacrifice of an entire afternoon to go to Kew.

819. You do go to Kew?—Not to the herbarium, with the students.

820. But you go to the British Museum?—Yes, always.

821. Can you get full access to the herbarium there for your students?—I have never had the slightest difficulty.

822. Are your students able to handle the plants in the herbarium upon the sheets?—In the way that sheets are ordinarily used. Of course they would not be allowed to detach specimens, or anything of that kind.

823. (*Chairman.*) That is always done under your eyes, is it not?—Yes, unless they go over on their own account, and then, of course, I do not know. I have never heard them say anything but that they have received every help.

824. Students have had access to the sheets of the herbarium by themselves?—Yes, the advanced students, and they are allowed to look at sheets.

825. (*Prof. Balfour.*) Even when you are not there? Yes, one or two of them—not a very large number.

826. With regard to your museum, you have, you say, a small teaching collection?—A small teaching collection to illustrate lectures, and so forth.

827. And you find it of very great use to have access to the collection at the British Museum?—Yes.

828. Have you a teaching collection of morphological objects like some of the things they have at the British Museum?—Yes.

829. You would like to see that extended, I suppose, as much as possible?—Certainly.

830. Would not there be a danger of overlapping the work they are doing at the British Museum?—I should think to a very small extent, because the only space which is available for our own collection is so extremely small that we are obliged to restrict it almost entirely to things wanted for very elementary students.

831. But if you had more space you could develop it to a great extent?—Yes.

832. If you could develop it to that extent, and make it accessible to the public at all times, it would take the place of the collection at the British Museum, and do exactly the same work that the collection there is doing now?—I suppose you mean there would be an additional staff, and all that that implies? But it would be dependent on our having suitable buildings to put it in, which we have not.

833. But going on upon your present lines, you would only overlap the work that is being done at the British Museum to a slight extent?—An extremely slight extent. Our own rooms where we are able to put these things are very badly lighted, and the things cannot be well seen. I have always to take them out of the cases to show them. We use them practically for lecture purposes, and we have no more than what is just useful to illustrate lectures. With the very small space at our command I am always obliged to restrict it for that purpose.

834. Supposing a change were made, and an educational collection were developed at the British Museum, the specimens required would be mainly in fluid, would they not? They would not be dried ones?—I imagine not; in the majority of cases, certainly not.

835. At present in the British Museum a large number of the specimens in the gallery are dried specimens, but they would be very much better if they were specimens in fluid, would they not?—In many cases I think they would.

836. And therefore the question of supply would be more one from a garden than from a herbarium?—Yes.

837. Therefore it would not be necessary to keep a large stock collection from which you could supply your exhibition?—For that purpose it certainly would not.

838. What is your estimation of the value of microscopic preparations as permanent things?—That varies very much with the objects concerned. Many of them keep very well, and in that case they are useful, but in a very large number of cases they deteriorate so much by keeping that unless they have some special interest they become almost valueless.

839. Do you think it is an advisable thing for any public museum to maintain a large stock of microscopic specimens, purchasing them as they come into the market?—Not for their intrinsic value. I do not think it is a good thing to do.

840. Did you ever hear of a teratological collection at the College of Surgeons?—I have heard of it.

841. Have you ever seen it yourself?—No. One difficulty is, of course, that that museum is such a long way off.

842. (*Mr. Darwin.*) I am not quite sure that I understood in what direction you would approve of the teaching collection of the British Museum being expanded, whether it was in the sort of thing that is now downstairs, the morphological series, or in the things which are upstairs?—I think it would be desirable that both should be extended.

843. Which is the one that wants extending most, do you think, the one that is more behindhand as it were?—The one downstairs is far more exiguous than the one upstairs.

844. It is smaller than it ought to be, and it is one you would be specially willing to see enlarged?—Certainly.

845. There is one question which is perhaps rather a vague question, which I should like to have your answer to. Supposing that the greater part if the research material was removed from Cromwell Road, so that the whole establishment became rather devoted to education than to research, do you think that would

be in any way an injury to botanical science in England? As it is at present it is a centre of research, and that gives it a certain vigour which might not be found in an educational collection?—I do not think unless research is going on in a museum there is very much life in it.

846. So that you think if it is turned into a purely educational department that would be undesirable?—I think it would be a definitely retrogressive step, if it implies getting out of touch with research.

847. Would that react on the Educational Department?—Yes—it was that I meant.

848. (*Mr. Spring Rice.*) Are you aware that at present there are two national institutions in the neighbourhood of London, each striving to get a complete botanical collection? Kew and the Natural History Museum are collecting on the same lines in competition with each other?—I have heard something to this effect, in so far as the herbarium is concerned.

849. Have you ever heard sometimes one succeeds in getting a rarity or a unique specimen, and sometimes the other succeeds?—I have not heard any more than rumours to that effect.

850. But assuming that to be so, the consequence is that neither of them gets as complete a collection as it would if only one competed—that follows, does it not?—Yes.

851. Do you think that is a good result from the purely scientific point of view?—It does not seem to me it matters very much from the purely scientific point of view. The two collections are pretty near to one another.

852. You mean that it is a matter of so much indifference as to whether a specimen is at Kew or at Cromwell Road, that it is not worth talking about?—Personally, I do not think it is.

853. Have you ever experienced any particular inconvenience in studying a particular branch of a subject at two places at once?—No. What I have done in many cases when I have used the collections is to go to one of the institutions and then to the other one.

854. Would not your time have been saved if the whole had been at one place?—In some cases perhaps it might, but as a matter of fact one nearly always finds when one is doing work of that kind that one can put in one day at one place and another day or more at another. Perhaps, for the purpose of convenience, it very often might happen it would be better to have them all at one institution. But you were asking whether I personally had experienced a difficulty, and I have confined my answer to that question.

855. Speaking rather more broadly than of your own personal experience, do you consider that the difficulty is worth considering or not?—It is very hard to say generally. I should think it would not in many cases be a matter of much consideration. One finds that difficulty almost everywhere, Berlin and other places too, different collections in different parts of the city.

856. (*Mr. Darwin.*) Is not your experience rather peculiar, inasmuch as you work at South Kensington and live close to Kew?—I do not live at Kew now.

857. I thought your experience might be based on that time?—No.

858. (*Mr. Spring Rice.*) No doubt it is true all the world over, but would it not be advantageous to science if the same amount of effort and trouble was spent by the two institutions on some specialised lines, or differentiated lines?—I think perhaps it might.

859. Has it ever occurred to you whether there could be any distinction drawn between the efforts of the Natural History Museum and Kew?—As far as I am concerned the Natural History Museum is, of course, an educational museum, and the Kew collections are more of national importance in connection with the resources of the Colonies, and so forth.

860. Would you think it desirable that such differences as that should be emphasised rather than obliterated?—Yes, I think it would be distinctly advantageous from our point of view that they should be emphasised.

861. I was asking also from the general scientific point of view. Looking at them as two more or less Government institutions engaged in botanical work, do you think they should be instructed to work on different lines rather than on competitive lines?—Yes. I take it that the Natural History Museum, except insofar as it acquires type specimens, does not compete in any sense with Kew. In that sense perhaps it does and I think to that extent some differentiation would be desirable.

862. Speaking of such a case as we were told of the other day, the Indian flora is very much better represented at Kew than at the British Museum. At the same time there are some things in the British Museum that are not at Kew. In your opinion would it be an advantage if some arrangement were made by which it should be understood that an attempt at the complete Indian flora was the business of Kew, and that the British Museum should take another case, or *vice versâ*?—I should certainly go as far as that.

863. (*Chairman.*) Lord Avebury was putting a question to you as to the necessity of some means of keeping up a teaching herbarium, that there must be another herbarium behind it in order to fill up gaps for repairs and for extension. Is it necessary that that herbarium which is drawn upon should be at the British Museum itself? Could not the dried plants be supplied from elsewhere, from Kew, for instance?—If there were sufficient room for a museum at Kew to admit of the retention of duplicates and so forth in sufficient quantities to do that, yes, but that might be a difficulty.

864. There are always a large number of duplicates, are there not?—In practice it is not always easy to get them.

865. Referring to the question Mr. Darwin put to you, is it not possible to have research going on, even in a teaching institution? Supposing that the Botanical Department at the British Museum was limited to an educational institute, would it not still be possible to have research carried on in connection with it?—Certainly it would, if provision were made for that.

866. So that the conversion of the present arrangement of the British Museum into a purely educational and illustrative establishment would not necessarily put an end to research there?—It would not necessarily do so.

FIFTH DAY.

WESTMINSTER PALACE HOTEL.

Thursday, 15*th November*, 1900.

PRESENT:

Sir MICHAEL FOSTER, K.C.B., M.P., SEC.R.S., &c. (in the Chair).

The Right Hon. BARON AVEBURY, P.C., F.R.S.
Sir JOHN KIRK, G.C.M.G., K.C.B., F.R.S.
Professor ISAAC BAYLEY BALFOUR, D.SC., F.R.S.
Mr. FRANCIS DARWIN, M.B., F.R.S.
Mr. HORACE ALFRED DAMER SEYMOUR, C.B.
Mr. STEPHEN EDWARD SPRING RICE, C.B.

Mr. BENJAMIN DAYDON JACKSON, *Secretary*.

Mr. ALBERT CHARLES SEWARD, F.R.S., called; and examined.

Mr. A. C. Seward, F.R.S.
15 Nov. 1900.

867. (*Chairman.*) You are University Lecturer in Botany at the University of Cambridge?—Yes.

868. You have paid special attention to fossil botany?—Yes.

869. You are acquainted with the botanical collections both at the Royal Gardens, Kew, and the British Museum in Cromwell Road?—Yes. There is a part of the collection I have no acquaintance with, namely, the flowering plants at Kew, or practically none. It is chiefly the ferns and gymnosperms.

870. Are there any collections of fossil plants at Kew?—Very few. There are a few slides of importance in the Jodrell Laboratory, cut from specimens in the Kew Museum.

871. But there are valuable collections of fossil plants at the British Museum?—Yes, exceedingly good.

872. Those, with certain exceptions, which I think are displayed for popular purposes, are placed in the Geological Department, are they not?—Yes, now practically all are in the Geological Department, but there are a few put in the show cases as you say.

873. According to a memorandum laid before us it was intended that the collection should be placed in the Geological Department, under the superintendence of the keeper of the Botanical Department?—That I do not know.

874. Have you studied geology as well as botany?—Yes.

875. Are you able to form an opinion as to the value of a collection of fossil plants—whether the geological value or the botanical value is of the greater moment?—I think undoubtedly the botanical value is much greater than the geological; such work as I have done myself has been chiefly from the botanical point of view. The chief use of fossil plants geologically is connected with the question of geological age.

876. Do you give that simply as your own opinion, or is that an opinion which you think would be very largely shared by other scientific men, botanists and geologists?—I think so.

877. Our attention has been called to certain difficulties which are presented by having a large botanical collection at Kew, and another at the British Museum, and it has been suggested that there would be advantages in uniting the two collections, either on the one hand at Kew, or on the other hand at the British Museum. Supposing that in the first instance the Herbarium at Kew was transferred to the British Museum, then the fossil plants would necessarily remain at the British Museum with the rest of the collection, so that that case does not perhaps call for further enquiry. But supposing it was decided to transfer to the Royal Gardens, Kew, the present general herbarium to the British Museum, do you think it desirable that the fossil plants should be transferred to Kew with that general herbarium, or should they be allowed to remain at the British Museum?—I think if the herbarium were transferred to Kew the fossil plants ought certainly to go as well. In working at the fossil plants one has constantly to refer to specimens in the herbarium for comparison, and one frequently finds plants that one is unable to identify, and one wishes to compare them with recent forms. Very frequently those recent forms which are most useful from this point of view are exceedingly rare at the present day; it is necessary therefore to have access to specimens in a good and fairly complete herbarium. If no herbarium were at hand one would constantly have to make journeys to Kew. At present it is impossible, without getting a special order, to take specimens out of the building of the British Museum. One would really have to make drawings of the specimens, or to carry the appearance of the specimens in one's head, which is most unsatisfactory.

878. But is not the fact that the fossil plants are placed in the Geological Department is an indication that the authorities of the British Museum are of opinion that it is most important the fossil plants should be retained at the British Museum in connection with the geological collections?—That would appear so on the face of it. Of course the collection of fossil plants in the Geological Department has been always a good deal greater than that in the Botanical Department, and I fancy it was thought much more convenient to have all the collections together; the larger portion being downstairs in the Geological Department, it was decided to transfer the remainder to the Geological Department.

879. And the transference to Kew which you are recommending is the transference only of those fossil plants which are definitely in the Botanical Department?—No; I was thinking of the main collection in the Museum generally, which is in the Geological Department. There are very few in the Botanical Department so far as I know.

880. We cannot distinguish between fossil plants which have been always in the Geological Department and the the large collections of fossil plants which we were told were placed in the Geological Department on the understanding that they were to be under the direction of the keeper of the Botanical Department?—May I say what I know about the transference? I cannot speak with authority, but some time ago, when I first worked in the Museum, I found there were a considerable number of fossil plants I constantly had to refer to in the Botanical Department——

881. Actually in the Botanical Department reserved for research, and not for public display?—No, not publicly displayed, put away in drawers and so forth in the herbarium, in the part not open to the public. About a year or rather more ago, these various specimens were transferred to the Geological Department, and they are still there, in cases piled up one on top of the other, in one of the working rooms of the Geological Department. Sometime ago Dr. Woodward, the keeper of the Geological Department, asked me to go through those specimens that had been transferred, and as far as I could name them. I began to do that, but owing to the pressure of other work I have not yet completed it. I now have that work on hand. In connection with that work I was not led to suppose for a moment that the keeper of the Botanical Department had any further authority over those particular plants. So far as I was able to gather from what was said to me, I formed the impression that

they now formed as much a part of the Geological Department as any other specimens of that department.

882. Then do we understand that in case of the transference of the general herbarium to Kew you would also recommend the transference to Kew of all fossil plants at present in the British Museum, wherever they may be placed, save possibly those in the public galleries used for popular illustration?—I should not go quite so far as that, I think. My own feeling is, from what experience I have had at working at these things, that the ideal arrangement would be for the fossil plants as a whole to be arranged with the recent plants, or put at least in the same building, but there ought to be a second or smaller collection chosen from rather a different point of view to be arranged with the animal fossils to illustrate the characteristic and most important fossil plants of each geological period. The bulk of the fossil plants, however, I should prefer to see with the recent plants.

883. Even in the case of this smaller collection arranged stratigraphically in connection with the other fossils of which you speak, it would be desirable, would it not, to have at hand for reference some collection of recent plants?—If what you propose was carried out, the general herbarium being transferred to Kew, the mass of the fossil plants being still retained at the British Museum, it would then be most distinctly necessary, would it not, to have at the British Museum for the purpose of the proper study of these fossil plants, collections of recent plants?—Yes, I think it would, except that it would still be necessary in working at fossil plants to make fairly frequent visits to Kew. One has not only to look at the dried plants in a herbarium, but very frequently I have myself found it most helpful and useful to look at the living plants in the houses at Kew, because there one sees an individual plant bearing a number of fronds, and one is able to notice the variations that occur in the fronds of the same plant. That assists one a great deal in correlating fragmentary fossils.

884. Would you go so far as to say that in the botanical study of fossil plants access, for the purpose of study, to living forms was almost, if not quite, as necessary as access to a herbarium of dried plants?—Yes, I think I should say that. In order to have the opportunity of doing the work as thoroughly as possible one ought certainly to have a good collection of recent plants at hand.

885. So that speaking in the interests of botany only, and leaving geological interests on one side, it is actually desirable that the fossil plants should be transferred to Kew, because there they can be studied much more conveniently in connection with living plants?—Certainly.

886. Disregarding for the present the view you have put before us, supposing it was decided to retain the fossil plants at the British Museum, it would be desirable, even if you had to go to Kew to compare the living plants, to have at the British Museum a collection of dried plants?—Yes, I think it would be desirable, in that it would save a certain number of journeys to Kew.

887. Supposing that to be the case, could you describe in any way what kind of herbarium you think would be sufficient for the purpose? Would a herbarium in which the specimens were authentic specimens, not type specimens, be sufficient, if I may draw a distinction in that way? You have type specimens which are of historic value; would it be sufficient, for instance, if you wanted to compare your fossil with the living plant to have an ordinary herbarium with specimens of the plant without the necessity of having the type specimen?—I think so; so long as the specimen is an authentic specimen it need not be the type specimen for ordinary purposes of comparison.

888. So that a relatively simple reference herbarium, such as might be used for the mere identification of plants occasionally, or by an amateur, would be sufficient for the purpose?—You mean chiefly excluding type specimens?

889. Yes?—Yes. Of course I think it is very important to have as complete a collection as possible, excluding for the moment type specimens, which are not essential; but I think a collection ought not to be a small one selected for the purposes of comparison, but a collection including some of the most rare living plants, because it is frequently the rarest plants which are most useful.

890. It should be a complete herbarium in the sense of having representatives of all plants, but should not necessarily be a herbarium in which all the specimens were type specimens?—No; that I think is not essential.

891. (*Sir John Kirk.*) I understand you draw your conclusions chiefly from cryptogamic plants, with very little reference to the flowering plants?—My work has generally consisted in working at the cryptogams and the gymnosperms. Cycads I have worked at a good deal, but hitherto I have done practically nothing with the dicotyledons or monocotyledons.

892. I suppose you find very few plants that are specifically the same, but you look to alliances and similarities?—Certainly. The plants I have worked at are chiefly from the mesozoic formation, the Wealden and Jurassic rocks. I have not worked at the more recent fossil plants.

893. Do you find herbarium specimens of flowering plants of less use to you than the vascular cryptogams?—I have really had no experience of that.

894. You have not worked much at that?—I have written two or three British Museum catalogues. I mention that because that is what my work has consisted of chiefly, and the floras I have had to describe have been of the mesozoic age, and no flowering plants are in the collections I have had to deal with. I have not had, therefore, to refer to the flowering plants.

895. Do you study the microscopical structure largely in the case of the fossil plants?—As regards the mesozoic plants, very few of them unfortunately have their structure preserved. The anatomical fossil botany work I have done has been in connection with palæozoic plants. I have worked at those to some extent.

896. You go by external similarity more?—Yes. One is bound to for the most part in the case of the mesozoic plants.

897. Do you find the living plant, where you can get it, more useful than the dry?—Yes.

898. Where you can compare a number of forms of the same plant to show the variations?—Yes.

899. (*Professor Balfour.*) Suppose you had a selected herbarium kept at South Kensington, all the other herbarium specimens being sent to Kew, would that be at all a misleading herbarium—would it be apt to mislead people in their comparisons?—Because of its imperfection?

900. Yes?—It might, I think. One mght look through that herbarium you describe and come to the conclusion that a plant which it was wanted to compare with the recent forms was not represented among the recent types. I have found more than once that it is only some of the most rare and least known among the recent forms, ferns more particularly, that one can match best with the fossils, so that I think it might be distinctly misleading.

901. But I suppose, just as in connection with other kinds of work, before a piece of work of that kind was completed it would be quite easy to make a comparison?—Yes.

902. You have to do that even now?—Yes.

903. So that it would be no less objectionable than the present system?—No. The existence of the large herbarium at the British Museum does not in the least render it unnecessary for me to go to Kew.

904. You have still to go to Kew?—Yes.

905. There would be no more trouble then?—Very little.

906. One thing I should like to ask you is this. You recognise that a herbarium is an extremely important thing in connection with a botanic garden?—Yes.

907. It has been put to us that it is more important to have a complete herbarium by the side of a collection of fossils than by the side of a collection of living plants?—I should have thought not.

908. At any rate if this herbarium was brought down to Kew you would have it there both for the garden and for the fossils?—Yes.

909. And that would be a distinct advantage?—I think it would myself.

910. It has been pointed out that the herbarium at the British Museum, within recent times at least, has not been used in connection with the fossils. As far as one can gather, you yourself, Dr. Scott, and Professor Bower, have been about the only users of it. I take it Dr. Scott's work has been almost entirely palæozoic work, and that has been all microscopic?—Yes, practically palæozoic and microscopic.

911. And Professor Bower's work in the same way has been entirely microscopic?—Yes.

912. So that practically you are the only person who has been using the herbarium in connection with these fossil plants, and you have been using it entirely for the

Mr. A. C. Seward, F.R.S.

15 Nov. 1900.

ferns and the gymnosperms?—The vascular cryptogams generally and the gymnosperms.

913. So that one may take it that the herbarium of the British Museum has not been very much used of recent years by botanists in connection with fossils?—No.

914. Do you know of your own knowledge any botanist who would be likely to use the British Museum herbarium in connection with fossil plants recently?—There has been no one recently working at the mesozoic plants so far as I know.

915. I suppose Mr. Clement Reid is about the only worker?—Yes; he goes there from time to time to look at flowering plants. I fancy he has gone to Kew more, but I am not sure as to that. He has gone to both places a good deal.

916. I suppose one may take it that even supposing the fossil plants were all left at the British Museum, and the herbarium were moved to Kew, it would not be really a cause of great inconvenience to botanists?—It would be much more inconvenient than as things are at present. At present one is able to consult a very good herbarium at the British Museum, but at the same time one is occasionally obliged to go to Kew to see the living plants, and sometimes to look at the herbarium also, which may fill up a gap or two in the British Museum. If there were no recent plants in the British Museum it would make the work very much more difficult.

917. But apparently it would not interfere very much with the botanical work in fossil botany were this done?—Do you mean if all recent plants were moved from the British Museum and the fossil plants were left there?

918. Yes?—I think it would rather seriously interfere with the work. At present in many cases one is able to get all one wants in the British Museum in the way of recent plants for comparison, but occasionally one has to go to Kew, though not in every case.

919. (*Mr. Darwin.*) Omitting the fossil plants from consideration for the moment, and supposing that from the point of view of systematic botany it were decided to remove the herbarium from the British Museum and amalgamate it with Kew, then, as I understood you, you would still want for adequate work in the British Museum a very complete herbarium containing representations practically of the known flora?—Yes.

920. That would practically block the amalgamation of the two herbaria which was desired from a wide systematic point of view. What I wanted to ask was, do you or do you not think that palæo-botany is so important in reference to the rest of systematic botany that such an arrangement would be desirable, that the necessity of keeping a complete herbarium should be allowed to block the amalgamation of the two herbaria which was desirable from other points of view?—I think I should hardly go as far as that. I have found from the little work I have done in connection with recent ferns that one is always bound to go to Kew and the British Museum, and one sometimes has to do that even now in connection with the fossils. I must say although I think on the whole there certainly would be disadvantages and inconveniences if the herbaria were removed from the British Museum to Kew; on the other hand the advantages resulting from the amalgamation would be greater than the disadvantages.

921. That would result in what you have already spoken of, the fossils being with the herbaria?—Yes.

922. Is there anyone at the British Museum who has any special knowledge of palæo-botany?—No.

923. Have you found any difficulty in consequence of that in the use of the specimens?—It has been rather difficult. One has had to learn the whereabouts of plants a good deal oneself, and I have met with more than one visitor to the Museum who has been to look at some particular fossil plant and has been unable to obtain information as to its whereabouts. No one I think there knows much about the fossils or does any work in connection with them.

924. As regards the general conveniences for work on fossil plants in the British Museum, have you found it suitable for the work?—In some respects the conditions have been very favourable. The library is an excellent one, more particularly the library in the Botanical Department, but there are certain inconveniences. For example, I have often had to examine sections in the Williamson collection of palæozoic plants showing detailed internal structure, and to get those specimens I have had to go first of all into an underground room in the basement, and then bring those sections upstairs, and one cannot, as a rule, obtain adequate microscopes in the Geological Department. I have generally had to take those sections to the top of the building and borrow a microscope from the Botanical Department. The conditions, as far as the study of microscopic sections is concerned, are not very favourable.

925. There is a considerable waste of time?—Yes, and there is the carrying of valuable sections from distances.

926. (*Lord Avebury.*) That is rather an accidental circumstance of the present moment; it would be as easy to supply a good microscope at the British Museum, if necessary, as it would be anywhere else?—Certainly.

927. You would not attach any great importance to that consideration from the point of view of the question which we have to consider, would you?— No. I was merely saying that as things are at present the facilities are not very good.

928. I quite understood that it was an answer to a question, but I wished to ascertain how much importance you attach to the consideration. At present in the Natural History Museum we have a complete natural history collection. There is a sense in which it is incomplete, but it covers the whole ground, so far as the scope is concerned. Do you or do you not attach much importance to retaining one great national collection which should cover the animal and vegetable kingdom?—From the point of view of display?

929. Yes, and of general science?—I think it is most important.

930. You would break that up, would you not, if you transferred the whole of the botany from the Natural History Museum?—I do not think I suggested the transference of the whole of the Botanical Department. I was speaking rather of the herbarium, the part not open to the public.

931. You would leave the part which is open to the public still in the natural history collection?—Yes. I think I was not quite asked that question. It would be a great pity to take away botany entirely from the natural history collection and render it incomplete.

932. Would it not be very difficult to have a partial collection? Would not the first effect of transferring the collections that now exist be that we should have to begin another collection *de novo* at the Natural History Museum if we are to have an exhibition for the public?—The plants I have had occasion to refer to in connection with my work are those in the herbarium not exposed to public view. If they were transferred it would not materially affect the public exhibition of the specimens.

933. Is not the public exhibition fed, as it were, from the herbarium, and is it not necessary to have a herbarium in order to select specimens which can be exhibited from time to time to the public?—Yes, I suppose the number of specimens now exhibited originally came from the herbarium.

934. For instance, in forming a collection of the British plants, to name them and determine them, and so on, is it not necessary to have a sort of reservoir behind from which the public collection should be supplied?—That would certainly be advisable, but so far as I can form an opinion about that point, it does not seem to me that the transference of the herbarium as a whole would be inconsistent with retaining a good typical selection of plants for the purpose of public exhibition. The two things seem to me rather distinct.

935. No doubt you could retain those that are now in the public galleries, but you probably would agree with me that for any exhibition of that kind it is necessary to be continually replacing specimens and introducing fresh ones?—Certainly.

936. And would it be easy to do that if there was no general collection behind, as it were, to be drawn on for the purpose?—Of course, if the two departments were in touch with one another, specimens might be supplied from the living material at Kew. I do not think there are a great number of dried specimens exhibited now in the public galleries, but I am not well acquainted with the public collection.

937. And that would almost involve, would it not, bringing the management of Kew and the management of the Natural History Museum into closer relation with one another than they are at present?—That would be an advantage, I think.

938. (*Chairman.*) I forgot to ask you, but it came out

incidentally: you have made two catalogues, or more than one catalogue, of fossil plants in the British Museum?—Yes.

939. You might just state definitely what you have done in that way?—Two volumes so far have been published, both being the Wealden plants, the collection that was acquired by the Museum some six or eight years ago, and the third volume, which I have just finished, though it is not yet published, is on the Jurassic plants of the Yorkshire coasts, of which the Museum possesses a fairly good collection.

940. Those you have brought out under the direction of the Trustees, and have been published by the Trustees?—Yes.

941. (*Professor Balfour.*) In connection with the exhibition in the galleries, suppose the collections were trasferred, as it was suggested they might be, to Kew, and a few good specimens were exhibited in the galleries, would you have these specimens in the botanical gallery or the geological, or have some in both?—I should have some in both.

Mr. A. C. Seward, F.R.S.

15 Nov. 1900.

942. I suppose a series of representative fossil specimens exhibited along with the present morphological and systematic collections in the galleries, specimens, for instance, of lepidodendra and similar objects, would be quite sufficient in the botanical department. There are some there at present. One case I remember in the Botanical Department at present containing recent lycopods and similar plants, and with these some specimens of palæozoic lepidodendroid plants?—Yes. I think it would be an advantage to have some in the Geological Department to illustrate the affinities.

943. There is not very much of that?—No, but it has been extended recently a little.

944. And it could be extended more with advantage?—I think so.

945. So that in that way the fossil plant collections would be of more use than they have hitherto been?—Certainly.

Mr. William Philip Hiern, M.A., F.L.S., called; and examined.

946. (*Chairman.*) You have been engaged the greater part of your life in the study of systematic botany, and you are the author of one or more monographs?—Yes.

947. You are acquainted with the botanical collections both at the Royal Gardens, Kew, and at the British Museum, Cromwell Road?—Yes; I worked continuously for about 8½ years at the Kew Herbarium, living at Richmond on purpose to do so. I have also worked continuously for about five years at the British Museum Herbarium, and I have taken a house in London on purpose.

948. So that you have really had an unusually large acquaintance with the two collections?—Yes.

949. Can you say that you have made use of the Kew collections for certain purposes and of the British Museum for other purposes; or, to put it in another way, what were the reasons that led you to study at Kew, and what were the reasons that led you to study at the British Museum?—I went to Kew before I knew very much of the comparative extent or merits of the two collections. The reputation of Kew at that time was greater, as having the largest and best arranged collections of plants. I found that in connection with my work at Kew it was necessary to pay visits to the British Museum, which I did.

950. That is to say, there were collections at the British Museum which did not exist at Kew?—Certainly. At the British Museum more recently I have been very regular, because the Trustees have employed me to do special work for them in connection with a collection of West African plants.

951. You are now working more or less officially there?—I have been working at special employment there.

952. In the preparation of a work to be published by the Trustees?—Precisely.

953. Do you say it has been published by the Trustees?—Yes.

954. Do you think, in the interests of botanical science, it is desirable that the two collections, the one at Kew and the other at the British Museum, should be maintained in their present form?—No.

955. You think a change is desirable?—Yes.

956. What is the change which seems to you desirable?—I should recommend absolute incorporation of both collections under one roof, and consolidation as far as practicable, and by preference all on the same floor.

957. And the locality in which that union should take place should be at Kew, or at the British Museum?—Having regard to all the circumstances of the case, I think that the best place would be in the Cromwell Road, at the Natural History Museum.

958. Could you state the reasons which lead you to that opinion?—The reasons are what I think would occur to anybody. The first is that the place is more easily and generally accessible; the second, that it is nearer to the herbarium and library of Linnæus, which has occasionally to be consulted.

959. That is in the possession of the Linnean Society?—Yes. Then in the same building are found the zoological collections, part of which approach in structure and affinities the lower classes of cryptogams. And so with the geological collections. There are points where it is very necessary to be able to see specimens which are in the geological collections in connection with fossil botany. Therefore, to make the representation of botany complete, it is very desirable that the two places should be in close proximity. There is, of course, the risk of fire, but in a substantial building like the one in Cromwell Road I think it is obvious that the risk of fire would be very much less, and the appliances for extinguishing the fire would be much more readily accessible.

Mr. W. P. Hiern, M.A., F.L.S.

960. Would it not be possible to construct a fireproof building at Kew if it was decided to unite both collections there?—No doubt.

961. And there is water at Kew, is there not?—The Thames is there, and I believe the waterworks have their pipes there, but I do not know if they have fire stations there. Then there is another reason. They have in Cromwell Road books, transactions of societies, and periodicals which may not bear on botanical matters principally, but which contain some reference to them, and it is a great convenience to be able to get at papers and books that may happen to contain some botanical matters—books that would be hardly expected to be found at Kew.

962. They are not found at Kew?—No, in many cases they are not found at Kew.

963. Then the course which seems to you the best is the transference of the herbarium at present at Kew to Cromwell Road?—A transference for the purpose of taking out all that would be required to make there the best collection of plants.

964. Would you take certain parts only?—I suppose the mode of doing it would be to take all for the purpose of considering what is required, and then, if it was thought proper to have any sort of herbarium at Kew, to return what might be wanted there.

965. That is to say, if one might use the expression, a mutilated herbarium?—Yes. That is to say, a secondary herbarium.

966. From your knowledge of Kew, are you of opinion that what you speak of as a secondary herbarium, that is to say, I suppose, an herbarium either incomplete, or at all events, not containing what are called the type specimens, would be adequate for the very large work which is being carried on at Kew? The work that is carried on at Kew is very large, is it not, more especially in connection with the Colonies and with economic botany? Do you think it is not necessary that there should be at Kew a very complete herbarium?—No. I think such a herbarium that could be placed there after satisfying the demands of a primary herbarium would be quite adequate for its purposes.

967. Such a transference would necessarily entail a certain amount of expense?—No doubt.

968. Supposing that upon inquiry it were found that the expense so caused was very great, do you think that the advantages of the amalgamation are such as to justify on the part of the nation a considerable expenditure of money?—I think the scientific advan-

Mr. W. P. Hiern, M.A., F.L.S.

15 Nov. 1900.

tages would be very great, having regard to the fact that we find the best botanical work on the Continent is done where the principle of concentration exists. As to the expense being very great, it is very difficult without figures to answer the question.

969. I simply use a very vague phrase, a very large expense. What if it were to run into £100,000?—I must say that £100,000 does seem very difficult to be balanced by the scientific advantages. Strictly speaking, the two things are incommensurable, and it is almost impossible to weigh one against the other.

970. (*Lord Avebury.*) With reference to the question of danger from fire, do you attach much importance to the proximity of the London Fire Brigade, with its very valuable appliances, in the case of Cromwell Road?—Yes.

971. It has been represented to us that the sheets used at Kew and those used in the Natural History Museum are of a different size?—Yes; the British Museum sheets are about one-seventh larger in area than those at Kew.

972. Do you attach any importance to the fact that whereas the Kew sheets might be introduced into the cabinets of the British Museum, it would be impossible to introduce the British Museum sheets into the Kew cabinets, so that it would involve either alteration of the specimens or an entire reorganisation of the cabinets?—I think that is a matter of considerable importance, because it is impracticable to attempt to cut down the sheets of the British Museum.

973. We have had it represented to us that there is on the one hand an advantage, and almost a necessity, for the collection at Kew, having regard to the living plants, and that, on the other hand, there was an advantage, and almost a necessity, for a collection at the British Museum, having regard to the presence of the fossil collections there. Mr. Carruthers expressed the opinion that it was necessary to have really a larger collection in connection with the fossil plants than it was for the use of a botanical garden. Have you any opinion on that point as to the relative importance of a collection, with reference to fossil botany on the one hand, or to an existing garden on the other?—No doubt, in the study of fossil botany a very intimate acquaintance with recent plants is required. It is the intimate acquaintance of a monographer rather than the superficial examination of specimens, I think. But there is no doubt the larger the collection of recent plants you have for the purpose, the better is the position of a monographer or other person.

974. The point is that you have got to work on the one hand a botanical garden, and on the other hand a collection of fossil plants, and Mr. Carruthers expressed the opinion that to do those two things satisfactorily you would really require a larger collection?—A collection of dried plants?

975. Yes?—I should place great confidence in the opinion of Mr. Carruthers; I have no strong opinion on the matter.

976. You have no strong view yourself as to the relative necessity of a collection in the two cases?—No.

977. (*Mr. Seymour.*) Do you think the removal of the Kew herbarium to London would be a very decided improvement on the present accommodation afforded?—Yes, if it were done properly. There is this about everything going to Kew, that unless there is some great change made in the organisation of the place, the person who had to control the whole herbarium would be under the direction of the Director of Kew Gardens, who would, I suppose, be necessarily selected for other considerations than those which made him best competent to control a dried collection; whereas in the British Museum the keeper of the Botanical Department would not be controlled in the same sense.

978. Would that be your main reason for recommending transference from Kew to Kensington, rather than the transference of the whole from Kensington to Kew?—That would be one of the reasons.

979. Not the main reason?—I gave various reasons before, and this is a supplementary one.

979*. (*Professor Balfour.*) That point would be one really of administration?—Yes.

980. It could be got over by administration, could it not?—Yes.

981. Is there any work done by the Botanical Department of the British Museum which you would at all put in comparison with the amount of work that is done by Kew—I mean general botanical work for the whole country and the Empire, the Colonial Office, and so on?—In quantity, or in scientific value?

982. Both in quality and in quantity?—As regards the past, the quantity I believe done at the British Museum is small; but there has been a great advance of late years, and in looking forward, of course the rate of change has to be looked at, and the gain which is now taking place at the British Museum is so great in the value of the work that they put out that I think we must consider very shortly the two will be equal.

983. Do you recognise that the colonial work which Kew does is a very important work?—Yes; I suppose that need not be interfered with.

984. Supposing you were to transfer this herbarium from Kew, or the bulk of it at any rate, would not there be a very great risk of that work being interfered with?—I do not think so at all, because it is intended that there should be, I believe, a secondary herbarium at Kew. Of course, the British Museum authorities should be consulted on any special points.

985. That is to say, you think if you had this secondary herbarium at Kew, the Kew people could consult the British Museum for anything that it did not supply?—Yes; but I think in most cases there would be no need to consult the British Museum.

986. But do you think, in the event of an important question being submitted to Kew by the Colonial Office, that the answering of it would be facilitated if the Kew people had first of all to go through their herbarium, with great uncertainty of being able to find a plant, and they then had to go to the British Museum?—I think that the practical loss on that account would be small. Conceivably it might be great.

987. (*Mr. Darwin.*) In following up what Professor Balfour said, I should like to know what your opinion is as to whether the severance of the connection of Kew with the Colonies would lead to a want of research into the naming of new plants?—I should not think so; not into new plants.

988. One of your reasons for preferring the British Museum as the place for amalgamation was the presence of the zoological and geological collections. In the course of your botanical work, have you ever had occasion either to consult the zoologists or the geologists?—I have not worked at the lower classes of cryptogams where that necessity would be likely to arise. As regards geology, I believe that what little I have done in connection with fossil botany has not been such that any fossils in the British Museum at that time existed.

989. Have you seen it going on in the work of other people—any union of work among zoologists and botanists?—I have often seen people from the Geological Department come into the Botanical Department of the British Museum. I only know it in that vague way.

990. My impression was that in these days of specialisation there is very little connection?—Until you come to the border line.

991. That is not very much in herbarium work, is it?—Not so far as my work has extended.

992. The border line is rather more microscopic, is not it?—I believe it is.

993. (*Chairman.*) In some of the answers you gave to Lord Avebury, in reference to the mode of incorporation, and certain difficulties which might arise from incorporation, I might ask you whether there is not more than one mode of incorporation possible?—I daresay there is.

994. For instance, besides the difficulties of total incorporation, sheet by sheet, on account of the difference in the size of the sheets, there is incorporation that went so far as placing the cabinets of a certain order or a certain group together in the British Museum, side by side with the cabinets from Kew. Would not incorporation to that extent very much assist study?—It would, but I should look upon such a thing as a temporary expedient only.

995. (*Lord Avebury.*) You stated in answer to Professor Balfour that until recently the amount of work that had been done by the Natural History Museum Botanical Department had not been so large as that done at Kew, but is it not fair to consider with reference to the officials that their time was very much taken up in the transfer-

ence from Great Russell Street to Cromwell Road?—I believe so.

996. Would not that account a great deal for there not being so much original work done for a few years after the transference?—It would.

997. Supposing the collections at Kew were transferred to the Natural History Museum, which would be a transference of the great Colonial collections, would it not be natural that many of the questions which are now addressed to Kew would be addressed to the Natural History Museum?—Yes, I daresay several would.

998. Wherever the Colonial collections are, naturally the Colonial questions would go?—So far as they depended upon the specimens. So far as they depended on economic considerations perhaps they would go to Kew.

999. So far as they depended on naming the plants they would go wherever the collections were?—No doubt. *Mr. W. P Hiern, M.A., F.L.S.* 17 Nov. 1909.

1002. Supposing that the objections you have urged could be overcome, would you think that union at Kew would be of distinct advantage?—Yes.

1001. And you would prefer to have it at Cromwell Road?—Yes.

1002. Supposing that the objections you have urged could be overcome, would you think that union at Kew would be of distinct advantage?—Yes.

1003. So that if all those points that you refer to as leading you to think that Cromwell Road would be better, were satisfactorily overcome, you think that the union at Kew would be a great advantage?—Yes, union at Kew, rather than leaving things as they are.

Mr. Henry John Elwes, F.R.S., called; and examined.

1004. (*Chairman.*) You have paid during your life great attention to botany, chiefly from the horticultural point of view, and you are the author of a monograph on the genus *Lilium*?—Yes.

1005. You are acquainted with the botanical collections at Kew?—I have not had lately so much occasion to work there as I had formerly, but I have been there a good deal at various times, and I have always found it unique among public herbaria for the facility with which one can work and the abundance of material at one's disposal.

1006. Have you had occasion to consult the British Museum?—Hardly at all. It never happened that I wanted things in the herbarium there. I found I could get on so much faster at Kew and find more abundant material there. I never had, as far as I recollect, to go to the British Museum for anything I could not find at Kew.

1007. But you are generally acquainted with the collection at the British Museum?—I mean to say, of the herbarium, very little. My acquaintance with the British Museum is more in the Zoological Department.

1008. Do you feel qualified to give any opinion as to whether it is desirable to maintain the two collections, the one at Kew and the other at the British Museum, in their present form?—I have the very strongest opinion that the maintenance of two collections is, I was going to say ridiculous, and I feel that the study of dried plants, at any rate of monocotyledons, cannot be carried on without reference in very many cases to living plants, and that Kew is the only place where systematic botany can be studied properly, perhaps I may say in the world.

1009. Do we understand then that you are distinctly of opinion that it would be desirable to unite the two collections?—I am very strongly of that opinion.

1010. That union probably you would think should refer to the herbarium of the British Museum?—Yes.

1011. You would leave the popular illustrations in the galleries?—Yes; that is a separate thing altogether.

1012. You are speaking now of the general herbarium?—Yes.

1013. There is also there a British herbarium. Would you transfer that also to Kew?—I cannot speak about that, because I do not know to what extent it is consulted by purely British naturalists. There are a certain class of people, who, I suppose will always continue, who try to study the English flora as they do the English fauna, without regard to other countries, and I should not like to say whether such a collection as that might not be reserved if thought desirable in the Museum, but that would be a very trifling thing in extent I imagine.

1014. You are very distinctly of opinion that it would be most desirable to transfer the general herbarium now at Cromwell Road to the Royal Gardens, Kew?—So much of it as would be useful there. I think that probably if a transfer was made a very large part of the older specimens would be found worthless and would have to be got rid of in some way, but such collections as might be, from any particular point, valuable certainly ought to be at Kew.

1015. Would it be desirable to retain for the rest of the purposes of the British Museum any general herbarium at Cromwell Road?—I cannot see myself the necessity. Of course, in studying fossil plants it may, no doubt, be desirable at times to have the existing representatives at hand, but not being a geologist I cannot speak as to the necessity of that. That is the only point of view from which I should suppose it might be desirable. *Mr. H. J. Elwes, F.R.S.*

1016. It has been represented to us that it is in the interests of science that the zoological collections and the botanical collections should be together in the same building. Does that carry any weight to your mind?—None whatever.

1017. You have carried on very considerable biological researches as well as botanical?—I have had a great deal more to do with entomology and ornithology than I have with botany as botany. My botanical work is purely from a horticultural point of view, the desire to get plants correctly named. I should not study dried plants if I could get the living ones.

1018. It is suggested that it is of scientific importance that the workers in zoology should be side by side with the workers in botany?—I cannot see myself any necessity for it.

1019. In working at Kew have you found any marked deficiencies in the library there?—No; I should say it is an admirable library. I have never been to any herbarium or public museum in the world where you can work so conveniently and so quickly as at Kew. I consider it is a most admirably managed institution.

1020. Does the library contain an adequate supply of general scientific journals and periodicals, in which there are only occasional botanical papers?—I never asked for any book in the Herbarium at Kew that I did not get almost instantly, which, as you know, is of great advantage.

1021. Supposing it is admitted that it is desirable to amalgamate the two herbaria and it were decided to move the herbarium at Kew to the British Museum, how would you regard that step?—I should consider it an impossible thing to do. I am quite sure it could not be done without the strongest opposition. The whole world would rise against it. If there is one public institution in England which we are proud of, it is Kew.

1022. Are you of opinion that that would most materially affect the general work of the establishment at Kew?—I say it would be just as impossible for the horticultural part of the work to be carried on without the herbarium as it would be for the herbarium to be carried on without the horticultural work. I believe that in the future the connection between the two sciences will be found much more intimate than it has been in the past. Dean Herbert 60 years ago said the two sciences must be studied together, and I fully agree with him. You will find a great deal of the work at Kew has been only possible because of the existence of the living specimens. That applies, of course, more particularly to the trees and to monocotyledonous plants, but the study of orchids, of palms, of aroids or trees, is practically impossible from a herbarium only. You have the two together at Kew.

1023. But the point was, supposing that the herbarium as at present existing at Kew is removed to the British Museum, would that produce a very bad effect indeed on the whole administration at Kew, and render it impossible, as you say?—I think it would be an absolutely impossible step to take. There would be a general strike against it.

1024. Does that apply to this step, that the herbar-

Mr. H. J. Elwes, F.R.S.

15 Nov. 1900.

ium as at present should be removed, but in place of that herbarium, which is now very rich in what are called type specimens, a herbarium as complete as possible, but without type specimens, should be placed at Kew?—I do not say you might not in the course of another century possibly collect a herbarium at Kew which might be as valuable or more valuable than the existing one, but I say that the existence of another herbarium to which the types were taken would compel everybody to do their work twice over. The competition which must naturally go on as long as you have two herbaria is evident, one must suffer for the other; whichever is worked by the most capable and energetic men goes ahead. Certainly Kew will always attract collectors more than others, because the horticulturists go to Kew, and the scientific travellers, who bring home live as well as dried plants, send them to Kew. You can by no possible means divert from Kew a great many of the best acquisitions, and as long as there is competition going on it must be bad for both. I do not think if you take away from Kew everything they have that you would prevent the reaccumulation of another collection. But still you would cripple the establishment for many years to come.

1025. What I rather meant was this, that the value of the herbarium at Kew for the general purposes of the Gardens is dependent upon that herbarium containing type specimens?—I am not a worshipper of types myself, because I think a type, in the museum sense of the word, is a thing which very often does not exist in nature. A type is really an aggregation of individuals, and from that point of view I say that a very large quantity of specimens are necessary for examination before you know what is typical of the species. I do not think a small herbarium is of much use to anyone.

1026. Then I understand you to be of opinion that no herbarium at the British Museum, however complete or however good, would satisfy the needs of horticulturists?—No.

1027. They must have at Kew not only the living plants, but also an adequate herbarium?—When you say adequate I do not recognise any herbarium as adequate which is not as complete as ability and industry will make it. I say you have very nearly got that at Kew, and I do not think you can take it away from them.

1028. So you think you may say on behalf of horticulturists that they would deplore any change in the arrangements at Kew in the way of diminution?—I think they would resist it to the utmost of their power.

1029. Do you think that would welcome the further enrichment of the herbarium at Kew by the transference to it of the herbarium at the British Museum?—I should not like to say. I can only speak for myself, and I have never had occasion to consult the herbarium at the British Museum for the purposes for which I go to Kew. I do not suppose many people would feel differently from myself, but I should not like to say. Personally I look upon Kew as so complete and satisfactory that I do not pay any attention to the other.

1030. (*Lord Avebury.*) If it involved a good deal of expense to move the collection from Cromwell Road to Kew, do you think it would be worth while from your point of view doing it?—No; I think that possibly nine-tenths of what exists at the herbarium there would be duplicates.

1031. You speak of competition; have you come across any cases in which either of the two collections or the public interests have suffered by any competition between the Natural History Museum and Kew?—I should not like to specify cases. It has been represented to me more than once that such cases have arisen, and that higher prices have had to be paid, that is to say, that possessors or representatives of owners of herbaria have run one place against the other with a view to getting a higher price. I have heard that Mr. C. B. Clarke has acted as executor for a deceased naturalist, and that although he was a Kew man he was bound to do the best he could for his trust, and I believe the collection eventually went to the British Museum.

1032. Is that the only case that you are prepared to bring forward of your own knowledge?—I could not bring that forward of my own knowledge, that is only hearsay, I could not speak of any case that has occurred to me personally.

1033. Do you think it desirable that there should be in London some exhibition, educational or otherwise, of botany?—I think educational, yes.

1034. You would keep what one may call the public part of the galleries?—I should like to see kept up there a popular illustration, and as interesting as possible, for the ordinary public, of the floral world, but it would be distinctly looked upon as popular and educational. Of course, it would have to be scientific too.

1035. Would you consider that it would be practical and necessary in that case to have some general collection from which such an educational exhibition might be fed from time to time?—No, I do not think so. I think that if the person in charge of that department found new plants of great interest from his point of view, and he could not get them, he would go to Kew for them, and I think it would be the duty of Kew to supply everything they receive which had a special interest for such a purpose. It would not be very difficult to provide them for the British Museum.

1036. Then you would consider that the authorities of the British Museum should have some call, so to speak, on the assistance of Kew to keep up the exhibition?—I think so, certainly.

1037. That there should be some more close relation between the Natural History Museum and the authorities at Kew?—Yes, I should look upon it as a branch of the Kew work under the direction of the British Museum authorities. The Museum should look to Kew for its maintenance in regard to illustrations and specimens which could not be procured elsewhere.

1038. You would give the Trustees of the British Museum a sort of right to appeal to Kew for specimens?—Certainly, as all public departments do now on subjects which affect Kew.

1039. (*Mr. Seymour.*) From your experience of the herbarium at Kew, do you consider there are many duplicates there at present?—I do not quite know what you mean by a duplicate.

1040. I would rather that you said what your idea of a duplicate was than I did, but one of the questions we have to decide is with regard to the avoidance of duplication in the collections of the two institutions. I will ask you in another way: supposing the two herbaria are concentrated or amalgamated, would there then be a considerable number of duplicates?—A duplicate is a vague term. If the director at Kew had to undertake such an amalgamation he would probably require several years in which to do it, and he would be very cautious in treating things as duplicates until he knew they were superfluous, because it requires a very intimate knowledge of a genus, a much more intimate knowledge than a general botanist could have, to say what is a duplicate in any particular case. Specimens are sometimes treated as duplicates which are afterwards wanted, and *vice versâ*; a great deal of absolute rubbish is kept in collections from rather antiquarian and historical reasons than any real scientific value of the specimens. That is my view of it, speaking much more, you will understand, from a zoological than a botanical point of view. This has come before me very strongly in zoological work; so far as I have done botanical work I believe it applies exactly in the same way to botanical specimens.

1041. In any case the work done in that way would be work to be done very gradually, and would cover a long time?—It would have to be done gradually, and very carefully.

1042. (*Professor Balfour.*) Under modern conditions of travel, travellers nowadays bring home so many living specimens that they would not have the same inducements to go to the British Museum as to Kew?—Certainly not. That is what first took me to Kew.

1043. And the national collection would probably suffer?—I think it would suffer very much.

1044. Supposing you transferred the herbarium, or as much as was wanted, to Kew, what would you do with the library at South Kensington?—That is an administrative question which I should not like to answer. If they had works there which were not in Kew Herbarium library, I should hand them over, because completeness is everything. You can say when a book is a duplicate and when it is not.

1045. Would you take from that collection as much as is wanted to make Kew complete?—Yes.

1046. You have no opinion as to what should be done

with the rest?—No doubt if they were sold they would realise as much as they cost, or perhaps a bit more. There would be no loss on them surely.

1047. (*Mr. Darwin.*) I suppose you have some knowledge of the methods followed by commercial horticulturists in getting their things?—Yes.

1048. Do you find they go to the British Museum or to Kew for naming?—I never heard of their going to the British Museum—I do not say they do not. I know that the principal importers and introducers of new plants take their living plants to Kew, and usually go there for the sake of getting them named, and when their collectors bring home herbaria, which they very often do, and I believe will do much more in the future, they naturally go to Kew.

1049. They do not, as a fact, make any great use of the British Museum?—I cannot say whether they do or do not, because I do not know.

1050. (*Mr. Spring Rice.*) You said that in the subject which you had studied specially there was practically nothing at the British Museum which there was not at Kew? There may be things there, but they have never come to my knowledge. In my researches no such specimens came to my knowledge.

1051. We have been told that in the case of the flora of India the Kew collection is very much richer than that of the British Museum, but the British Museum have some things which they have not got at Kew. A man wanting to study the subject thoroughly has to get most of it at Kew, and then go to the British Museum?—I should ask Mr. C. B. Clarke, he is the best authority.

1052. Assuming that to be so, should you consider that a serious injury to scientific work?—Certainly. If a man has to go to two places to do his work you are doubling his time and trouble. I should like to see everything worth taking from the British Museum, which may not be much, sent to Kew. No doubt any conscientious monographer who knows of the existence of specimens, Indian or any other, at the British Museum, would have to go there to see them. I should like to see that put a stop to.

Mr. H. J. Elwes, F.R.S. 15 Nov. 1900.

1053. You consider it is an appreciable injury?—Certainly it is. You may draw a specimen, and take the drawing back with you, but you cannot compare it so well as when you have the two things side by side on the table.

1054. Do you live in London?—No.

1055. I ask you then, as a non-resident in London, is the locality of Kew appreciably more inconvenient to you as compared with South Kensington?—That depends. When I come from home I get out at Paddington, and get to Kew as quickly as I can get to the British Museum. When I am in town I can get to the British Museum quicker than I can get to Kew. It may make ten minutes difference and possibly costs 6d. more. But it is not to my mind a question to be considered having regard to the much greater amount you can see when you get to Kew. If I had to go two hours instead of 20 minutes I should still go to Kew.

1056. (*Chairman.*) Have you been lately at Kew working there?—Not working. I have not had time to go there as often as I should like, but I am going there now if I can get away in time. I was there last week, and the week before last.

1057. Do you think the present accommodation of the Herbarium there is adequate?—Possibly not, but I should not like to say that. I have been very little in the Herbarium of late years. It was perfectly adequate when I was working there, and I have not heard any complaints on the subject. But no doubt they would have to make extensions if large fresh accessions came to them. I should imagine it could be done at a low cost. The building at Kew is not a very elaborate one, and would not require very expensive architectural alterations.

1058. Are you aware that it is not fire-proof?—I have heard that, but the regulations against fire are very strict as I know to my cost.

SIXTH DAY.

Wednesday, 28th November, 1900.

PRESENT:

Sir MICHAEL FOSTER, K.C.B., M.P., SEC.R.S., &c. (in the Chair).

Sir JOHN KIRK, G.C.M.G., K.C.B., F.R.S.
Professor ISAAC BAYLEY BALFOUR, D. SC., F.R.S.
Mr. FRANCIS DARWIN, M.B., F.R.S.
Mr. FREDERICK DU CANE GODMAN, F.R.S.
Mr. HORACE ALFRED DAMER SEYMOUR, C.B.
Mr. STEPHEN EDWARD SPRING RICE, C.B.

Mr. BENJAMIN DAYDON JACKSON, *Secretary*.

Dr. HENRY WOODWARD, F.R.S., Keeper of Geology, British Museum (Natural History), called; and examined.

1059. (*Chairman.*) You are the Keeper of the Department of Geology of the British Museum (Natural History)?—Yes.

1060. There are collections of fossil plants in your Department?—There are.

1061. Are those all of the same kind and origin, or are there differences? There are, I believe, collections that have been there for some time, and others that have been placed there more recently?—The collection was formed prior to Mr. König's time, when he was keeper; that is to say, prior to 1815. He was keeper until 1851, and during the time he was there he described many fossil plants that are in the collection in a work he published, called "Icones Fossilium Sectiles" (1820), and that is good evidence that the collection then existed.

1062. He was the keeper?—He was the keeper of the Geological and Mineralogical Department in those days.[1] He was succeeded by Mr. Waterhouse in 1851, who remained keeper till 1880, when I took over the charge. I had been an assistant from 1858, and had worked at fossil botany under his direction at that time. The collection is a very large one, consisting of 30,300 odd, specimens.

Dr. H. Woodward, F.R.S. 28 Nov. 1900.

1063. Were there not collections placed in your department about 1898?—In 1898, three years after Mr. Carruthers retired, Mr. George Murray handed over to me all the specimens which Mr. Carruthers had borrowed to describe in the years during which he was working at fossil botany, between 1860 and 1890. During that time he described a very large number of fossil plants. He was Keeper of the Botanic Department the latter part of the time, after Mr. Bennett's retirement. With those returned specimens, which were originally borrowed from the Geological Department, he handed over to me two small cabinets, one containing the Robert Brown collection of fossil plants, principally consisting of sections of fossil plants mounted on glass, and a series prepared by Sir Joseph Hooker, which also formed a small collection in the Department. The slides amounted to 1773, and the miscellaneous specimens to 2170. I should say that

[1] Mineralogy was separated from Geology in 1857, and made into a Department under Professor Story Maskelyne, F.R.S.—H. W.

Dr. H. Woodward, F.R.S.

28 Nov. 1900.

three thousand, probably, is the extreme number of specimens which Mr. Murray really transferred, which did not already belong to the Department. Of course, compared with the 30,000, it would be only about one-tenth.

1064. Are they now all in your Department under your charge?—Yes, under my charge entirely. I should say that the number of 30,000 includes the Williamson collection, which was purchased in 1896, numbering two thousand specimens. Those are all microscopic sections mounted on glass.

1065. It has been represented to us that fossil plants are more valuable in research to botanists than to geologists. With reference to that, can you state to what extent the fossil plants under your charge have been used by geologists in geological research during recent times, say ten years or so?—It is very difficult to distinguish amongst the men who come to the Department how many of them are botanists and how many geologists. I asked a palæo-botanist the day before yesterday, whether I might claim him as a geologist as well as a botanist, to which he replied he was not a geologist at all. I said "About one-half?" He said, "No, not one-quarter." I think that makes it extremely difficult to say how far they are one or the other. Again, I may venture to point out to you that although my Department is called the Geological Department it is really the Department of Palæontology, and that the workers in it are all biologists. We have no geological collection, strictly speaking. The collections are nearly all arranged zoologically and botanically, and are quite distinct from that of Jermyn Street, which is a stratigraphical collection. Since Mr. Waterhouse's time we have gone upon the principle that it is undesirable to have two stratigraphical collections, and our collection has been arranged on zoological lines on that account. I find it very difficult to answer your question with regard to the distinction between botanists and geologists using the collection.

1066. What was meant was rather this: whether the fossil plants were examined with a view to their throwing light on botanical problems, or with a view to their throwing light on geological problems—the one we may call botanical research and the other geological research?—I think most largely for botanical research, but there have been a good many geologists using them. I may mention the names of Mr. Etheridge, Mr. Clement Reid, the late Duke of Argyll, Mr. J. Starkie Gardner, Mr. P. Rufford, Mr. R. Kidston, Dr. C. I. Forsyth Major, Dr. George J. Hinde, Dr. Wheelton Hind, and Professor T. Rupert Jones, all of whom have used the collection, if I may say so, geologically or palæontologically. On the other hand, I have to mention botanists such as Count Solms-Laubach, Mr. A. C. Seward, Professor D. Stur of Vienna, Dr. D. H. Scott, Mr. Carruthers, the late Baron von Ettingshausen, Professor Weiss, the late Professor W. R. McNab, Professor F. O. Bower, the late Professor Williamson, Dr. A. B. Rendle, and Mr. A. J. Maslen, who have all worked on the collection and done good work from the botanical side.

1067. From the list you have read one would rather infer that research on the botanical side was larger than on the geological side?—I think so. I may venture to point out to you—although you are already very well aware of it—that there is a great deal to be done with fossil plants, as with other organisms, in considering the question of the appearance of life in time, and of geographical distribution. Those are points which of course, may be considered as more palæontological than botanical, although palæobotanists would no doubt also take them into consideration in their work. Still, that is a very important side of palæobotany, the question of distribution of forms over the surface of the earth in past geological times.

1068. In reference to the desirability of uniting the collections of recent plants, the herbaria at present at Kew and at the British Museum respectively, in one place, it has been urged on one side that they should be united at Kew. Then the question has arisen, supposing that the recent plants were placed at Kew, what should be done with the fossil plants? How would your Department, as a Department of Geology, suffer from the transference of the whole collection of fossil plants to Kew?—It would, of course, be a gradual dismemberment of the so-called Geological Department. I am aware that the late Director, Sir William Flower, and the present Director, Professor Lankester, have both strongly desired to make one great biological series, and then, of course, geology to a great extent would disappear. Some work in that direction has already been done, and some in the way of introducing living forms among fossil forms. At first I did not see that this inquiry applied to me at all, but I noticed, on carefully re-reading Mr. Daydon Jackson's notice to me, that it did apply to the palæobotanical collection under my charge, and I should like to mention that I never understood there was any intention of making a collection of fossil plants at Kew. Indeed, Sir William Thiselton-Dyer in 1895 wrote to Sir William Flower with reference to the Williamson collection. He was challenged: "Why do not you buy the collection for Kew, as you are so anxious that this collection should not go out of the country? We have no money to purchase it just now; why not secure it for Kew, as it is a purely structural collection?" Sir William Thiselton-Dyer replied, "I have no intention of making any collection of fossil plants at Kew, and, therefore, I cannot purchase the Williamson collection." That was Thiselton-Dyer's opinion in 1895. It would be a great loss to geological science, as well as to palæobotany, to break up the collection either by taking the whole, or by dividing it. The collection is not merely a British plant collection, but a collection made from the fossil remains of plants all over the world.

1069. You think your Department would seriously suffer, not only from the transference of all the fossil plants, but by a transference which would permit the maintenance at the British Museum of a sufficient number of specimens to serve as illustrations of geological truths?—If the Government decided to remove the fossil plants to Kew, with the recent plants, at least it might be possible to leave a general, illustrative series of plants behind which might serve for the use of the ordinary student, but it would not satisfy the requirements of a scientific palæobotanist.

1070. Or a scientific geologist?—A scientific geologist, hardly, either, especially if he were looking at the plants in a broad way, say, from the geographical distribution question of carboniferous plants in past times over the whole of the earth.

1071. A geologist having recourse to fossil plants in geological research, would not meet with what he needed in the mere illustrative collection? It would be, in all probability, necessary for him to have recourse to a larger collection containing a number of forms of great value?—I think so.

1072. That is your opinion?—I think so.

1073. So that the maintenance of a mere illustrative collection would not satisfy the wants of those who are engaged in geological research at the Museum?—No. I think it ought, as a national exhibition, to be a more complete series than a collection which one might almost call elementary, as a few examples of fossil plants would be. One ought to expect to find in the British Museum a better collection than that, such a collection, in fact, as we now possess.

1074. And nothing short of that? "Elementary" may be very elementary, but you might have a collection to some extent sufficiently wide to satisfy the demands of a geological enquirer, something which need not be called elementary, and yet leave a sufficient number of specimens to be transferred elsewhere?—Yes. As I said before, I never contemplated the removal of the palæobotanical collection, and therefore it comes upon me rather as a surprise, although I know the tendency at the present time is rather to consider that the palæontological collection in that sense, being only a part of zoology and botany, should be dismembered. Therefore I am prepared to suffer martyrdom in the cause of science.

1075. But I gather that the change is one which you would speak of as martyrdom?—Only, of course, to older men like myself, who have always viewed palæontology as a distinct subject. If I live long enough I shall probably be converted entirely to the present biological aspect of the question.

1076. May I ask whether the geologists in your department make any large use of the general botanical herbarium for the purpose of geological research?—It has been

of great use to palæontological workers, but I do not think to the geologists, unless it were a man like Mr. Clement Reid, who does make for himself very careful comparisons of fossil with recent forms. I do not think that the majority of geological workers would go to the botanical gallery; they would probably go to the geological library, and would there consult the works on palæo-botany which are ready to their hand. Only such men as Seward, Solms-Laubach and others, would go and work in the Botanical Department. If that department were removed I think it would be a great loss from the palæo-botanical point of view. I should like to say also, with regard to the botanical library, that it is certainly one of the finest to be consulted anywhere, and I may remind you that it has been incorporated into the general library catalogue which is being printed, and about half of which is now actually set up and struck off. That is an important point to consider. I hope that if the botanical collection and the botanical library have to be transferred to Kew, that at least the authorities at Kew should be asked not to take away the duplicate books, but that they should leave behind a working library of botanical works. That would be of great value, even if they took the rarer and less known books, which are not so much consulted except by historical workers.

1077. Would what you have just said with reference to the use made of the herbarium be met by what might be called a general, illustrative herbarium, pretty full and complete, but not necessarily containing what botanists call type specimens?—I think if a collection of recent plants were left behind in the Museum it would satisfy all the requirements of student workers, if it did not satisfy the requirements of the men of greater research. It would also be extremely desirable that we should have a collection of recent woods for comparison with the fossil woods, and of microscopic sections of recent plant structures for comparison with the fossil ones. Again, out of the very extensive collections of seeds and woody pericarps, and objects of that sort, we ought to have a good series for comparison with the fossil forms, those seeds, for example, which are most likely to be found in the fossil state.

1078. Do you mean in the interests of geology, as well as of palæo-botany?—In the interests of geology, as well as of palæo-botany.

1079. May I ask whether your Department derives much advantage from the opportunities of consulting personally the staff of the Botanical Department?—I do not think I can say they have used that opportunity very much, because you must bear in mind that that the only botanical assistance I have had has been in the shape of work done by my staff in arrangement, in the registration of specimens, and in the labelling of specimens; the scientific part has been done by gentlemen outside the department, like Mr. Kidston and Mr. Seward, whom I have been authorised to employ. I may call your attention to these catalogues simply to show that good work has been accomplished in the department. (*The witness handed copies of four palæobotanical catalogues to the Committee.*) That is the last catalogue of Mr. Seward, which came out this month. The catalogue of Mr. Kidston on the Carboniferous plants goes back to 1886. Mr. Seward's catalogue of the Wealden plants has also been brought out under my charge in connection with the collection. I have asked for a palæobotanical assistant, but have been unable to obtain one on account of the greater needs of the Zoological Department, which the late Director and the present Director both urged as a reason why I should not have a special palæobotanical assistant given me.

1080. Are none of your present staff fully qualified to grapple with these problems?—Not at present.

1081. (*Mr. Godman.*) There is one point I should like to ask, and that is, whether you consider the whole of the fossils as in your Department or not? I understood you considered them in your Department and under your charge, but Mr. Murray considered a portion of them under his charge?—That I can answer most positively. There has been no agreement made whatever by which any part of my collection should be transferred from my care, and I have absolute control over the fossil plants, as I have over every other part of the collection under my charge. The Trustees have issued no command to the contrary.

1082. Might I use the word, and say they were borrowed?—Borrowed merely means that if in the Museum there is a man working at a special subject, such as in the case of Mr. Carruthers, everyone in the Museum assists him by allowing him to work over the specimens in the department which relate to the subject on which he is engaged. Mr. Bather, for instance, is working at fossil crinoids, and everything relating to recent crinoids in the zoological department would, I feel sure, be gladly placed at his disposal to enable him to carry out the work.

1083. Do you consider they belong to the Geological Department?—Not the recent ones; they would be only lent for the purpose of the special research, just as we borrow a book from one department and use it in another, and then the book is returned—it is still under the custody of the Trustees. I may mention, if I may be allowed to do so, that several collections besides the ones cited by Mr. Murray have been transferred from one department to another. For instance, the Searles-Wood collection was given to Dr. John Edward Gray on condition that it was kept together, but when Mr. Searles-Wood died this collection of Crag mollusca was transferred to the Geological Department on the ground that it properly belonged to that Department. The Gilbertson crinoids, and other carboniferous fossils, were also transferred by Dr. Gray to me, on the ground that, although he cherished the idea of forming a palæo-zoological collection in the old days, he had abandoned that idea, and now transferred them to my Department.

1084. (*Professor Balfour.*) *A propos* of these collections of Robert Brown and Sir Joseph Hooker, they were in the Botanical Department; are they borrowed by your department now, or have they been transferred to you?—They are transferred unconditionally—without any condition whatever. I never heard of any arrangement made between the late Director and the present Keeper of Botany in reference to this matter.

1085. (*Mr. Godman.*) You look upon that as a permanent transfer?—Yes.

1086. (*Professor Balfour.*) Was the transfer made on the initiative of the Keeper of Botany?—Yes. It arose through asking to have the specimens returned to my department that Mr. Carruthers had been working with, he having retired. Mr. Murray said, "I am not only returning you those, but I am returning you the other fossil plants which I have, with the exception of some few illustrative specimens which are now in the cases of the public botanical gallery, such as the cycads."

1087. (*Sir John Kirk.*) I understand you look upon the use of dried plants as subordinate in exemplifying the study of fossil plants, or of less use than the specimens of woods and fruits?—Of course, that is merely a comparison of forms in the case of dried plants, comparing forms of leaves of one plant in, say a *hortus siccus*, and another plant on a piece of shale. That is, of course, one method of using a herbarium, as, for instance, those Salisburias which were long ago placed by the late Dr. Lindley with the fronds of ferns, and are now known to belong to the Coniferæ. That is a discovery for which we are indebted to a palæo-botanist, M. Gaudin, of Lausanne. He worked at these oolitic shale plants, and pointed out to me the actual resemblance, not only in the form of the leaf, but in the venation of the supposed fossil fern leaves in the oolitic shale of Scarborough with the living *Ginkgo*.

1088. Do you find rather more alliances than specific affinities among the fossil plants and the living plants; I mean a general representative herbarium would probably be almost as useful as a typical herbarium containing the type species of described plants?—No doubt, for a student worker. I was referring more to the advanced worker, who might like to use a larger series before he arrived at a decision which would bear the stamp of his determination afterwards. Naturally, he would like to be quite sure of his determinations, whereas an elementary worker would be satisfied with a mere comparison.

1089. Would it hamper you very much, do you think, if the type specimens, or the greater part of them, were removed and representatives left?—It would not affect my Department materially, although, of course, I should be very sorry to see them go away, because I know as a matter of fact it is a great accommodation to a large number of people to have a collection conveniently at hand.

1090. (*Professor Balfour.*) When the Williamson collection was purchased, was it purchased by the Botanical Department or by your Department?—We have each of us a grant, and until the last few years at the end of the financial year the unexpended balance was returned to the Treasury; and we had been in the habit, therefore,

Dr. H. Woodward, F.R.S.
28 Nov. 1900.

in order to save our balance, if one department had overspent its annual grant and another department had underspent it, of borrowing. We go to the Director, and ask him to induce the other keeper who has a credit balance to assist us temporarily with a loan. I find that in 1895 I borrowed money from the Botanical Department, £425, and that money should have been returned in 1896, but the emergency of the Williamson collection was so great that I had again to apply to the Director to ask him to use his influence with the Keeper of Botany not to press for the return of the borrowed money, and therefore the money was again borrowed. At that time it was stated in Mr. Murray's report to the Trustees that he forgave the debt, and the money was consequently spent on the Williamson collection. But it had been actually borrowed and spent the year before.

1091. Then practically it was bought with the money of the Botanical Department?—Only a portion of it.

1092. (*Mr. Spring Rice.*) You are aware that that system of expending balances has been altered now?—Yes, we now have the liberty to retain, or the Trustees have the liberty to retain, the unexpended balance at the end of the year, and therefore hurrying purchases through is now happily avoided.

1093. (*Professor Balfour.*) In your library you have palæo-botanical books, have you not?—Yes, a very large and valuable series.

1094. Have they got them in the Botanical Department as well?—No, only works on recent botany.

1095. I should like to understand a little more about this. How do you expose specimens in your galleries? What is the idea you have in exhibiting your series? I take it that you look to researchers first of all, and then I suppose you have also a popular exhibition; you endeavour to attract the public by some popular display. But you have frequently spoken about students: what do you understand really by them?—The majority of them are satisfied with the exhibited series displayed, which they see through the glass, but if a student applies for a student's ticket he gets access to the geological library and to the student's collection, which for the sake of the limited space that we are able to allot to it is arranged stratigraphically, and contains an exhibited series of each formation, consisting of seventy-eight drawers.

1096. Are there fossil plants in that series?—I believe there are some fossil plants in that series, but only a limited number. That is a very small collection, merely for such students as come to us from the Royal College of Science, or from the Birkbeck, or from Professor Judd's class.

1097. So far as the general display is concerned, it is entirely a popular display, as it were?—There is no attempt made to popularise the labels in the Gallery of Fossil Plants; the labels are generic and specific labels attached to the plants, with the formation and locality of every specimen, and the name of the donor. There is at the present time a special collection of coal plants given by Mr. McMurtrie, which occupies two cases in the centre of the gallery. It is a fine illustrative series of the coal plants from the Radstock coal field.

1098. I understand from what you have said before that the removal of the whole of the herbaria, leaving a typical collection, would not interfere much with the geological work?—Not with the actual conservation of the collection, but if the work of a palæo-botanist was to go on it might be detrimental to such work.

1099. That is to say, the investigation of plants as fossils and as representatives of the plant kingdom, but from the geological side, say from the stratigraphical side, the removal of the herbarium would not be prejudicial, would it?—I think stratigraphical geologists would, as a rule, go to Jermyn Street for the stratigraphical series.

1100. (*Mr. Seymour.*) Jermyn Street is only British, is it not?—Yes, ours is wider; we take in the whole world.

1101. (*Mr. Darwin.*) Is there anything palæo-botanic at Jermyn Street?—They have a series of fossil plants to illustrate the coal measures, some good specimens, but not a very large series. The Museum is a small museum, although a very compact one, and has a very admirable and well-arranged collection.

1102. I am not quite sure that I understand the general point of view that is followed in the work of your Department. I suppose the palæontological material may be used either to study the classification of the whole of the animal and vegetable kingdom, including their geographical distribution, or what has been spoken of as the stratigraphical, where the specimens are used as a means of recognising certain strata, and so on?—Of course, they are frequently used as a means of determining horizons, because although it was stated the other day, I believe, before this Committee that there was a fashion in these things, one fashion has never changed since the beginning of this century, and that is the discovery which William Smith made, and which has lasted, and will last, namely, that certain formations are characterised by certain forms of life, and those forms are of the greatest value in stratigraphical geology. I think that is a fundamental principle of geological teaching which has never been destroyed by any subsequent discoveries.

1103. The bearing on stratigraphical geology is a side which is practically not of importance in the Cromwell Road?—Not so largely, because the arrangement has been subordinated to the zoological. In most of the galleries however, you will find, if you walk through them, that the forms of life, as we have always believed they would do, follow an orderly succession in the rocks. Therefore the earliest rocks have the simplest and lowest forms, and the latest have the highest and most complex forms of life, and that is to be seen all through the palæontological galleries. I believe there can be no doubt with regard to that. There are certain groups like the sharks which begin in the Devonian, and have lived on to the present day, and in groups of very great antiquity it must necessarily follow that to a certain extent you lose the geological aspect, which is swallowed up in the far larger zoological aspect of the group.

Dr. Dukinfield Henry Scott, F.R.S., Honorary Keeper of the Jodrell Laboratory, Royal Gardens, Kew, called: and examined.

Dr. D. H. Scott, F.R.S.

1104. (*Chairman.*) You have, I believe, paid special attention to fossil plants?—Yes, I have for some years past.

1105. Do you know the botanical collections both at the British Museum and at Kew?—Yes.

1106. At Kew there are a certain number of fossil plants, are there not?—Very few.

1107. And at the British Museum there are a very large number?—Very large indeed.

1108. I think you have especially studied the so-called Williamson collection of fossil plants?—I began with that. My earlier work was chiefly on that, but lately I have worked at other specimens as well.

1109. Those at present are in the Museum?—Yes.

1110. You are yourself a botanist?—Yes.

1111. What is your opinion of the value of fossil plants for the purpose of research? Do you think they are of more value to botanists in botanical research than they are to geologists in geological research?—I should say, on the whole, they are of more value to botanists. I look at the matter as a botanist myself, which may prejudice me to some extent, but I think on the whole, having regard to the work that has been done, they have been more important to botanical than to geological research.

1112. Allowing for any bias you may have had?—I have tried to allow for that.

1113. You still think they are of greater value for the purpose of botanical research?—I think so, on the whole, but no doubt a great deal of important work has been also done on the geological side.

1114. The question has been placed before us as to the desirability of uniting the botanical collections at Kew and at the British Museum in one place, either at Kew or at the British Museum. Supposing that they were united at Kew, do you think that the fossil plants which are at present in the British Museum should be retained at the British Museum, or transferred with the living plants to Kew?—I think, on that supposition, according to which Kew would become the one great centre for the botanical collections of the country, certainly fossil plants should be represented there. I should go as far as that, but that would not necessarily involve the transference of the entire fossil collection.

1115. That is to say, you would transfer to Kew what may be called representative specimens?—Yes.

1116. Do I understand you would be in favour of leaving the collections in the main, especially collections containing type specimens, specimens of value for the purpose of research, and specimens on which certain conclusions have been based, at the British Museum?—I think I should rather suggest a somewhat different line of division. I think a possible line of division might be to transfer to Kew the specimens showing structure, which, I imagine, are the least important geologically and the most important botanically, and also to transfer to Kew a representative collection of the specimens showing external characters, leaving the bulk of the ordinary specimens at the Museum for the purposes of geologists. That struck me as a possible line of division in that case.

1117. That is to say, the collection of fossil plants at Kew should be arranged with a view to the wants of the botanical investigator?—Precisely.

1118. And those at the British Museum left to satisfy the wants of the geological investigator?—Exactly. I think that would involve the type specimens remaining at the British Museum, as regards the specimens showing external characters and not internal structure.

1119. You do not think that it is desirable, even from the botanical point of view, that all the fossil plants should be transferred to Kew, supposing that the general botanical collection were sent to Kew?—No, I think it would be a distinct loss to separate them altogether from the other geological and palæontological collections.

1120. And the division you would make would be according to the lines you have just suggested?—That occurred to me, after some thought, as a reasonable and possible line of division.

1121. (*Mr. Seymour.*) Supposing the herbarium was removed to Kew from South Kensington, would it be a great loss to those who study fossil botany at the British Museum?—I think if it were removed wholly it would be a great loss, but I think a representative botanical collection, not the great herbarium there is now, but a much smaller one, left at the British Museum would answer the purpose.

1122. But you think it would be necessary to have something?—Yes, I think it would be quite necessary to have something.

1123. (*Professor Balfour.*) Do you think that it would be a distinct advantage to have some of these fossils removed in the way you suggest to Kew, on account of the garden being there—on account of the advantage of comparing the specimens with living plants?—Yes; I think the comparison with living plants is very important indeed, quite as important as comparison with the herbarium specimens.

1124. (*Mr. Darwin.*) Do you think it is practicable or possible to divide the specimens according to the line you have suggested?—I think as regards the structural specimens there would not be any difficulty, because the existing catalogues of the British Museum of fossil plants deal hardly at all with structural specimens. At present they hardly come in. As far as they are concerned I think there would be no difficulty. As regards the selection of other specimens, a representative set to show the external characters, it will have to be done with care, and I think as far as possible the specimens that have been catalogued for the British Museum should remain there—the specimens on which the catalogue is chiefly based.

1125. In view of palæontological research, is it the case or not the case that you do want external forms as well as structure?—Yes, you do; one must endeavour to correlate the two as far as possible.

Dr. D. H. Scott, F.R.S.

28 Nov. 1900.

1126. But some workers would want both structure-specimens and external-form-specimens?—Yes, but not to the same extent. I have worked enormously more with structural specimens than with others, myself.

1127. Take Mr. Seward he does a great deal of external form work in his own work, apart from the cataloguing work?—Yes, he would do more than I should, no doubt. The two sides would be more equally balanced.

1128. Would not the plan you have suggested mean inconvenience? Would it not be a division of material which would make palæontological work more difficult?—I do not think that would matter practically. At present, taking my own experience, all the structural work is done at Kew or at home, and whatever I do on the external characters is done at the British Museum or on private collections. I have not found that that was any trouble.

1129. But it does mean going from Kew to the British Museum, whether it is convenient or not?—Yes, but the amount of work on the structural specimens done at the Museum has been on the whole very little at present.

1130. That is because of the nature of your work, and not because the amount of material is not complete there?—There is magnificent structural material at the British Museum, but I think it has been mostly worked elsewhere up to now.

1131. (*Mr. Spring Rice.*) With regard to the existing collection of fossil plants at Kew, is it at all a representative one?—No; it is excessively small, and not at all representative, I should say.

1132. A thing may be small and yet in its limited measure representative; is it representative or accidental?—I think it is, to a great extent, accidental.

1133. It merely happens to have gone there, and the question of what is really wanted there has never been considered?—No; I should say it has never been thoroughly considered. I believe there has been no attempt to form palæontological collections there at all.

1134. I presume what is there has been presented?—Yes, except that quite recently a few large sections showing structure were acquired by the Director, but only twenty or so.

1135. Otherwise one may consider it as accidental?—I think, on the whole, yes, and not, I should think, important, except as regards a few specimens—*e.g.*, *Bennettites Gibsonianus*.

1136. (*Chairman.*) Supposing that the mode of division which you have suggested should not prove practicable or desirable, and that it should be decided to remove the collection of living plants to Kew, there would remain one or two courses: (1) leaving the whole of the fossil plants as they are at present at the British Museum, and adding to them as time went on, or (2) transferring them to Kew, leaving only a representative collection for the purpose of geology. Which of those two courses would you recommend?—It is very difficult on those suppositions, to decide.

1137. May I put it in this way: that there are not overpowering reasons in favour of one course or the other?—I should certainly say not overpowering. I think I should, on the whole, be inclined, on those assumptions, to leave them at the Museum, but it is a very difficult question indeed to settle.

Professor Edwin Ray Lankester, LL.D., F.R.S., Director of the Natural History Departments of the British Museum, called; and examined.

1138. (*Chairman.*) The Committee has had under consideration the desirability of uniting in one collection, either at the British Museum or at Kew, the botanical collections now existing at Kew and at the British Museum. May I ask what would be the effect upon the British Museum as a whole, on the one hand, of the transference of the general herbarium, with possibly the fossil plants, to Kew; and, on the other hand, the transference to the British Museum of the herbarium now existing at Kew?—You say "effect"—it is rather difficult exactly to say, if the botanical collections were moved from the Natural History Museum, what the effect would be. One effect would be a certain amount of vacant space in the Museum. On the other hand, if the collections were brought from Kew to Cromwell Road it would necessitate additional building and additional provision at a certain expense. Also, of course, if the collections were removed there would be less expenditure at Cromwell Road, and if the collections were brought there from Kew there would be additional expenditure.

Prof. E. R. Lankester, LL.D., F.R.S.

1139. In the case of the general herbarium, at least, now at the British Museum, being transferred to Kew, what effect would that transference have upon the other departments—the Zoological Department and the Geological Department? Do you think, putting aside questions of space, those departments would suffer

Prof. E. R. Lankester, LL.D., F.R.S.

28 Nov. 1900.

from the transference?—No, I do not—I do not think they would suffer in any way.

1140. You do not think the Zoological Department derives benefit from having in the same building the botanical collections?—No. I think that such advantage as exists is of the most minimal kind, that is to say, it might occasionally be desirable, but very occasionally, for a botanist to be consulted or the botanical collections to be consulted with regard to some matter which interested the Zoological Department, but that would be very rare, and it is by no means important that such means of consultation should exist in the same building.

1141. So that, as far as you are aware of the work of the Zoological Department, that would not be injured by the transference of the general herbarium?—I should distinctly say it would not be injured.

1142. Then with regard to the Geological Department, limiting ourselves at first to the general herbarium, would that Department be injured by the transference of the general herbarium to Kew, or would any injury which might be so inflicted be remedied by retaining at the British Museum, not the complete authentic collections that at present exist there, but a fairly complete general herbarium of reference?—I think it should be remembered that the Geological Department of the Natural History Museum is essentially a palæontological Department. It is really mainly palæo-zoological, and is treated from that point of view, and arranged and kept from that point of view. A small proportion of the collections consist of fossil plants, *i.e.*, of palæo-botany. I do not myself think there is any advantage in the presence of a botanical herbarium of an extensive kind in close contact with this collection of fossil plants. I do not think that it assists in any important way in the study or appreciation or care of the collection of fossil plants. Those who are engaged in studying fossil plants do not want to consult, *pari passu* with their studies, a herbarium of dried recent plants. If questions arise as to the affinities of fossil plants, as they must necessarily arise, and it is necessary to consider the structure of recent plants in that matter, such questions are not capable of immediate solution by comparison. The person who is so concerned probably has himself material bearing on the matter, or he obtains the material from a herbarium or garden or a collection of plants, and carries on his studies. It is not by any means the same question as comparing the flora brought home from some particular island with the existing collection. The whole process of comparing fossil plants with recent structures is quite different from that, and involves microscopical study and special methods, which the contiguity of a herbarium would not facilitate.

1143. You said that the Department of Geology is really a Department of Palæontology?—Yes.

1144. And that the collections which are palæo-zoological are very much more numerous and complete than the collections which are palæo-botanical?—Yes.

1145. But is it not the fact that the palæo-botanical collection is a very rich and large one from the point of view of palæo-botany?—Certainly, a very valuable and extensive collection.

1146. Do you think it desirable, in the interests of palæontology and of biology generally, that the palæo-botanical collections should be housed in the same building as the palæo-zoological collections, or would you say that the transference of the fossil plants from the British Museum to Kew, supposing there were reasons for that transference, would be a step not to be taken?—It seems to me that it is to a very large extent a matter of convenience; that there is no general reason which can be assigned for keeping together a collection of fossil plants and of fossil animals because they are both fossils. That appears to me not to have any particular value or meaning. If the collections were arranged and were considered geologically, and they were treated from that point of view, then, of course, you would use them in connection with different strata and different localities, specimens of the plants and specimens of the animals together for the purpose of geological inference and study. But where they are treated simply as plants, and put aside from the animals, and not treated geologically, I do not see any advantage in their association with the remains of animals. Therefore, if it were convenient on other grounds to have them in a separate building, I think there would be no disadvantage to the zoological collections in doing so. Besides, I think it is worth noting that the persons who study fossil plants are botanists, that is to say, there is no special type of investigator who makes fossil plants his sole study, in the same way that you get a palæontologist who entirely occupies himself with fossil bones or fossil shells. Fossil plants are studied by botanists, and on that account I should say on scientific grounds the indication was that fossil plants should be placed with the great botanical collections where they would be most readily accessible to botanists.

1147. You regard the palæontological collections as really part of the zoological collections, as illustrating the great problems of zoology?—Yes, but they actually form part of the Geological Department.

1148. I am using the word zoology in its wider form, or I might say biology, if you prefer that?—They are treated from that point of view in the British Museum, not as a geological collection, but as a collection of extinct animals arranged zoologically and studied zoologically. They are not treated as geological specimens.

1149. It is, of course, most desirable that they should be kept in connection with the collections of recent forms?—Most desirable—essential.

1150. But speaking as a biologist, you do not think that there are such close connections between all the animals forms and plant forms as to render it most desirable that all the plant forms, recent as well as extinct, should be placed in the same building as the collection of animal forms, recent and extinct?—I do not think that any such close connection exists. Practically and theoretically I think there is not that connection. Actually, in the case of study, there are not the same persons concerned and interested; and for various reasons connected with the possibilities of having living specimens of plants, it seems to me desirable that the botanical collection should be treated in a different place, and on a different footing to the zoological collection.

1151. The transference of the herbarium at Kew to the British Museum would occupy room that you think there may be a demand for on the part of the zoological collections?—With regard to that, it appears to me that if the collections were transferred from Kew to Cromwell Road it would certainly necessitate great additional building. I think everybody is agreed upon that. If the Government is to be asked for money for additional building for the natural history collections, and similar collections, it seems to me that it is not for botany that that money should be asked—that there are other branches of natural history study which are in much more urgent need of proper care and representation in our national collections. I mean more especially stratigraphical geology and anthropology. One cannot expect to have large buildings put up simultaneously for those subjects and for botany. If money is to be expended at Cromwell Road upon new buildings, it seems to me that there is greater urgency for geology and anthropology than there is for botany in such buildings.

1152. Do you regard one of the functions of the museum to be that of popular instruction, and to excite a popular interest in biology?—I should like to say that in this, as in all other answers which I give to the Committee, I am expressing a personal opinion, and that I hope it will not be supposed that I am speaking in any way officially, or representing any conclusion that has been arrived at by the Trustees. My own opinion is that the word "instruction" or "education" ought not to be used in connection with the Natural History Museum. I think it is not its purpose to educate, in the narrow sense of the word. I would rather use the word "edification." That is to say, the function of the Museum, so far as the public is concerned, is to exhibit interesting and beautiful objects in a way which will excite the attention and the intelligence of the public, but that it is not its function to do anything in the form of systematic or pedagogic instruction.

1153. It was in the sense of what you call "edification" that I asked you that question. As a matter of fact, a great deal is done in that way by means of your public galleries and other exhibitions?—Yes.

1154. Both zoological and botanical?—Zoological, palæontological, botanical, and morphological?—There

is also a great collection of minerals there, which is very important.

1155. Also, as a matter of fact, the Museum is made use of by students for the narrower educational purposes of which you just spoke?—So far as I can make out, that applies almost exclusively to certain students of dental anatomy, dental students who come to look through a very beautiful series of teeth, which were put up in one of the compartments of the Central Hall by my predecessor, Sir William Flower. Students come to use that collection in a way which I think should not be the general use of the collections of the Museum. They come to use it as they would use a collection in a college or in connection with university class work.

1156. But the botanical collections are used by students?—Not to my knowledge.

1157. Not by the students of the Royal College of Science?—I say they are not used by them, that is to say, they are not systematically worked through as a part of their study. Of course, all the collections over the place are looked at by students of all kinds, but I think one has to be very careful as to the exact meaning and limitation of the word "use" in that matter, and of the word "student." What I meant with regard to the series of teeth was that the students came with note-books, and occasionally I have seen an instructor of some kind holding forth to them, and using this collection as a series of specimens which might be used in a class-room. I do not think that goes on with regard to any other portion of the Museum at all, and I do not think that it is desirable that the Museum should provide that kind of material for instruction on a large scale. Of course no doubt it is an excellent thing in itself, but it is not a purpose of the Museum so far as I apprehend it.

1158. (*Mr. Godman.*) I do not quite understand whether you think if the amalgamation took place and the main botanical collection went to Kew, it would be desirable to keep no collection at all, or whether you would prefer having a representative collection, a smaller one, for reference?—For myself, I should think it would not be desirable to maintain any botanical collection under those circumstances, if the main collection were removed to Kew. It would not be desirable to maintain any collection at Cromwell Road of the nature of a reference or systematic collection. I do not see whose purpose it would serve. But that is a different question from keeping a certain number of cases exhibiting the general forms of the vegetable kingdom. That would be a matter of very small expense.

1159. Such as you have in the gallery now?—Yes, I think that is a question.

1160. (*Sir John Kirk.*) Would you be in favour of retaining the British floral plants in Cromwell Road?—Which part of the British flora?

1161. I believe there is a large collection of British plants there?—There is a series which are set out on movable frames for the public, and there is also a collection which is in the herbarium; which do you refer to?

1162. I refer to both?—I should say I should leave those which are set out in frames for the public, but those which form part of the herbarium I should not. My opinion is that on the supposition that the scientific collections, the consultative collections, were moved to Kew, they should be entirely moved to Kew, or *vice versa*.

1163. Would the fact of the living plants in the gardens at Kew influence you in the position in which the united herbarium would be kept, so as to have the living and the dried plants at hand?—I think what would influence me as to the choice of the two places or institutions which should have the great botanical collection, would be the possibility of making a really great botanical institution. That can only be done—I may say practically has been done—at Kew, by having gardens, greenhouses, herbarium, and museum all in one institution. It seems to me that it is almost inevitable that if there is to be only one great collection it must be at Kew on account of the existing organisation and the great development which botanical study and means of study of all kinds have taken at Kew.

1164. (*Mr. Seymour.*) Any amalgamation of the two herbaria would be a very costly affair, I suppose?—I think it would involve building, and that would be costly.

1165. You think that that would be the main cost, a building say at Kew, to accommodate a herbarium now at Cromwell Road?—Yes, I should think that would be the main cost.

1166. Do you think, in the interests of science, the amalgamation of the two is a desirable object, or would you prefer to see things left as they are?—I should say that if science could draw to any extent on the public exchequer for its requirements, or even for its fancies, it would be desirable to leave things as they are, but as probably the taxpayer and those who look after his money are not willing to expend money unnecessarily, we must have one botanical institution instead of two. There are other subjects, as I mentioned just now, which are not provided for, namely, stratigraphical geology and anthropology. Whilst these, and possibly other things, are not provided for, I do not think it is reasonable for scientific men to propose to maintain two botanical institutions when there is not even one for some other subjects.

Prof. E. R. Lankester, LL.D., F.R.S.
28 Nov. 1900.

1167. Do you consider that for those who examine fossil plants at Cromwell Road it would be necessary to retain a herbarium for them to consult?—I do not.

1168. Not at all?—No.

1169. (*Chairman.*) You say stratigraphical geology is not provided for; is it not provided for in the Museum at Jermyn Street?—It is provided for a very minute fragment of the surface of the globe; not even for the British Isles, but only Great Britain.

1170. (*Professor Balfour.*) Holding your views of the proper function of the British Museum, and your views of the importance of this amalgamation, I gather that if any change was made you would like to see something like the following, namely, that there should be a popular exhibition at Cromwell Road for the edification of the people; then that you would carry all research material, that is to say the herbarium, to Kew. You would not provide for education, in the narrow sense of the word, at all, at Cromwell Road, nor at Kew, but you would leave that to be provided by the different teachers in London?—That is very distinctly my view. I think certain institutions of the nature of the Departments at the Natural History Museum and the Royal Gardens at Kew are maintained, and regarded by scientific men as being maintained, for the purpose of research and investigation, for the purpose of gaining a complete knowledge of all the forms and all the material of natural history on the face of the globe, for the benefit of searchers into science, and for the benefit of the public service, whatever it might be. Those institutions have a very costly and very difficult work to carry through, the complete investigation of the natural history of the globe. You may also have an exhibition to the public to interest them in what is going on, and to give them a certain kind of gratification in the undertaking. But purely educational, pedagogic teaching, preparing for examinations, and so on, it seems to me should be kept entirely apart from such institutions, since from its very nature, its somewhat disturbing nature, it tends to destroy the other work. Its demands are apt to become very aggressive, and it should be left, and is frequently left, to its own special institutions. A university with its museum carries on that kind of work; a college with its museum carries on that kind of work; and I do not think you can expect, without great danger and inconvenience, to introduce such academical or pedagogic work into the area of these great scientific institutions.

1171. You have some of it at present in the Botanical Department?—None which has ever been deliberately recognised. As far as I have been able to gather, it has never been the intention of the Trustees or of the authorities of the Museum to provide such teaching.

1172. Do you think it is a thing that should be provided by the Government at all?—I think I should suggest that that is outside the present inquiry.

1173. What I was going to ask you was, you have on the opposite side of the road the Royal College of Science, at which Professor Farmer, the botanical teacher, has a museum of the nature that you indicate, an educational museum. If that education work was not done at Cromwell Road Museum do you think it could be done over the way? Would it, in your opinion, be an advantage if they had that museum open to the public there for that purpose?—I think it cannot be said it is done or ever has been done, or contemplated to be done, at Cromwell Road in the Natural History Museum. In my opinion it is the business of the Government, if it runs the Royal College of Science, to provide it with all the necessary appliances for teaching the different branches of science to its students. Therefore, I should expect and suppose they would have a botanical museum for that purpose. I know that in the case of zoology they have an adequate museum at the Royal College of

Prof. E. R. Lankester, LL.D., F.R.S.

28 Nov. 1900.

Science. Such museums do not need to be extensive, and are easily provided for.

1174. But would it not be a difficult thing to separate between the popular or edificative, and the educative? In botanical work would it not be rather difficult to separate in connection with the exhibition such objects as would be for the edification of the public, and such objects as would be used for this pedagogic work?—I do not think it is difficult. It depends on the attitude of the person who exhibits those objects, and the persons he is aiming at. It is not possible to combine in any way the two in one. If I exhibit to the ordinary visitor, the stranger from the country, or the resident in London who happens to be interested in birds or animals or plants, I exhibit things in a different way altogether—a different selection of things, with a different aim in view—to that which I should adopt if I were addressing students who intended to give several months to close study of the elements of either botany or zoology. I think that is obvious, and that everybody must feel it. I can show models of carnivorous plants to the first class of people, and give them some explanation as to the nature of these carnivorous plants, or I can show them a stuffed gorilla, and possibly its skeleton by its side. But I should not undertake to teach them either systematic botany or botanical morphology, or to teach them osteology. I should tell them something about the specimens, something which they could easily carry away with them, but my attitude towards a visitor and my attitude towards a student would be quite different in the two cases.

1175. If you were to remove the herbarium to Kew do you think it would be a great disadvantage to the people living in London?—No. I think that notion may be greatly exaggerated. The underground railway which brings you to South Kensington, which must bring a considerable number of persons who come to South Kensington, in another 20 minutes would take you to Kew, and it cannot make a very great difference to the visitor whether it is South Kensington or Kew to which he goes.

1176. With regard to fossil collections, as I understand you, the botanical element in the Geological Department is quite subordinate to the zoological?—I should rather not put it in that way. I should say that the number of the specimens and the importance of the specimens representing fossil plants is very much smaller than that belonging to the animal series.

1177. Do you think the removal of this would very much injure the geological work there, as it is carried on at present?—I do not know that there is any geological work carried on there. It would not affect the study of animal palæontology which does go on there.

1178. Then these plants are not, as you say, kept as indices at all in connection with stratigraphical geology, but if you had galleries of stratigraphical geology you would want fossil plants for them?—If that were ever done you would have, I suppose, for every stratum and locality represented in your collections, the fragments of plants as well as animals, which would give an indication of the nature of the conditions under which that bed was deposited. For that purpose you do not require very fine specimens of either plants or animals; all you require are the fragments which are indicative—in fact, for a geologist these fragments are more instructive than fine specimens. They accustom him to read the indications of small pieces, to identify them, and show that they belong to such and such organisms.

1179. In your view it would be a distinct advantage to have not only the fossil plants but the herbarium specimens actually with the living plants—to focus them, and make one big botanical institution?—That is my present opinion as a scientific naturalist.

1180. (*Mr. Darwin.*) We have had evidence before us that a herbarium is eminently necessary for the study of fossil plants, not merely an ordinary herbarium, but an extremely perfect one. Again, we have had it in evidence that the study of fossil plants is very much aided by the presence of a first-rate botanical garden. Our witnesses went so far as to say that they thought it extremely desirable to move the fossil plants to Kew merely for those reasons. But I gather that you do not think that is an argument for removing the fossil plants to Kew?—I do not.

1181. I thought in your last answer that you said you were in favour of moving the fossil plants to Kew?—Yes; but on the ground that fossil plants are studied by botanists, and if you have an institution which is frequented by botanists, and which possesses a large botanical staff, the natural place for the fossil plants would be that botanical institution. I am not sure that it has been stated in evidence to this Committee, but I think it should be said that fossil plants are now being studied at Kew, and specimens which belong to the Natural History Department of the British Museum have been studied by a gentleman who is engaged in the Jodrell Laboratory at Kew, and who is working at fossil plants. I should be very much surprised if he were to say that it was necesary for him to do that in a garden, and I should be very much astonished if he said it was necessary he should be close to a herbarium. Of course, both these things must be within a day's journey, and accessible to him. When once he gets the material he does not require to carry on his studies of sections of fossil plants either in proximity to a herbarium, or a garden, or fossil animals.

1182. I am not talking about Dr. Scott, but other experts have expressed a strong opinion of the desirability of having the fossil plants in close proximity to the herbarium and gardens?—I must say that the expert who is really engaged in the matter might perhaps give a valuable opinion.

1183. I was wanting to get your opinion really about it, and I gather you do not think that is a sufficient reason for removing the things to Kew. There is one point about the educational series in the Cromwell Road that I do not quite see. To take an instance, those morphological specimens in the bays on the ground floor, would you call them as making for the edification of the public?—No, I would not. I do not see why I should not say that I do not like the scheme of those plants. Probably the Committee is aware that the bays of the central hall were to form a sort of index museum, as it was originally called by Sir Richard Owen; general facts about the different great groups, both of animals and plants, were to be indicated in those bays. His scheme apparently for that was to give very elementary broad outlines of the characters of large groups of animals and plants. That has never been carried out. The very beautiful series of things put up by Sir William Flower is much more detailed than such a scheme would imply, and the Keeper of Botany being requested to put up something with regard to plants of the same nature as that which has been done with regard to the vertebrate animals by Sir William Flower has, I think, rather overshot the mark.

1184. I only meant as making for edification from the point of view of someone who knows a little more. It is entirely a question of what public you are aiming at?—No doubt; but the larger public, that is the point. You have not to aim at a limited body of students. Another important point I think is that the two things cannot be done coincidentally. You cannot with any advantage bring an uneducated person—uneducated I mean in this special matter either of botany or zoology—in the presence of a pedagogic or academic collection. He is simply confused, perplexed, and repelled by the mass of detail and elaborate explanation which the more instructed person might take in with pleasure.

1185. You have not got room to do anything for the edification of a slightly more educated public, is that so?—That is so. I have never understood, and I do not think that the policy of undertaking such instruction has been accepted by the Trustees, but I am not able to say that with any authority. It appears to me, judging by the whole aspect of the Museum, that that is not what is undertaken by the Museum.

1186. (*Mr. Spring Rice.*) I wanted to ask a question about the arrangements recently made as to giving scientific advice to the Board of Agriculture, the arrangements of which you are acquainted with?—Yes.

1187. The Trustees have been good enough to allow you to advise the Board of Agriculture on the zoological side of problems which arise connected with agriculture?—Yes.

1188. And you probably know that a similar arrangement is being made with Kew as regards the botanical side?—Yes.

1189. Do you anticipate that that division will impede you in discharging that part of the work which you have undertaken to perform?—Do you mean the removal?

1190. I mean simply the separation. The Government has asked the British Museum people to do the zoology, and Kew to do the botany; do you anticipate any difficulty in that division of function?—No, I do not. I suppose you mean that the questions very often intimately relate both to a plant and to an insect.

1191. I conceive that they might do so, and that is

why I asked the question?—I should say with regard to that that I do not think there is any inconvenience, and you must in such a case consult both expert zoologists and expert botanists, and it would be an advantage having the matter dealt with in the two institutions which could give the best information on each side of the question.

1192. Pursuing that one step further, supposing the botanical collections were removed from your care, your duty with regard to Board of Agriculture questions on zoology would not be interfered with?—No, it would not be interfered with.

1193. (*Chairman.*) You said, I think, that there were considerable claims for housing collections of stratigraphical geology at the British Museum?—Yes.

1194. That is one of the things which might be considered as having claims?—Yes.

1195. For that there would be a considerable use of fossil plants?—No doubt.

Prof. E. R. Lankester, LL.D., F.R.S.

28 Nov. 1900.

1196. But you do not think that the transference of the present collection of fossil plants to Kew would seriously interfere with, say, the ultimate installation of collections illustrative of stratigraphical geology?—No, because I should say that the present collection of fossil plants has been always kept as a collection of fossil plants, and it would not be desirable to break that up to use it as illustrating geological phenomena. It is now got together as a special series from the botanical point of view. Collections which come in illustrating particular places or particular localities from the geological point of view, containing necessarily their own plants and their own animal remains, would be kept together as such. Probably any strictly geological museum would always be ready, or ought by the controlling authorities to be made ready, to hand over to a strictly botanical or strictly zoological museum any very fine specimens illustrative of zoology or botany which are not really needed from the point of view of the study of geology.

SEVENTH DAY.

WESTMINSTER PALACE HOTEL.

Thursday, 29*th November*, 1900.

PRESENT:

Sir MICHAEL FOSTER, K.C.B., M.P., SEC.R.S. (in the Chair).

Sir JOHN KIRK, G.C.M.G., K.C.B., F.R.S.
Professor ISAAC BAYLEY BALFOUR, D.SC., F.R.S.
Mr. FRANCIS DARWIN, M.B., F.R.S.
Mr. FREDERICK DU CANE GODMAN.
Mr. HORACE ALFRED DAMER SEYMOUR, C.B.
Mr. STEPHEN EDWARD SPRING RICE, C.B.

Mr. BENJAMIN DAYDON JACKSON, *Secretary.*

Mr. WILLIAM BOTTING HEMSLEY, F.R.S., Keeper of the Herbarium and Library of the Royal Gardens, Kew, called; and examined.

1197. (*Chairman.*) You are at present Keeper of the Herbarium and Library of the Royal Gardens, Kew?—Yes.

1198. And you have been so for some considerable time?—No, not quite two years.

1199. But previous to that were you engaged in the Herbarium?—Yes; I held the position of first assistant for nine years.

1200. So that your knowledge of the Herbarium extends over a considerable period?—Forty years, I may say.

1201. And therefore you are thoroughly cognisant of the uses to which the Herbarium is put?—I should be—yes.

1202. I suppose we may divide those uses, roughly, into external and internal; I mean it is used by the establishment itself in economic and other questions, and it is also used in reference to the garden?—Yes, one of the principal functions of the Herbarium is to name and verify the names of plants cultivated in the garden.

1203. And it is also used by what we may call external people for purposes of botanical research?—Yes.

1204. And used very largely?—To a very great extent, especially in the way of inquiries with regard to economic plants and naming plants generally. We have daily numerous specimens sent for determination.

1205. So that there is continued and great activity in the Herbarium?—Yes.

1206. Are you acquainted with the Herbarium at the British Museum?—Yes; I frequently go there myself.

1207. That differs in some respects from your herbarium, does not it? There are certain groups of plants represented in that collection more adequately than in your own?—They have the old collections at the British Museum.

1208. Do you mean the pre-Linnean?—No, I will not say pre-Linnean especially.

1209. The old collections incorporated in the general herbarium?—Collections made on Cook's voyages, in the Banksian herbarium, and others.

Mr. W. B. Hemsley, F.R.S.

29 Nov. 19

1210. It frequently happens that persons engaged in scientific research, after having been working for some time in your herbarium, in order to complete that research have to have recourse to the herbarium at the British Museum?—That is so; we have to do it ourselves.

1211. It has been represented to us in various quarters that it would be for the benefit of botanical science if the general herbarium of the British Museum and your own herbarium at Kew were amalgamated together; and it has been proposed, on the one hand, that the amalgamation should take place at the British Museum by the transference of your herbarium in general, or in part, to the British Museum, and, on the other hand, that the amalgamation should take place at Kew. Taking the latter hypothesis, that the amalgamation takes place at Kew, would you consider it an advantage, a complete advantage, an advantage accompanied by disadvantages, or wholly a disadvantage, that the herbarium at the British Museum should be amalgamated with your own, speaking in the interests of your own herbarium at Kew?—Speaking generally, I should say it would be an advantage to amalgamate the collections.

1212. An advantage not only to botanical science in general——?—As a matter of fact in all our work we have to go to and fro between Kew and the British Museum.

1213. So that it would be an advantage to the establishment at Kew?—It would, decidedly, because you see they have the types of the early collections, especially the Banksian.

1214. Would there be any disadvantage to Kew connected with the transference?—I do not anticipate any. I cannot tell what might be done, but I do not anticipate any disadvantages.

1215. Have you any views as to how the amalgamation could be effected, and which manner of amalgamation

Mr. W. B. Hemsley, F.R.S.

29 Nov. 1900

would be the better one? It has been suggested to us that there are three ways in which the amalgamation could take place: (1) That the general herbarium at the British Museum should be placed in a building by itself contiguous to your own herbarium; (2) that the incorporation might be complete, sheet by sheet; and (3) that the two herbaria might be housed in the same building, but that the cabinets should be kept distinct—that is to say, that the cabinets containing allied groups should be placed side by side, without going so far as to incorporate the actual sheets?—It would be impossible under the present arrangements to incorporate them; the sizes are different, and I think it would be a great pity to cut down the historical sheets of the British Museum to our size at Kew. Our sheets at Kew are smaller than the British Museum. I think if they were all brought to the same place you would have to keep them in separate cabinets. There might be a considerable reduction by eliminating the duplicates.

1216. But supposing amalgamation were to take place, you are distinctly in favour of the third mode of amalagation by cabinets?—I think it would be a great pity to cut the sheets down—that is to say, to reduce the British Museum to the size at Kew.

1217. You are distinctly opposed to a complete incorporation sheet by sheet?—Yes.

1218. But you are of opinion that the purposes of the amalgamation, the scientific results of the amalgamation, could be secured simply by having cabinets side by side containing allied groups?—I do not know about side by side; I think there would have to be separate departments, as it were. I think we should have to keep the Kew collection as it is, and the other in another part, perhaps, of the same building.

1219. Then you are in favour of what I stated to be the second mode suggested, namely: that the herbaria should be side by side, so that an observer could pass readily from one to the other?—Yes, but I am not in favour of cutting down the British Museum collection to the size of Kew and incorporating them throughout with the Kew collection.

1220. But such an amalgamation in the form which you approve you think would not only be a very great advantage to botanical science in general, but an actual advantage to Kew?—No doubt. As you are aware, the collectors, as a matter of fact, were Kew collectors, but there was no place to put the dried specimens, and so while the seeds and living plants came to Kew, the dried specimens went to Sir Joseph Banks's herbarium.

1221. I understand from the memorandum which has been sent to us by the Director that you are at present extremely overcrowded in the Herbarium, and that the want of additional room is most urgent?—Yes.

1222. (*Mr. Godman.*) There was another suggestion made, and that was to back the sheets, to bring the Kew sheets, which are smaller than those of the British Museum, to exactly the same size by pasting them on another sized sheet. Would that be practicable?—I think not, because the size of the Kew herbarium is about three times that of the British Museum, speaking of the number of sheets.

1223. Would it be a very great labour?—Yes; and I do not see the advantage of it.

1224. Then they could be incorporated?—Why should we bring our size up to the other? I think it would be much better to keep them separate. Supposing there was an amalgamation of the two collections, we could gradually reduce the size of the herbarium by reducing it to the types of the old collections, taking out all the modern ones which we already possess at Kew, but keep the old ones in the cabinets they have, or cabinets of the same size. I do not think it would be desirable to make up or cut down.

1225. (*Sir John Kirk.*) Do I understand that the fruits and bulkier specimens of the Banksian collection are now at Kew?—No. At the time of these expeditions the seeds and the living plants went to Kew, and the dried plants went to Sir Joseph Banks. His idea was that they should form part of the Kew collection, but that fell through. They actually commenced making a library at Hanover House, and that fell through.

1226. What has become of those seeds and bulkier specimens?—I mean seeds that were actually sown and plants grown from them. I do not mean museum specimens, but living specimens.

1227. You estimate that the bulk of the British Museum is about one-third of yours?—Something like that I should think.

1228. So that if they were united the building would have to be one-third more than the Kew building now is to take in the British Museum specimens?—It would have to be considerably more than that, because it is a growing thing.

1229. It is a growing thing?—Any herbarium is a growing thing.

1230. But would you propose to increase the British Museum collection if it were transferred to Kew?—That would then form a portion of our collection, and I should propose taking out the duplicates they have of modern collections, which are already represented at Kew, and keeping historical collections on paper the size they are on now, continuing the collection on the Kew size.

1231. Do you prefer the Kew size?—Decidedly, considering that we have such a very large collection already of that size. I may say we have two sizes. We have for some plants, Cycads and a few other things, a small number of cabinets of nearly double the size of the ordinary cabinet; which are about 16in. by 10½in., and that is sufficient for all ordinary purposes.

1232. (*Chairman.*) Might I just interpose one moment? It is stated to us that with regard to the number of specimens, the number at Kew is over 2,000,000, and the number at the British Museum is 1,853,293, so that your speaking of about one-third is hardly accurate. The British Museum numbers include museum specimens, and we must add to Kew the 20,000 museum specimens you have, so that we have 2,020,000 specimens at Kew, and 1,800,000 odd specimens at the British Museum?—I have not the figures before me.

1233. Those are the figures which have been sent to us respectively from the Director of Kew Gardens and from the British Museum——

1234. (*Sir John Kirk.*) I think the British Museum counted as a specimen each individual plant on a sheet. When you speak of specimen do you mean one plant or a number of specimens on a sheet?—I consider a specimen includes all that belong to one label.

1235. However many there may be?—Yes.

1236. (*Professor Balfour.*) You might have a dozen or twenty?—Quite so.

1237. (*Chairman.*) We put that question to Mr. Murray, and I fancy the answer was in the negative?—The statement handed in by the Director was prepared by me under his direction. I do not carry the figures in my mind, but I have no doubt as to their substantial accuracy.

1238. (*Chairman.*) I am quoting now from the statement handed in by the Director, but I do not think we need go into that any further?—I think not.

1239. (*Sir John Kirk.*) Are you satisfied with the building at present as a fire-proof building for the safe keeping of the plants?—It is not a fire-proof building.

1240. Is there danger now?—Yes. I had an anxious time about it, because my residence was next to it until about two years ago, and I suggested, and the Director took up the suggestion, that they should pull down that part of the residence close to the Herbarium. We were very close to it, and you can never tell what is going to happen in a house with servants and that sort of thing, and I was very anxious. We were within two yards of the Herbarium, but now they have pulled down a portion and the other part is kept as a storehouse.

1241. (*Mr. Seymour.*) You said, I think, you were very crowded in the herbarium, and that you must have fresh accommodation?—It is absolutely necessary.

1242. Does that apply also to the museum in the gardens, as well as the Herbarium building?—I cannot speak of that. The museums are not under my control.

1243. In any case, whatever happens, whether there is amalgamation or whether there is not, fresh buildings are absolutely necessary at Kew?—Yes; no doubt there must be some extension.

1244. (*Professor Balfour.*) Do you find your work is very much hampered by want of room in the Herbarium?—It is.

1245. So that even though there were no additions of specimens from Cromwell Road you would require additional room?—Yes, very shortly.

1246. (*Mr. Spring Rice.*) I did not quite understand what you said you could do, if the collections were brought under one roof, in the way of reducing the numbers which might be regarded as duplicates?—At the British Museum

they have many of the same recent collections as we have, and those could be eliminated.

1247. Looking at the two as a whole, is there a considerable amount of work which might be done in that direction?—Yes, a considerable amount of reduction might be made.

1248. You were speaking of the fact that the present Herbarium is not fireproof, but have you not very strict rules to guard against any risk of fire from within?—Yes. We have no fires; the only thing we have is a spirit lamp in my room to boil specimens for examination.

1249. So that there is no risk of fire from within; is there any practical risk from without?—No. As I explained just now the Director had a portion of my old residence pulled down that was contiguous to the place.

1250. The building is quite isolated now?—Yes.

1251. So that in a practical sense you would not say there is any serious immediate risk?—No, I would not.

1252. (*Chairman.*) I do not know whether you feel able to answer this question—you will tell me if you do not; are you consulted in the purchase of collections offered to Kew?—Yes. I usually suggest them to the Director and he consults me on the point.

1253. Collections are sometimes offered to you and to the British Museum, and a certain competition may take place between the two with regard to the purchase?—I do not know with regard to the purchase of collections.

1254. But you do purchase collections, do you not?—Yes; we purchase some, and naturally there is in a sense competition, but it is more especially with regard to collections presented by travellers, and that sort of thing, that the question of competition comes in.

1255. The competition then in the purchase of collections is insignificant?—Yes. I think you might keep that out of the question altogether.

1256. It does not lead to any unnecessary expense, does it? The collections are not raised in value by your competing, are they?—There are certain collections which we find it necessary to have, and I daresay they may have the same at the Museum; but the collections in which there is any competition are those collections made by expeditions and travellers.

1257. (*Professor Balfour.*) I want to make perfectly clear this question of duplicates. I suppose what you mean by duplicates is this, that taking a named and numbered collection like Bourgeau's, or those sets that have been sent out by Sintenis or Siehe, the British Museum buys a set also as well as Kew?—Yes, at exactly the same price. *Mr. W. B. Hemsley, F.R.S.* 29 Nov. 1900.

1258. If there was an amalgamation you could practically get rid of one of these sets?—Yes.

1259. There must be a very large proportion of sets like that, and those are the sets that would be truly duplicate?—The old classical collections, Banksian specimens, and so on, you would not get rid of, even if the plants were the same as those you had, because of their historical value, and because you may have some notes upon them by a botanist which may be valuable.

1260. (*Mr. Darwin.*) I have heard it suggested that when a collector is starting on an expedition the fact that there are two institutions, one at Cromwell Road and one at Kew, gives such collector rather a power over those institutions, that he can play off one against the other and make terms he could not otherwise make. Do you think there is anything in that?—I do not think so. Our terms at Kew are that if they present their collections we name them, furnish the donor with a list, and so on.

1261. A collector would never want any other terms than that, you think?—If there are more sets than we want we perhaps might undertake to return them to the collector, or to distribute them to other botanical establishments, according to his wishes. As a matter of fact the most valuable collections we get are those which are presented by travellers.

1262. Have you, as a matter of fact, found any difficulty of that sort—the fact of there being two institutions giving as it were a collector power over them?—No. So far as my experience goes, a great many are sent to Kew, because the Colonial floras and the British Indian floras have been worked out at Kew, thus there are greater facilities and they get the results so much easier; I mean on account of the types of all these floras being at Kew.

1263. (*Mr. Godman.*) You spoke about the increase of the collection; can you give us any idea of the rate at which the collection is now increasing—1 per cent. or any other figure?—I am afraid I cannot tell you that.

Sir WILLIAM TURNER THISELTON-DYER, K.C.M.G., F.R.S., Director of the Royal Botanic Gardens, Kew, called; and examined.

1264. (*Chairman.*) You are at present the Director of the Royal Gardens, Kew, and have been so since the year 1885, I think?—Yes.

1265. You have been so good as to draw up for us a very valuable memorandum in reply to questions which were addressed to you. You are willing, I suppose, that that memorandum should be put in as evidence?—Certainly. The circumstances of that memorandum were these. The questions were transmitted to me by the First Commissioner with the desire that I would supply the Committee with the information asked for, and I have done that to the best of my ability. I found considerable difficulty in doing it, and I dare say the Committee have observed that my statement is perhaps redundant in some particulars, and not complete in others. *Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.*

The following is the list of questions referred to, with the answers of the witness appended:—

COMMITTEE APPOINTED

BY THE

LORDS COMMISSIONERS OF HER MAJESTY'S TREASURY.

"To consider the present arrangements under which botanical work is done and collections maintained by the Trustees of the British Museum and under the First Commissioner of Works at Kew, respectively; and to report what changes (if any) in those arrangements are necessary or desirable in order to avoid duplication of work and collections at the two Institutions."

The information desired by the Committee may be conveniently arranged under the following heads:—

I. A general statement of the nature and extent of the collections under your charge within the scope of the present enquiry.

This statement will naturally distinguish between different kinds, general, special, etc., of collections. It will also be desirable to distinguish between:—

(a) Dried plants.

(b) Other preparations, either (1) Dry, in bottles or boxes; (2) In preservative fluid; or (3) Microscope slides.

and to give a rough or approximate estimate of the extent or number of each.

II. The duties of the Keeper and of his chief subordinates.

III. The uses to which the collections are applied.

In this it will be desirable to distinguish between:—

(1) Popular instructions.

(2) Assistance given to students, *i.e.*, educational use.

(3) Assistance to research, given either to home or foreign investigators.

(4) Government requisitions.

special attention being given to the third and fourth sub-headings.

IV. The main several sources from which accessions are derived.

This should indicate in their relative proportions the accessions derived by:—

(a) Purchase.

(b) Exchange.

(c) Gift.

V. The chief additions or alterations which have been made in your collections since 1875, the date of the last report of the Royal Commission on Science (Devonshire Commission).

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

VI. The approximate number of specimens received annually during the last few years.

VII. The main results, scientific or other, which have been accomplished by means of your collections since 1875.

This statement may be given as in paragraph III., thus:—

(1) Popular instructions.

(2) Assistance given to students, *i.e.*, educational use.

(3) Assistance to research, given either to home or foreign investigators.

(4) Government requisitions,

special attention being given to the third and fourth sub-headings.

VIII. The main respects in which your collections differ from similar collections at the British Museum.

IX. The circumstances which determine whether a particular collection is placed under your charge, or goes to the British Museum.

X. The annual cost of maintaining the collections, distinguishing:—

(a) Administration, as salaries and wages.

(b) Purchases of (1) Dried plants and (2) Books and Binding.

(c) Special expenditure not falling under either of the preceding categories.

XI. Whether specimens are lent to monographers; if so, on what conditions.

XII. Information is also desired on the following special points:—

1. When specimens such as bulky fruits, or woods, cannot be incorporated with the dried plants, how and where are they preserved?
2. Whether the specimens are poisoned, or if some other preservative such as camphor is employed to guard against insect-damage.
3. If the specimens are glued down and laid in at stated intervals?
4. Whether any accumulation of unmounted plants takes place, and if so, are such unmounted collections readily available for botanic use, and further, what is the amount of such accumulation?
5. Are there any fossil plants under your charge? If so, what system is adopted in their arrangement?
6. What arrangement is followed with regard to recent plants? Under genera what is the system pursued, either of following some recognised authority, or a geographic arrangement? If the latter, state if many redundances arise in consequence of widely-distributed plants occurring in several geographic divisions?
7. Have the cabinets fixed shelves, or movable trays?
8. What is the size of the sheets on which the plants are glued? Is a special size used for such specimens as palms?
9. Have you any subsidiary collections besides the general collection? If so, what is their character, and the reason they are kept separate?
10. Can specimens be examined by boiling, or other laboratory methods?
11. Are the collections housed in a fire-proof building?
12. Have you sufficient space for your collections, or is it likely to become inadequate within the next few years?
13. What space is available for extension in connection with existing buildings or galleries?
14. How far is the collection of prints and drawings available for public use, with a view of determining plants, and thus diminishing the risk of damage by consulting herbarium specimens?
15. What publications are issued officially, by:
    (a) The officers of the herbarium.
    (b) Specialists not themselves officers, but acting under authorization,

    and if the cost of such publications is wholly borne by the Government, or is partially defrayed out of some other source of income.
16. What is the extent of the library in connection with the herbarium? Is it complete in itself, or dependent on some other collection of general works?
17. Is there a printed catalogue of your library?
18. What means are employed to secure the most important new publications, journals, and transactions?

Sir WILLIAM T. THISELTON-DYER, K.C.M.G., F.R.S., Director, Royal Botanic Gardens, Kew, to the Secretary of the Botanical Work Committee.

[COPY.]

Royal Botanic Gardens, Kew,
October 29th, 1900.

Sir,—The First Commissioner of Her Majesty's Works and Public Buildings transmitted to me the letter which you addressed to him on April 24th, enclosing a memorandum which, under instructions from the Chairman of the Botanical Work Committee, you requested him to place in my hands. This memorandum contained "a statement of the data which the Committee desire to have before them at their first meeting."

2. This statement I have now the honour to submit to you. The field of work of this establishment is so large and varied that it would have been impossible to do it justice by merely brief replies to the interrogatories. I have not hesitated, therefore, to place before the Committee the fullest information in my possession. I have assumed that most of what I have stated will not be within the knowledge of the members of the Committee. I do not think I have communicated anything which in one shape or other will not be material to their deliberations. I might have added a good deal more.

3. The preparation of the replies has been a laborious undertaking in addition to an unprecedented amount of other Government work, including several other departmental Committees. I much regret the delay in furnishing you with the replies. This has been altogether unavoidable. I have not been able to revise my replies as a whole or condense them, and I am aware that there is a good deal of repetition in what I have written. This, however, arises from the interrogatories in many instances covering the same ground.

4. I have further to ask you to lay before the Committee the following general observations. As regards Kew, this enquiry, according to the Treasury Minute of 19th April, 1899, originated in a proposal which I submitted for "reconstructing and improving the building in which the Kew Herbarium is now housed." The urgency of the matter will be seen from the information and documents which I have introduced into my replies. I confess I am at a loss to understand why it is necessary to investigate it unless it is proposed to remove the Kew Herbarium elsewhere, and consequently break up Kew as a national scientific institution. It, therefore, appeared to me desirable to show at some length that the whole work of Kew focuses in the Herbarium, and would be immediately paralysed without it.

5. It seemed the more desirable to take this course, as the Treasury Minute proceeds to observe that the Committee would be so framed "that the bearings of the question on the Empire at large might be fully considered." I have therefore thought it necessary to enter somewhat fully into what may be called the Imperial work of Kew. And here I may observe that Kew has now been in some degree officially recognised by the Colonial Office by the inclusion of an account of the establishment in the Colonial Office list.

6. I may point out that the question of the concentration of botanical work at Kew has been more than once the subject of official discussion during the last forty years.

I find from papers presented to Parliament in 1858 that the Trustees of the British Museum were not in-

disposed at that time to the transference of the Banksian Herbarium to Kew. A committee of the Trustees on that occasion took evidence on the subject, and I am inclined to think that if the present facilities of access had existed it is not improbable that it would have been carried out. Sir Richard Owen stated in evidence that:—"Believing that, for some years past, the present botanical collection at Kew has to a certain extent, fulfilled the functions of a national one, I should be disposed to regard that locality as the more advantageous one for carrying out the design of a complete national botanical collection."

In later years this opinion seems to have changed, and he indulged in embittered attacks on Kew and its administration, being at the time in the pay of the State.

7. The question was again investigated at great length by the Royal Commission on Scientific Instruction and the Advancement of Science in 1874. A kind of compromise was suggested, which is not readily intelligible, and is certainly unworkable.

8. I can only, therefore, venture to express the hope that the Committee will arrive at some definite and final decision which will dispose of the question once for all. My own official career is drawing to a close, and that decision will not therefore, whatever it may be, probably materially affect myself. But it is of the deepest moment to India and the Colonies that the botanical assistance which the Home country can supply to them should not be impeded by defective organisation for affording it.

9. There are two other matters which I trust will engage the attention of the Committee, and which I am most anxious to submit to it.

During the time that Kew was a private establishment belonging to the Crown it fulfilled very similar functions to the Colonies and to botanic science generally to those it does at present, though on a smaller scale. This secured for it a place in public esteem. When, therefore, the Government proposed its abolition in 1838, public opposition led to the appointment of a Treasury Committee, which reported to Parliament in 1840. In 1841 Sir William Hooker was appointed Director to carry out its recommendations. They were faithfully adhered to. And looking back on the history of Kew for the last sixty years I cannot see any point on which those recommendations have either been deviated from or exceeded. No Government has ever complained of the ambitious initiative of any director. There has been expansion and development. But both have flowed from a well-conceived initial scheme.

10. The recommendations of the report are, however, buried in Parliamentary archives, and have perhaps been in a measure less present to the minds of successive Governments than they have been to the Kew staff. It appears to me much to be regretted that the duties and functions of Kew were never laid down formally at the start in a Treasury Minute from the provisions of which it would not have been possible to deviate without Treasury sanction. When I myself was appointed Director I was not furnished with instructions of any kind or description. When, therefore, my action has, as has sometimes been the case, been challenged, I have had no defence to offer except the fact of the unbroken tradition of the establishment, a defence which necessarily requires prolonged explanation and argument to support. It cannot be said that this difficulty was not foreseen. It is dealt with in an important letter signed by Lord Duncannon, dated 24th April, 1839, of which I have verbally requested you to obtain a copy for submission to the Committee. Its recommendations were, however, never acted upon.

The want of a definite constitution for Kew made itself manifest when the late Mr. Ayrton was First Commissioner. That undoubtedly able Minister, largely under the influence of Sir Richard Owen, arrived at the conclusion that the scientific work of Kew should be transferred to the British Museum, and that the establishment should be merely maintained as a place of public recreation. This was reverting to the position which Parliament had decided against in 1840. He received at least no opposition from the Prime Minister. It must be admitted that both were animated with views honestly held, however limited, and both, subject to Parliamentary approval, were within their rights. But once again the disintegration of Kew was defeated by popular opposition.

11. As a result the Treasury at length issued a Minute dated 24th July, 1872. This is the nearest approach to a constitution which Kew possesses. It however, very imperfectly defines the relations of Kew to the Office of Works. This has at various times led to a good deal of friction. Lord Welby has laid it down that "nothing is so important as that the permanent staff of a department should be able to rely upon the hearty and loyal support of their superiors." And it cannot be said that in performing the functions imposed upon it, Kew has always received that support. I may mention that there was a proposal for a Departmental Committee in 1883 on the administration of Kew, but it came to nothing.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

12. A second question on which I wish to engage the attention of the Committee is the nature of the relations which have for a long time subsisted between Kew and the Botanical Department of the British Museum. I have always held that it is no part of the duty of a Government servant to criticise, especially in a public manner, the arrangements which the Government thinks proper to make. If there were a dozen botanical departments maintained at public expense I should not concern myself about it. But I should certainly endeavour in the interests of science and of the public service to maintain friendly relations with them all. But in the case of the Botanical Department of the British Museum, I regret to say that this is all but impossible. I have had to encounter from members of its staff public attacks which I have felt obliged to bring under official notice—attacks on my good faith in my official capacity, and also statements calculated to sow dissension amongst my staff. It is obvious that such attacks damage and lower the prestige of the establishment, and are read in foreign countries with perplexity and astonishment. On at least two occasions apologies of a kind have only been extorted under official pressure.

Now Kew is responsible to the First Commissioner, who in turn is responsible to Parliament. Any grievance which the British Museum feels can be at once submitted officially to the First Commissioner. It is therefore as unnecessary for one public servant to attack another in the public prints, as it is contrary to official discipline. But though the British Museum is maintained out of public funds, it appears to be exempt from Government control.

On one occasion when an accusation of bad faith towards my staff was launched against me in print by a member of the staff of the Natural History Museum, the matter was brought under the notice of the Director of the Natural History Museum. It appeared, however, that though nominally under his control, the Botanical Department is not so as a matter of fact. And it is not easy to ascertain to whom it is actually subordinate. I therefore applied, as in duty bound, to the First Commissioner, for leave to address my complaint to the Treasury. Mr. Shaw-Lefevre went into the matter very thoroughly, but withheld his consent on the following ground:—"The Trustees of the British Museum are, I think, in a more independent position than the heads of ordinary Government Departments, which are under the control of the Treasury, and they, and not the Treasury, are responsible for maintaining discipline in their staff."

It is important, I think, to clearly recognise that the Trustees are an *imperium in imperio*, and that there is no means of bringing Government influence to bear upon them.

13. From time to time the Trustees have asserted their claims to various collections at Kew, some even of private origin. I am entirely unable to ascertain on what ground these claims proceeded. I have set out some of these documents in my reply. Kew holds these collections not in a private capacity but on behalf of the nation, and in the interests of science. The only valid ground of complaint would be the assertion of some public loss or injury due to neglect. So little, however, does this seem to have existed that the Royal Commission of 1874 expressly recommended that the collections of public expeditions should be sent to Kew. It is to be observed that the Trustees suggested an enquiry into the matter, but declined to take steps to procure one.

I am, sir, your obedient servant,
(Signed) W. T. THISELTON-DYER.

B. Daydon Jackson, Esq., Sec. L.S.,
Botanical Work Committee,
8, Delahay Street, S.W.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

REPLY FROM THE DIRECTOR OF THE ROYAL BOTANIC GARDENS, KEW.

29 Nov. 1900.

I.

The collections maintained at Kew have for their primary object the advancement of botanical study in its most comprehensive sense. For this they afford the largest accumulation of material, both living and preserved, which exists in any institution in the world. In so far as they are publicly exhibited, they further serve for popular instruction, and, in a subsidiary degree, for the requirements of artists, of commercial enquirers, and of horticulturists.

It is necessary to observe that an essential feature of Kew (an expression which for the sake of brevity may be used throughout this paper in the place of the full title, "Royal Botanic Gardens, Kew"), in which it differs perhaps from every other botanic institution, is that plants are studied in every aspect—their structure, taxonomic relations, geographical distribution, properties, industrial applications, and cultural capabilities.

So wide a field of work requires a number of different departments, which, though at first sight independent, are so intimately interconnected, that no one could be suppressed without impairing, and perhaps fatally, the usefulness of the rest.

1. Living Collections.—According to an approximate enumeration made a few years ago, these include 20,000 species and distinct varieties. The nomenclature of these has been determined with great care, and is believed to reach a standard of considerable accuracy. This can only be attained by constant and, indeed, daily reference to the Herbarium. The whole living collections have now been catalogued in a series of published handbooks and hand-lists:—

Hand-list of Herbaceous Plants cultivated in the Royal Gardens. 1895. Cloth boards, price 1s. 9d. By post, 2s. 0½d.

Hand-list of trees and shrubs grown in Arboretum. Part I.: Polypetalæ. [Under revision.] Part II.: Gamopetalæ to Monocotyledons. 1896. Price 1s. By post, 1s. 2½d.

Hand-list of Coniferæ grown in the Royal Gardens. 1896. Price 3d. By post, 4d.

Hand-list of Trees and Shrubs, Parts I. and II., and Hand-list of Coniferæ, in one volume, cloth boards. Price 2s. 8d. By post, 3s. 1d.

Hand-list of Tender Dicotyledons cultivated in the Royal Gardens. 1899. Price 2s. 6d. By post, inland, 2s. 10d.; foreign and colonial, 2s. 11d. Cloth boards, price 3s. By post, inland, 3s. 4d.; foreign and colonial, 3s. 5d.

Hand-list of Orchids cultivated in the Royal Gardens. 1896. Price 6d. By post, 8d.

Hand-list of Tender Monocotyledons cultivated in the Royal Gardens. 1897. Price 9d. By post, 11½d.

Hand-list of Orchids and Hand-list of Tender Monocotyledons, in one volume, cloth boards. Price 2s. By post, 2s. 4½d.

Hand-list of Ferns and Fern Allies cultivated in the Royal Gardens. 1895. Price 6d. By post, 7½d.

2. Herbarium.—This consists of upwards of two millions of specimens mounted on a million and a quarter of sheets. It is to be noted that under "specimen" everything belonging to the accompanying label is meant. A "specimen" may therefore include one or more complete plants or portions or fragments of plants. The sheets are contained in about 1,000 cabinets, each 4ft. high.

3. Library.—This consists of about 19,000 volumes. Of these some 1,200 are kept in a separate building open to the gardeners in the evening, and the keeper of the museums has about 700 works of reference in his office.

4. Drawings and Figures Preserved in the Library.—These amount to 106,000, mounted on 66,000 sheets in 464 portfolios.

5. Museums.—Of these there are three:—No. I. is devoted to dicotyledons and gymnosperms; No. II. to monocotyledons; No. III. to timbers.

In the Nos. I. and II. the specimens are arranged in systematic order. The object is to illustrate to the eye the structure of different types of plants and the useful purposes to which plants or their products can be applied. The specimens are displayed in wall cases 8ft. high, which aggregate about 2,250ft. in running length, and in about 750ft. of table cases. They consist of 6,200 dry and 1,200 wet structural specimens. It is to be noted that the former from their bulk could not be preserved in the herbarium, to which, however, they form a necessary supplement. They include models, and are further illustrated by about 1,200 photographs, plant portraits, and maps illustrating geographical distribution. The total number of economic specimens (excluding woods) is about 20,000. Of wood specimens 6,500 are exhibited; the smaller in their proper systematic position, the larger in Museum No. III., where they are arranged geographically.

A guide to each museum has been published enumerating and describing the most interesting objects.

No attempt has been made to form a collection of microscopic slides. They are subject to rapid deterioration (except in the case of fossil plants), and are, with this exception, of little value in any case to anyone but the person by whom they were originally prepared.

6. Collection of Botanical Portraits.—These are some 500 in number, including 16 oil pictures and 19 busts and medallions. Rather more than 200 are exhibited. The rest are arranged in portfolios.

7. North Gallery.—This contains 848 oil pictures of vegetation painted from nature in different parts of the world by Miss Marianne North. It is probably the most remarkable phytogeographic exhibition in existence. Below the pictures are shown 246 specimens of woods from the countries illustrated. A descriptive guide has been published. Besides these about 600 photographs and prints are shown in Museum No. III., illustrating the botanic establishments of the Empire and of a few foreign countries. It would be desirable to extend and display more conveniently this collection, and for this an inexpensive gallery might be easily provided.

II.

There is no officer designated "the keeper," but there are four who correspond to such a description. Each has charge of a separate department in subordination to the director.

1.—Keeper of the Herbarium and Library.

He reports daily to the Director, and takes his instructions as to the nature of the work which the department should take in hand from time to time and the incidental business, and discusses correspondence.

The following is an enumeration of his staff, with detailed particulars of the circumstances of their employment:—

Office.	——	Name.	Salary.	Entered Service.	Age.
			£ s. d.		
Keeper	(Residence)	W. B. Hemsley	524 6 8	5 July 1890	57
Principal Assistant (Cryptogams).		G. Massee	319 1 10	4 May 1893	54
Principal Assistant (Phanerogams).	(Residence)	O. Stapf	350 – –	13 January 1899	44
Assistant		N. E. Brown	224 1 6	17 February 1873	51
Ditto		R. A. Rolfe	224 1 6	6 July 1880	45
Ditto		C. H. Wright	215 16 4	1 September 1884	36
Ditto		S. A. Skan	125 11 11	16 July 1894	30
Ditto		T. A. Sprague	80 – –	23 May 1900	22
Ditto	(Indian Flora)	H. H. W. Pearson	160 17 1	1 March 1899	31
Artist		Miss M. Smith	52 – –	1 April 1898	46
Porter (in uniform)		S. Marshall	1 4 –	October 1876	40
Preparer		Miss A. F. Fitch	– 15 –	30 May 1892	30
Boy		C. Cotter	– 12 –	10 April 1899	18

It is to be observed that the scale of salaries is inferior to that which obtains at the British Museum for analogous work and duties.

The keeper of the herbarium and library, under the supervision of the director, is responsible for the general administration of the department and for the direction of the scientific work performed.

Subordinate to the keeper, the two principal assistants take general scientific charge of the two great divisions of the vegetable kingdom entrusted to them respectively. They prepare the numerous reports called for when necessary by the director, and transmitted to him through the keeper.

The general routine work of the herbarium and library is carried on by the keeper, the principal assistants and the assistants, its general allocation (except as regards the superior officers) being decided by the keeper after consultation with the Director.

One assistant is, however, paid by the India Office. His function is to help the Indian Botanical Departments to keep in touch with European work.

2.—Keeper of the Museums and North Gallery.

He reports daily to the Director, and takes his instructions as to the nature of the work which the department should take in hand from time to time, and the incidental business, and discusses correspondence.

The following is an enumeration of his staff with detailed particulars of the circumstances of their employment:—

Office.	——	Name.	Salary.	Entered Service.	Age.
		MUSEUMS.	£ *s.* *d.*		
Keeper		J. R. Jackson	324 1 6	August 1858	63
Assistant		J. M. Hillier	135 13 10	15 December 1879	39
Preparer		G. Badderly	90 – –	1 April 1880	62
Porter (in uniform)	Museum, No. 1	J. Fulcher	1 4 –	2 October 1899	32
Ditto ditto	Ditto, No. 2	T. Martin (A. P., 30*l.* 8*s.* 4*d.*)	1 4 –	15 May 1882	58
Ditto ditto	Ditto, No. 3	—	1 4 –	—	—
Ditto ditto	Packing Room, etc.	J. Hazel	1 4 –	18 October 1897	29
		NORTH GALLERY.			
Caretaker	(Residence)	Mrs. Badderly	– 10 6	4 June 1882	52

3.—Honorary Keeper of the Jodrell Laboratory.

He reports from time to time, as occasion requires, to the Director, and takes his instructions as to the admission of persons to the laboratory who desire to engage in research in it and as to incidental business.

The following is an enumeration of the staff, with detailed particulars of their employment:—

Office.	Name	Salary.	Entered Service.	Age.
		£ *s.* *d.*		
Honorary Keeper	Dukinfield H. Scott	– – –	13 September 1892	46
Porter (in uniform)	W. R. Corrin (A.D.)	1 4 –	29 March 1897	38

4.—Curator.

He is the general "man of business of the establishment," and corresponds to the steward of an estate. Besides this he has the responsible charge of the living collections. Subordinate to the curator there are two assistant curators—one has charge of the cultivation under glass amounting to $3\frac{1}{4}$ acres; the other of the arboretum, believed to be the most extensive in any temperate country.

III.

A.—Living Collections.—These are distributed over the whole establishment. This has its disadvantages. But it was considered when the policy was determined upon that these were outweighed by the wider dispersion of visitors and the prevention of undesirable congestion at any one point.

1.) Kew receives annually on an average a million and a quarter of visitors. It would be idle to contend that the vast proportion of these come with any scientific purpose. But it is only necessary to move amongst them to see that a large number examine the collections with intelligence. This is further proved by the daily official correspondence, which shows that the public generally feel an almost jealous interest in the "completeness" of the collections, and will take some personal trouble to supply a plant which they presume has been lost or which they think should be represented. Desirable acquisitions are constantly obtained in this way from merely casual visitors.

Nothing, however, is done in the way of direct popular instruction. But the series of hand lists is sold at the gates and commands a steady sale.

It is further to be observed that everything of interest in the living collections at Kew is copiously reported in the Horticultural Press, and the particular attention of visitors is in this way directed to it.

Though Kew does nothing direct in the way of popular instruction, it can hardly be doubted that it exercises an immense indirect influence in encouraging a taste for botanical study and intelligent horticulture.

(2.) It will, however, be proper to mention here the internal educational work of the establishment, the results of which are of increasing and far-reaching importance.

The gardening staff of Kew is worked on the basis of an advanced horticultural school. There is no time to teach beginners; five years' previous experience is required of every candidate for admission. The term of employment is limited to two years for all who do not obtain promotion. During this period, according to capacity, each man is passed through various departments. In this way a range of varied experience is acquired which could not be obtained elsewhere.

After working hours on two nights a week lectures are given on the following subjects:—

i. Elementary chemistry and physics;
ii. Elementary botany;
iii. Economic botany (in the museums);
iv. Geographical botany.

There is no examination, but notes are required to be taken, which are revised by the lecturer, and a certificate is given to those who have afforded evidence of having profited by the instruction.

On one morning a week the gardeners are allowed to visit other departments than those in which they are ordinarily working.

Several botanical excursions are arranged during the summer, which are conducted by members of the staff.

The garden library is open on every weekday evening, and is supplied with a well-selected selection of professional books and gardening periodicals.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

No direct pressure of any kind is put upon the men to take advantage of the facilities for professional improvement which Kew affords. But the general result is no doubt to keep them during their stay at Kew at rather high tension. They stand it well, and are even able to work off superfluous energy in attending the classes and passing the examinations of the Science and Art Department with credit.

Monsieur A. Ménissier, a former Kew employé, has given in the "Bulletin de l'Association des Anciens élèves de l'école Nationale d'Horticulture de Versailles," 1899 (pp. 144-159), an account of "L'enseignement horticole à Kew," of which a copy is attached:—

Kew n'est pas, à proprement parler, une école d'horticulture; ce serait plutôt, au point de vue horticole proprement dit, un établissement pratique similaire à notre *Jardin des Plantes*, mais dans lequel tout semblerait organisé en vue de parfaire l'instruction technique des jardiniers et où tout convergerait vers ce but: d'une part, former des jardiniers coloniaux bien préparés, prêts à surmonter tous les obstacles; d'un autre côté, former des jardiniers instruits, aux connaissances nombreuses et variées, hommes destinés à prendre la tête de l'horticulture anglaise.

Ceci est surtout obtenu par la sélection rigoureuse qui préside à l'admission; cinq années de travail dans les meilleurs établissements horticoles, gage d'une solide instruction pratique, sont requises. Le postulant ne doit pas être âgé de moins de 20 ans, et comme les demandes sont toujours excessivement nombreuses et le nombre de places limité, il s'ensuit qu'un choix très sévère est ainsi fait.

Ensuite, l'heureux admis a sous les yeux les plus riches collections végétales du monde entier, semblant réunies là uniquement pour son propre usage; toutes les serres, tous les musées lui sont ouverts; des cours spécialement faits pour lui, dont les professeurs sont les grandes autorités botaniques de Kew même; des conférences, des réunions organisées hebdomadairement pour son seul bénéfice; une salle spacieuse renfermant une magnifique bibliothèque horticole spécialement réservée pour lui. Que peut-il demander de plus?

Le salaire qu'il reçoit pour son travail, sans être très élevé, lui permet de vivre convenablement; enfin, dès son arrivée il est incorporé dans le *Kew Guild* ou association de tous les membres passés ou présents de Kew, y ayant occupé une situation *responsible*, ce qui en exclut les ouvriers, les manœuvres. De ce fait, il se trouve introduit dans une phalange scientifique où figurent les noms des plus hautes autorités botaniques de l'Angleterre. (D'ailleurs, le curateur actuel de *l'Herbarium*, M. Hemsley, n'est-il pas lui-même un ancien apprenti de Kew?)

Par le fait de son séjour dans cet établissement, notre jardinier peut rester toujours, s'il le désire, en relations constantes avec cette administration; il est sacré *Kewite*, faisant partie, comme je l'ai dit, du *Kew Guild*, association dont les membres sont répandus maintenant aux quatre coins du globe.

L'esprit de l'enseignement donné à Kew se trouve indiqué tout entier dans les paroles suivantes, prononcées par Sir W. T. T. Dyer, directeur: "Nous traitons nos jeunes gens comme des hommes, et nous attendons d'eux qu'ils fassent eux-mêmes leur salut. Nous les désirons virils, respectueux d'eux-mêmes. Nous mettons sur leur chemin, avec l'aide du gouvernement, tous les conseils que nous pouvons leur donner. A eux d'en faire un intelligent usage."

L'ensemble des travaux de Kew peut être compris dans quatre grandes divisions, ayant chacune à leur tête un curateur: 1°, l'Herbarium et la bibliothèque; 2°, les muséums d'économie botanique; 3°, le laboratoire; 4°, les cultures.

Cette dernière division, qui nous occupe spécialement, possède à sa tête M. G. Nicholson, une des personnalités les plus éminentes de l'horticulture anglaise. M. Nicholson est surtout connu en France par son excellent et très remarquable ouvrage, *Dictionnaire d'horticulture*, dont une édition française vient d'être récemment publiée sous la direction de M. S. Mottet; mais il possède d'autres titres à notre gratitude; c'est un membre honoraire de la Société française d'Horticulture de Londres et un de ceux qui ont toujours porté le plus grand intérêt à nos compatriotes. L'assistant-curateur, M. W. Watson, bien connu en Angleterre comme hybridateur heureux, et par la publication d'un certain nombre d'ouvrages d'horticulture, s'occupe plus spécialement du service des serres.

Quatre *foremen* ou chefs de service viennent ensuite ayant chacun sous leurs ordres un département respectif, savoir: 1°. Arboretum; 2°. Jardin botanique (plantes herbacées); 3°, Jardin fleuriste et partie ornementale; 4°. Grande serre tempérée (*sub-tropical department*).

Les autres serres sont placées sous la surveillance directe de l'assistant-curateur, et sont divisées par groupes ayant chacun à leur tête un *sub-foreman*. Nous avons ainsi les subdivisions suivantes: Palmiers, Orchidées, Fougères, multiplication, etc.

Le personnel se divise en trois catégories: 1°, les *labourers* ou manœuvres; 2°, les jardiniers (*gardeners*), 3°, les *sub-foremen* (chefs d'ateliers). Ces derniers sont, lors d'une vacance, choisis parmi les jardiniers. Les deux premiers groupes sont payés à raison de 21 shillings par semaine (26 fr. 25), les *sub-foremen* en obtenant 24, c'est-à-dire 30 fr.

Il n'y a pas de roulement spécial établi pour le passage d'un service dans un autre, cependant chaque jardinier est tenu de rester au moins six mois dans la même division, cette période de temps étant réduite à trois mois pour un étranger.

Les cours (*lectures*) sont donnés dans une salle spéciale, aménagée à cet effet, et ont lieu généralement le soir (sauf pour les leçons d'économie botanique, qui se donnent dans la matinée). Il n'y a pas d'examens, mais les notes, prises et écrites ensuite au net, sont examinées fréquemment et annotées. Un certain minimum de marques est nécessaire pour l'obtention du certificat.

Les cours sont les suivants:—

1°. Physique et Chimie (30 leçons d'une heure); professeur, Dr. J. H. Harris.—Leçons accompagnées de nombreuses expériences.

2°. Botanique systématique (25 leçons); professeur, M. Baker, ancien curateur de l'Herbarium, savant botaniste, bien connu par ses travaux sur les monocotylédones et les fougères.

Les premières leçons ont rapport aux principes de classification botanique basés sur l'organographie, le reste du cours (à part les cinq dernières leçons) étant consacré à une brève étude des familles végétales, en suivant la classification de Bentham et Hooker. Cette classification diffère un peu de celles généralement en usage sur le continent; la voici:—

Cryptogames.—I. Thallophytes (Algues-Champignons). II. Bryophytes (Mousses). III. Ptéridophytes (Fougères, Lycopodiacées, etc.).

Phanérogames.—A. Gymospermes. B. Angiospermes; ce dernier groupe est divisé en
1 Monocotylédones.—(Pétaloides, Glumifères).
2 Dicotylédones.—(a.) Polypétales (Thalamiflores, Caliciflores).
(b.) Gamopétales.
(c.) Incomplètes.

Les cinq dernières leçons consistent en *applications* faites sous forme d'excursions dans le jardin, se décomposant ainsi: jardin alpin (1 excursion), jardin botanique (plantes herbacées, 2 excursions), arbres (1 excursion), arbustes (1 excursion).

3° Géographie Botanique (10 leçons); professeur, M. Brown, assistant à l'Herbarium. Programme: Généralités, origine des plantes, période glaciaire, saisons, action de la chaleur sur les plantes, zone tropicale (1° Amérique, 2° Afrique, 3° Asie); zone subtropicale (Australie, sud de l'Afrique); zone tempérée (hémisphère nord, hémisphère sud); zone arctique. Flores spéciales (îles de Madagascar, Sainte Hélène, Kerguelen, etc.).

Les deux dernières leçons sont consacrées à une étude sur le séchage des plantes pour herbier, particulièrement adaptée aux regions tropicales.

4° Economie Botanique (35 leçons); professeur, M. Jackson, curateur des Muséums.

Ces leçons, excessivement intéressantes, ont lieu dans la matinée et se font sous forme d'excursions à travers les muséums, permettant ainsi une illustration continue des sujets traités. Ce cours est, en réalité, une étude des splendides collections d'économie botanique réunies à Kew.

Voici la liste des plantes économique passées en revue dans ce cours; je prie le lecteur de m'excuser pour cette longue énumeration, mais peut-être n'est-elle pas sans utilité.

Généralités sur l'économie botanique.

Renonculacées.—Aconitum.

Magnoliacées. — Illicium, Liriodendron (Tulipier de Virginie).

Anonacées.— Monodora, Anona (Chérimolier), Xylopia æthiopica (poivre d'Ethiopie),

Ménispermacées.—Chondrodendron tomentosum (Pareira brava), Jateorhiza Columba (racines de Columba), Coscinium fenestratum (faux Columba), Anamirta paniculata (Cocculus indicus du commerce).

Berbéridées.—Berberis, Podophyllum peltatum (pomme de mai).

Nymphéacées.—Nelumbium speciosum.

Papavéracées.—Papaver somniferum (pavot à opium).

Crucifères.—Anastatica hierochuntica (Rose de Jéricho), Cochlearia Armoracia (raifort), Brassica (moutarde), Isatis tinctoria.

Capparidées.—Capparis spinosa (câprier).

Cistinées.—Cistus creticus (résine Ladanum).

Résédacées.—Reseda Luteola (gaude).

Cannellacées.—Cannella alba (cannelle), Cinnamodendron corticosum.

Bixinées. — Cochlospermum Gossypium, Bixa Orellana (Arnotto), Aberia caffra (pommes de Kei), Gynocardia odorata.

Polygalées. — Polygala Senega (Senega), Krameria triandra (racines de Rhatania).

Caryophyllées.—Saponaria officinalis (Saponaire).

Tamariscinées.—Tamarix.

Guttifères.—Pentadesma butyracea (arbre à beurre), Garcinia divers, Calophyllum (Calaba), Mammea americana (Abricot des Antilles).

Ternstrœmiacées.—Caryocar nuciferum (Noix de Souari) Camellia Sasanqua, C. Thea.

Diptérocarpées.—Dipterocarpus, Dryobalanops aromatica (camphre de Sumatra), Vateria acuminata (copal de l'Inde), Shorea robusta.

Malvacées.—1° *Malvées :* Althæa officinalis (Guimauve); 2° *Hibiscées*: Hibiscus, Gossypium (coton); 3° *Bombacées* : Adansonia digitata (Baobab), Bombax malabaricum (arbre à soie), Eriodendron anfractuosum (arbre à soie), Durio zibethinus.

Sterculiacées.— Sterculia (Cola) acuminata (noix de Kola), Theobroma Cacao (cacaoyer).

Tiliacées.—Corchorus (jute), Tilia europæa, Elæocarpus.

Linées.—Linum usitatissimum (Lin), Erythroxylon Coca (Coca).

Malpighiacées.—Byrsonima spicata.

Zygophyllées.—Guiacum.

Géraniacées.—Oxalis Acetosella, Averrhoa.

Rutacées.—1° *Rutées :* Ruta graveolens (Rue) ; 2° *Zanthoxylées :* Cusparia febrifuga (écorce d'Angusture), Barosma (feuilles de Buchu), Zanthoxylum (bois de satin), Feronia elephantum (pomme de bois), Ægle Marmelos ; 3° *Aurantiées :* Citrus.

Simarubées.—Quassia amara (bois de Quassia), Picræna excelsa (bois amer), Irvingia Barteri (graines de Dicka).

Burséracées.—Boswellia Carterii (Frankincense), Balsamodendron (myrrhe), Canarium.

Meliacées.—Melia, Carapa guianensis (huile de Crab), Swietenia Mahogani (Mahogany), Khaya senegalensis, Soymida febrifuga, Chickrassia tabularis, Cedrela odorata (Cèdre des Antilles), Chloroxylon Swietenia (bois de satin).

Ilicinées.—Ilex paraguensis (Maté).

Célastrinées.—Euonymus Hamiltonianus.

Rhamnacées.—Zizyphus Jujuba (jujubier) ; Rhamnus.

Ampélidées.—Vitis vinifera.

Sapindacées. — Paullinia sorbilis (pain de Guarana), Æsculus Hippocastanum (marronnier d'Inde), Cupania edulis, Nephelium (Letchi), Harpullia pendula (Tulipier d'Australie), Acer.

Sabiacées.—Ophiocaryon paradoxum (graines de serpent).

Anacardiacées. — Rhus, Pistacia, Mangifera indica (Manguier), Anacardium occidentale, Semecarpus Anacardium (noix à marquer).

Moringacées.—Moringa pterygosperma.

Légumineuses.—1° *Papilionacées :* Crotalaria juncea, Lupinus, Trigonella Fœnum-græcum (Fenu-grec) ; Indigofera (indigo) ; Astragalus, Glycyrrhiza glabra (Réglisse) ; Æschynomene aspera (Shola), Brya Ebenus (ébène des Antilles) ; Arachis hypogæa (noix de terre) ; Cicer arietinum (pois chiche) ; Abrus precatorius, Glycine hispida (Soja) ; Mucuna pruriens, Butea frondosa (Kino de Bengale) ; Physostigma venenosum (noix de Calabar) ; Phaseolus, Dolichos Lablab, Dalbergia, Pterocarpus Marsupium (vrai Kino) ; Dipterix odorata (bois de Tonkin) ; Castanospermum australe, Toluifera Balsamum (baume de Tolu). 2° *Cæsalpiniées :* Caesalpinia, Hæmatoxylon campechianum (bois de Campêche) ; Gymnocladus sinensis, Cassia, Ceratonia Siliqua (Caroubier) ; Bauhinia, Afzelia, Trachylobium Hornemannianum (Copal fossile) ; Hymenæa Courbaril, Tamarindus indica (Tamarin) ; Copaifera, Dimorphandra oleifera. 3° *Mimosées :* Entada scandens, Tetrapleura Thonningii, Adenanthera pavonina, Lysiloma Sabicu, Calliandra Saman (arbre à pluie) ; Albizzia, Enterolobium Timbouva).

Rosacées.—Moquilea utilis (arbre à poterie du Pará), Hirtella americana, Quillaja saponaria (écorce Quillaia), Prunus, Roses.

Saxifragées.—Ribes.

Hamamélidées.—Liquidambar orientalis (storax).

Rhizophorées.—Rhizophora (palétuvier), Ceriops Roxburghiana.

Combrétacées.—Terminalia (Myrobolan).

Myrtacées.—Melaleuca, Eucalyptus, Psidium (goyavier, Pimenta officinalis, Eugenia caryophyllata (clous de Girofles), Barringtonia speciosa, Lecythis, Bertholletia excelsa (noix du Brésil).

Lythrariées.—Physocalymna floridum (tulipier du Brésil), Lawsonia alba (Henné), Lagerstrœmia, Punica Granatum (Grenadier).

Onagrariées.—Fuchsia excorticata, Trapa (macre).

Passiflorées.—Passiflora, Carica Papaya (papaye).

Cucurbitacées.—Telfairiao ccidentalis, Lagenaria vulgaris (gourde), Luffa ægyptiaca, Citrullus Colocynthis (coloquinte), Ecbalium Elaterium, Zanonia macrocarpa, Fevillea cordifolia, Sechium edule.

Cactées.—Opuntia.

Ombellifères.—Hermas gigantea, Carum, Dorema Ammoniacum (gomme ammoniacum), Ferula (Assa-fœtida).

Araliacées.—Aralia (ginseng) Fatsia papyrifera (papier de riz).

Cornacées.—Cornus.

Rubiacées.—Sarcocephalus esculentus (pêche de Sierra-Leone), Uncaria Gambier (Catechu), Gardenia lucida, Cinchona (arbre à quinine), Coffea (caféier), Morinda, Cephaëlis Ipecacuanha, Psychotria emetica, Rubia tinctorum (garance).

Valérianées.—Valeriana officinalis, Nardostachys Jatamansi.

Dipsacées.—Dipsacus fullonum (cardon à frulon).

Composées.—Raoulia (plante-brebis), Olearia argophylla (bois musqué), Helichrysum (Immortelles), Helianthus, Guizotia abyssinica, Anthemis nobilis (camomile), Artemisia Absinthium (absinthe), Arnica montana, Bedfordia salicina, Carthamus tinctorius, Cichorium Intybus (chicorée), Taraxacum officinale (pissenlit), Lactuca.

Campanulacées.—Lobelia inflata (tabac indien).

Vacciniées.—Oxycoccos.

Ericacées.—Erica arborea, Rhododendron californicum.

Sapotacées.—Chrysophyllum Cainito (pomme étoilée) Lucuma mammosa, Argania Sideroxylon (Argan) Dichopsis Gutta (gutta-percha), Achras Sapota (sapotillier), Bassia, Mimusops globosa (Balata), Butyrospermum Parkii.

Ebénacées.—Diospyros.

Styracées.—Styrax Benzoin (benjoin).

Oléacées.—Fraxinus Ornus, Olea (olivier).

Apocynacées.— Landolphia (lianes à caoutchouc), Hancornia speciosa, Aspidosperma excelsum, Alstonia, Strophanthus hispidus, Wrightia tinctoria, Kickxia elastica.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

Asclépiadées.—Calotropis.

Loganiacées.—Strychnos (noix vomique).

Gentianées.—Gentiana lutea, Ophelia Chirata.

Boraginées.—Alkanna tinctoria.

Convolvulacées.—Ipomœa Purga (Jalap), Ipomœa Batatas (patate), Convolvulus Scammonia (Scammonée).

Solanées.—Capsicum, Atropa Belladona, Datura Stramonium, Hyoscyamus niger, Nicotiana Tabacum.

Scrophularinées.—Digitalis purpurea.

Bignoniacées.—Oroxylum indicum, Crescentia Cujete.

Pédalinées.—Martynia proboscidea, Harpagophytum procumbens, Sesamum indicum (sésame).

Verbénacées.—Tectona grandis (Teck).

Labiées.—Lavandula vera (lavande), Mentha, Thymus vulgaris, Salvia officinalis, Rosmarinus officinalis, Perilla ocymoides (papier Japonais).

Plantaginées.—Plantago Ispaghula.

Chénopodiacées.—Chenopodium Quinoa, Beta maritima (Betterave).

Polygonacées.—Polygonum, Rheum.

Aristolochiées.—Aristolochia.

Pipéracées.—Piper nigrum (poivre).

Myristicées.—Myristica fragrans (nutmeg).

Laurinées.—Cinnamomum, Persea gratissima (avocatier), Sassafras officinale, Nectandra Rodiæi, Laurus nobilis.

Protéacées.—Grevillea robusta, Macadamia ternifolia, Guevina avellana, Brabejum stellatum, Leucadendron argenteum (arbre d'argent).

Thyméléacées.—Daphne, Lagetta lintearia, Aquilaria Agallocha.

Loranthacées.—Loranthus.

Santalacées.—Santalum album (bois de santal).

Euphorbiacées.—Euphorbia resinifera, Buxus sempervirens, Oldfieldia africana, Hevea brasiliensis (caoutchouc du Pará), Aleurites moluccana, Croton, Manihot, Mallotus philippinensis, Ricinus communis, Sapium sebiferum, Hura crepitans.

Urticacées.—1°, *Ulmées:* Ulmus campestris; 2°, *Celtidées:* Celtis; 3°, *Cannabinées:* Humulus Lupulus (houblon), Cannabis sativa (chanvre); 4°, *Morées:* Broussonetia, Chlorophora tinctoria, Morus; 5°, *Artocarpées:* Ficus, Brosimum Aubletii, Antiaris toxicaria. Castilloa elastica (caoutchouc des Antilles), Artocarpus; 6°, *Urticées:* Urtica dioica, Girardinia heterophylla, Bœhmeria nivea (ramie), Laportea gigas.

Platanées.—Platanus.

Juglandées.—Carya, Juglans.

Myricacées.—Myrica.

Casuarinées.—Casuarina.

Cupulifères.—Betula, Alnus, Corylus, Carpinus, Quercus, Castanea, Fagus.

Salicinées.—Salix.

Conifères.—1°. *Cupressinées:* Callitris quadrivalvis (bois d'arrar), Thuya gigantea, Cupressus nootkatensis, Juniperus; 2°, *Taxodiées:* Taxodium, Sequoia; 3°, *Taxinées:* Torreya nucifera, Taxus baccata; 4°, *Podocarpées:* Podocarpus Totara; 5°, *Araucariées:* Dammara australis, Araucaria; 6°, *Abiétinées:* Pinus, Cedrus, Abies.

Monocotylédones.—Orchidées: Vanilla, Eulophia, Orchis.

Scitaminées.—Curcuma longa, Amomum, Elettaria Cardamomum, Zingiber officinale (Gingembre), Maranta arundinacea, Musa (bananier).

Broméliacées.—Ananassa.

Hæmodoracées.—Sansevieria.

Iridées.—Iris, Crocus sativus (safran).

Amaryllidées.—Agave.

Dioscoréacées.—Dioscorea.

Liliacées.—Smilax, Phormium tenax, Aloe.

Juncacées.—Xanthorrhœa, Kingia australis.

Palmiers.—1°, *Arécinées:* Areca Catechu, Ceroxylon Andicola, Manicaria saccifera, Arenga saccharifera, Caryota urens, Leopoldinia Piassaba, Phytelephas macrocarpa; 2°, *Phœnicées:* Phœnix dactylifera et sylvestris; 3°, *Coryphées:* Corypha umbraculifera, Copernicia cerifera, Trachycarpus excelsa, Chamærops humilis; 4°, *Lépidocaryées:* Calamus, Dæmonorops, Raphia, Metroxylon Sagu (sagoutier), Mauritia flexuosa; 5°, *Borassinées:* Borassus flabelliformis, Lodoicea sechellarum, Hyphæne thebaica; 6°, *Cocoinées:* Astrocaryum, Acrocomia sclerocarpa, Bactris Gasipaes, Elæis guineenis, Attalea, Jubæa spectabilis, Cocos nucifera, Maximiliana regia.

Pandanées.—Pandanus utilis.

Typhacées.—Typha latifolia.

Cypéracées.—Cyperus.

Graminées.—Pennisetum, Paspalum, Panicum, Sorghum, Zea Mays, Oryza sativa, Saccharum officinarum, Andropogon, Macrochloa tenacissima, Avena sativa, Triticum vulgare, Hordeum vulgare, Bambusa, Dendrocalamus.

Cette liste ne comprend que les noms de genres dont les produits sont étudiés dans ce cours et est loin d'englober toutes les plantes économiques représentées par des échantillons dans les riches collections de Kew.

En dehors de ces cours, un certain nombre d'excursions ont lieu pendant l'année aux différentes expositions d'horticulture, une visite à l'Herbarium est organisée, etc. . . . En outre, chaque mercredi matin, trois quarts d'heure sont accordés sur le temps de travail, pour la visite des serres et des cultures.

Je dois maintenant mentionner deux institutions à peu près spéciales à Kew, je crois, et qui donnent certainement d'excellents résultats.

La première de ces institutions, déjà vieille de vingt ans, est la "*Kew Gardener's Mutual Improvement Society*," qui organisa pendant les mois d'hiver, sous la présidence de l'assistant-curateur, M. Watson, des réunions hebdomadaires.

À chaque séance, un des jardiniers ou contremaîtres lit un rapport sur une question spéciale en connexion avec l'horticulture; ce rapport est ensuite discuté entre tous les membres présents. Voici, comme exemple, quelques titres de sujets traités dans la dernière session: Horticulture commerciale; Plantes alpines; Cultures pour graines en Allemagne; Plantes grasses et Cactées; Emballage des plantes, etc. . . .

Un prix donné par Sir J. Hooker, le grand botaniste anglais, est accordé, chaque année, par vote, à celui qui a le mieux contribué à rendre les séances intéressantes.

Un certain nombre de conférences, faites par de hauts dignitaires de Kew, contribue à rendre l'ensemble éminement profitable.

Ces réunions hebdomadaires offrent, à mon avis, le grand avantage d'habituer les jeunes gens à exprimer leurs idées en public d'une façon claire et précise, de leur apprendre à exposer leurs critiques loyalement, sans nervosité aucune et surtout sans animosité.

Ces "*meetings*" montrent bien un des nombreux et excellents côtés du peuple anglais qui est, l'on peut dire, le peuple "parlementaire" par excellence; dès que le seuil de la salle est franchi, toute familiarité disparaît; les assistants se conduisent en parfaits *gentlemen*, témoignant une profonde déférence pour le président et discutent d'une façon absolument posée, sans excitation, sans mots vifs. . . . Il y aurait, je crois, une leçon à prendre pour bon nombre de nos réunions horticoles.

La seconde de ces institutions, le "*British Botany Club*," a été créée dans le but d'attirer l'attention des élèves vers le séchage des plantes pour la confection d'herbiers, en même temps pour leur faire ample connaissance avec la flore indigène. Dans ce but, pendant tout l'été, des herborisations hebdomadaires sont organisées dans les environs sous la conduite d'un contremaître ou d'un membre de l'Herbarium; en outre, quatre grandes herborisations d'une après-midi ont lieu dans le courant de l'été. Un diplôme spécial est accordé à toutes les collections d'au moins 200 plantes faites durant une seule saison, les spécimens étant représentés bien complets, correctement nommés et proprement montés. Trois prix sont accordés aux élèves présentant le plus grand nombre de spécimens.

Enfin, j'arrive à un des plus grands avantages que Kew accorde au jardinier profondément désireux de s'intruire. Je veux parler de la bibliothèque. Cette bibliothèque, composé d'environs 1,500 volumes, exclusivement horticoles ou botaniques, est spécialment réservée aux "*Kewites*" et comprend tous les principaux ouvrages publiés à ce sujet en anglais, ainsi qu'un certain

nombre d'ouvrages allemands ou français. En outre, la bibliothèque reçoit toutes les publications horticoles anglaises, ainsi qu'un grand nombre de journaux étrangers. Elle est ouverte tous les soirs, excepté le samedi, de 7 heures (6 heures en hiver) jusqu'à 10 heures du soir, les élèves prennent à tour de rôle, pour une semaine, le service de bibliothécaire.

Le "*Kew Guild*" englobe, comme je l'ai dit, en outre des jardiniers anciens et actuels, tous ceux qui ont occupé dans Kew une position responsable quelconque. Le comité se compose de sept *kewites*, soit quatre membres permanents, un *subforeman*, un membre du personnel de l'Herbarium et un jardinier, ainsi que de dix anciens kewites. Tous sont élus chaque année, lors de la réunion générale qui a lieu en février. Le président actuel est M. Nicholson. Un très intéressant Bulletin, servant de lien entre tous les membres dispersés par le monde entier, est publié chaque année en mai.

Comme toute association qui se respecte en Angleterre, "Kew Gardens" a son "*cricket club*," le *cricket* se disputant, en effet, avec le *football*, le titre de "sport national." Les Anglais prétendent que c'est à la pratique générale de ces deux jeux que la race anglo-saxonne doit sa supériorité. Sans aller jusque-là, nous ne pouvons cependant nier l'influence énorme qu'ils ont sur la santé publique et particulièrement à Kew, où les jardiniers employés dans les serres chaudes ont grand besoin, de temps à autre, d'un peu d'exercice en plein air. "*Kew Gardens*" a donc son "cricket club" et ses *matches* sont, ma foi, très suivis.

Une après-midi de libre, le samedi, généreusement accordée tous les mois, permets aux amateurs de se livrer à leur sport favori.

La durée du séjour à Kew est de *deux* années pour tous les sujets de l'empire britannique, mais cette période est réduite à une année pour les étrangers.

Le postulant ne doit pas être agé de moins de 20 ans, ni de plus de 25. Il doit posséder un minimum d'au moins cinq années d'expérience pratique dans les meilleurs établissements d'horticulture ou jardins privés, période comprenant au moins deux années de culture sous verre.

S'il est étranger, il doit parler à peu près couramment l'anglais.

Les différentes formalités à remplir sont les suivantes : en premier lieu, solliciter du curateur une formule d'admission en accompagnant, autant que possible, la demande d'une recommandation quelconque ; signaler, sur cette formule, les différentes situations occupées précédemment, le temps passé dans chacune d'elles ; mentionner l'âge, la nationalité, s'il y a lieu ; enfin, les divers diplômes qui ont pu être obtenus par le postulant. Cette formule, une fois remplie, doit être signée par le patron du dernier établissement dans lequel le candidat a travaillé. Joindre à cette feuille une copie de tous les certificats mentionnés, ainsi qu'une demande d'admission adressée au curateur des jardins. Si la demande est accueillie favorablement, le postulant en est informé ; mais il doit la renouveler de trois mois en trois mois, jusqu'à son admission définitive.

À la fin du temps de séjour prescrit, tous les stagiaires reçoivent un certificat général relatant les différents services dans lesquels ils ont été employés. Un autre certificat, spécial aux cours, mentionne ceux dans lesquels le minimum des points requis a été atteint.

Lorsqu'une vacance se produit parmi les *subforemen* (chefs d'atelier), un jardinier est choisi pour combler le vide, et, par ce fait, la durée de son temps à Kew se trouve augmentée ; malgré cela, le séjour total ne doit excéder cinq années.

Le nombre actuel des jardiniers stagiaires est de quarantedeux, dont cinq étrangers ; les *subforemen* sont au nombre de dix.

Depuis quelques années, un certain nombre de femmes (trois au minimum) sont admises comme stagiaires ; une d'entre elles s'est même élévée au rang de *subforeman*. Toutes sortent du college d'horticulture de Swanley, qui s'est proposé le but louable, mais peut-être un peu audacieux, de former des femmes jardiniers.

Nous avons vu que le nombre des étrangers est très limité, cinq ; il s'ensuit que l'admission à ce titre est excessivement difficile à obtenir, les demandes affluant de toutes parts, les postulants sont souvent obligés d'attendre pendant deux ou trois années avant de pouvoir être admis. Les pays qui ont été les plus représentés jusqu'ici à Kew sont : l'Allemagne, la Hollande, la Belgique et le Danemark. Les Français sont en très petit nombre sur les listes, probablement que pour beaucoup d'entre eux, le service militaire est un empêchement, par suite du temps considérable nécessité pour l'admission, cependant, il serait à désirer qu'un plus grand nombre de nos compatriotes sollicitent la faveur d'être admis.

Sir W. T. Thiselton-Dyer, K.C.M.G., C.B.S. — 29 Nov. 1900.

C'est aux autorités de Kew que l'empire anglais doit la création des nombreux établissements botaniques qu'il renferme, c'est même à Kew que sont formés les hommes appelés à les diriger. Et c'est là, à mon avis, un des côtés les plus intéressants sous lesquels on peut considérer Kew, une pépinière d'hommes pour l'œuvre coloniale, mais il ne faut pas croire que tous les stagiaires peuvent aspirer à ces situations, une sélection encore plus rigoreuse que celle qui préside à l'admission est faite, et les hommes choisis pour devenir les pionniers de l'agriculture dans les parties les plus reculées de l'Empire britannique sont seulement ceux reconnus particulièrement aptes pour cette tâche. Grâce à cette règle de conduite, l'Angleterre possède un corps de botanistes coloniaux absolument de premier ordre.

En résumé, Kew est surtout un établissement d'enseignement pratique, les cours n'y ayant qu'une importance tout à fait secondaire. C'est un champ d'études et d'observations qui n'a probablement pas son pareil dans le monde entier, et je crois que pour être apte à en profiter pleinement, notre jardinier doit être complètement développé à la fois théoriquement et pratiquement.

Nous venons de passer en revue Kew, considéré comme établissement d'enseignement horticole, le Kew "université d'horticulture," le mot a été dit. Ce n'est certainement pas le côté le moins important, quoique cependant, dans les nombreuses études faites sur cet établissement, il soit très souvent passé sous silence.

Il me resterait, si le temps et l'espace ne me faisaient pas défaut, à traiter maintenant de Kew en général, à essayer de donner une idée du vaste champ d'études qu'un crédit annuel de plus d'un demi-million peut permettre, ainsi que de l'immense travail embrassé et de la merveilleuse organisation qui préside à sa répartition.

Il me faudrait examiner en detail les vastes collection de plantes vivantes de toutes sortes, depuis *l'Arboretum*, le jardin botanique et le jardin alpin, jusqu'aux nombreuses serres chaudes, en passant par la grande serre tempérée, achevée tout dernièrement, vaste palais vitré d'une surface de plus de 80 ares, la plus grande serre du monde jusqu'à présent.

Il me faudrait mentionner les riches collections d'économie botanique, la magnifique galerie de peintures de Miss North, le célèbre peintre explorateur : *l'Herbarium* le plus riche du monde, renfermant, en outre d'une collection de plantes sèches, une collection de dessins non moins importante ; la bibliothèque, possédant de rarissimes ouvrages de botanique et d'horticulture d'un prix inestimable.

En dehors de cela, il me faudrait Kew, avec son lac splendide, comme un des plus jolis parcs publics d'Angleterre, le rendez-vous favori des Londiniens.

Mais, surtout ce que je ne devrais pas omettre, c'est le rôle de Kew, son influence à la fois intérieure et extérieure ; par ses publications scientifiques de longue haleine, témoin le fameux *Index Kewensis*, un des plus gigantesques travaux de compilation qui aient jamais été entrepris ; par son organe mensuel, le *Kew Bulletin* ; par les recherches scientifiques poursuivies dans le laboratoire qui lui est annexé ; par les renseignements de toute nature qu'il est en mesure de fournir ; par ses incessantes tentatives d'acclimatation de végétaux utiles et, à ce titre, l'introduction de l'arbre à quinquina dans l'Inde restera l'un de ses plus signalés services ; par son échange continuel de plantes et de graines avec les pays du monde ; par . . . que sais-je ? . . . L'énumération serait interminable.

Kew, sous la savante impulsion de son directeur actuel, Sir W. T. Thiselton-Dyer, est certainement arrivé à l'apogée de sa carrière ; son influence bienfaisante en matières botaniques et coloniales est immense et se répand sur le monde entier. C'est d'ailleurs, d'après une décision parlementaire, vieille de plus de cinquante ans déjà, la seule autorité scientifique prépondérante à ce sujet pour tout l'Empire britannique. Sa décision fait loi.

Mais surtout, ce que nous ne devons pas publier, c'est la dette considérable de reconnaissance que l'horticulture européenne à contractée envers Kew par le nombre considérable de plantes ornementales introduites par son

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S

29 Nov. 1900.

intermédiare, par le magnifique élan donné par son exemple.

En effet, dès 1772, Kew commença à envoyer des collecteurs dans le monde entier; les Masson, les Nelson, les Cunningham, les Kerr, les Lockart, célèbres explorateurs botanistes auxquels nous devons tant de jolies choses, n'étaient que de simples jardiniers de Kew.

The general result of Kew training is not merely to impart to the men a considerable body of technical instruction, but also to infuse into them an element of seriousness and purpose, and to quicken their general intelligence.

An even more important result is to obtain a body of men from which the numerous minor Government posts in India and the colonies can be filled. At the present time there are some 80 Kew men who are curators or superintendents of botanical gardens in different parts of the empire. Unhappily no less than five of their predecessors have succumbed to the climate of the West Coast of Africa.

The following summary gives the distribution of 510 men who have passed through Kew, and whose present addresses are known:—

Europe - - - - - -	355
Asia - - - - - -	45
Africa - - - - - -	28
America - - - - - -	66
Australia and New Zealand - -	16

including Falkland Islands, China, Chili, Perak, Fiji, Senegal, Hayti, Sumatra, Congo, Angola, British Central Africa, Mozambique, Transvaal, Egypt, etc.

Number of

Curators and Superintendents -	80
Head gardeners - - -	125
Nurserymen - - - -	100
Foremen - - - - -	50
Editors of papers and County Council lecturers - - -	18

Special arrangements have been made for admitting students, artists, and others who visit Kew with some definite object in view during private hours in the morning. A written application for such admission is required. To those to whom it is granted facilities are given which cannot be extended to the general public. The privilege was much appreciated, but it has been curtailed by the earlier hours of opening to the general public. This has excited warm protests from artists, as well as on behalf of the Indian Forest students from Cooper's Hill, who during the summer months visit the establishment weekly.

The collections of living plants are grown for scientific purposes, and for the inspection of the public, including students. It is not permitted to visitors to gather specimens, and it would be impracticable to allow this to be done. A small private "students' garden" has therefore been formed, in which a typical collection of herbaceous plants is grown, and in this students are permitted to gather specimens for examination and study.

A supply of cut plants is sent weekly to the Royal School of Art at South Kensington.

An arrangement has been made with the School Board for London by which specimens suitable for demonstration are supplied to the Board, who undertake their distribution to the schools.

An extensive distribution of seeds takes place annually. These are freely supplied to educational institutions, and by way of exchange to probably the majority of the botanic establishments of the world. The distribution for 1899-1900 amounted to 10,337 packets sent to 133 institutions.

(3.) The ultimate end of the immense living collections maintained at Kew must be the furtherance of research. In this respect it is a matter of regret that their richness and extent are insufficiently appreciated. This is not the case on the taxonomic side, on which they are incessantly drawn upon. But for morphological and anatomical investigation there is still room for further development. The belief exists widely amongst the younger men engaged in botanical research that it is necessary to go to a foreign country to prosecute investigation. But in a large majority of cases ample material is available at Kew in a much more accessible form. The collection, for example, of vascular cryptogams has probably no parallel anywhere.

Men do, however, come to Kew for research and from all parts of the world, and to those every possible assistance is given. Applications for material from persons abroad are less freely complied with. This does not arise from any indisposition to assist foreign workers, but simply from want of a staff to prepare and despatch the material in a proper way. It is, however, always open to a foreign investigator to conduct his research at Kew, and many do so.

(4.) Kew on its cultural side is generally regarded as the botanical headquarters of the empire. It may be roughly described in this respect (i.) as a "central depôt"; (ii.) as a "clearing house." This aspect of its work can only be briefly summarised.

Besides the standard collection of economic plants exhibited to the public a large stock is constantly kept on hand. But as everything depends on their being accurately identified the necessity of controlling work of this kind by the resources of a herbarium and a skilled botanical staff is obvious. The Dutch cinchona enterprise in Java was hampered for many years by the cultivation of a species which was subsequently discovered to be worthless. At the present moment Kew is engaged in an investigation of the little known but unexpectedly numerous trees which produce india-rubber in tropical Africa and South America.

Kew then on its own initiative distributes to botanic gardens and stations throughout the empire plants which are likely to afford the foundation of new cultures. At the present moment it is particularly engaged with the West African colonies, the resources of which have hitherto been mainly natural products, many of which are becoming exhausted.

Besides this Kew undertakes larger enterprises at the instance of the Government when it deems them advisable. Of these the most important was the introduction of *Cinchona* into India in 1861, and of South American rubber trees into that empire in 1876. The Government of India has recently sanctioned the planting of 10,000 acres in Burma with the tree yielding Pará rubber. The plants will be the descendants of those originally introduced through Kew. Minor operations are the transfer of plants in quantity from the new world to the old and *vice versâ*. These are received at Kew, nursed to recovery, repacked, and redespatched. A seedling sugar-cane raised at Kew and sent out to Queensland has been named "Kewensis," and it is said to be prolific and of high value.

B.—Herbarium and Library.—These are not accessible to the general public. Their use is restricted to the official work of the establishment and purposes of research. Its different heads may be briefly summarised as follows:—

1. Identifying and verifying the names of plants cultivated at Kew. This need not be further dwelt upon.

2. Naming plants sent by the public for identification. During 1899 about 2,000 speciments were so named. This is rather a heavy tax on the time of the staff, but often leads to important material being obtained from previously unknown correspondents.

3. The discussion of specimens transmitted by the Foreign, India, Colonial, and other Government Offices, especially of plants yielding oils, fibres, rubber, or other substances of commercial value.

4. The gradual elaboration of a botanical survey of the whole empire. About 1856 the Government sanctioned a scheme for the preparation of a series of floras or descriptions in the English language of the indigenous plants of British colonies and possessions. In 1863 Sir W. Hooker addressed a memorandum to the Colonial Office which was printed as a Government paper.

In this the scheme assumed a more mature form. The general principle was that the plan of the floras should be uniform octavos, and that publication should be secured by the Home or Colonial Governments guaranteeing to take 100 copies of each volume at the published price. On this basis the work has since proceeded. The floras of the following portions of the Empire are completed:—

Enumeration of Ceylon Plants (1858-64) by G. H. K. Thwaites, F.R.S., edited by Sir Joseph Hooker.

South Africa, by Harvey, Sonder and others (1859-65),

3 vols.; continuation by Sir W. Thiselton-Dyer (1896-1900), 2 vols., and in progress.

Hong Kong (1861), by G. Bentham, F.R.S.

Australia (1863-78), 7 vols., by G. Bentham, F.R.S.

New Zealand (1864-67), by Sir J. D. Hooker, F.R.S.

West Indies (1859-64), by Dr. Grisebach.

Tropical Africa (1868-77), 3 vols., by Prof. Oliver, F.R.S., 3 vols., continuation by Sir W. Thiselton-Dyer (1897-1900), 2 vols., and in progress.

Flora of British India (1875-97), 7 vols., by Sir J. D. Hooker, F.R.S.

Mauritius and Seychelles (1877), by J. G. Baker, F.R.S.

Bermuda, Ascension, and St. Helena (1885), by W. B. Hemsley, F.R.S. (published in the "Challenger" Reports).

It is to be observed that although some of these works have been executed by persons not in official employment at Kew, the material upon which they worked had all been accumulated, studied, and arranged by the Kew scientific staff. It is further to be observed that in so far as members of the Kew staff were separately remunerated for their labours, these were the occupation of their private time.

5. An enormous amount of other scientific work has emanated from Kew. For this reference may be made to the Bibliography published in the "Kew Bulletin" for January, 1897.

6. By an arrangement with the India Office (Feb. 20, 1883) a contribution is made to Kew from Indian funds, including the payment of an assistant for work done for Indian botanical establishments.

7. Under the authority of the Treasury (Jan. 29, 1900), Kew has undertaken the technical botanical work of the Board of Agriculture.

8. The collections made by Government expeditions have usually been sent to Kew, those of the "Challenger" for example, to be worked out. This is done in official time. The collections of private expenditure are also undertaken on the condition that the first set is deposited in the Kew herbarium. This is one of the most effective means by which the herbarium has been enriched.

ix. The Kew library and herbarium are at the disposal of all competent persons engaged in research. The regulations for admission are attached:—

REGULATIONS to be observed by Visitors to the Herbarium of the Royal Botanic Gardens, Kew.

Visitors are requested, on entering the building, to insert their names in the Visitors' Book, kept in the Hall.

The keeper of the Herbarium and his assistants are in attendance daily (Sundays, Good Friday, and Christmas Day excepted), from 10 a.m. to 5 p.m. in summer, and until dusk in winter, when application may be made to them by visitors for the specimens and books which they require.

Botanists engaged in the arrangement of large collections, upon monographs or floras, and foreigners resident for a short time only in this country, desirous of access to the Herbarium at any earlier hour of the day, must apply to the director for special permission.

The library being specially destined for the illustration of the herbarium, museums, and garden, cannot be made use of for compilations, reviews, or similar purposes.

No person shall be allowed to remove any flower or other portion of a specimen for dissection or examination without permission.

No person shall be allowed to remove any book, pamphlet, or periodical belonging to the library from the herbarium building.

No person shall enter any names, or make any notes on the sheets to which the specimens are attached, excepting in pencil; and it is particularly requested that the attention of the keeper of the herbarium or his assistants be called to any names so entered, as well as to any specimens which may be found misnamed or misplaced.

Before quitting the herbarium building the specimens and books which have been in use by visitors must be returned to the officers. Visitors are requested not to put them away themselves.

W. T. THISELTON DYER,
Director of the Royal Gardens.

D. OLIVER,
Keeper of the Herbarium and Library.

September 1, 1886.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

The total number of visits of persons applying for information or for purposes of original work in 1899 was 2,549.

The visitors included botanists of ten nationalities, namely, British, 60; American, 9; Danish, 1; Dutch, 1; French, 18; German, 11; Italian, 2; Norwegian, 1; Swiss, 3; and Russian, 3.

Among the British botanists were several who attended very frequently and some almost daily. The following names and particulars will give some idea of the nature and extent of the work accomplished by visitors to the herbarium:—

Sir Joseph Hooker: Flora of Ceylon. "Botanical Magazine."

Mr. B. D. Jackson: Catalogue of the Library. Supplement to the Index Kewensis. Glossary of Botanic Terms.

Mr. C. B. Clarke: Flora of Tropical Africa. Flora of South Africa. Monograph of the *Cyperaceæ*.

Mr. E. S. Salmon: Monograph of the *Erysipheæ*. Monograph of the genus *Fissidens*. *Musci sinenses*.

Dr. G. W. Parker: Flora of British Guiana.

Dr. F. N. Williams: *Caryophyllaceæ*.

Mr. W. P. Hiern: Flora of West Tropical Africa.

Mr. E. M. Holmes: Chiefly medicinal plants.

Mr. Robertson-Glasgow: Fungi of Singapore.

Mr. S. Le M. Moore; Flora of West Australia.

Dr. A. B. Rendle: Grasses of West Africa and China. Genus *Naias*.

Major A. H. Wolley-Dod: Plants of the Cape Peninsula.

Dr. R. Braithwaite: Moss Flora of the United Kingdom.

Dr. J. W. H. Trail: General Studies.

Dr. M. T. Masters: General Studies, and *Restiaceæ* of South Africa.

Mr. L. A. Boodle: Anatomy of *Lycopodium*.

Dr. I. B. Balfour: General Studies.

Sir John Kirk: Flora of East Tropical Africa.

Rev. R. P. Murray: Flora of the Canaries.

Mr. D. E. Hutchins: Flora of South Africa.

Mr. E. G. Baker: Monograph of the *Malvaceæ*.

Mr. J. G. Baker: Ferns, and Petaloid Monocotyledons.

Prof. F. O. Bower: Anatomy of Ferns.

Mr. H. Groves: *Characeæ*.

Prof. H. Marshall Ward: General Studies.

Prof. A. H. Church: Economic Plants of India and other countries.

Among the botanists specially engaged on the flora of India were:—

Mr. C. B. Clarke: General.

Mr. C. W. Hope: Ferns.

Sir Henry Collett: Flora of Simla.

Sir George King: Flora of the Malay Peninsula.

Dr .D. Prain: General.

Sir Dietrich Brandis: Forest Trees.

Mr. J. S. Gamble: Bamboos.

Mr. G. M. Woodrow: Grasses.

Colonel R. Beddome: Ferns.

Dr. T. Cooke: Flora of Bombay.

Among the botanists specially engaged on the Colonial work were:—

Mr. J. C. Willis: Ceylon.

Dr. G. W. Parker: British Guiana.

Messrs. W. H. Johnson and J. H. Holland: West African Settlements.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

Among the visitors who worked at the botany of the British Islands were:—

Mr. Leslie Stephen.

Mr. G. C. Druce.

Mr. Arthur Bennett.

Mr. E. A. L. Batters.

Mr. E. C. Horrell.

Foreign botanists who used the herbarium for a considerable time in 1899:—

Prof. W. G. Farlow, of Harvard University, spent some weeks studying the Cryptogamic collections.

Dr. E. A. Burt, Professor of Natural History, Middleburg College, New York, worked at the *Thelephoreæ*.

Captain J. Donnell Smith, of Baltimore: Flora of Guatemala.

Mr. Drake del Castillo, the owner of a large private herbarium in Paris, studied the Madagascar collections.

Prof. M. Cornu, Director of the Jardin des Plantes, Paris: Chinese plants.

Mr. Eugène Poisson: Rubber-producing plants.

Mr. Godefroy-Lebœuf: Rubber-producing plants.

Count zu Solms-Laubach, Director of the Strassburg Botanic Garden: General work.

Dr. A. Voight, of Hamburg: *Apocynaceæ*.

Dr. J. Briquet, Director of the Botanic Garden, Geneva: *Labiatæ*.

Dr. G. Hochreutiner, of Geneva, spent six or seven months studying the *Malvaceæ*.

Mr. M. Micheli, a private gentleman of Geneva: *Leguminosæ* of Central America.

Dr. Hugo de Vries, Director of the Botanical Laboratory of the University of Amsterdam: General studies.

Dr. J. E. Lange, of Copenhagen: Parasitic Fungi.

Dr. M. Foslie, Curator of the Botanical Department of the Natural History Society of Trondhjem: Marine *Algæ*.

Mr. B. Fedtschenko and Mrs. Fedtschenko, of Moscow: The plants of Russian Turkestan.

By an arrangement with the Royal Geographical Society technical instruction is given to persons about to engage in expeditions.

C.—Museums.—These differ from the library and herbarium in being open to public inspection. They are closed during the morning hours, but are then accessible on application to students and persons who wish to examine the specimens in the cases.

As already explained, the museums are partly an adjunct to the herbarium, partly an independent economic collection. The latter is in constant use in connection with the daily correspondence and the identification of specimens sent by commercial enquirers and others. There is probably no industry in the country which uses vegetable materials which does not have recourse to Kew at some time or other. A prolonged investigation was undertaken on behalf of the War Office in connection with the Lee-Metford rifle. An example of a commercial application is enclosed:—

W. T. Henley's Telegraph Works Co., Ltd., to Royal Gardens, Kew.

27, Martin's Lane, Cannon Street,
London, E.C., 18th Sept., 1900.

Sir,—We enclose copy of an extract from the consular report on the trade of Zanzibar for the year 1899; and the Foreign Office has suggested that we should communicate with you with regard to the matter. We shall be obliged if you will kindly inform us if you have received any samples of the gum referred to, and if so, whether you could supply us with a sample in order that we may experiment with it with a view to ascertaining if the material is likely to be of any commercial value.

Yours truly,
(Signed) G. Sutton,
Managing Director.

The Director of the Royal Gardens, Kew.

Constant communication is kept up with the leading brokers in the City: the technical information supplied by Kew is thus completed by commercial data.

Surplus material and duplicates are systematically distributed to elementary schools throughout the country as available. From June 1, 1890, to June 1, 1900, 7,252 duplicate specimens have been distributed to 342 schools. The accompanying application will sufficiently illustrate the nature of this branch of work.

City of Nottingham School Board.
Offices, Victoria Street,
Nottingham, 4th July, 1900.

The Director, Royal Gardens, Kew.

Sir,—Inasmuch as we are informed that you have presented to the Todmorden School Board the very valuable set of botanical specimens detailed in the enclosed list, my Board venture to ask whether you will extend your kindness to us by granting us a similar set for our Central Peripatetic Science Department, the instructors of which would make use of them in their visits to the various schools of the Board, which has about 40,000 children on its registers.

I am, Sir, yours faithfully,
W. J. Abel,
Clerk.

Todmorden School Board.

List of specimens presented to the Board by the Director of the Royal Gardens, Kew, 29th May, 1900.

1. Wood of *Cæsalpinia Sappan*. Java.
2. Veneer of Pear Wood (*Pyrus communis*).
3. Wood of *Pithecolobium pruinosum*. New South Wales.
4. Crabwood (*Carapa guianensis*). Lagos.
5. African Mahogany (*Khaya senegalensis*). Lagos.
6. Cutch, from *Acacia Catechu*. Burma.
7. Roots of long pepper (*Piper longum*). India.
8. Fibrous bark of *Bœhmeria macrophylla*. Used for fishing nets. N.W. Provinces and Oudh.
9. Raffia, the cuticle of the leaves of *Raphia vinifera*. Sierra Leone.
10. Sea Island Cotton. Grown in Natal.
11. Bark from old branches of "Sal" (*Shorea robusta*). Used for tanning. Central Provinces, India.
12. Sunn Hemp (*Crotalaria juncea*). Berar, India.
13. Bark of *Adhatoda Vasica*—employed in medicine, Bengal.
14. Roots of *Bryonia dioica*—known as Mandrake roots.
15. Seeds of "Tengkawang toengkoel" (*Shorea stenoptera*), used as an oilseed. Borneo.
16. Bark of Queensland Sassafras (*Beilschmiedia obtusifolia*). Queensland.
17. Job's Tears (*Coix Lachryma-Jobi*). Burma.
18. Vegetable Ivory Nuts—Seeds of *Phytelephas macrocarpa*. Guayaquil.
19. Fibre from *Triumfetta rhomboidea*. Saharunpore, India.
20. Fibre of *Sida carpinifolia*. India.
21. Bark of *Terminalia tomentosa*. N.W. Provinces, India.

James Whitehead,
Clerk.

The course of instruction in economic botany to gardeners in training, as already stated, is given in the museums, and takes the form of practical demonstrations on the specimens in the cases.

D.—Laboratory.—This is only open for purposes of research by properly qualified persons, as far as space will allow. It has been occupied by a long series of investigators, much of whose work has been communicated to the Royal Society. [A list of published researches which have emanated from the Laboratory since 1876 has been handed in. This, however, does not include work done in it by numerous persons, the results of which have not been printed. In 1885 the Laboratory was occupied by the advanced class from the Science Schools at South Kensington under Prof. Bower, and in 1886-7 under Dr. Scott. It has also been used on several occasions for the practical examination for the degree of science (in Botany) of the University of London.] It is also used for mycological investigations arising out of the study of the diseases of cultivated plants referred to Kew for report either

from at home or abroad. An important example is furnished by the sugar-cane disease of the West Indies, which has been the subject of a prolonged investigation at Kew leading to results, which have in some degree mitigated its ravages. In 1894 Mr. Bovell, the Superintendent of the Botanical Station, Barbados, was instructed in the methods of working out its life history, and Kew received the thanks of the Secretary of State for the Colonies for the service.

E.—Correspondence.—The public correspondence of the establishment, official and otherwise, now amounts to about 15,000 letters a year. This is dealt with daily by the staff in consultation with the Director. A statement is enclosed:—

Return of the Number of Letters, &c., despatched from the Royal Botanic Gardens, Kew, during the Year 1899.

——	Director's Office.	Curator's Office.	Museum.	Total.
Official, exclusive of India and Colonial Offices -	1,109	239	—	1,348
Semi-official - - -	7,084	4,351	145	11,580
India Office - - - -	34	—	—	34
Colonial Office - - -	64	—	—	64
India - - - - -	279	—	—	279
Colonies - - - - -	1,193	—	—	1,193
Total - -	9,763	4,590	145	14,498

It embraces every conceivable kind of technical question—botanical commercial, cultural, etc. The resources of the living collections, herbarium, museums, and library are constantly drawn upon to deal with it. As regards India and the colonies, where enquiries are apt to recur or proceed on continued lines, a kind of intelligence department has been organised in connection with the Directors' Office. The summarised information given in the "Kew Bulletin" is largely used in furnishing replies to enquiries from the public. This convenient mode of furnishing information is, however, often frustrated by the neglect of the Stationery Office to print sufficient copies to meet the demands of the public.

The colonial and economic work of Kew are probably better known and appreciated abroad than at home, where they are less in evidence. Most foreign Governments have at different times deputed representatives to study its organisation. This has been repeatedly the case with France and Germany. Monsieur A. Milhe-Poutingon paid a prolonged visit in 1898 at the instance of the French Ministry of Colonies, and drew up the enclosed official report, which, though open to correction on some unessential points, is an interesting record of the impression produced by Kew and its work on an instructed foreigner.

Rapport Présenté au Ministre des Colonies sur une Mission aux Jardins Royaux de Kew.

Monsieur le Ministre,

J'ai l'honneur de vous remettre le rapport que vous avez bien voulu me demander, par lettre du 8 juillet dernier, sur la mission que m'avait accordée M. Lebon, votre prédécesseur, pour me faciliter l'étude de l'organisation et du fonctionnement des Jardins royaux de Kew, en Angleterre.

Ce grand établissement botanique est considéré, à bon droit, comme un des principaux facteurs de la prospérité des possessions britanniques, par l'impulsion qu'il a donnée, la direction scientifique et méthodique qu'il a imprimée aux cultures coloniales.

A l'heure où l'on est pénétré en France du rôle prépondérant que l'agriculture est appelée à jouer dans le développement économique de notre empire colonial, il y avait un intérêt manifeste à étudier par quels organismes et par quels procédés s'est exercée l'action de l'Institut botanique de Kew et à rechercher quel profit nos colonies pourraient retirer d'un pareil exemple. C'était le but de la mission qui m'avait été confiée et c'est l'objet de ce rapport.

J'y étudierai successivement:

1° L'origine, l'organisation et le rôle, principalement au point de vue colonial, des Jardins royaux de Kew; 2° L'utilité que nos colonies pourraient retirer d'une institution analogue.

Origine, Organisation et Rôle Colonial des Jardins Royaux de Kew.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

§ 1.

L'origine des *Royal Kew Gardens* remonte à plus de deux siècles, et comme beaucoup d'institutions d'intérêt général, en Angleterre, ils ont eu pour point de départ une initiative particulière. En 1650, lord Capel acquit, aux abords de Kew, localité située à 10 kil. environ à l'ouest de Londres, une habitation entourée d'un petit parc; il y créa des jardins et entreprit d'y réunir en grand nombre des plantes exotiques. En 1730, cette propriété fut prise à bail par le prince de Galles (plus tard Georges III.), qui accrut considérablement les jardins et y construisit plusieurs serres. De cette époque, paraît dater la création du jardin botanique proprement dit, dont les collections s'accrurent si promptement qu'il devint nécessaire, en 1739, d'en confier la direction à un botaniste expérimenté: Aiton.

Celui-ci et son fils après lui furent puissamment secondés et encouragés par le haut patronage et l'assistance d'un savant naturaliste et explorateur, Sir Joseph Banks, qui, jusqu'à sa mort, en 1820, fut en quelque sorte le directeur honoraire de Kew. Grâce à lui, de nombreuses collections vinrent enrichir les jardins, dont la renommée commença à se répandre.

En 1789, les jardins furent achetés par Georges III, à la famille Capel, et devinrent la propriété de la famille royale, qui fit du palais de Kew sa résidence favorite. Des relations suivies commencèrent à s'établir entre Kew et les colonies et de nombreux botanistes furent envoyés sur divers points du globe pour collecter des plantes. Les frais de ces missions furent supportés par le Trésor ou l'Amirauté, comme dépenses d'intérêt public. Dès ce moment, l'établissement acquit donc une sorte de caractère national. Vers cette même époque, les gouvernements coloniaux contractèrent l'habitude de consulter, au sujet des cultures de leurs colonies respectives, les autorités de Kew, qui se trouvèrent ainsi progressivement investies d'une sorte de direction officieuse de la colonisation agricole.

En même temps, le patronage et la haute autorité du nom de Banks faisaient de Kew le centre de la science botanique dans le Royaume-Uni; des dessinateurs et des peintres spéciaux étaient attachés à l'établissement pour reproduire les plantes à leur arrivée, des publications étaient fondées pour s'occuper uniquement des plantations et des collections de Kew.

Après la mort de Georges III. et de Banks, survenue en 1820, l'établissement, négligé par la famille royale, laissé sans directeur scientifique, subit une éclipse; en 1840, il fut même question de la supprimer. Mais l'opinion publique s'émut et des pétitions ayant été adressées à la Reine, elle fit don à la Nation des jardins de Kew, qu'on plaça en 1841, sous le contrôle de la Direction des eaux et forêts, et sous la haute direction du savant professeur Hooker. Depuis lors, l'étendue, la richesse et la notoriété de cet Institut botanique n'ont fait que s'accroître. Des acquisitions et des dons ont porté sa superficie à 100 hectares; plusieurs musées, un laboratoire et un herbier célèbre ont été construits, puis agrandis, plusieurs bibliothèques créées et incessamment enrichies.

Kew est ainsi devenu, tout d'abord, un jardin d'agrément national qui, par le charme du site, la beauté des plantations, l'attrait des collections de plein air, de serres et de musées est aujourd'hui un lieu de promenade favori du public. D'autre part, le savoir et les capacités spéciales de ses administrateurs en ont fait un grand centre scientifique, le centre de la botanique pour le Royaume-Uni, mais où la tendance essentiellement pratique de la race anglaise a constamment associé et appliqué la science à l'étude et au progrès des intérêts économiques, de l'horticulture en général et plus particulièrement des cultures coloniales. On a appelé Kew l'Université de l'horticulture de l'empire britannique, et son action à ce point de vue serait des plus intéressantes à étudier; mais ce rapport doit spécialement s'attacher à mettre en lumière le rôle colonial des jardins de Kew.—Auparavant, il convient d'analyser sommairement leurs multiples fonctions, en passant rapidement en revue les divers organismes et services qui les composent.

Ces éléments comprennent:

Les jardins proprement dits;
Les serres;
Les musées;
L'herbier ou herbarium;
Le laboratoire;
Les publications;
L'enseignement;
Le service d'informations.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

1° *Jardins.*

Les jardins réunissent les collections d'arbres et de plantes de plein air, dont la distribution méthodique n'exclut pas un art et un goût qui font affluer les visiteurs. Leur nombre s'est élevé à 1,396,875 en 1896. Les jardins sont aussi fréquentés par les étudiants et les savants que peuvent s'y livrer, avant l'admission du public, à l'étude de la botanique, soit sur des spécimens mis à leur disposition, soit sur les collections des pelouses et des serres.

2° *Serres.*

La plupart des serres de Kew présentent, a des degrés divers, tout à la fois un intérêt d'agrément, un intérêt scientifique et un intérêt économique.

Parmi les serres qui contribuent plus particulièrement à l'ornement des jardins on peut citer : les serres des fougères (n° 2 et 3), des plantes d'ornement (4–9), des plantes grasses (5) (cette serre contient aussi la collection des plantes textiles de ces variétés : fourcroya, sansevieria, cactus, aloès, agaves, etc.),—des bégonias (8)—des orchidées (13–14)—les aquariums (10, 15)—enfin le palmarium que présente aussi un grand intérêt économique.

Les serres économiques comprennent : les serres des plantes commerciales, le palmarium, la serre des régions tempérées, les serres de forçage.

Les serres de ce groupe se complètent pour ainsi dire entre elles et concourent, comme nous l'allons voir, au groupement, à l'étude, à la multiplication et à la propagation des végétaux utiles.

Les *serres des plantes commerciales* (11 et 12) sont réservées aux plantes servant à l'alimentation, à la construction, au vêtement ; aux plantes médicinales, tinctoriales, à parfums, etc... Elles constituent un très efficace instrument de vulgarisation et d'instruction pour le grand public. Plaçant sous les yeux des visiteurs des spécimens des plantes utiles, de petites dimensions, il est vrai, mais tous munis d'étiquettes soigneusement rédigées, elles leur apprennent les usages de ces végétaux et montrent quelle immense variété de plantes utiles à l'homme produisent les pays chauds comparativement aux pays tempérés.

Ces serres servent, en outre, mais exceptionnellement, à cultiver et à étudier les nouvelles plantes dont on veut déterminer l'espèce, rechercher la valeur commerciale ou qu'on désire multiplier et propager dans les colonies. On les fait fleurir et fructifier dans ces serres, puis on expédie dans les colonies, soit les graines ainsi récoltées, soit des plants obtenus du semis de ces graines.

Lorsque les spécimens que renferment ces serres ont atteint un trop grand développement, ils sont transportés au palmarium ou à la serre tempérée, s'il y a intérêt à les conserver.

Le *palmarium* est une serre monumentale, l'une des plus vastes du globe* où se trouvent réunis les échantillons de plantes exotiques les plus considérables que possède Kew. L'encadrement de la coupole centrale est formé par 59 palmiers, plantés en pleine terre à perpétuelle demeure ; au centre se trouvent, également en pleine terre, de grands spécimens de plantes des pays chauds, qui trouvent dans cette serre les conditions climatériques presque naturelles de leurs pays d'origine. C'est ainsi qu'on y peut voir fleurir et fructifier notamment plusieurs variétés de caféiers, dont quelques-uns sont très âgés.

Le *serre des régions tempérées* était destinée, comme le palmarium, à recevoir les plantes de grandes dimensions, mais demandant moins de chaleur. On la transforme en ce moment et on y ajoute de nombreuses annexes, afin d'y grouper, dans une série de serres à températures graduées, depuis la serre froide jusqu'à la serre tropicale, les plantes économiques de tours les climats et d'y transférer notamment le contenu des serres commerciales. Après sa transformation, elle occupera une superficie plus considérable que le palmarium.

Serres de forçage.—Les serres dont nous venons de parler ne servent qu'exceptionnellement à la culture proprement dite et à la production des plantes ; les serres de forçage sont, au contraire, exclusivement réservées à la multiplication par semis ou par boutures des végétaux utiles.

* Voici les dimensions du palmarium : longueur totale, 125 mètres ; largeur de la coupole centrale, 30 mètres ; hauteur au centre, 22 mètres ; largeur de chacune des ailes, 19 mètres ; hauteur, 10 mètres.

Ces serres, construites d'après le type ordinaire des fosses à forçage des jardiniers fleuristes, n'ont rien d'architectural.* Elles sont même de très modeste apparence, et néanmoins jouent un rôle considérable dans l'action des jardins de Kew au point de vue colonial.

C'est dans ces serres, en effet, qu'ont été et que sont constamment cultivées et sélectionnées les espèces utiles que Kew expédie dans les colonies anglaises et dont certaines ont fait leur richesse, comme le quinquina et les diverses variétés de caféiers. Les jardiniers de Kew obtiennent en grand nombre, par semis ou par boutures, de petits plants des variétés que l'on veut propager. Ces plants sont ensuite amenés à un état de développement suffisant pour leur permettre de supporter le transport et sont enfin expédiés au loin, soigneusement emballés dans des sortes de serres portatives d'un modèle spécial (caisses Ward).

En résumé, le travail qui s'effectue dans les serres de multiplication des jardins de Kew est presque, à tous points de vue, comparable à ce qui se pratique dans les fosses à forçage de nos fleuristes parisiens. Ceux-ci s'occupent à faire acquérir à certaines plantes une croissance rapide pour les livrer plus avantageusement au public. Il en est de même à Kew, avec cette différence que le marché, la clientèle pour laquelle Kew travaille (d'ailleurs gratuitement), c'est l'ensemble des colonies anglaises, et que les végétaux qui leur sont livrés, au lieu d'être de simples plantes d'agrément, sont des végétaux économiques, productifs de richesse.

Les serres de forçage sont toutes réunies dans une enceinte, dont l'acces est interdit au public, et une autorisation spéciale du Directeur est nécessaire pour être admis à les visiter. Cette précaution a pour but, d'abord, d'éviter les allées et venues du public, qui pourraient nuire aux travaux délicats pratiqués dans ces serres ; en second lieu, de soustraire au public des essais et expériences, souvent très importants, que l'administration tient à ne pas divulguer. J'ajoute que l'autorisation de pénétrer dans ces serres n'est généralement accordée qu'aux visiteurs que peuvent invoquer un intérêt scientifique ou économique, et que les simples curieux en sont rigoureusement écartés. J'ai dû à la bienveillance de M. Thiselton Dyer, l'éminent directeur de Kew, de visiter longuement, à trois reprises, ces intéressantes serres ; en juillet 1897 et juillet 1898. Par deux fois, j'ai eu la bonne fortune d'être guidé dans ces visites par le très aimable et compétent administrateur des jardins, M. Nicholson, qui m'en a expliqué, en détail, le fonctionnement et l'utilité.

Outre les serres de multiplication, l'enceinte réservée renferme d'autres serres abritant les plantes qui ont subi de longs voyages, et qu'on y soigne, qu'on y hospitalise pour ainsi dire, afin de les guérir, de les rétablir des blessures et de l'épuisement occasionnés par le transport, avant de les réexpédier dans les colonies ou de les placer dans les serres.

Diverses annexes sont affectées au matériel des expéditions, caisses Ward, poteries, etc., et à la préparation des envois.

3° *Herbarium.*

L'herbier ou herbarium est un très important service de l'Institut de Kew. Il a pour mission de rassembler, de déterminer, de classer, d'étudier au point de vue purement scientifique, enfin de reproduire par planches et dessins et de faire connaître, par des publications spéciales, les spécimens de la flore du monde entier.

Fondé en 1853, avec les dons provenant de Bentham et d'autres naturalistes, il n'a cessé de s'enrichir par des liberalités ou des envois, qui, chaque année, représentent un apport moyen de 20,000 nouveaux spécimens. Ce chiffre considérable s'explique par la façon dont l'herbarium procède à ce recrutement.

* La serre à forçage est une construction basse, longue et étroite, comprenant le plus souvent deux serres accouplées, raccordées à l'une de leurs extrémités par un pavillon pour les manipulations ; quelques-unes sont en partie enterrées dans le sol.

Voici le type des serres accouplées, 17 A et 17 B, où se pratique le forçage des plantes destinées aux colonies tropicales : elles ont 33 mètres de longueur, 2 m. 50 de hauteur et 2 m. 50 de largeur, avec à l'intérieur accotées aux murs deux étagères de 0 m. 90 de large, séparées par un étroit passage et sous lesquelles courent des tuyaux de chauffage. Les serres sont reliées à l'une de leurs extrémités par un petit pavillon.

De toutes les parties du monde, on expédie à Kew des collections de plantes pour en opérer la détermination et le classement ; en rémunération de ce travail, l'herbarium conserve une quantité plus ou moins considérable de spécimens et se procure ainsi de nombreuses plantes, dont les plus intéressantes servent à des échanges avec les musées botaniques du dehors ; le reste est expédié aux herbiers des colonies, qui, à leur tour, ne cessent d'envoyer à Kew tout ce qui peut accroître ses collections.

Neuf classificateurs, rompus à ce travail, un peintre et un artiste affecté au montage des spécimens sont attachés à l'herbarium. Ils sont constamment occupés à classer les plantes, à décrire les espèces nouvelles, déterminer les spécimens envoyés par les correspondants de Kew ou collectées dans les parties peu connues du globe. Plusieurs publications, dont nous parlerons plus loin, réunissent le fruit de ce travail.

L'herbarium occupe une vaste construction à trois étages, très pratiquement aménagée pour la facilité des recherches et la commodité du travail. Il n'est pas ouvert au public, mais quiconque s'occupe de recherches botaniques est admis à y travailler dans les salles des collections et l'importante bibliothèque scientifique qui y est annexée.

4° *Musées.*

Les musées complètent l'ensemble des collections de Kew et contribuent avec les serres économiques à familiariser le public avec les végétaux utiles et les produits qu'en retirent le commerce et l'industrie. Leur aménagement est à cet égard des mieux conçus. On y trouve, en effet, groupés auprès des spécimens des plantes elles-mêmes et des produits qu'on en retire, des cartes et tableaux indiquant leur pays d'origine, les procédés et méthodes d'extraction et de préparation des produits, ainsi que les outils et machines qui servent à manufacturer ; on peut suivre, en un mot, les diverses transformations que subissent ces produits de l'état brut à l'état le plus perfectionné.

Ces musées servent en outre à l'enseignement : les cours organisés au profit du personnel des jardins, dont nous parlerons plus loin, ont lieu dans leurs salles, où la vue des végétaux et des produits dont parlent les professeurs, rend plus attrayantes et plus saisissantes leurs explications.

Le premier musée de cette catégorie fut fondé par Hooker, qui fit don à la nation de ses collections personnelles. Les importantes collections de même nature réunies pour l'Exposition de 1851, et plus tard pour l'Exposition de 1862, y ont été depuis annexées.

En 1862 également, un autre musée fut installé pour abriter la collection des bois d'industrie qui avait figuré à cette dernière Exposition.

Enfin, en 1880, l'Office des Indes transféra à Kew les immenses collections qui composaient le musée indien de Kensington. Le Gouvernement de l'Inde verse à l'administration de Kew une certaine redevance pour l'entretien des collections et la rémunération d'un agent chargé de surveiller l'arrivée des envois de l'Inde.

5° *Laboratoire.*

Le laboratoire Jodrell, du nom de son fondateur, s'occupe exclusivement de recherches scientifiques, et l'abondance des matériaux dont il est entouré le rend éminemment propre à ce genre de travaux. Mais il arrive souvent que les autorités de Kew sont consultées sur la valeur et les débouchés commerciaux des plantes ou des produits. En pareil cas, elles s'adressent pour ces études ou recherches à des spécialistes du dehors, courtiers ou experts de commerce, chimistes, industriels, etc... qui les renseignent, la plupart du temps, sans aucune rémunération, et dont les rapports sont fréquemment insérés au *Bulletin de Kew*. En cas de nécessité le Directeur fait même appel à des techniciens tout à fait indépendants de Kew et dont les travaux sont rémunérés.

6° *Bibliothèques.*

Kew possède plusieurs bibliothèques ; les plus importantes sont la bibliothèque de l'Herbarium qui possède plus de 15,000 volumes sur la botanique scientifique, et la bibliothèque annexée aux musées économiques qui est composée exclusivement d'ouvrages relatifs à la botanique économique et commerciale.

7° *Publications.*

Les publications de Kew contribuent puissamment à son action scientifique, économique et coloniale, en répandant les innombrables informations qui lui parviennent ou les travaux de son personnel.

Le catalogue général de ces publications a paru récemment (n° 121 du *Bulletin de Kew*, janvier 1897). La simple énumération des ouvrages ou périodiques publiés par l'établissement, de 1841 à 1885, remplit plus de quatre-vingts pages de petit texte.

Je me bornerai à mentionner les plus importants ; ce sont :

Au point de vue scientifique, les publications suivantes émanant de l'herbarium.

(*a*) La *Revue de Botanique*, mensuelle, donnant la description des plantes nouvellement acquises ;

(*b*) *Description des Plantes*, de Hooker, contenant la description et les figures des nouvelles plantes rares.

(*c*) *Les Décades de Kew*, courtes descriptions de plantes nouvelles, généralement extraites du *Bulletin*.

Ce dernier périodique, mensuel (*Bulletin of Miscellaneous Information*), est, à tous égards, la plus considérable des publications de Kew au point de vue économique.

Il est publié sous l'inspiration immédiate du sous-directeur de Kew, mais tout le corps scientifique de l'établissement y contribue. Il reproduit la plupart des correspondances échangées entre Kew et les administrations ou jardins botaniques des colonies ou de l'étranger, les listes des semences et des nouvelles plantes obtenues, des études sur les plantes, les procédés de culture, les produits, etc., etc. Ce *Bulletin* résume en un mot l'œuvre économique des Jardins de Kew et contribue à signaler et à propager dans les colonies anglaises les nouvelles découvertes et les nouvelles méthodes intéressant les cultures coloniales ; il fait œuvre d'enseignement général.

8° *Enseignement spécial.*

A côté de cet enseignement d'une portée générale, il existe à Kew une série de cours spécialement organisés au profit du personnel des jardins.

Kew façonne, par un complément d'études, un certain nombre de jeunes jardiniers possédant déjà les connaissances fondamentales de leur profession. Ces situations ne sont attribuées qu'aux jardiniers ayant au moins cinq ans de pratique de la culture des serres ; elles sont extrêmement recherchées et quelques-unes sont réservées à des étrangers. Les études sont à la fois théoriques et pratiques. Au point de vue pratique, les jeunes jardiniers, passant successivement dans les divers services des jardins, acquièrent une connaissance complète des travaux de jardinage, des serres et de plein air. Ils sont secondés par des hommes de peine, de sorte que le jeune jardinier peut se réserver uniquement pour les travaux réclamant une attention particulière ou d'une exécution délicate et pour les observations et les études que poursuit son service.

Les études théoriques marchent de front avec les travaux pratiques. Les jeunes jardiniers sont tenus de suivre un certain nombre de cours professés par le haut personnel de l'établissement. Cet enseignement comprend :

1°. Un cours de physique et de chimie générales, dans lequel sont plus particulièrement développées les matières ayant un rapport direct avec la botanique et la géologie ;

2°. Un cours de géographie botanique, portant principalement sur la climatologie, la distribution des végétaux sur le globe, les caractères botaniques des diverses zones, torride, tempérée, et leurs subdivisions, l'influence de la latitude, de l'altitude, de l'homme sur la distribution des plantes ;

3°. Un cours de botanique économique. Il est professé dans les musées économiques, au milieu même des spécimens de plantes et produits des nombreuses familles, et fournissant, en outre, des indications pratiques sur la manière de collecter les plantes, de les préparer pour les herbiers, de les classer et d'en assurer la conservation.

Durant son séjour à Kew, chaque élève doit collectionner et préparer lui-même un herbier d'au moins 250 spécimens. Enfin, chaque semaine, d'octobre à mars, les jeunes jardiniers, constitués en Association amicale (Kew Gardeners' Mutual Improvement Society) se ré-

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

muissent au siège de la Société pour entendre un rapport ou une conférence d'un élève, d'un chef ou d'une des autorités de Kew.

Après avoir passé deux années a Kew et subi avec succès les examens qui couronnent cet enseignement, les jeunes jardiniers reçoivent un diplôme et obtiennent aisément des emplois avantageux, soit dans les établissement botaniques, soit dans les exploitations culturales des colonies anglaises ou de l'étranger.

On a donc pu dire avec raison que Kew est une "Université de jardinage," fournissant aux jeunes gens appelés à participer à l'œuvre coloniale tous les moyens nécessaires pour acquérir une bonne instruction botanique ainsi que la théorie et la pratique de l'horticulture.

9° *Service de renseignements et d'échanges.*

Ce service est l'un de ceux par lesquels s'exerce le plus activement et le plus efficacement l'influence de Kew. Si son action est peu apparente, son importance est attestée par le seul fait que le Directeur et le Sous-Directeur de Kew en assument personnellement la charge.

Le rapide coup d'œil que nous venons de jeter sur les autres services des jardins a déjà permis d'entrevoir la variété des informations que Kew est appelé à fournir et l'étendue de sa correspondance. Nous définirons plus loin le caractère de celle qu'il entretient avec les gouvernements et les jardins coloniaux de l'empire britannique; mais, en outre, de toutes parts, les institutions scientifiques ou d'intérêt général du Royaume-Uni et de l'étranger, les économistes et publicistes, les particuliers qui s'intéressent dans un but scientifique ou commercial à l'horticulture ou aux cultures coloniales, demandent à Kew des conseils, des renseignements, envoient des spécimens de graines et de plantes à déterminer, des produits à analyser, demandent des plantes économiques ou ornementales proposent des échanges, etc., etc. Il serait difficile d'analyser en détail un service de ce genre: seule l'inspection des registres d'entrée et de sortie de la correspondance pourrait permettre d'apprécier plus exactement l'étendue et l'importance des informations transmises, des transactions opérées.

Tout le système des transactions de Kew est basé sur l'échange. Kew ne vend ni graines ni plantes, et la richesse de ses collections le dispense presque d'en acheter; mais il fait des échanges avec le monde entier.

Ces échanges sont même constants entre Kew et les jardins botaniques des colonies anglaises. Un mot de la Direction suffit pour faire venir de ces établissements, toujours abondamment pourvus, tout ce dont elle peut avoir besoin; car les administrations des colonies sont assurées de recevoir, en retour de leurs envois, beaucoup plus que ce qu'elles auront expédié.

Les envois de Kew aux jardins coloniaux sont d'ailleurs préparés d'après les besoins et les ressources des diverses colonies, grâce à la connaissance approfondie que le Directeur et le Sous-Directeur en ont acquise non seulement par leurs études, mais encore par un séjour plus ou moins prolongé dans les régions tropicales. Le Directeur actuel, M. Thiselton Dyer, a été l'aide-préparateur de Hooker, et était auparavant professeur de botanique. Le Sous-Directeur, M. le Dr Morris, a rendu des services signalés tant à Ceylan qu'à la Jamaïque, avant d'être nommé à Kew. Ce n'est là d'ailleurs que l'application d'une règle générale, qui impose à tous les fonctionnaires de Kew d'avoir séjourné dans les colonies. On a, avec raison, voulu fortifier leurs connaissances scientifiques par une expérience des choses coloniales que rien ne saurait suppléer, et assurer ainsi plus de valeur à leurs jugements et d'autorité à leurs conseils. Nous trouvons là un nouvel indice de l'orientation coloniale de Kew, que nous allons étudier, après avoir complété ce rapide aperçu de ses divers organismes par quelques indications sommaires sur le personnel et le budget.

§ 2

Personnel.

Le personnel administratif des jardins de Kew compte dix-huit fonctionnaires:

1°. Un directeur et un sous-directeur, qui exercent le contrôle général des services et dirigent personnellement la correspondance, les expéditions et échanges de plantes, la publication du *Bulletin.* Ils sont secondés par deux assistants.

2° Le personnel de l'herbarium qui comprend un directeur et huit assistants.

3° Le service des musées est assuré par un administrateur et un assistant.

4° L'administration des jardins est confiée à un curator et un assistant.

5° Enfin, le directeur du laboratoire, qui a rang dans le personnel administratif, remplit gratuitement ses fonctions.

Dans son ensemble, le personnel attaché à l'établissement se répartit ainsi:

Haut personnel administratif et scientifique	18
Horticulteurs et jardiniers (dont 37 élèves jardiniers)	49
Employés aux cultures	63
Gardiens, surveillants et attachés aux musées	30
Employés aux travaux	12
En tout	172

Si nombreux que soit ce personnel, la réputation des jardins de Kew est telle qu'il se recrute par une véritable sélection.

Nous l'avons déjà signalé pour la haute direction et les élèves jardiniers; il en est de même à tous les degrés, tant les postes sont recherchés.

Le corps scientifique se recrute généralement parmi les jeunes botanistes des Universités; parfois, à la suite d'examens, on y admet de jeunes jardiniers de Kew, ce qui montre le degré élevé d'instruction scientifique qu'ils y peuvent acquérir. C'est également parmi ces derniers qu'on choisit habituellement les fonctionnaires attachés aux jardins proprement dits.

Budget.

Le budget de Kew est des plus simples. Ses ressources proviennent à peu près uniquement du budget métropolitain. Chaque année, le directeur établit les états de prévisions, d'après lesquels le Parlement vote les fonds nécessaires à l'acquittement des dépenses. Ces sommes figurent au budget du Ministère des travaux publics, direction des services civils.

Les autres ressources de Kew sont insignifiantes: l'établissement, comme nous l'avons vu, ne reçoit aucune subvention des colonies, sauf une modeste allocation du gouvernement de l'Inde. Ses autres recettes n'ont pas dépassé 281 livres en 1897. Les états des prévisions de dépenses reproduits ci-dessous suffiront à donner une idée du budget de l'établissement.

Voici le détail de ces recettes:	Livres.
Vente de bois et vieux matériaux	20
Titre de rente	1
Bénéfice provenant de l'élagage des arbres	10
Produit de la location du buffet	250
	281

Pour l'exercice 1895–96, les prévisions de dépenses atteignaient le chiffre de 32,708 livres sterling (817,600 francs).

Elles étaient, pour 1896–97, de 29,318 livres, d'après le détail suivant:

	Livres.
Salaires et traitements	6,297
Voyages	50
Habillements	94
Police et garde du parc	1,626
Nouveaux travaux	7,255
Entretien	13,729
Fournitures	200
Rentes	67
	29,318

Voici enfin les prévisions plus détaillées pour 1897–98 :

		Livres.
Salaires et traitements		6,692
Voyages		50
Habillements		125
Police		1,621
Nouveaux travaux :		
Achats pour les musées	200	
Construction d'une partie des ailes de la serre tempérée	1,000	
Acquisition de nouveaux tuyaux pour la canalisation d'eau	100	
Aménagements sanitaires	180	
Nouvelles serres	400	
Six nouvelles prises d'eau contre l'incendie	144	
Menus travaux et réparations	126	
		2,150
Entretien de routes, pelouses, pépinières, plates-bandes, serres :		
Matériel	1,700	
Salaires	5,928	
Location de chevaux et camions	200	
Achat et entretien d'outils	160	
		7,988
Pavillon des gardes, palmarium ; murs d'enceinte, logements de l'administration, fontaines		3,950
Grosses réparations		800
Fournitures d'eau		450
Gaz et chauffage		1,731
Assurances maritimes et fret		180
Achat, réparations de mobiliers et aménagement		500
Contributions		66
Total		26,303

Ce rapide coup d'œil sur l'organisation administrative et financière des jardins de Kew suggère deux remarques :

On peut, tout d'abord, s'étonner que les budgets coloniaux ne participent point aux dépenses d'une institution si utile aux colonies.

Il faut en rechercher l'explication dans les origines mêmes des jardins de Kew. C'est de l'époque où ils étaient propriété de la couronne que datent l'établissement de leurs relations avec les colonies et la gratuité de leur assistance. Lorsqu'en 1841 les jardins furent donnés à la Nation, nul ne songea à modifier ces traditions et à faire contribuer les colonies aux dépenses de l'établissement, en retour des services qu'il leur rendait. La métropole le prit entièrement à sa charge.

Mais n'eût-il pas été, du moins, préférable de rattacher au *Colonial Office* une institution en rapports constants avec lui, plutôt que de la placer sous le contrôle du Département des travaux publics (service des eaux et forêts), avec lequel on ne lui entrevoit que des rapports secondaires ?

Cette dernière solution, qui se concilie mal avec nos tendances à la centralisation administrative, n'a en Angleterre, où l'esprit contraire prévaut dans l'organisation des services publics, aucun des inconvénients qu'on serait porté à lui attribuer et qui se produiraient chez nous en pareil cas. On peut affirmer, au contraire, que l'établissement de Kew n'en a retiré que des avantages. Il y a gagné de ne pas devenir un rouage administratif, de conserver une autonomie, une indépendance que le cours du temps n'a fait que fortifier.

En réalité, le lien administratif qui rattache Kew au Département des travaux publics est des moins rigides ; le contrôle de ce Département se limite effectivement à la gestion financière et, même ainsi réduit, il s'exerce très discrètement : il est tout à fait exceptionnel, me disait l'administrateur des jardins, qu'une observation soit faite sur l'objet ou le chiffre d'une dépense.

Le véritable contrôle pour le corps administratif et scientifique de Kew, c'est l'ensemble des services publics métropolitains et coloniaux qui suit leurs travaux, c'est par-dessus tout le Parlement, qui porte à l'Institut une grande sollicitude.*

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

Le savant Directeur de Kew me traduisait ce sentiment en ces termes : "Si Kew, me disait-il, cessait de rendre les services qu'on attend de lui, il verrait le Parlement refuser les crédits qu'il vote chaque année en notre faveur. C'est là notre véritable et plus efficace contrôle."

C'est, croyons-nous, à cette sorte d'indépendance, et aux traditions qu'elle a perpétuées que Kew est en grande partie redevable de l'esprit d'initiative et de la cohésion qui distinguent son corps administratif et scientifique, de l'intensité d'activité qu'on remarque dans tous les services. Dans ce personnel de 172 administrateurs ou employés, malgré l'opulent budget que nous connaissons, on ne pourrait citer une seule sinécure. Du Directeur au dernier employé, tout le monde travaille beaucoup.† Rien ne revêt à Kew l'apparence administrative ; ni luxe ni seulement confort dans les bureaux des fonctionnaires même les plus élevés, et chez eux, l'extérieur le plus simple, l'abord le plus facile et un accueil bienveillant, dès qu'il s'agit d'un intérêt réel.

Je me suis constamment tenu en garde, dans mes visites à Kew, contre une prédisposition assez commune chez nous, à admirer de confiance les institutions de l'étranger. Si néanmoins les impressions que j'en ai rapportées et que je consigne fidèlement paraissaient trop uniformément élogieuses, je puis affirmer qu'elles n'approchent pas des louanges que donnent aux hommes et aux choses de Kew les Français qui y ont été attachés ou s'y trouvent à cette heure même comme élèves-jardiniers, et qui ont pu s'initier ainsi aux moindres détails de l'organisation et du fonctionnement de ce grand établissement botanique.

§ 3.

Après avoir, dans les pages qui précèdent, en quelque sorte, décomposé l'organisme de Kew et montré le fonctionnement de ses divers rouages, il nous sera plus aisé d'étudier de près sa mission coloniale. Cette mission, il la tient non seulement des traditions que nous avons signalées, elle lui a été, en outre, officiellement confirmée par les pouvoirs publics. En 1841, en effet, lorsque les jardins devinrent propriété nationale, le Parlement, pénétré de l'influence utile qu'ils avaient exercée sur le développement économique des colonies, voulut en consacrer la suprématie et imposa à Kew le devoir d'être l'autorité prépondérante, dans toutes les parties de l'empire britannique, en ce qui concernait la science botanique. Cette mission, nous avons déjà dit comment elle est comprise à Kew. La préoccupation qui y domine est d'utiliser les recherches, les progrès, les découvertes de la science en vue du développement des intérêts économiques. C'est ce que M. Thiselton Dyer résumait en ces mots "Notre but essentiel, notre préoccupation dominante, me disait-il, est d'aider, de développer le commerce." Et comme l'agriculture est la base du commerce et que le commerce colonial est la source principale du trafic du Royaume-Uni, Kew, en travaillant à la prospérité des cultures coloniales, développe véritablement le commerce et enrichit la nation.

En parcourant les divers services des jardins, nous avons plus d'une fois déjà entrevu comment s'exerce l'action coloniale de Kew, mais elle est si incessante et variée qu'on ne saurait faire entrer toutes ses manifesta-

* Nous indiquerons plus loin le point de départ du haut contrôle et de la sollicitude du Parlement pour les jardins de Kew. Nous en trouvons un témoignage dans les paroles suivantes du Secrétaire d'État pour les Colonies, à la séance de la Chambre des Communes du 9 août 1897. A l'occasion d'une pétition déposée sur le bureau du Parlement, demandant que les jardins fussent ouverts au public à une heure plus matinale, le Ministre s'exprimait ainsi : "Nous sommes justement fiers de ces jardins qui ont droit à tout l'appui du Parlement en leur qualité de grand établissement scientifique. Comme Secrétaire des Colonies, j'ai été et suis encore en relations constantes avec Kew, en ce qui concerne la culture de toute espèce de plantes, et je n'hésite pas à dire que quelques-uns des plus grands perfectionnements apportés dans certaines colonies sont dus presque entièrement aux avis et à l'assistance reçue de Kew."

† Indépendamment de leurs occupations administratives, la plupart des fonctionnaires de Kew se livrent à des travaux personnels, dont le catalogue des publications de l'établissement permet d'apprécier l'importance. Nous y relevons, pour la seule année 1895, 63 monographies ou articles dus au Directeur, au Sous-Directeur, aux administrateurs de l'herbarium, des jardins et des musées, et parus en dehors des publications normales de Kew.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

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tions dans une formule unique. Nous la définirons donc en la ramenant à quatre fonctions principales :

1° Kew réunit et sélectionne pour les propager dans es colonies anglaises les nouvelles espèces et les meilleures variétés de plantes économiques. C'est un entrepôt et un centre d'approvisionnement pour les cultures coloniales ;

2° Kew fournit ou procure aux colonies des botanistes et des jardiniers pour leurs services publics, des chefs de culture pour les exploitations particulières. C'est un centre d'enseignement et de recrutement pour le personnel des cultures coloniales ;

3° Kew renseigne et éclaire les colonies sur tout ce qui intéresse la botanique et les cultures exotiques. C'est un office général d'informations pour l'agriculture coloniale ;

4° Kew enfin imprime aux colonies anglaises une impulsion et une direction méthodique en ce qui concerne les cultures coloniales. C'est, à cet égard, comme nous l'avons dit, l'autorité suprême pour tout l'empire britannique.

Pour achever de définir l'action coloniale des jardins de Kew, il faut ajouter (et ce n'est pas son trait le moins original), qu'elle s exerce la plupart du temps d'une manière indirecte et par des intermédiaires qu'aucun lien administratif ne rattache d'ailleurs à Kew, sur lesquels il n'a qu'une autorité morale : ce sont les jardins d'essais des colonies.

Kew n'a effectivement aucun droit de contrôle sur ces établissements, et néanmoins ses fonctionnaires sont régulièrement consultés pour ce qui leur est relatif ; et cette intervention est si complètement acceptée par les gouvernements coloniaux qu'on a pu dire que de toute façon la création et le développement des établissements botaniques coloniaux de l'empire britannique étaient dus presque entièrement à l'influence des autorités de Kew.

Il est donc indespensable, pour nous rendre exactement compte de l'action coloniale de Kew, d'indiquer très sommairement l'organisation et le fonctionnement des jardins d'essais des colonies anglaises.

Au début, ces jardins étaient de simples lieux d'agrément ou destinés à l'étude de la botanique scientifique. C'est sous l'influence de Kew qu'ils se sont progressivement transformés en centres d'études et d'essais pour la culture des plantes économiques et la préparation de leurs produits. Ces institutions jouent, en un mot, au profit de l'agriculture coloniale, le rôle bienfaisant que les stations agronomiques et les champs d'expérience ont re npli en France à l'égard de l'agriculture métropolitaine.

Leur rôle est trop bien connu pour qu'il soit nécessaire de l'analyser en détail.

Il suffit de dire qu'ils ont pour mission :

1° De fournir aux planteurs des pieds de café, de cacao, etc., etc., d'une façon générale de toute plante de grande culture, d'espèces convenablement choisies, ce qui nécessite des pépinières et des champs d'expérience ;

2° De leur fournir tous les renseignements dont ils peuvent avoir besoin, sur le sol, le climat, l'adaptation de telle ou telle espèce, les procédés de culture, la préparation des produits, etc., ce qui exige à la fois des démonstrations pratiques, un laboratoire, un enseignement agricole et une volumineuse correspondance.

Les établissements de ce genre existent en grand nombre dans les colonies anglaises, et ils se répartissent en trois catégories :

1° Les départements botaniques, dont le siège est près du gouvernement colonial et qui se ramifient en de nombreux jardins botaniques disséminés dans la colonie. Un département botanique occupe ordinairement de 500 à 250 hectares et nécessite une dépense de 75 à 150,000 francs. Il a d'importantes annexes : laboratoires, musées, publications, champs d'expériences. Il existe un département botanique à Calcutta, Madras, Ceylan, Maurice, etc.

2° Les jardins botaniques sont de moindre importance ; leur étendue n'excède pas en général 25 hectares. Leurs dépenses varient entre 25 et 75,000 francs. L'Inde en compte un grand nombre ; il y en a, en outre, à Hong-Kong, Port of Spain (Trinidad), Demerari (Guyane anglaise).*

3° Avant 1886, les colonies britanniques ne possédaient que les deux types d'institutions botaniques dont nous venons de parler. C'est à l'intervention des fonctionnaires de Kew qu'est due l'inauguration a cette époque d'un troisième type, encore plus modeste, mais qui s'est rapidement multiplié : la station botanique. C'est l'institution primitive par excellence, que son peu d'étendue (12 à 15 hectares), la simplicité de son installation et la modicité de son budget (8 à 20,000 francs) permettent d'installer dans les colonies les plus récentes ou d'importance restreinte, et qui est pour elles l'organ isme le plus indispensable, l'instrument de leur transformation et de leur progrès économique. La station botanique * est essentiellement un jardin d'essai et d'expérimentation. Son unique objet est de constituer et d'entretenir des pépinières pour la distribution des plantes économiques aux colons. Le chef est un jardinier possédant des connaissances variées et homme d'initiative, qui débute avec un traitement de 4 à 5,000 francs. Les stations botaniques sont nombreuses aujourd'hui aux Indes Occidentales anglaises et à la côte occidentale d'Afrique.

C'est cet ensemble d'établissements botaniques que domine Kew, qu'il approvisionne, renseigne, dirige, et dont il est en même temps le trait d'union.

C'est Kew qui fournira aux stations nouvellement créées les éléments premiers de leurs pépinières et de leurs champs d'expériences, qui introduira dans la colonie récemment acquise les végétaux qui font la richesse des anciennes possessions.

C'est Kew que le *Colonial Office* consultera sur les nominations à faire, auquel il demandera même des jardiniers, pour constituer le personnel des jardins coloniaux.

C'est Kew, enfin, qui, centralisant toutes les informations et observations émanant des jardins d'essais, grâce à ce vaste système d'informations et aux nombreux savants qu'il s'est attachés, sera à même d'étudier et de résoudre toute question du domaine de la botanique générale, de la chimie agricole, de la pathologie végétale, susceptible d'intéresser l'agriculture des colonies ; qui procédera à des enquêtes ; signalera, recommandera, prescrira même l'application de nouveaux procédés, de nouvelles méthodes, dans l'intérêt des cultures coloniales.

Ainsi les institutions botaniques des colonies anglaises ne sont pas des établissements isolés, livrés à leurs seules forces ; ce sont, comme on l'a dit justement, les branches d'un immense service agricole, dont la direction est à Kew et dont les ramifications s'étendent dans tout l'empire britannique. †

Pour achever de faire complètement saisir l'assistance que les jardins de Kew prêtent aux cultures coloniales, nous allons montrer comment elle s'est exercée pour les principales de ces cultures, le quinquina, le café, le thé, le caoutchouc, etc.

Quinquina.—L'introduction du quinquina de la Cordillère des Andes dans les colonies britanniques fut d'abord entreprise par le gouvernement des Indes, qui envoya en Amérique un botaniste et des jardiniers, pour collecter des plants de ce végétal. Après les premiers essais de transport de ces plants aux Indes, l'œuvre fut continuée avec la collaboration des jardins de Kew. Ils fournirent d'abord des jardiniers chargés de recueillir les plants, de les emballer et de les rapporter à Kew. Une serre y fut spécialement aménagée pour les recevoir : on les y soignait et mettait en état d'être transportés, sous la surveillance d'un jardinier, de Kew à Ceylan, où les premiers plants arrivèrent en 1862, et d'où ils furent ensuite répartis dans les Indes anglaises.

En même temps, on instituait à Kew une série d'analyses pour déterminer la richesse respective en quinquina des diverses variétés et en opérer la sélection, afin de n'introduire et de ne propager que les variétés les plus avantageuses. En dernier lieu enfin, en 1882, Kew faisait procéder à l'établissement d'une classification de cette espèce végétale.

Café.—Dans la culture du café, l'action de Kew a été plus étendue encore ; elle s'est manifestée le plus apparemment et ses résultats ont été particulièrement sensibles dans la lutte contre les maladies qui détruisirent les plantations de café à Ceylan et aux Indes, et qui ont envahi, depuis, tout le bassin de l'océan Indien.

* Voir un très intéressant rapport sur ces deux établissements, par M. Landes, professeur au lycée de la Martinique (*Revue des Cultures coloniales* T. II., p. 7).

* La *Revue des Cultures coloniales* (t. I., p. 347) a publié une notice sur la station botanique de Sierra-Leone, qui a été créée en 1895.

† SAUSSINE. *Les stations botaniques des Antilles.*

Dès qu'on signala, en 1862, apparition de la maladie, Kew en entreprit l'étude.—Un questionnaire fut rédigé par l'administration et adressé à tous les producteurs de café des régions contaminées. Les réponses furent étudiées et un rapport élaboré et publié par l'administration : il établissait que l'on se trouvait en présence de sept maladies différentes. Un botaniste de Kew fut alors détaché à Ceylan pour étudier ces maladies et rechercher les moyens pratiques de les combattre. Mais ses rapports, qui furent publiés, ayant constaté l'inefficacité de tous les remèdes expérimentés et conclu à l'impossibilité d'enrayer la maladie, les autorités de Kew entreprirent alors d'introduire dans les régions dévastées la variété de café, dite de Liberia, originaire de la côte occidentale de l'Afrique, variété qui résistait aux maladies. De 1874 à 1876, Kew procéda à une immense distribution de graines, de sauvageons, en même temps que de plants obtenus de semis dans les serres de forçage, qui furent expédiés en caisses Ward dans les colonies infestées, Ceylan, Indes, Singapoor, Seychelles.

En même temps Kew faisait procéder, dans les pays d'origine du café Liberia, à une enquête étendue sur les propriétés de cette variété, ses avantages sur le café d'Arabie, sa résistance aux maladies, sa productivité, ses conditions d'habitat, etc., et les résultats de cette enquête furent consignés dans un rapport.

Kew a donc, dans cette circonstance, poursuivi un triple but :

1° Obtenir des rapports circonstanciés sur la nature de la maladie ;

2° Rechercher les mesures propres à préserver les anciennes cultures de café ;

3° Propager de nouvelles espèces dont la résistance à la maladie avait été éprouvée.

Cet exemple nous révèle très complètement le mode d'action de Kew en matières de cultures coloniales, car la méthode suivie peut être généralisée et appliquée à toute autre espèce de cultures.

Thé.—L'introduction de la culture du thé à Ceylan et aux Indes a procédé du même point de vue : là encore, il s'agissait de substituer une culture nouvelle aux anciennes cultures (café et quinquina) qui périclitaient.

Après la destruction des plantations de café et la dépréciation du quinquina produite par l'extension de cette culture à Java, les autorités de Kew recommandèrent de revenir à la culture du thé qui avait été précédemment essayée, et elles envoyèrent des jardiniers pour aider les colons à l'organiser. L'assistance que Kew a prêtée, ensuite, au développement de cette culture, a un caractère très général et les détails en sont difficilement accessibles.

Il nous suffit d'avoir montré que c'est de Kew qu'est partie l'impulsion qui a donné naissance aux admirables cultures de thé de Ceylan et de l'Assam. Elles constituent un des faits économiques les plus remarquables de la colonisation moderne, et que résume le rapprochement suivant : en 1873, Ceylan n'exportait en Angleterre que 23 livres de thé, la Grande-Bretagne était tributaire de la Chine pour cet article. Or, en 1895, elle a consommé 221,800,137 livres de thé, représentant une valeur de 92,417,825 francs et provenant :

	Livres.
Indes anglaises	116,343,314
Ceylan	74,023,809
Chine	26,201,374
Autres pays	5,231,640

On peut prévoir qu'avant deux ans l'Angleterre tirera de ses colonies tout le thé nécessaire à sa consommation.

Caoutchouc.—Enfin, l'histoire de l'introduction aux Indes des plus intéressantes variétés de caoutchouc est pour nous des plus suggestives.

Tandis que nous entreprenons, en 1898 (mission Bourdarie), d'introduire dans nos colonies les variétés du Brésil et de l'Amérique centrale, Kew, dès 1873, avait expédié à Calcutta des caisses de plants et boutures de ces végétaux. En 1876, Kew recevait de l'Amazone, 70,000 graines d'Hevea (caoutchouc du Para), dont on ne put faire germer dans les serres de forçage que 3 à 4 pour 100. On obtint ainsi environ 2,000 plants, dont 1,900 furent expédiés à Ceylan, puis répartis dans les Indes.

La même année, Kew y introduisait également le Castilloa (caoutchouc de Panama), aujourd'hui presque inconnu dans nos colonies, et le Manihot Glaziovii (caoutchouc de Ceara), que nous possédons depuis quelques années au Gabon, qu'on s'est récemment préoccupé de propager au Sénégal, à Madagascar, en Nouvelle-Calédonie.

Kew a depuis longtemps déterminé les zones convenant à ces diverses espèces, tandis que nous tâtonnons encore à cet égard. Elles ont, il est vrai, inégalement prospéré dans les colonies anglaises ; néanmoins, dès 1882, le Directeur de Kew possédait des échantillons des trois variétés, récoltés aux Indes, et pouvait écrire : " La tâche entreprise par l'Office des Indes a été couronnée d'un plein succès. Un stock de caoutchouc provenant des trois plus importantes espèces de caoutchouc de l'Amérique du Sud a été introduit en Orient, et il est maintenant établi qu'ils sont capables de donner, sous le climat des Indes, des produits qui ne sont pas inférieurs à ceux de leur pays d'origine."

Un fait tout récent, dans cet ordre de cultures, atteste la promptitude de Kew à introduire dans les colonies les nouvelles plantes utiles. On a, depuis peu, préconisé la culture des Landolphia* lianes à caoutchouc, qui fournissent un produit estimé. Or, cette année même, Kew a pu expédier en grand nombre dans les colonies anglaises des plants et boutures de ces lianes.

Un dernier fait, tout d'actualité, achèvera de montrer l'autorité de Kew s'exerçant d'une façon plus immédiate encore, comme Haute Direction de l'agriculture coloniale.

Les Petites Antilles anglaises traversent depuis quelques années une crise agricole intense.—Le *Colonial Office*, pour y remédier, va faire appel à l'assistance de Kew, dont l'un des plus distingués fonctionnaires, le Dr Morris, Sous-Directeur des jardins, se rendra incessamment aux Antilles pour y combattre les causes de la crise, rechercher et appliquer les mesures nécessaires pour transformer les cultures locales et relever la situation économique de ce groupe de possessions anglaises. A cet effet, le Dr Morris sera investi d'un titre analogue à celui de Superintendant (Directeur général d'un département botanique). Un émolument élevé (25,000 fr.) lui sera alloué et un yacht mis à son service pour visiter sous les points de l'archipel placés sous son contrôle.†

C'est bien là une preuve manifeste de la suprematie effective de Kew en matière de botanique coloniale, suprématie que fortifient chaque jour les services que ce grand établissement rend aux colonies anglaises.

Nous pourrions en multiplier les exemples, si ceux que nous avons cités ne devaient suffire.—Nous y ajouterons seulement l'appui d'un témoignage d'une valeur considérable, car il émane d'un homme ayant rempli la plus haute fonction de l'empire colonial britannique, du marquis de Ripon, ancien vice-roi des Indes, qui, en mai 1896, portait sur les jardins de Kew ce jugement singulièrement précis et probant :

" Une grande somme de travail, disait-il, a été réalisée et l'on continue à marcher, grâce surtout à l'impulsion qui est donnée par M. W. T. Thiselton-Dyer, Dr. Morris et autres assistants de l'œuvre coloniale ; ils contribuent puissamment à aider les colonies dans l'introduction des nouvelles plantes et dans la culture et le développement de celles que l'on trouve croissant naturellement dans ces colonies. De quelque côté que l'on dirige ses regards, on ne voit que progrès. En Afrique Occidentale, aux Indes proprement dites, à Ceylan, des progrès très satisfaisants ont été réalisés. Un des grands travaux accomplis par Kew a été l'introduction de la méthode, en matière botanique, dans les colonies. Il n'était pas facile de faire apprécier les travaux des hommes de Kew à ceux dont les produits dépérissaient, leur mission étant d'introduire de nouvelles plantes pour remplacer les anciennes ou tout au moins les suppléer. En dépit de l'opposition, un grand pas a été fait pour établir de nouvelles cultures, développer de nouvelles industries, et cela par l'intervention de ceux qui s'étaient dévoués et mis en avant pour cette cause, au nom de Kew."

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* Voir notamment "Les cultures de caoutchouc coloniales," par le Dr. Heckel (*Revue des Cultures coloniales*, t. II., p. 102).

† Depuis ma dernière visite à Kew, où ces renseignements m'avaient été donnés, le Parlement a été appelé à voter les crédits nécessaires à la nouvelle organisation. M. le Dr. Morris a reçu le titre de *commissaire impérial*, et en cette qualité il ne dépendra pas des gouvernements des différentes îles ; il relèvera directement du Colonial Office. Il résidera à la Barbade.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

Utilité d'un service central en France pour les jardins d'essai des colonies. Esquisse de son organisation.

§ 1.

Une récente circulaire ministérielle sur la colonisation agricole a mis en lumière, d'une façon saisissante, l'infériorité de notre production coloniale et la nécessité de développer dans nos possessions la culture des produits que nous devons actuellement tirer de l'étranger. Or, pour faciliter la création d'exploitations agricoles, il faut mettre, sur place, à la portée des colons, d'abord les plants nécessaires à l'établissement des cultures, en second lieu des renseignements et des conseils expérimentés pour l'aménagement et l'entretien des plantations.

Les Anglais, nous venons de le voir, ont créé dans ce but :

1° De nombreux services locaux : départements jardins, stations botaniques ;

2° Et un service central qui les relie, les inspire, les dirige : l'institut botanique de Kew.

Chez nous, il n'a pas été aussi complètement pourvu à ces besoins.

* * * * *

In summarising the result of his enquiries as a basis for the action of his own government, Monsieur Milhe-Poutingon further adds :—

Il ne saurait s'agir, en effet, de constituer, de toutes pièces, un ensemble d'organismes comparable aux jardins de Kew. De pareilles institutions sont l'œuvre du temps. Nous avons vu successivement naître et grandir les divers rouages de Kew; leur ensemble correspond aujourd'hui à un perfectionnement très avancé de la colonisation dans l'empire britannique. Nous sommes, au contraire, en France, au début de la colonisation agricole, et pour parer aux besoins immédiats que nous signalions plus haut, il ne serait nécessaire ni de services compliqués ni d'un nombreux personnel.

Avant tout, nos jardins coloniaux ont besoin d'être approvisionnés de plantes de grandes cultures, afin de créer des champs d'expérience et des pépinières où les colons puissent se procurer des plantes et des graines en quantité suffisante pour l'établissement de leurs cultures. C'est par les serres de forçage que Kew a pourvu à ce besoin. Le premier organisme à créer consisterait donc en une ou plusieurs serres semblables à celles dont nous avons décrit le plan et montré le fonctionnement.

A ce service d'approvisionnement devrait être annexé un service de renseignements, qui aurait mission de procurer aux jardins coloniaux les informations, les avis, les conseils, qui leur font trop souvent défaut pour imprimer aux cultures coloniales une direction méthodique et rationnelle. A plusieurs reprises, au cours de ce rapport, nous avons pu entrevoir l'étendue et la variété des études que comporte un pareil service. Son action s'exercerait sous deux formes principales : par un échange suivi de correspondances avec les établissements botaniques des colonies; par la diffusion au moyen des publications officielles ou particulières, (*Revue Coloniale*, Journaux officiels des Colonies, etc.), des renseignements et études utiles à vulgariser.

Monsieur Poisson, a member of the staff of the Jardin des Plantes, has recently spent some time at Kew in studying the organisation of its museums on behalf of the French Government.

The two following recent documents are sufficient further illustrations of the way in which Kew is regarded abroad:—

"Director, Botanic Gardens, Sydney, New South Wales, to Royal Gardens, Kew.

Botanic Gardens, Sydney,
June 4, 1900.

"Dear Sir William Dyer,—I hope to be in England about the end of July. As soon as I can I hope to call on you and also to visit Kew, the Mecca of all botanists, and a place of especial reverence to me, situated as I am at the other end of the world, where good gardens and good botanists are so few. I particularly desire to look at your Australian herbarium, and especially *Eucalyptus* and *Acacia*.

Yours sincerely,
(Signed) J. H. Maiden.

Sir William Thiselton-Dyer, K.C.M.G., F.R.S., Kew."

"Lyon, le 24 juillet, 1900.

"La Chambre de Commerce de Lyon.

à Monsieur le Directeur du Jardin botanique de Kew.

"Monsieur le Directeur,

"M. Antoine Allemand, élève des cours d'enseignemen colonial créés par la Chambre de commerce de Lyon, a obtenu de notre compagnie une bourse de voyage pour se rendre en Angleterre et y étudier les diverses collections se rapportant à la colonisation.

"Le jardin de Kew est placé au premier rang des collections de cette nature; aussi vous serions-nous très obligés, Monsieur le Directeur, si vous vouliez bien rendre plus aisée la tâche de M. Allemand en lui accordant toutes les facilités possibles pour étudier les richesses que contient votre si intéressant établissement.

"Veuillez agréer, Monsieur le Directeur, l'assurance de ma considération très distinguée,

Le Président,
(signé) Aug. Isaac.

IV.

The principal source of accessions throughout the establishment is the correspondence which is kept up with all parts of the world.

1. The actual expenditure on purchases for the living collection is practically nominal. They are maintained by gifts and exchanges of living plants and seeds from every country. The expenditure in labour in procuring them is, however, very considerable. It is difficult to estimate the sum of money which would be required to purchase what is obtained; it would certainly be very large.

2. The Herbarium and Museum have an annual vote of £200 for purchases. The actual expenditure of money in respect to both is probably in the aggregate very small. Both have been in the main built up by gifts and by carefully organised exchange. In the case of the Herbarium the accessions by gift and bequest have been vast. It will be sufficient to mention the enormous collections of the East India Company, the extensive herbaria of G. Bentham and J. Ball, that of Gay, presented by Sir Joseph Hooker, and the mycological collection of the Rev. M. J. Berkeley. Kew has become, in point of fact, the ultimate depository into which everything, with few exceptions, worth having in connection with botanical studies ultimately flows.

It is not desired to indefinitely extend the Kew Herbarium. As soon as the vegetation of a country is adaquately represented in it, the effort to obtain collections from it is relaxed, and attention is limited to securing any additional new species that may be discovered. No large accessions, for example, are now received from Australia or India. The influx of specimens is therefore irregular, but in any one year has occasionally been enormous.

The accessions during 1899 are probably fairly normal. The approximate number was about 18,000 specimens. Of these about 7,000 were purchased from travellers, about 5,000 by exchange with various botanical establishments, and 6,000 were gifts from travellers for whom they were determined. Of the purchased collections it is not always thought desirable to retain more than a part; the rest are distributed.

One important and constant source of supply is the Colonial and Indian botanical establishments. These are constantly being added to, and each becomes, in a sense, a centre of Kew work. The mode in which this is effected will be seen from the concluding paragraph of the circular sent out from the Colonial Office:—

Downing Street,
2nd August, 1893.

Sir,—The Director of the Royal Gardens, Kew, has been good enough from time to time to advise the Secretary of State on questions relating to the administration of Botanical Establishments in the Colonies, and in response to an invitation to indicate generally the lines on which such Establishments might be most advantageously conducted so as to be of permanent assistance to the communities in which they are placed, he has prepared the accompanying paper of "Suggestions."

These suggestions may be regarded as affording a well considered basis which experience has shown to be practicable for the administration of a well equipped Botanical Establishment, and, as it is very desirable that the administration of these establishments should, as far as

possible, be conducted on uniform principles, I have to request that, so far as local circumstances permit, you will take the necessary steps for giving effect to these suggestions in the Colony under your Government.

I have the honour to be,
Sir,
Your most obedient, humble servant,
RIPON.

The Officer Administering the Government of .

The Secretary of State having from time to time requested the assistance of the Director of the Royal Gardens, Kew, in indicating the lines on which the Botanical Establishments of the several Colonies might be most advantageously conducted, so as to be of permanent assistance to the communities in which they are placed, the following suggestions have been drawn up.

Subject to such variations as the local necessities of various Colonies might seem to render desirable, the Secretary of State regards these suggestions as affording a well considered basis, which experience has shown to be practicable, for the administration of a well-equipped Botanical Establishment in a Colony.

Colonial Office, July, 1893.

SUGGESTIONS for the information of Colonial Governments about to appoint Superintendents of Botanic Gardens, and for the guidance of the Superintendents themselves.

I. The Superintendents' time should be occupied by the duties of the gardens in the interests of the Colony and mother country.

These duties include not merely the keep and cultivation of the plants, but correspondence with other gardens in the Colony and elsewhere, and activity in procuring by means of travellers, visitors, ships' officers, etc., all plants that it may be desirable to introduce, whether for use or ornament, and botanical information generally.

II. The gardens should be both useful and attractive to the general public, and should contain:—

a. A plainly ticketed collection of the plants, shrubs, and trees of the Colony.

b. A collection, also well ticketed, of all such useful plants as can be cultivated in the Colony.

c. A collection of useful and ornamental plants for distribution, exchange, etc.

III. The Superintendent should keep a catalogue of all the plants cultivated and that have been cultivated in the garden; a monthly journal of operations, which may be consulted by persons desirous of forming gardens, and a brief meteorological abstract of the mean maximum and mean minimum temperature of the month, with its humidity, clearness, or cloudiness, amount of rain, etc. He should annually prepare a report on the progress and condition of the garden, of its receipts and expenditure, donations, donors' names, and those of the more important plants distributed from it; this report should be printed by the Government.

The Superintendent should regularly devote a certain portion of his time to the collection of the indigenous plants of the Colony to be established in the Botanical Gardens, or for purposes of exchange. He should also collect, dry, and arrange a complete set of indigenous plants for the purpose of forming a named *Herbarium* of the flowering plants and ferns of the Colony. All plants collected by the Superintendent while occupying an official position in connection with the Gardens, whether in a growing or dried state, should be considered the property of the Colony, and should not be removed by him, or converted to his own use, without the written authority of the Government.

Wherever practicable a public *Museum*, containing named specimens of Colonial woods, of vegetable products useful in medicines, as foodstuffs, or capable of being utilised in trade or for commercial purposes, should be attached to every Colonial Botanic Garden.

IV. A *Library* of botanical books of reference should be attached to the garden and catalogued in duplicate, and no book should be lent out of the library on any pretext whatever. Of this catalogue one copy should be kept in the library, and the other should be deposited in some Government Office, and these should be annually compared. The fact and date of comparison should be stated in the Annual Report, and all losses and additions recorded.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.
29 Nov. 1900.

V. No Superintendent or other officer of the garden should be permitted to sell any plants or garden produce without the written orders of the Government, nor should they be permitted for their own personal emolument to sell or trade in plants of any kind, indigenous or cultivated, nor to take apprentice or other fees.

VI. The Superintendent should not be permitted to cultivate vegetables for the table of any public officer or private individual but his own, or that of other persons employed in the garden; and in all such cases the value of this perquisite should be calculated as part of the salary or wages of the individual who enjoys it. He should not cultivate for his own table rare or expensive fruits, such as take care or time, or offer temptation for pilfering.

With regard to supplying occasionally or periodically the table of the Governor with vegetables, fruit, flowers, etc., this as a duty imposed on the Superintendent is in every respect objectionable; but, on the other hand, a Superintendent must be ineligible or inefficient who has not a sufficient supply of flowers to send frequently to the Governor's house, if not far distant, or who does not use every effort to gratify those institutions or persons, public or private, who actively promote the interests of the gardens. Under no circumstances are fees for such objects to be accepted.

VII. A sufficient stock of all useful and ornamental plants should be kept for interchange with other gardens in the Colony and elsewhere; and, further, the Superintendent may often be required to cultivate a large stock of certain plants for distribution in the Colony or elsewhere. In the case of interchange, a sufficient return in kind or otherwise should be required, at the discretion of the Superintendent; but no general distribution should ever take place except under the orders of Government, which should further decide under which of the following conditions the stock should be distributed:—

a. By sale by auction or otherwise.

b. Gratis, under guarantee that the recipient of the plants will devote a certain amount of land, time, and labour to their cultivation.

c. Gratis to Government establishments or to Colonists or others who have benefited the gardens directly or indirectly.

Specific information regarding any of the above points may be had by application to the Director of the Royal Gardens, Kew, who will be glad to recommend the books most suited to each Colonial Garden, and the best and least expensive way of procuring them. He will also give assistance towards naming dried specimens of the plants of the Colony for the Superintendent, provided the latter keeps up a Herbarium and a proper correspondence in plants, etc., with the Royal Gardens.

(Signed) W. T. THISELTON DYER,
Director, Royal Gardens, Kew.

V.

1. The Laboratory.—This was erected and equipped to carry out the recommendation of the Devonshire Commission by T. J. Phillips Jodrell, Esq., in 1876.

2. The present herbarium building, 86 feet long, by 40 feet wide, was erected in 1877, to take the place of the northern portion of the house, the remainder of which is now devoted to the library.

3. The North gallery was erected in 1880, at the expense of Miss Marianne North.

4. The north wing of No. 1 Museum was erected in 1881 to afford increased accommodation for the Economico-botanical collections taken over from the India Museum. An addition principally for the Cryptogamic collections was also made in the same year to Museum No. II.

5. The temperate house was completed by the erection in 1897 of the south, and in 1899 of the north wing.

VI.

There is nothing to add to what has been stated under IV.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

VII.

"Results" are simply the accomplishments of "uses." Reference may therefore be made to what has been stated under III.

A detailed record of what has been accomplished at Kew in the last quarter of a century would be a voluminous document. It is only possible to indicate salient examples.

The amount of published scientific work turned out from Kew has already been referred to. Two undertakings of indispensable utility to botanists generally which have been prepared at the herbarium deserve especial mention. The Genera Plantarum of Bentham and Hooker was published 1862-83. It consists of three volumes, containing pp. 1,044, 1,279, and 1,258 respectively. It defines the character of all known genera of flowering plants, and is a generally accepted standard; it embraces 202 orders and 7,585 genera, including 95,620 species. It has largely supplied the basis for similar comprehensive works in France and Germany.

The Index Kewensis, published in 1893-5, is an indispensable complement to this. It records the names of all published species of flowering plants, with the place of publication and the geographical distribution. The expense of preparation from materials afforded by Kew was defrayed by the munificence of the family of the late Mr. Charles Darwin; the work was printed by the Oxford University Press.

In 1886 a beginning was made in organising a system of botanical stations in the West Indies in order to promote new cultural industries. In 1898 the work was taken over by the Imperial Government, and the direction was entrusted to Dr. Morris, the late Assistant Director of the Royal Botanic Gardens, as Commissioner of Agriculture. In 1896 Dr. Morris had been previously attached as expert adviser to the West Indian Commission. At the suggestion of the Colonial Office his report on the agricultural resources of the West Indies was republished in a more convenient form as an appendix to the Kew Bulletin.

In 1887 a commencement was made of a similar system of botanical stations in British possessions in tropical Africa. This has been largely developed since.

The object in either case is to create a peasant proprietary and to instruct it in profitable agricultural pursuits.

The Curators of the stations, the plants to stock them, and the necessary technical advice have all been furnished from Kew.

The history of the rubber trade in British possessions on the West Coast of Africa affords a striking example of the results of botanical enterprise. That on the East Coast was created by Sir John Kirk in 1876. Sir Alfred Moloney, impressed with the utility of botanical knowledge in developing the resources of Tropical Africa underwent a systematic course of botanical training at Kew. In 1882 he temporarily administered the Government of the Gold Coast. His attention was attracted by a plant which yielded rubber. He sent specimens to Kew, where it was identified as a source of rubber of excellent quality. At that time the export of rubber from the colony was nil; in 1893, as the result of this discovery, it was of the value of £200,000. Sir Alfred Moloney suggested the establishment of a similar industry at Lagos. No progress was, however, made till 1894, and in 1895 the export rushed up to a value of £270,000.

During the present year the first sample of Cacao grown in any British African colony has been produced at the Gold Coast Botanical Station, and exhibited by Kew on its behalf at the Paris Exhibition, where it has been awarded a bronze medal.

These are merely illustrations. For full detail of the Imperial work of Kew, in so far as they are matters of public interest, reference may be made to the volumes of the *Kew Bulletin*.

I may, however, quote the testimony of the Marquis of Ripon, at the time Secretary of State for the Colonies, at the dinner of the Linnean Society, on May 24, 1895:—

"Sir Hugh Low has spoken in most just terms of services which have been rendered to the Colonies, especially by Kew. I think my friend Mr. Thiselton Dyer will not contradict me when I say that he has more to do with the Colonial Office than with any other public department, and I was very glad to learn from him recently that he found the mode in which we transact our business in that department not unworthy of his praise. Great work has been done, and is being done, mainly through the exertions of Mr. Thiselton Dyer and Mr. Morris, and his assistants, to aid the Colonies in the introduction of new plants, and in the development and cultivation of those which naturally belong to them. In all directions this is the case to-day. On the West Coast of Africa at the present moment it is being done. It is only, you may say, the commencement, but it is a commencement which is very satisfactory in its progress and in its results up to the present time, and which I hope may develop very largely in the future. Then, again, we all know that in the West Indies great work has been done by those men—men, most of them I ought to say, who have been sent out from Kew to those Colonies. In Jamaica there is the fruit cultivation, which has become every day more important, and which only requires the establishment of further lines of steamers between Jamaica and the United States to develop a still larger and more important trade. And again, almost all our natural products have been, through the agency of Kew, introduced in Jamaica. I find that much goodwill has always existed among our friends in Kew; but we must bear in mind that one of the great works which has been undertaken by Kew is to educate the Colonies to recognise the nature of their various natural products, and the advantage of introducing new products. But when you come to introduce new products you encounter difficulties. There are cultivators of the old sort whose products are dying out, and whose particular industry is falling away; it is not very easy to induce those who are in that unfortunate condition to appreciate the labours of the man from Kew who comes down and introduces new plants into their Colony which they see are gradually ousting the old ones. But we must bear in mind that this work is done not only in the Colonies, properly so called, with which I am now connected, but also on a large scale in the great Dependency of which I once had the honour of being the head, in India."

It should be added that at the present time the Colonial Office desires to be represented before the Committee by one of its staff. Probably the India Office would also wish to take a similar course.

Mainly owing to Sir Joseph Hooker's early connection with India, the relations of Kew and the India Office have always been of the most intimate kind.

The introduction of Cinchona into India in 1861 has steadily borne fruit under the skilful administration of Sir George King. Since 1893 a dose of five grains of quinine can be purchased at every local post office in Bengal for about a farthing. This was followed in 1876 by the introduction through Kew of the principal trees producing india-rubber in South America, at an expense of upwards of £1,500. India-rubber of excellent quality is now exported from British possessions in the East, and the cultivation is to be taken up by the Government of India on a large scale.

In 1858 the Honourable East India Company transferred to Kew "the enormous collection of plants made under the order of the Indian Government by officers of their service, and which had been accumulating for thirty years in the cellars of the India House." These, in addition to the large collections of Sir Joseph Hooker himself, of Mr. C. B. Clarke, and others, supplied the material for the Flora of British India, commenced in 1875 by Sir Joseph Hooker, aided by a staff of botanists, and completed in 1897. India was then supplied with a systematic record, not merely of its indigenous plants as far as ascertained, but of the botanical literature relating to them. In 1874 Sir Dietrich Brandis had also prepared at Kew his Indian Forest Flora, which gives an admirable survey for the use of Indian forest officers of its ligneous plants.

In 1873 Dr. Watt, since 1887 Reporter on Economic Products to the Government of India, was selected by Kew for service in India. His great Dictionary of Indian Economic Products, in nine volumes (1889-96) was largely inspired by Kew, and sweeps up all the

work done for India by Kew. It may be said with confidence that there is no country of which the vegetable resources have been so elaborately detailed.

Kew is constantly called upon to advise the Secretary of State for India in Council upon technical questions of the widest range relating to the material development of India. During the present year the Director of Kew has been requested to report upon the education of Indian Forest Officers. The following paper will serve as an example of the nature and responsibility of this branch of Kew work:—

NOTES of a meeting held at the India Office under orders of the 14th June, 1900 (R. and S. No. 1663, 1900).

At the instance of Mr. Denzil Ibbetson, lately a member of the Government of India, a meeting was held to discuss the request of the Government of India, that a scientific expert in agriculture should be selected for the office of Inspector-General of Agriculture in India. The request was made in April, 1897 (No. 1396/97); but at that time the Secretary of State was unable to find a candidate possessing the necessary qualifications (No. 2360/97). Mr. Ibbetson had been authorised to represent them in the matter and to attempt to find a suitable candidate. The meeting was attended by Sir W. Thiselton-Dyer, Sir George King, Mr. Denzil Ibbetson, Professor Somerville, Sir C. E. Bernard, and took place on the 3rd July at noon. Most of the members were conversant with the question, and had seen the Government of India letter of April, 1897. But, as Dr. Somerville had not seen the papers, the objects of the meeting were briefly explained. It was said that agriculture was by far the greatest of India's interests and industries; that 70 to 80 per cent. of the people lived by agriculture; and that the people had an ancient system of agriculture of their own full of practical wisdom. The Government of India had for 30 years attempted in a fitful way to promote the improvement of agriculture. New staple crops had been introduced, old staples had been developed; but these advances were greatly due to increasing trade and to the improvement of means of communication. Model farms, experimental farms had been opened and worked and often closed. But it was difficult to say that any scientific improvements had really been grafted upon Indian systems of agriculture, or that experience gained at experimental farms had radiated into the districts round. Of all the many agricultural machines and appliances that had been carried into India, one only, the Beheea sugar mill, had been adopted by the people; and of that machine (or its imitations) hundreds of thousands were now used by the people.

Eleven years ago the Indian Government took the important step of sending out from England a well-known agricultural chemist, Dr. Augustus Voelcker, to report upon the improvement of Indian agriculture. Dr. Voelcker's report was known to the members of the meeting; and perhaps the most important teaching of that report was that Indian agricultural systems and methods were usually good and suitable; and that the wisest course would be. not to subvert those systems and methods, not to substitute western methods, but to apply scientific knowledge to the improvement of existing systems which were based on the practical experience of many generations.

With reference to the choice of an Inspector-General of Agriculture, it was mentioned that though the Government of India was the supreme power in the land, yet the country was administered, the people were influenced, improvements were initiated and prosecuted by the local governments and their officers, subject to the control and direction of the Government of India. An officer under the Government of India could not be a Director of Agriculture; he would be Inspector-General; his function would be to influence and guide the local governments and their agricultural officers. That kind of organisation had been adopted with immense success in the Forest Department. Forty years ago there was no Forest Department, and no scientific forestry except in Burma. Dr. Brandis was called from Burma to India; he visited forests in all provinces; with the support of the Supreme Government he organised a forest staff in every province; he influenced the local governments and their officers; he procured the introduction of scientific forestry all over the vast Government forests; and now the Indian forests yield a yearly surplus revenue of more than half a million pounds, while the Forest Department is preventing unscientific waste, and is administering as well as conserving 80,000 square miles of forests, for the benefit of present and future generations. What the Inspector-General of Forests has done it is hoped and believed the Inspector-General of Agriculture will also do in his department.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

Mr. Denzil Ibbetson said it was true that the Government of India, though they recognised the immense importance of agriculture to the country and the people, had postponed agricultural reform partly because of the inherent difficulty of the matter, and partly because they wished first to get the land records system into thorough working order. This had now been done, and the Government desired actively, systematically, and perseveringly to take up the improvement of agriculture. Dr. Voelcker's report had laid down the lines in which this could best be done. It was the very best feature of Dr. Voelcker's report that, after a comparatively short experience of the country, he decided that the true path of improvement lay, not in subverting Indian agricultural methods, but in developing and improving them by the light of scientific knowledge. Mr. Ibbetson's view was that an Inspector-General of Agriculture coming to India, would, for some time at any rate, have to learn more than teach. Until he was acquainted with Indian systems and methods, and had realised their merits, he would be little able to develop and improve them. Mr. Ibbetson had obtained leave to convene the present meeting in order that he might, on behalf of the Government of India, obtain advice and assistance in selecting the best possible man for the office of Inspector-General of Agriculture.

Sir William Thiselton-Dyer paid a warm tribute to Dr Voelcker's report; he regarded the work as a most remarkable instance of how a truly scientific man recognised the merits and the value of unscientific methods of agriculture, the outcome of ages and generations employed in working out practical problems. This question of Indian agriculture was most serious. The British Government in India had to face the problem how the vast population of India, increasing at the rate of two millions a year, were to be fed. India required a more intensive agriculture. We saw many backward countries, which sent food to England, satisfied with 9 to 12 bushels of wheat per acre; while the English farmer was not satisfied unless he got 30 bushels per acre. The English results were due partly to manuring and high farming. The Indian peasants could not afford, could not obtain manure. But there were other ways of improving the yield of land. We had seen sandy wastes in Prussia rendered fertile by growing successive nitrogen-accumulating crops. Possibly the yield of Indian lands might be systematically improved by ploughing in or by a rotation of leguminous crops. This was only an instance how scientific knowledge might be applied. At the same time it would be the greatest mistake to substitute for Indian agricultural practices western methods merely because they had succeeded in the west. For instance, it had been urged that Indian cultivation would be vastly improved by deeper ploughing. A Madras agriculturist, a pupil of Sir W. Thiselton-Dyer's, had made careful experiments, and claimed to have proved that deep ploughing yielded crops more tolerant of drought than shallow ploughing in similar adjacent soil, and under the same circumstances. This seemed a startling and so far a satisfactory demonstration. But on the other hand it was shown that in most parts of India the land was infested by long-rooted grasses. So long as these grasses did not get their roots below the pan underlying the surface soil scratched by the native ploughs every year, it was comparatively easy to get rid of the weeds. But if the pan was loosened by deep ploughing, the long roots of the noxious grasses penetrated, and it became most difficult for the Indian peasant to eradicate them with the means and funds at his disposal. The problem in India was how best to graft the results of scientific agricultural knowledge on to the stock (the really valuable stock) of Indian agricultural practice and experience.

It had been said by Mr. Ibbetson that the Government of India had intentionally postponed earnest systematic effort after agricultural improvement to other (no doubt important) reforms. This being so it was needless to go back upon the past, and he (Sir W.

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Dyer) was glad this great subject was now to be taken up. But he thought there were lessons to be learned from the results of previous spasmodic, unsystematic effort. He had been struck by the Government of India having in the first place called to their aid two agricultural chemists (Messrs. Leather and Collins) who were chemists and not agriculturists. No doubt chemists were needed, analyses of soils, of waters, and of products were most useful and necessary. But you could not expect a chemist to initiate systematic improvements in agriculture. Good of a limited kind had no doubt been done by the model farms and experimental farms, and by the attempts at agricultural teaching of the past 20 or 30 years. But one obstacle in the way of success has been the lack of permanence in these undertakings. Indian officers, very rightly, pay much regard to the financial bearings of an undertaking. They have been apt to close agricultural experiments, or discourage them, because they do not pay. Administrative officers change in India at short intervals, and, if an agricultural venture does not pay, stoppage or modification is liable to be enforced therein at any or every change in the directing officer. It must be recognised—and he (Sir W. Dyer) was glad to learn from Mr. Ibbetson that the Government of India now recognised—that agricultural experiments and agricultural observations do not and cannot pay directly within a few years. Such work must be carried on persistently for a generation—not of short-lived Indian officials who last in the same office for five years or less—but for a generation of 30 years or so. And during all that time the work will not pay in any direct way. In England we had seen Sir John Lawes carrying on for more than 50 years a continued series of agricultural experiments and observations at his own expense. In not one year had these operations been otherwise than a direct expense (we need not say loss) to Sir John Lawes. Yet the lessons taught at Rothamsted were valued and were bearing fruit not only all over England, but throughout the whole civilised world.

Mr. Ibbetson here mentioned the sort of difficulty that sometimes occurred. Funds might be short in a particular province; an important road had to be finished, a court-house or a prison, levelled by earthquake, had to be rebuilt; and so, perhaps, funds were withdrawn by a local government, temporarily or otherwise, from agricultural undertaking. Mr. Ibbetson did not approve or justify such a policy. But he could imagine that something of the kind might happen.

Sir W. Dyer said there would be little use in having a qualified expert as an advisory officer in agricultural affairs, unless the agricultural policy and the agricultural programme of the Government was permanent. It was a case of casting your bread on the waters, and getting a return after many days. You cannot get, and you ought not to expect a return at once. Experiments and observations must be continuous, the work of applying scientific knowledge to Indian agriculture must be permanently carried on. If that principle was accepted and carried out, it was contrary to human experience to suppose that good—perhaps great good—would not result. The experiments and the undertaking under discussion were of vital importance to the future well-being of India. It was only by the gradual adoption of intensive agriculture that the country could expect to support in time to come its rapidly increasing population.

Professor Somerville remarked that what had been already said by others anticipated in a very great measure all he had to say. He could hardly have expected to hear his own views thus clearly expressed by the previous speakers. He was strongly of opinion that the agricultural practice of a country like India must be accepted as wise and expedient; and he held that changes must not be attempted without extreme caution. Even in a comparatively small country like England it was often found dangerous to import details of agricultural practice from one county to another. Small divergencies of practice were usually founded on practical experience.

A long time would be necessary for the Indian Agricultural Department, or for an Indian Inspector-General of Agriculture, to obtain mature results. Short periods of experiment and observation do not afford adequate material for generalising. And so, also, in regard to agricultural education, early results must not be expected. Educated agriculturists must, from the nature of the case, be young men at the outset. For some years such men would not reach positions where they could make themselves felt and during their practical apprenticeship their capacity and usefulness would be maturing.

Sir George King suggested that there were two ways of getting competent agricultural officers. One was to send civil servants of some short experience in the country to learn scientific agriculture, in order that they might on returning to India organise and direct agricultural work. The Dutch Government in Java were acting on this system. The second plan, which was favoured by the Government of India, was to get from the west a scientific and experienced agriculturist, who, after acquainting himself with Indian facts and Indian methods, would apply his scientific knowledge to the development and improvement of Indian agricultural methods. It would take a new man 10 or 12 years to learn Indian facts, and until he was thoroughly acquainted with his new environment he could not usefully initiate measures of improvement and development. No practical result could be manifest from such work for a generation. One great difficulty in India was the frequent change of administrative officers. Within a generation of 30 years the Governor of a province and the chief authorities in that province would be changed five or six times.

It may be convenient now to call attention to the somewhat peculiar position which Kew occupies as a Government institution. This is defined by the Treasury Minute of July 24, 1872. According to this the Director is subordinate to the First Commissioner of Works in all administrative matters. But in regard to the scientific work of the establishment and advice furnished to the Government Kew is independent of the Office of Works. The position has not, however, been clearly understood by the Office of Works or always by the Treasury, and a good deal of disagreeable friction has from time to time arisen in consequence. This is obviously not conducive to the efficient performance of public work, and it is to be hoped that the Committee will see a way to recommendations which will put matters on a more satisfactory basis.

The KEW BULLETIN is practically a "continuous record of Kew work in all its various aspects." The following paper describes the circumstances under which it was undertaken, and summarises the most important results of Kew work for the period, 1887-96.

The completion of the tenth annual volume of the *Kew Bulletin* has made it desirable to publish a detailed index to the whole series. As the number of volumes has increased it has become more difficult to find the information they may contain on any particular subject.

The opportunity may be taken to pass in review briefly the more important subjects which have been treated. This will have the more interest as the period covered has been one of more than usual activity in the development of our tropical possessions.

Kew, from its first establishment as a national institution in 1841, has always been applied to by men of business desirous of engaging in new industries. Response to individual enquiries gradually came to be regarded as insufficient, and a demand arose for the prompt publication for general use of any information likely to be of service to those engaged in colonial pursuits. With this object the first number of the *Bulletin* was issued in January, 1887. But it was also intended to serve another purpose. When public attention is engaged by any particular subject, enquiries about it are numerous. To say all there is to be said about it, once for all, in the pages of the *Bulletin* effects a great saving in labour. To quote the prefatory notice to the first number:—

"It is hoped that while these notes will serve the purpose of an expeditious mode of communication to the numerous correspondents of Kew in distant parts of the Empire, they may also be of service to members of the general public interested in planting or agricultural business in India and the colonies."

On March 18, 1887, the First Commissioner of Her Majesty's Works and Public Buildings (Mr. Plunket) informed the House of Commons:—"In response to the demands for the publication more speedily than in the annual report of information received from abroad, I

have sanctioned the publication of a monthly bulletin, which can be purchased for a small sum."

Publication was originally intended to be "occasional." It has not been found practically possible to keep up an absolutely regular monthly issue. This, however, has been approached as nearly as circumstances would allow.

The original intention was to confine the *Bulletin* to colonial and commercial information. The suggestion of a larger scope having been raised in Parliament, especially with regard to reports on expeditions, the materials collected by which had been entrusted to Kew, to notices of interesting plants or objects received and the important plants sent out, Mr. Plunket further decided that the "*Bulletin* . . . should be made the vehicle of all printed matter suitable for its pages, which it is desirable to issue from" Kew. As a sequel the *Bulletin* became, what it remains, a continuous record of Kew work in all its various aspects.

Botanic Stations.

The establishment and development of the institutions known as Botanic Stations belongs almost entirely to the period under review. These stations were first suggested in 1885 to meet the special requirements of the smaller islands in the West Indies (*K.B.*, 1887, June, pp. 1-12) where "a great want was felt for reliable information on the culture of new economic plants and plain practical hints as to the best means to be employed for rendering them of the greatest value" (p. 7). This information was intended to be supplied by a regular system of bulletins supplemented by the maintenance of stations with nurseries attached for supplying seeds and plants. The officers in charge of the stations were men selected mostly from Kew, with sound knowledge of gardening and capable of showing experimentally the conditions under which tropical economic plants might best be utilised as objects of remunerative industry.

The scheme met with the approval of the late Earl of Derby, and has been supported by successive Secretaries of State.

The details of its working have devolved largely on Kew, which had been continuously drawn upon for men, plants, advice, and information.

The first Botanic Stations were started at Grenada and Barbados, in 1886. These were soon followed by similar stations at St. Lucia (1889), Dominica, and other islands in the Leeward Group (1889), St. Vincent (1890), and afterwards at British Honduras (1894). There are now nine stations in all in the West Indies.

The Grenada station was established on a spot just outside the town of St. George, described by the Governor as a "good site, well watered, accessible, and apparently suitable in every way." The first grant was £300, with a further sum of £1,000 towards establishing and laying out the garden and providing a house for the curator. The objects of this garden were stated as follows: "To introduce and distribute plants of great economic value, to supply practical hints respecting new and promising industries, and to develop and improve existing minor industries" (*K.B.*, 1887, June, p. 12). An account of the interesting station at St. Vincent, established on the site of the old botanic garden that existed from 1765 to 1823, was given, with a drawing of the curator's house (*K.B.*, 1892, p. 92). Several references are made to the excellent work done at the Botanic Garden at Dominica, which promises to be one of the most attractive and useful in the West Indies (*K.B.*, 1893, p. 148).

Following the example of the West Indies, there have been established five Botanic Stations on the West Coast of Africa. The earliest was started at Lagos by Sir Alfred Moloney in 1888; the next at Aburi on the Gold Coast, in which Sir W. Brandford Griffith took a deep personal interest, in 1890. Since then stations have been established both at Gambia (1894), in the Niger Coast Protectorate (1891), and at Sierra Leone (1895). A further station has been established in Fiji by the efforts of Sir John Thurston (1889). The results attained by these Botanic Stations have been so promising that a strong wish has been expressed by the local authorities to obtain similar institutions at Bermuda, Bahamas, and Seychelles.

Fruit Trade.

One of the most interesting developments in Colonial enterprise in recent years has been the increasing trade in fruit. Jamaica led the way, largely owing to the encouragement of the late Sir Anthony Musgrave, by supplying the United States with bananas and oranges that hitherto had had no local commercial value. The Jamaica fruit trade is now of the annual value of more than half a million sterling, and employs a considerable number of vessels wholly engaged in it. The trade in fruit between the Southern Colonies of the Old World (the Cape and Australia) and the mother country is another instance of commercial activity in a new direction. It is not yet ten years old, but the value of the fruit annually imported is very considerable. The first steps in this direction were undertaken on the suggestion of Kew, and led to the excellent display of fruit made at the Colonial and Indian Exhibition in 1886. This showed so strikingly the capabilities of the Australian Colonies and the Cape to ship fresh fruit to this country during the winter months that considerable effort was made to establish what is now regarded as an important trade.

In the *Bulletin* for the years 1887 and 1888 will be found a summary of information not accessible in any other form in regard to the capabilities of various parts of the Empire for the production of fruit. This was brought together through the aid of reports obtained by the Secretary of State for the Colonies, and is still the most authoritative source of information on the subject. The efforts now being made to ship various tropical fruits from the West Indies direct to this country is another direction in which great results may ultimately be attained. The popular taste for the consumption of bananas is increasing. It has been shown that many of such fruits can be brought to the home country in a fresh condition and find a ready market.

Information is also given respecting certain kinds that have been introduced with the aid of Kew from the West to the East Indies (*K.B.*, 1887, August, p. 1). Among these the Tree Tomato, the Chocho, and the Cherimoyer have proved useful additions to the food supply of hill stations in India and Ceylon. On the other hand, new varieties of bananas and mangoes, the Durian and the Mangosteen, have been transferred from the East to the West Indies.

Decades Kewenses.

Under the title of "Decades Kewenses" descriptions of plants new to science have reached the thirtieth decade. These are based on specimens contributed from every region on the earth's surface from the extreme heights of Tibet to the shores of the remotest islet in the Pacific Ocean. Further, owing to the increased impulse to exploration and commercial enterprise in Tropical Africa, it was thought desirable to publish at once, but in a separate series, brief diagnoses of new species. This has been done in the "Diagnoses Africanæ" (1894 to 1895).

Floras.

Besides these the vegetation of special regions investigated at Kew as the result of collections communicated by expeditions and travellers, appear under numerous headings as the Flora of the Solomon Islands (*K.B.*, 1894, p. 211; 1895, pp. 132, 159; of Aldabra Islands (*K.B.*, 1894, p. 146); of Formosa (*K.B.*, 1896, p. 65); of St. Vincent and adjacent islets (*K.B.*, 1893, p. 231); of the Gambia Delimitation Commission (*K.B.*, 1891, p. 268; 1892, p. 45); of the Sikkim-Tibet frontier (1893, p. 297); of Tibet (*K.B.*, 1894, p. 136); of the Hadramaut Expedition (*K.B.*, 1894, p. 328; 1895, p. 315; Siam plants (*K.B.*, p. 1895, p. 38). Amongst investigations of the economic products of various regions are articles on the Agricultural Industries of the Gambia (*K.B.*, 1889, p. 242); Economic plants of Madagascar (*K.B.*, 1890, p. 200); Agricultural resources of Zanzibar (*K.B.*, 1892, p. 87); Economic plants of Sierra Leone (*K.B.*, 1893, p. 167); and Plant industries of Lagos (*K.B.*, 1893, p. 180).

Orchids.

The cultivation of orchids is one of the most prominent features of English horticulture. Every part of the world is ransacked for them by collectors. Of no family of plants have more species been got together in a living state, and in no country are a greater number maintained under cultural conditions than in England. During his lifetime, the late Dr. Reichenbach, Professor of Botany at Hamburg, was the acknowledged authority for their nomenclature. On his death in 1889 vigorous public pressure was brought to bear on Kew to take up his work. This was done, though not without difficulty in addition to its other duties, and in 1891 the publication of technical descriptions of new species was commenced. Twenty decades of "new orchids" have been published in the *Bulletin*.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

Horticulture.

Of horticultural interest a list enumerating 766 species and varieties of orchids that flowered at Kew during the year 1890 has been published (*K.B.*, 1891, p. 52), affording useful information as to the time and duration of the flowering period of orchids cultivated in this country. The highest number of species flowered in one month was 125 in May; the lowest was 85 in January. Some species, as for instance *Cypripedium longifolium*, *Masdevallia pulvinaris*, and *Odontoglossum crispum*, were in flower all through the year.

The cultivation of tropical and sub-tropical plants on the Riviera was described (*K.B.*, 1889, p. 287), with notes on the principal palms, cycads, bamboos, agaves, and other succulent plants. To this was added a list of some of the most interesting other species established on the Riviera, revising in many cases the names under which they had hitherto been recognised. A further contribution was made to this subject by a paper written by Mr. J. G. Baker, F.R.S., on the agaves and arborescent liliaceæ on the Riviera (*K.B.*, 1892, p. 1). As few botanists have attended much to these plants it has been very difficult for cultivators to obtain names for their collections. A correct determination of cultivated Riviera plants is also of value to Kew, as it assists in the interchange or purchase of new and desirable specimens required for the establishment.

An important paper on horticulture and arboriculture in the United States, prepared by the curator, Mr. G. Nicholson, A.L.S., whilst on a visit, as a judge in horticulture at the Columbian Exposition at Chicago (*K.B.*, 1894, p. 37), has rendered it possible to obtain a more complete representation of the trees and shrubs of the United States in the Arboretum of the Royal Gardens, and has brought before horticulturists in this country many interesting plants that had not hitherto received the attention they deserved. Nearer home, a paper on Horticulture in Cornwall (*K.B.*, 1893, p. 355) affords a fairly representative picture of the possibilities of Cornish horticulture, where, owing to the mildness of the climate, types of the vegetation of New Zealand and the Himalaya do better even than under glass at Kew. The "cultivation of vegetables for market" and the possibilities of market gardening in Great Britain (*K.B.*, 1895, p. 307) discusses an important economic problem.

Among other horticultural subjects dealt with are the storing of home-grown fruit (*K.B.*, 1895, p. 31, with an illustration of a fruit room), and a detailed account of the prune industry in France and California.

Plant Diseases.

The diseases of cultivated plants is a subject on which the aid of Kew is frequently sought on behalf of Colonial Governments by the Secretary of State for the Colonies. The investigation of fungoid diseases often demands considerable time and attention on the part of members of the Kew staff, while those caused by insects render it necessary to secure the assistance of specially qualified experts to whose courtesy this establishment is greatly indebted. The several diseases that have affected the sugar-cane in the West Indies, Queensland, and Mauritius have been described in a series of important articles extending over several years (1890-96) whilst diseases such as those affecting arrowroot in St. Vincent, bananas in Fiji, cocoa-nut in British Honduras, coffee in East Africa, onions in Bermuda, wheat in Cyprus, pepper in Mysore, potatoes in India, vanilla in Seychelles, have also been carefully dealt with. Of considerable practical value are articles on the preservation of grain from weevils (*K.B.*, 1890, p. 144), and on the well-known plant-malady called "anbury" and "finger and toe," which attacks turnips (*K.B.*, 1895, p. 129). It is shown that free acid present in the soil is favourable to the disease, while a free alkali is unfavourable.

Fibre Plants.

The large and increasing interest taken in fibre plants and the numerous references made to this establishment on the subject, rendered it desirable to place within reach of cultivators in India and the Colonies a summary of information respecting them. This is contained in a series of articles begun in 1887 and continued with more or less regularity to the present time. The total number amounts to about 70. As might be expected, those of chief importance relate to Sisal hemp and Ramie, or China grass, subjects which have received much attention in various parts of the Empire. These articles are of value, not only in encouraging the cultivation of plants yielding fibres likely to be in actual demand, and yielding remunerative results, but in preventing expenditure upon those that are known to be useless.

Many fibres have been traced to the plants yielding them for the first time. For instance, the Mexican whisk, or *Raiz de Zacaton*, was identified, from specimens communicated by the Foreign Office, as the root of a species of *Epicampes*, a grass distributed over the highlands of Mexico. The plants yielding the fibre called Istle, used, not for rope making, but as a substitute for animal bristles in the manufacture of cheap nail and scrubbing brushes, were found to belong to a group of Agaves with short leaves, of which *Agave heteracantha*, Zucc., is the type. The first information respecting African bass, a fibre obtained from *Raphia vinifera*, was published in the *Kew Bulletin* (*K.B.*, 1891, p. 1). This is now a regular article of export from our African Colonies; and the same thing may be said of the bass fibre obtained from the Palmyra palm in Ceylon (*K.B.*, 1892, p. 148), and of Madagascar Piassava yielded by a new species of *Dictyosperma* (*K.B.*, 1894, p. 358). A continuous account of the hemp industry in Yucatan, and of the similar industry lately started in the Bahamas, is given over the whole period. The origin of the white-rope fibres which appeared in commerce as Bombay aloe fibre, and as Manila aloe fibre, have been traced to *Agave vivipara*, a New World species now naturalised and fairly abundant in many parts of the East Indies (*K.B.*, 1893, p. 78).

The recent attempts to extract and to utilise the valuable fibres contained in the China grass (*Boehmeria nivea*), and Ramie or Rhea (*B. tenacissima*), have been placed on record in a series of articles which have been of considerable service to manufacturers in this country and also to our planting Colonies. The habits and requirements of the plants and the conditions necessary for their successful cultivation have been carefully discussed.

Rubber Plants.

The investigation of rubber-yielding plants has resulted in drawing attention not only to new sources of supply, but in increasing the quantity available for commercial purposes. The remarkable rubber industry started in the Colony of Lagos in 1889 is described (*K.B.*, 1895, p. 241), and a figure is given of the plant, which hitherto had not been known as a source of commercial rubber. The Lagos rubber industry in two years developed into an export value of nearly £400,000. A somewhat similar industry had been started on the Gold Coast by the efforts of Sir Alfred Moloney, with exports in 1893 of the value of £218,162. Practically all the more important sources of commercial rubber are reviewed, while particulars respecting new rubber plants such as *Forsteronia gracilis* in British Guiana, *F. floribunda* in Jamaica, and *Sapium glandulosum* in the United States of Columbia are also given. It may be added that information is desired by this establishment respecting the plants yielding the Esmeralda rubber of Guiana (*K.B.*, 1892, p. 70) and that exported from Matto-grosso in Brazil. There is a doubt as to the distinction, if any, existing between caout-choucs yielded respectively by the Ule and Tunu trees of Central America. One of these is usually referred to *Castilloa elastica*, but botanical specimens are necessary of each tree to definitely decide the point.

Special Articles.

These include the results of investigations made at Kew into plants yielding Paraguay tea, or maté, so largely used as a beverage in South America (*K.B.*, 1892, p. 132); vanilla-yielding plants cultivated in tropical countries (*K.B.*, 1895, p. 169); the plants yielding Sisal hemp (*K.B.*, 1892, p. 21); the timber of the Straits Settlements (*K.B.*, 1890, p. 112); the species and varieties of *Musa* cultivated for food or ornament (*K.B.*, 1894, p. 229); tropical fodder grasses (*K.B.*, 1894, p. 373; 1896, p. 115); Chinese white wax (*K.B.*, 1893, p. 84); the arrowroot industry of St. Vincent (*K.B.*, 1893, p. 191); tuberous Labiatæ (*K.B.*, 1894, p. 10); Canary rosewoods (*K.B.*, 1893, p. 133); American ginseng (*K.B.*, 1893, p. 71); palm weevils in

British Honduras (*K.B.*, 1893, p. 27); and sheep bushes and salt bushes (*K.B.*, 1896, p. 129). In addition several articles have appeared describing the various forms in which tea is met with in European and Asiatic commerce. P'u-êrh tea is made into balls as big as a man's head, or into cakes; compressed or tablet tea is manufactured from tea dust by steam machinery, while another form known as brick tea is used in Chinese Mongolia and Tibet. Lao tea is not used for making an infusion, but prepared wholly for chewing purposes. A pickled tea, called Leppett tea, is eaten as a preserve with other articles. The white tea of Persia has been shown to consist of the undeveloped leafbuds of China tea thickly coated with fine hairs, giving them a silvery appearance. A singular beverage, known as Faham tea, is prepared in Mauritius from the leaves of an orchid *Angræcum fragrans* (*K.B.*, 1892, p. 181). This is described as agreeable and used as a digestive; it is even recommended in diseases of the respiratory organs. The leaves themselves mixed with ordinary tea impart to them an extremely pleasant perfume.

The discovery of seedling sugar-canes at Barbados (*K.B.*, 1889, p. 242) has rendered it practicable to raise new serviceable varieties, and probably to improve the yield of this valuable plant. A seedling raised at Kew has yielded excellent results in Queensland, and has been largely propagated under the name of "Kewensis" (*K.B.*, 1896, p. 167). The possibility of preparing a palatable butter from the oil of the cocoa-nut (*K.B.*, 1890, p. 230), is an instance of the advance made in the chemistry of familiar vegetable products. Canaigre (*K.B.*, 1890, p. 63) will probably prove a most valuable tanning agent, while the preparation of cutch from the bark of mangrove trees (*K.B.*, 1892, p. 227) may bring into profitable use stretches of vegetation in the tropics that have hitherto been regarded as perfectly useless. Amongst new economic plants should be mentioned *Coffea stenophylla*, the highland coffee of Sierra Leone (*K.B.*, 1896, p. 189) which in certain localities may prove a formidable rival of the Arabian coffee.

The publication of a note on Jarrah timber (*K.B.*, 1890, p. 188) has led to the extended use of this and similar Australian hard woods for the purpose of paving the carriage-way of London streets instead of the cheaper but less durable white pine. The collection of Australian timbers in Museum III. were of special service in this direction.

A paper on Natural Sugar in Tobacco (*K.B.*, 1896, pp. 49-55) recorded some scientific facts of great novelty and interest, and solved an important fiscal problem.

Drugs.

Many little-known drugs have been investigated. The seeds of *Sophora secundiflora* have a singular use among the Indians of Mexico, where they are taken as an intoxicant. Half a seed is said to produce exhilaration followed by sleep lasting two or three days (*K.B.*, 1892, p. 216).

Derris elliptica, now growing in the Economic House at Kew, yields the Malayan fish poison known as "Aker Tuba" (*K.B.*, 1892, p. 216). From the account given of Natal Aloes and of the plants supposed to yield this product (*K.B.*, 1890, p. 163) it appears that it differs in some important respects from the more commonly known Cape Aloes. The discovery of the plant, also in the Kew collection, yielding the true Star Anise of commerce, is noticed (*K.B.*, 1888, p. 173). The manufacture of quinine in India and the wide distribution at a nominal price of this valuable medicinal agent amongst the natives (*K.B.*, 1890, p. 29) is one of the most important services which European rule has rendered to the Indian Empire. Paraguay Jaborandi (*Pilocarpus*) is discussed (*K.B.*, 1891, p. 179) from materials sent to this country by H.M.'s *Chargé d'affaires* at Buenos Ayres in 1881. The origin of myrrh and frankincense is discussed in considerable detail (*K.B.*, 1896, p. 86), while the first authentic information respecting the district whence Siam Benzoin or Gum Benjamin of commerce is obtained in the subject of another article (*K.B.*, 1895, p. 154). Next to Gum Benjamin, Siam Gamb ge is is obtained in the subject of another article (*K.B.*, 1895, p. 139). The peculiar Ai Camphor prepared in China from a shrubby composite, a species of *Blumea*, is described (with a plate) from information supplied by Dr. Augustine Henry (*K.B.*, 1895, p. 275). The plants yielding the leaves known as coca, and the drug cocaine, with their characteristics, are discussed (*K.B.*, 1889, p. 1), with a suggestion that a plant long cultivated a Kew (*Erythroxylon Coca*, var. *novo-granatense*) might be suited for cultivation at a lower elevation than the type. The little-known Iboga root of the Gaboon and Bocca of the Congo, possessing tonic properties, is traced to *Tabernanthe Iboga*, Baill. *K.B.*, 1895, p. 37); the tree yielding the Ipoh poison of the Malay peninsula is identified with that yielding the Upas poison of Java (*K.B.*, 1891, p. 24), but the remarkable point is brought out that while in Java the Upas tree (*Antiaris toxicaria*) furnishes a very effective arrow poison, in the Malay peninsula the juice of what is regarded as an identical species is apparently innocuous, and the defect is remedied by the use of arsenic.

Food Grains.

A series of articles on the Food Grains of India by Professor A. H. Church, F.R.S. (1888 to 1893), supplements the information contained in his published handbook on the same subject. The materials for these investigations were supplied from the Museums of the Royal Gardens.

Miscellaneous Notes.

In 1891 a series of miscellaneous notes was begun in which were recorded appointments on the Kew staff as well as those made on the recommendation of Kew by the respective Secretaries of State to Colonial and Indian Botanical Gardens. The notes also included a record of contributions made to the gardens, herbarium, and museums, the movements of expeditions and travellers engaged in botanical exploration, notices of Kew publications, and facts of interest connected with the daily work of the establishment. Later there were added paragraphs on general economic subjects too short to appear as separate articles. The detailed index now published will afford the means of reference to these scattered notices.

Appendices.

The Appendices remain to be noticed. Of these three have been regularly issued at the end of each volume since 1891. Previously the information contained in them had appeared as one of the monthly numbers of the *Bulletin*. (1) Lists of seeds of hardy herbaceous plants and of trees and shrubs offered in exchange by Kew to Colonial, Indian, and Foreign Botanical Gardens; (2) Lists of new garden plants annually described in botanical and horticultural publications. These are indispensable to the maintenance of a correct nomenclature in the smaller botanical establishments in correspondence with Kew, and afford information respecting new plants distributed from this establishment in regular course of exchange with other botanic gardens; (3) Lists of the staffs of the Royal Gardens, Kew, and of botanical establishments at home and in India and the Colonies in correspondence with Kew.

In Appendix III., 1890, will be found a complete index to the Reports on the Progress and Condition of the Royal Gardens, Kew, from 1862 to 1882. This index is useful as a means of easy reference to the numerous notices respecting economic and other plants.

The following documents may be submitted to the Committee as official evidence of the nature of one aspect of Kew work:—

[Copy.]

Downing Street, 20th May, 1885.

Sir,—I am directed by the Earl of Derby to transmit to you, to be laid before the Earl of Rosebery, a copy of the annual report on the Public Gardens and Plantations of Jamaica for the year 1884 by Mr. Morris, the Director, and to request that you will call Lord Rosebery's attention to the recognition in the report of the services rendered to Jamaica by Sir Joseph Hooker and the officers at the Royal Gardens at Kew.

Lord Derby desires to take this opportunity of expressing to the First Commissioner of Works his appreciation of the valuable advice and assistance which this Department and the various Colonial Governments continually receive from Sir Joseph Hooker and Mr. Thiselton-Dyer, and of the trouble and attention which they invariably bestow upon all colonial matters in which their advice or assistance is desired.

I am, etc.,

(Signed) Robert G. W. Herbert.

The Secretary to the Office of Works.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

[Copy.]

Downing Street, 26th July, 1897.

Sir,—I am directed by Mr. Secretary Chamberlain to transmit to you the accompanying copy of a letter in which Messrs. Elder, Dempster, and Company express their satisfaction at the success of the Botanical Gardens which have been established in the four West African colonies.

I am, etc.,
(Signed) John Bramston.

The Director of the Royal Gardens, Kew.

[Copy.]

African House, Water Street, Liverpool,
July 9th, 1897.

Sir,—We have been very much interested lately in the botanical gardens on the West Coast of Africa, particularly those at Lagos, and great credit is due to Sir Gilbert Carter for the way in which these gardens have been pushed. We would like to impress upon the Colonial Government that they should double the extent of the gardens, not only at Lagos, but at all the colonies. They are a most important feature, and have been a great success in distributing plants to all the growers. We have obtained rubber plants on the Ilaro estates, and they are doing splendidly. We could not have had them had it not been for the botanical gardens. We are very glad to see that Major McCallum is taking a great interest in these gardens.

We are, etc.,
(Signed) Elder, Dempster, and Company.

The Right Hon. Joseph Chamberlain, M.P.,
Secretary of State for the Colonies.

V

A good deal which bears on this point will be found incidentally under other heads.

1. Herbarium. — Many continental herbaria are simply collections of dried plants, which do not profess to afford more assistance to a person engaged in research than to save the trouble of visiting the countries they came from. Such collections are samples of their vegetation, but nothing more. That is an extreme case, and various institutions afford every gradation in the extent to which their collections are worked up and systematically determined and arranged. Probably this is carried further at Kew than anywhere else, simply because such a vast amount of published work has been based upon its material. The dominant object of herbarium administration at Kew is to set the material received as soon as possible into a shape in which it is available for study. Every detail of arrangement is directed towards making it as conveniently accessible as possible, and towards bringing to bear upon it the resources of the library by means of indexes, catalogues, etc. In this respect it is, I believe, a matter of general agreement amongst botanists of all countries that the Kew Herbarium affords greater facilities for work, and for the determination of plants than any other. In most foreign herbaria the mere mechanical difficulties in consulting the collections seriously limit their utility.

What I think may be fairly described as the superior advantages of Kew methods attract to Kew many foreign botanists, who find that they can work out their collections at Kew with greater readiness than elsewhere. Don Vidal y Soler, was sent by the Spanish Government to Kew to work out his forest collections from the Philippines, as explained in the following letter:—

Legacion de España en Londres.

The Marquis de Casa Laiglesia presents his compliments to Sir Joseph D. Hooker, and would be infinitely obliged if he would kindly grant permission to Mr. Sebastian Vidal, bearer of the present, to study the collection of plants in the museum of Kew Gardens.

Mr. Vidal is an inspector of woods and forests in Spain, and has been specially commissioned by the Spanish Government to make a report on the plants of the Philippine Islands.

London, October 23rd, 1883.

The results were embodied in a work published at Manila in 1885. In 1897 Dr. Loher arranged to send to Kew from Manila his herbarium of Philippine plants, comprising some 3,000 specimens, Kew being allowed to retain what it required in return for the determinations. In view of recent political events, it was further requested that a set of the duplicates should be sent to Washington. This request was the more readily complied with as the relations which have obtained between Kew and the United States botanists have always been of the most cordial kind, and the liberality of its Government to Kew has been unfailing.

Kew is especially frequented by American botanists. Mr. Donnell Smith, of Baltimore, has repeatedly visited Kew for the identification of his Costa Rica collections, and Professor Rusby, of New York, for those made by him in Bolivia. Monsieur Glaziou has during a long series of years transmitted to Kew his immense collection of Brazilian plants for determination. Monsieur Pierre has similarly visited Kew from time to time to work out the materials of the flora of Cochin China which he is preparing for the French Government. Sir George King has transmitted to Kew for comparison by himself the very extensive collection made in view of his flora of the Straits Settlements which he is preparing for the Government of that colony. It is not necessary to extend the list; the above will sufficiently indicate the appreciation abroad of the method on which the Kew Herbarium is administered.

2. Museums.—While other countries possess herbaria of greater or less importance, the Kew museums in their way are probably unique. I am not aware that there is anything precisely comparable to them elsewhere.

I extract from the "Indian Forester" the "Service Journal" of the Indian Forest Department an account of the impression which Kew and its resources produced on a colonial official during a recent visit. If I have not suppressed the disparaging reference to the timber collection at the Natural History Museum, it must be remembered that the institution does not possess the space available at Kew for such bulky objects as timber specimens.

Extract from the "Indian Forester," March, 1900.

Botany and the Forest Department.

My object in writing now is to endeavour to draw the attention of foresters on leave to Kew. It is a common error to suppose that Kew is all botany, or at least pure botany. Kew is nothing if not practical; and I feel very strongly that no forest officers home on leave should miss seeing Kew and its treasures.

When recently on leave in England I visited Kew, intending to stay a week. I ended by staying ten weeks. Its museums and herbariums are well worthy of study. Its glass houses cannot fail to interest foresters from every part of the world. Coming from the Cape, its temperate houses had naturally for me a peculiar interest. But of the two great houses at Kew there is no doubt that the tropical is the more successful. Extra-tropical regions are characterised by peculiar climatic conditions, which are difficult to imitate in a glass house. Trees and vegetation from the damp, temperate climates of Japan and the Himalayas cannot be grown in the same house with the trees and vegetation from the dry, sunlit climates of Australia and the Cape.

The North Gallery at Kew is a sort of happy hunting ground for the forester on leave. I used to spend some hours there daily, like the orthodox tourist in Rome doing St. Peter's. It is a perfect paradise for lovers of nature. The collection of timber at Kew is, for purposes of study, the best in England. Cooper's Hill has got a very good small working collection. The largest and finest collection of woods is undoubtedly in the much abused Imperial Institute, but this collection lacks the method and arrangement of the Kew collection. It is, nevertheless, a splendid and unique collection.

The Natural History Museum in the Cromwell Road (a branch of the British Museum) has, for a national institution, a simply disgraceful collection of timbers. There are some British woods and pictures recalling the child's Noah's Ark, and a few specimens of the big trees of the world, but anything like a general or representative collection of timbers is conspicuous by its absence at South Kensington. This is the more remarkable when it is remembered that England has more extensive and widespread colonies than any other nation, and that England's little bill for imported timber, which can be grown two or three times over within the limits of the British Isles, has now reached the respectable figure of twenty and three-quarter millions.

At Kew it is the fortunate combination of interesting trees in the glass houses, good museums and accurate nomenclature that is so useful to the forester on leave. All this, too, set in its lovely gardens. One is out of the grime and gloom of London, but within half an hour of the West End, and with trains every half hour.

To the courtesy and kindness of Sir William Thiselton-Dyer and the staff at Kew I owe a debt which I am glad of this opportunity of acknowledging. My time at Kew stands out as a happy memory in a quarter of a century's service in India and South Africa. I saw living specimens there of trees that I had hitherto known only on paper. I met several foresters, including Sir D. Brandis, as active and well as when I saw him last ten years ago in Germany.

I do not think that foresters on leave sufficiently appreciate Kew and its advantages, which is my reason for troubling you with this somewhat lengthy note.

D. E. Hutchins,
Conservator of Forests.

Cape Town, December 15th, 1900.

Mr. Hutchins's paper at least illustrates the advantage and reality of the close interconnection which exists between every part of the Kew establishment.

3. Living Collections.—I forbear to add anything further as to the distinctive character of these. The collection of palms I have occasion to believe is the largest in the world, richer even in number of species than that of Buitenzorg. These can hardly be studied to any advantage except in a living state. Nevertheless the Botanical Garden at Berlin has recently requested that an extensive suite of specimens shall be furnished to them for preservation. The arboretum is in extent and correct nomenclature certainly without a rival in the northern hemisphere.

IX.

It will be seen from what has been stated that Kew is practically of the nature of a Government Department, and as such is more or less in touch with the various public offices. Any collections or material brought home by Government expeditions or officials which come into the hands of public departments, naturally find their way to Kew.

Botanical establishments throughout the empire are mostly either staffed by Kew men or are in intimate relations with Kew. In either case collections for determination will naturally be sent to it.

Private individuals can dispose of their collections at their pleasure. But the facilities for rapidly dealing with them at Kew usually lead to their being sent there, and this, as has been shown, even from foreign countries.

In the case of expeditions promoted by scientific bodies, such as the British Association and the Royal Society, an undertaking was attempted to be arrived at that the first set should go to the institution which initiated the project and the second set to the other, as the case might be. It cannot, however, be said that the British Museum adhered very loyally to this arrangement.

It will, I think, be convenient here to place before the Committee a brief statement of the historical facts relating to the two institutions.

As a matter of fact, ever since its foundation in 1759, Kew has been *the* national botanic centre, and this whether it was maintained by the Sovereign or out of the public purse. The following short statement of its history is now published officially in the annual Colonial Office List:—

Royal Botanic Gardens, Kew.

Kew as a scientific establishment dates from 1759, when a Botanic, or, as it was then called, a Physic, Garden was established by the Princess Augusta of Saxe-Gotha, Dowager Princess of Wales.

It was energetically maintained by her son, George III., with the scientific assistance of Sir Joseph Banks, who was virtually for the greater part of his life director. Under his advice collectors were sent to all parts of the world. The first New Holland plants were introduced during Cook's voyages, 1768-1780. At Sir Joseph Banks's instance the system of inter-colonial exchange was commenced, which has been maintained ever since. The most memorable undertaking of this kind was the voyage of the "Bounty" (1787), for the purpose of introducing the bread-fruit tree from the South Seas into the est Indies. Nelson, the Kew collector, was amongst those sent adrift by the mutineers, and eventually died of the exposure. Another Kew gardener, James Hooper, who had been attached to Lord Amherst's Embassy to China, remained in Java, and was from 1817-30 Hortulanus of the celebrated Dutch Colonial Botanic Garden at Buitenzorg, which he helped to create.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

Both George III. and Sir Joseph Banks died in 1820, and the colonial and other work of Kew languished, though it was not absolutely abandoned during the reign of George IV. and William IV. In 1838 the abolition of the whole establishment was contemplated by the Government. Public opposition led to the appointment of a Treasury Committee, the report of which was presented to Parliament in 1840. The following paragraphs briefly defined the functions of the reorganised establishment:—"A national garden ought to be the centre round which all minor establishments of the same nature should be arranged. . . . . From a garden of this kind Government would be able to obtain authentic and official information on points connected with the founding of new colonies; it would afford the plants there required, without its being necessary, as now, to apply to the officers of private establishments for advice and assistance."

These recommendations having been adopted by the Government, Sir W. J. Hooker, F.R.S., was appointed Director in 1841 to carry them out. A close connection between Kew and the Colonial Office immediately sprang up. A scheme for a complete series of Colonial Floras was sanctioned in 1856, and has been steadily prosecuted. Kew serves to a large extent as an advanced horticultural school. Special attention is given to the preparation of gardeners for Colonial service. Some sixty men trained at Kew are now in official employment in different parts of the empire.

Relations with the botanical institutions of the self-governing colonies are maintained by semi-official correspondence. With those of colonies more directly under the control of the Colonial Office the connection is closer.

Colonial botanical institutions fall roughly into three classes. Those of the first class are usually, like Kew, administered by a scientific director; those of the second class by a skilled superintendent; the third class consists of "botanic stations." These last are small and inexpensive gardens, devised in 1885, in order to afford practical instruction in the cultivation of tropical crops, and were intended to develop the agricultural resources at first of the smaller West Indian islands, and subsequently (1887) of British possessions in Tropical Africa. Each is in charge of a Curator, who is a gardener trained at Kew.

The principal members of the Kew staff are:—

Director, Sir W. T. Thiselton-Dyer, K.C.M.G., C.I.E., LL.D., F.R.S.

Keeper of the Herbarium and Library, W. B. Hemsley, F.R.S.

Honorary Keeper of the Jodrell Laboratory, D. H. Scott, Ph.D., M.A., F.R.S.

Keeper of Museums, J. R. Jackson, A.L.S.

The most important Colonial Botanical institutions in intimate relation with Kew are those of:—

Ceylon.—*Director of Royal Botanic Gardens*, J. C. Willis, M.A.

Straits Settlements.—*Director of Gardens and Forest Department*, H. N. Ridley, M.A.

Jamaica.—*Director of Public Gardens and Plantations*, William Fawcett, B.Sc.

In 1898, in accordance with the recommendations of the West India Commission, a Special Department of Agriculture was created for Barbados, the Leeward and the Windward Islands, and was placed under the charge of a Commissioner, with headquarters at Barbados.

Commissioner of Agriculture at Barbados, D. Morris, C.M.G., D.Sc., M.A.

Travelling Superintendent, G. W. Smith.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

Chief Clerk, A. G. Howell.

Entomologist, H. M. Lefroy, B.A.

Consulting Chemists, Prof. J. B. Harrison, M.A., F.I.C., F.C.S.; Prof. J. P. d'Albuquerque, M.A., F.I.C., F.C.S.

During the period that Sir Joseph Banks virtually acted as director of the scientific operations of Kew, the flora of the Southern hemisphere was assiduously explored both by Sir Joseph Banks himself and by collectors sent out from Kew. It seems clear, however, from the following correspondence, that in some cases at any rate the expenses of the collector were paid out of public funds.

W. T. Aiton, Esq., to The Right Hon'ble Sir Joseph Banks, Bart., K.B., etc., etc.

Sir,—On all subjects the most interesting to the Royal Collection at Kew you have been pleased to allow me to be directed by your greater experience, I therefore trouble you with this letter.

I beg I may refer to your recollection that previously to the illness of the King it was His Majesty's pleasure to direct that botanical collectors were to be prepared and sent abroad for the express object of procuring fresh and choice supplies of seeds, roots, and plants, become necessary to be added to keep up the Royal Collection of Kew, made superior to other gardens in England by means of the frequent importations of the rarer exotics; in all cases of this kind the subject has been referred by His Majesty's command for your decision to fix upon and name those countries most proper for botanists to explore.

The improved state of science in England, the increasing desire of novelty in botanical pursuits, the great deterioration and the loss of various plants, that no ordinary means or care could obviate, and withal the repose of botanists awaiting orders of appointment abroad, together most anxiously beseech your kind view of this subject. I therefore entreat your mediation and support of the necessary and good cause of sending botanical collectors to foreign parts in search of supplies.

On some occasions you have named Southern Africa, America, and the promising lands of New Holland, as ample fields for a productive harvest. You have also visited these countries, and consequently are the best judge of the particular tracts proper for research.

I have in view men of sound principles and invaluable zeal for the service, having the best requisites of knowledge, and desire to offer themselves as collectors, and who will perform this duty in any part of the world. Under circumstances so favourable, and with it the most supreme blessing of general peace, I think the subject and the season to submit it to Royal approbation auspicious. I therefore humbly beg you will confer upon me the kindness of your directions to govern my proceeding with this business in the way you approve, so that I may not fail in duty to the Royal Gardens at Kew when the most favourable opportunity occurs to lay this subject before His Royal Highness the Prince Regent for His Royal Highness's most gracious commands.

I have the honour to be, sir, etc., etc., etc.,

(Signed) W. T. Aiton.

Royal Gardens, Kew, May 29th, 1814.

To the Right Hon'ble Sir Joseph Banks, Bart, K.B., etc., etc.

The Right Hon'ble Sir Joseph Banks, Bart., K.B., etc., etc., to W. T. Aiton, Esq.

Soho Square, June 7th, 1814.

My dear Sir,—Among the innumerable indulgencies I have for a long time enjoyed, derived from the gracious kindness of our beloved and afflicted Monarch, the connection I have been permitted to form with the Royal Gardens at Kew is among those most grateful to my feelings, and I beg you to be assured that as long as I shall be permitted to continue it I shall cherish and improve it to the best of my power.

Among the other indulgencies allowed to me on that head, I was permitted, as you, sir, know, to draw instructions for those persons whom you from time to time recommended as properly qualified to travel as collectors for the Royal Botanic Gardens. I think I may venture to affirm that until that arrangement was interrupted by the almost impossibility of sending home living plants in ships liable to the detention of waiting for convoy, His Majesty's Gardens at Kew stood unrivalled in the whole of Europe for the extent of its collections as well as for the beauty and interest of the plants it consisted of.

The arrival of the definite treaty with France, and the certainty that before any collection can be ready to be sent home, ships will sail as they were used to do without being subjected to any uncertain delays, makes me anxious to see the establishment of foreign collectors resumed, and the more so as the Emperor of Germany, who has formerly freighted ships at an immense expense, and sent well-educated botanists to collect for his garden at Schœenbrun (the only rival to Kew that I have any fear about), will no doubt resume the business of improving it.

"The climate best suited for our collectors is, as you know, the southern temperate zone, and in that part of the world no places are so productive as the Cape of Good Hope and New South Wales: if His Royal Highness the Prince Regent should permit you to engage two collectors these are the places I should wish them to be sent to. The plants of both these countries are beautiful in the extreme, and are easily managed, as they suit the conservatory and have no occasion for the unnatural heat required by the intertropical vegetable. I should wish also to have a collector sent to Buenos Ayres, but at present, and till Spain has repossessed herself of her refractory Colonies, this cannot be thought of.

"Should you be allowed to send to the Cape of Good Hope and to New South Wales, I have no doubt of being able to give such instructions to the governors of these countries as will enable His Majesty's collectors to visit at a very reasonable expense countries hitherto unexplored, and they will add to the royal collection riches beyond the most sanguine expectations of those who have had less experience in the produce of those countries than has fallen to my lot.

"I am, my dear sir, with real esteem and regard, your most faithful and most obedient servant,

"(Signed) Joseph Banks."

To W. T. Aiton, Esq., Royal Gardens, Kew.

"Treasury to the Right Honourable Sir Joseph Banks, Bart., K.B., etc., etc.

Treasury Chambers, September 13, 1814.

"Sir,

"Having laid before the Lords Commissioners of His Majesty's Treasury the communication which you were so good as to make to me, by the desire of the Earl of Liverpool, upon the subject of the appointment of fit and proper persons to proceed to the Cape of Good Hope and elsewhere, for the purpose of collecting rare and curious plants for His Majesty's Botanic Garden at Kew, I have received their Lordships' commands to express to you their entire concurrence in the suggestions contained in that communication, and their approbation of the persons recommended by you for this service, and that their Lordships will nominate them thereto accordingly, and that their Lordships feel much gratified by, and will most readily adopt your offer of auditing the accounts sent home by the collectors, and of certifying them to the Treasury, when sent home for their Lordships' approbation. And I am further to acquaint you that their Lordships will from time to time issue to Mr. Aiton, the Superintendent of His Majesty's Botanic Garden at Kew, such sums as you may recommend for this service, for the application of which Mr. Aiton will be accountable only to their Lordships' Board. And that with a view to provide for such outfit of the persons appointed on this service as may be necessary, their Lordships have directed Mr. Spur of this office to issue to Mr. Aiton the sum of £200 upon his application for the same.

"And my Lords have further commanded me to request that you will have the goodness to give either immediately from yourself or through Mr. Aiton, as you may deem most expedient, such instructions to the collectors for their governance and conduct in the discharge of their duties as may appear to you best calculated to ensure a due and faithful execution of the

service entrusted to them, and such a satisfactory result as may reasonably be expected from their employment in it, which instructions their Lordships have directed them most implicitly and punctually to observe and obey.

"Conformably to your suggestions with regard to the passage of these persons to the first objects of their destination, my Lords have requested the Lords of the Admiralty to direct that they may be provided with a passage in the first Man of War which may sail for Rio de Janeiro, and that they may be entered on the ship's books for provisions, and be allowed to mess with the warrant officer, and that they will direct the officer commanding His Majesty's Naval Forces at Rio de Janeiro to give any similar facilities which may occur for their transport to the Cape of Good Hope.

"My Lords have also requested the Earl Bathurst to direct the Governor of the Cape of Good Hope to provide for the service of the collectors a waggon, a couple of teams of oxen for their journeys, a Hottentot driver and two or three more to attend the oxen, and also to furnish the collectors with the usual order upon the boors for boorspans of oxen, and if they should go beyond the limits of the Colony, with an order to the Landrost to give them the protection of a few boors, which is termed a commando.

"I have the honour to be, sir, your very faithful and obedient servant,

"(Signed) GEO. HARRISON.

"The Right Honourable Sir Joseph Banks, Bart., K.B., etc., etc."

It can hardly be doubted that collections so made were public property. Sir Joseph Banks was, however, allowed to retain the dried plants, and they form no small part of the Banksian herbarium, which he created, and of which amongst others the celebrated Robert Brown was Curator.

There is every reason to conclude that Sir Joseph Banks intended his herbarium at his death to go to Kew, and it is believed that the present Herbarium House was purchased by the Crown for the purpose. In view of the uncertainty which attended the fate of Kew on the death of George III., Sir Joseph Banks undoubtedly took the wisest course for the secure preservation of his invaluable herbarium by bequeathing it to the British Museum.

In a memorandum addressed to the First Commissioner of Works on February 9th, 1899, which will no doubt be accessible to the Committee, I have put together what I have been able to ascertain with regard to the Banksian Herbarium. By a codicil to his will made January 21st, 1820, Sir Joseph Banks, as a condition of an annuity to Robert Brown, stipulated "that he assists the superintendent of the Royal Botanic Gardens at Kew, as he also now does." In this and other ways, Sir Joseph Banks attempted to provide for the continuity of the botanical work of the establishment after his death.

There appears to have been a herbarium at Kew independently of the Banksian, and this Sir Joseph Hooker informs me was also transferred to the British Museum, under instructions from Mr. Brown.

It appears from these facts that the Botanical Department of the British Museum is really an offshoot from Kew, and is largely based upon Kew work.

At various times the Trustees have claimed as a right the possession of all collections made at the public, and apparently even in some cases at private, expense. On the first occasion on which this was done the then Director, Sir Joseph Hooker, was himself as President of the Royal Society a Trustee, and the action of the Trustees was taken without his being consulted. The essential facts are set out in the following correspondence:—

"4th July, 1874.

My Lords,—I have the honour, by direction of the Trustees of the British Museum, to bring again under the consideration of your Lordships the question of the disposal of the specimens of Natural History which have been, and may be collected during the scientific expedition of H.M.S. "Challenger."

On the 3rd of January, 1873, I had the honour to make a representation to your Lordships on this subject, and in reply to that representation Captain Hall, by desire of your Lordships, forwarded to me, with a letter dated the 10th of January, an extract from the instructions given to Professor Wyville Thomson as Director of the Scientific Civilian Expedition, H.M.S. "Challenger."

From those instructions the Trustees learned that it was to be understood that all Natural History or other collections obtained during the expedition of H.M.S. "Challenger" were to be considered as primarily the property of the Government, to be ultimately deposited in the National Museum; and that the Natural History specimens sent to England from time to time would be forwarded to the Secretary of the Admiralty with recommendations from Professor Thompson as to their temporary disposal. Captain Hall's letter concluded with the following words, "My Lords will take care that a fair portion of all the collections which are made shall be allotted to the British Museum."

The Trustees find from the report on the Progress and Condition of the Royal Gardens at Kew during the year 1873, presented by the Director to the First Commissioner of H.M. Works, that the "Challenger" collections from the Bermudas, Cape de Verde Islands, and Fernando Noronha have been added to the Herbarium at Kew, and they are informed that these collections have been permanently incorporated with the dried plants there.

Should this be the case, it appears to the Trustees that the instructions of the Government have not been carried out in the spirit in which they were framed; and that the promise above cited, that a fair portion of all the collections should be allotted to the British Museum has been overlooked.

It has been represented to the Trustees that the Museum has sustained a serious loss in being deprived since 1854 of the plants obtained in Government expeditions. The last important Government collections of dried plants received by the Museum were those made during the expedition of the "Erebus" and "Terror" under Sir James Ross.

Six quarto volumes were published under the authority of the Admiralty between the years 1844 and 1860, recording the results of this expedition.

The principal or study set of the plants described in the first volume, with the original notes and drawings, was handed over to the Museum in December, 1845. An imperfect set of the plants, described in the second, third, and fourth volumes, was delivered in February, 1847, and May, 1854. None of the plants described in the fifth and sixth volumes have been delivered at the British Museum.

The Trustees are given to understand that since 1858 all the botanical collections made at the Government expense have been secured for the Royal Gardens at Kew, and that the principal sets have been incorporated there, the remainder having been distributed from Kew to various Herbaria, chiefly to foreign countries, but not a single specimen has been sent to the British Museum. The following are some of the more important collections of which the Museum has, in the way above referred to, been deprived:—

The plants of the Niger Expedition, collected by Barter.

The plants of the Fernando Po, Cameroons, and the Gaboon River, collected by Mann.

The plants of Eastern Africa, collected by Kirk and Meller.

The plants of Madagascar, collected by Meller.

The plants of the Sinai Survey Expedition.

The plants of China, Japan, etc., collected by Wilford.

The plants of the West Indies, collected by Purdie.

The plants of Captain Palliser's British North American Exploring Expedition, collected by Bourgeau.

The plants of the British Columbia Expedition, collected by Lyall, Wood, and Campbell.

The plants of Captain Mayne's Expedition to the Straits of Magelhaens, collected by Cunningham.

The plants of the exploring expedition to the Gulf of Carpentaria, collected by Schomburgk.

I am directed by the Trustees to ask the attention to

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

your Lordships to the circumstances detailed in this letter, and to express their earnest hope that your Lordships will be pleased to issue such instructions as will secure to the British Museum a fair portion of the collections formed by the Government, and of which the Government have the disposal.

I have, etc,
(Signed) J. WINTER JONES.

The Right Honourable the Lords Commissioners of the Admiralty.

Royal Gardens, Kew.
December 15, 1874.

To the Secretary of the Admiralty.

Sir,—Two letters, dated July 4th and 31st, 1874, addressed in the names of the Trustees of the British Museum by the Principal Librarian thereof to the Lords Commissioners of the Admiralty contain various statements affecting this establishment, and implications of its having misappropriated Government Botanical collections.

Such business as these letters refer to is transacted by the Standing Committee of the Trustees alone, which, in accordance with precedent, directs the Principal Librarian to correspond in the name of the whole body of Trustees, and without reference to them.

This circumstance in part only accounts for the fact, that though myself a Trustee at the time, I was not made aware that the business in question had even occupied the attention of any of my co-trustees, and still less that it had formed the subject of a correspondence with a department of Government. My ignorance of this matter was in fact absolute. Had I been informed of it, as I consider I should have been, I have shown that the statements alluded to were not supported, and that the implications were baseless.

I beg to forward herewith a copy of a letter which I have addressed to the Principal Librarian on the subject, which I have to request may be so placed in the records of the Admiralty as that they may not be overlooked should any future reference be made to the correspondence to which they refer.

It remains to state that I have received the assurance of the Standing Committee and of the Principal Librarian, that they had no intention whatever of conveying in the letters in question any reflections upon this establishment.

Such being the case, and being further convinced that the statements alluded to were received by the Standing Committee without suspicion of their accuracy and their intent, and were through inadvertence transmitted to the Admiralty without reference being made to me, together with the promise that in future all correspondence of a like nature shall be laid before me, I have confined my action to the protest enclosed, and I would add that, with the view of promoting that harmony which should subsist between the British Museum and Royal Gardens, and between them and the various departments of Government, I do not desire that further action should be taken in the matter.

I am, etc.,
(Signed) J. D. HOOKER.

British Museum,
March 2, 1876.

Sir,—The attention of the Trustees of the British Museum has recently been directed to the subject of the collection of plants made in the voyage of the "Erebus" and "Terror," under Captain Sir James Ross.

These plants were sent to the British Museum by the Lords Commissioners of the Admiralty, and remained in the charge of Mr. Robert Brown, the then Keeper of the Botanical Department, until the month of May, 1844, when, on the application of Sir John Barrow, who wrote by command of the Lords of the Admiralty, Mr. Brown, with the permission of the Trustees, placed them in your hands. The purpose for which the plants were delivered to you is explained in the following letter from Sir John Barrow, dated the 26th of April, 1844:—

"I am commanded by my Lords Commissioners of the Admiralty to request you will be so good as to deliver to Dr. Joseph D. Hooker, who is charged with the publication of the botany of the voyage of the "Erebus" and "Terror" the botanical specimens collected during that voyage, which he will be directed to return to the Museum when done with."

It is reported to the Trustees that when the phenogamous plants collected in the Auckland and Campbell's Islands had been described they were returned to the Museum on the 11th of December, 1845, according to the terms of Sir John Barrow's letter, and that two other parcels were subsequently restored to the Trustees.

The Trustees have no information as to the number of plants collected during the expedition, but they are informed that only 1,404 species out of the 5,340 described in the botany of the voyage have been received back at the Museum.

The Trustees assume that the purpose for which the plants were placed in your hands was fully accomplished when the last portion of the botany of the voyage was published in 1860. Under these circumstances, the Trustees have directed me to bring this subject under your notice, and to express the hope that such of the plants collected in the voyage of the "Erebus" and "Terror" as have not yet been returned to the herbarium of the British Museum may be returned to the Trustees with as little delay as may be convenient.

I have, etc.,
(Signed) J. WINTER JONES.

J. Dalton Hooker, Esq., M.D., C.B., P.R.S.

MEMORANDUM on the collection of plants, of which the establishment of Kew is considered by the Trustees of the British Museum to have deprived the British Museum:—

1. The Antarctic collections made during the voyage of the "Erebus" and "Terror." It was but a small portion of these, formed (if my memory serves me) during the first year of the voyage, that was deposited at the British Museum. On the return of the ships they were claimed by the Commander, who was charged under the Admiralty with their publication and disposal, and were made over under his orders to me, to be incorporated with the main collection, which never went to the Museum; and I was requested by him to give to the Museum, after their publication, as complete a set as I could of all the plants collected by the "Erebus" and "Terror" in the Antarctic regions.

This I did, giving manifold more than had been originally sent to the Museum, including the best specimens of these, and adding others from private sources; for all which I received the thanks of the Trustees and of the Keepers of the Botanical Department, who, though nearly 30 years have since elapsed, made no complaint to me, nor alluded to a claim for further contributions.

2. The New Zealand and Tasmanian plants of the same voyage were collected when I was on leave, not on duty, and at my own cost for travelling, horses, servants, transport and living. The bulk of them was sent to England by the Commander of the expedition (neither to Kew nor to the British Museum) to await its return, and another large portion was taken home by the ships. On the return of the latter, all were placed by me at the disposal of the Commander, who regarded them as my private property, and took no cognizance of the publication of the floras of New Zealand and Tasmania. Nevertheless, I did give a share of the New Zealand plants to the British Museum, and would have done so with the Tasmanian had it not been that a magnificent collection of the very same plants, far superior to my own, and made by my fellow-collector in Tasmania, Mr. Gunn, was given by him to the Keeper of the Botanical Department of the British Museum.

I should state that the expedition carried no official naturalist; it was intended that it should have done so, and I was offered the appointment by its Commander. The Admiralty, however, refused to appoint one, and I was offered the Assistant Surgeonship of the "Erebus" or nothing. I accordingly had to study for this; and, having passed the necessary medical and surgical examinations, I received that appointment without any instructions from the Admiralty regarding Natural History collecting, and I did the duty of

Assistant Surgeon, and often of Surgeon, throughout the expedition, receiving no other pay but that of my rank nor enjoying any immunity in respect of my acting as naturalist, for which duty I was a volunteer and accepted as such by the Commander. My outfit of books, microscopes and collecting materials was also provided at my own cost. Nevertheless as before said I placed the whole of my collections at the disposal of the Commander of the Expedition, including the Zoological, the greater part of which last are in the British Museum, where also I deposited all my Zoological drawings which were largely used in the publication of the zoology of the voyage.

3. Of the other collections enumerated in the letter to the Admiralty, it may be enough to state that had the Museum any just title to them, it would assuredly have been asserted at the proper time by the Keeper of the Botanical Department, who repeatedly consulted them at Kew, and who received portions of some of them for his own study. I would add further respecting these collections, that some were in every sense private property; another never had any existence; and of the best of them full shares were repeatedly, but vainly, offered to the Museum, provided only that it would do, what other institutions did, viz., make a return, however small, from its own stores of duplicates.

4. The statement made by the Trustees to the Admiralty that the plants of the "Erebus" and "Terror" were the last of any Government Expedition received by the Museum is not a correct one: since that period extensive Indian collections, larger by far than any of those enumerated in the letter of the Standing Committee, and containing some thousands of specimens, were presented to the Museum by Dr. Thomson and myself.

5. The complaints made to the Admiralty are not directed against me alone, but against my father, who is no longer able to defend himself—one to whom the Botanical Department of the Museum is more indebted than to any botanist of his day. He was the friend of Banks, its founder, and the coadjutor in its interests of Messrs. Brown and Bennett, under whom it assumed its present importance, and by the first of whom, I believe, the arrangement was made with the Commander of the "Erebus" and "Terror," under which the Museum received even more than its fair share of the Antarctic collections.

(Signed) Jos. D. Hooker.

Kew, July 24, 1876.

There is no evidence upon what the claim of the Trustees was based. As a public body they would no doubt be justified in protesting against collections made at the Government expense not being available for public use. But that contention could hardly be urged against Kew, which is, in point of fact, an institution completely under Government control, which the British Museum is not. In the one case the Government could interfere as to the use to which the collections were put; in the other case it has no power to do so.

When I was appointed Director of Kew in 1885, I adopted the view that it was the duty of a public servant to loyally accept arrangements sanctioned by the Government. It, therefore, appeared to me desirable to endeavour to establish an amicable *modus vivendi* between the two institutions. It seemed to me that the field of systematic botany was sufficiently large to afford ample employment to both without overlapping in their work. This appeared to be the spirit of the recommendations of the Devonshire Commission. I accordingly transferred to the British Museum such objects and collections as seemed more suitable for its custody than that of Kew. I cannot say that my efforts were reciprocated in the spirit I had looked for. I felt obliged, therefore, to address to the Keeper of the Botanical Department the following friendly remonstrance:—

Royal Gardens, Kew,
October 17, 1890.

Dear Carruthers,—Whenever Kew has had the administration of Government grants we have always scrupulously sent to the botanical Department of the British Museum the first set after Kew of any collections made with public money.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

We are a good deal disappointed at the delay and difficulty we experience in getting a set of Ridley's Fernando Noronha plants, and we were still more disappointed at the very poor share we received of Forbes's New Guinea plants, which I am informed were distributed from the Botanical Department.

I believe that in both cases you had some sort of technical excuse. But I go upon the broad ground that it is desirable to have a friendly reciprocity between the two institutions.

I suppose the Department would like to have a good set of the St. Vincent collections, which are excellent and extensive. The first consignment of ferns has been worked up by Baker, and I have had a good set put aside, which I should be happy to send to the Botanical Department. I must explain that the botanical collections made in St. Vincent are Mr. Godman's private property. On asking for instructions as to dealing with the duplicates, he replied that he wished me to do what I liked with them in the interests of Kew. I am holding the set destined for the British Museum back till the Fernando Noronha business is settled. It is so small a matter that you will no doubt speedily get it arranged. I find that we have had the Monocotyledons and Polypetalæ. But we cannot get the Gamopetalæ out of you. The total number of specimens we have so far received is sixty-eight.

(Signed) W. T. Thiselton-Dyer.

The result was a complete rupture of official relations, a state of things which received the more than tacit approval of the Director, Sir William Flower.

I understand that Bescherelle's moss herbarium has been purchased by the British Museum. It had been previously offered to Kew, but after careful consideration the purchase was declined. This deserves some explanation.

The principal value of the collection arose from its containing the types of a limited number of new species from French colonial possessions. It would have seemed preferable that these should be retained in France. Every herbarium is, however, desirous of securing types. But in this case their acquisition involved the purchase of some 15,000 specimens, the great bulk of which would have merely duplicated what Kew already possesses. The transaction, therefore, really comes to this: A very long price was to be paid for a limited number of types. I did not feel that I could make out a sufficient case for a somewhat large expenditure of public money. In the case of a younger institution, not so rich in material as Kew, the purchase would present itself in a different aspect.

Cases such as the one under consideration present a growing difficulty to public institutions. The object of the vendor is to force a purchase not in itself desirable by including in it something relatively small which by itself would be worth securing. There is reason to think that a practice is growing up of manufacturing types in order to give a fictitious value to the collection in which they are included; and, unfortunately, we have to face the paradox that the value of types is directly proportionate to the badness of the species they represent.

X.

The detailed estimates, which are attached, show, under the several heads for which the expenditure is accounted for, the cost of maintaining Kew as a whole. The classification is that prescribed by the Treasury, and it does not admit of the cost of the various branches of the establishment being separately set out.

The purchase of dried plants is provided for under the item E 11—Works: Purchases for the Museum. It is to be noted that the purchase of living plants, equally for scientific objects, comes under F.—Maintenance: 1 and 2*a*, Materials. The principle is not very intelligible, but it was prescribed by the Committee on Public Accounts.

The amount allowed for the purchase of books is £170 a year; this is borne on the estimates of the Stationery Office. This office also provides binding as required; but no information is available as to the cost.

A classified list of the entire staff employed at Kew is appended. This will give some idea of the plan on which the establishment is organised, and the way in which the staff is occupied

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

1900–1.—Kew Botanic and Pleasure Gardens and Green.

1899–1900.	1900–1.		£. s. d.	£. s. d.	£. s. d.
		A.—*Establishment* :—			
1	1	Director,* £1,000. after five years £1,200	1,200 – –		
1	1	Keeper of Herbarium and Library,* £500—£20—£600	524 6 8		
1	1	Keeper of Museums	324 1 6		
3	3	Principal Assistants* (*only one has a residence.*) — £300—£10—£350: after 15 years, by £10 to £400.	981 5 2		
1	1	Curator*	324 1 6		
1	2	Assistant Curators*	324 1 6		
—	—	Light and Fuel Allowance to Mr. Bean — £80—£10—£200: after 15 years, by £10 to £250.	7 10 –		
7	7	Assistants	1,202 3 2		
1	1	Foreman :* Works	200 – –		
4	3	Foremen :* Gardens : 30*s.* by 2*s.* 6*d.* to 35*s.* ; then by 1*s.* to 40*s.* per week. Two have residences. House allowance of 10*s.* per week to the other	321 8 8		
—	—	Light and Fuel Allowance of £4 each to two Foremen	8 – –		
1	1	Store-keeper, 25*s.* by 1*s.* to 35*s.* per week	83 4 –		
1	1	Engine-driver,* 40*s.* per week	104 – –		
1	1	Herbarium Porter (in uniform), 24*s.* per week	62 8 –		
5	5	Museum Porters (in uniform), 24*s.* per week	312 – –		
1	1	Turncock† (proportion of wages, 33*s.*)	58 11 9		
1	1	Medical Officer	40 – –		
—	—	Payments for Evening Lectures to Young Gardeners‡	100 – –		
—	—	Temporary Technical Assistance, including £150 per annum until 31st December, 1901 (T. L. 14631 of 13th October, 1896, B. $\frac{6489}{06}$), and also £150 for personal clerical assistance for Director	400 – –		
—	—	Preparation of "Flora of Tropical Africa"	200 – –		
30	30				6,777 1 11
		B.—*Travelling* :—			
		Travelling expenses			50 – –
		C.—*Clothing* :—			
		Uniforms for 1 Sergeant, 1 Deputy-Sergeant, 11 Park-keepers, 7 Gate-keepers, 1 Office Messenger and 5 Porters, 1 Herbarium Porter, and extra full Uniform in case of vacancy			125 9 5
		D.—*Police* :—			
		2 Metropolitan Police Constables, at the rate of £123 3*s.* 9*d.* each per annum, and 1 for 6 months, 1 for 20 Sundays and Bank Holidays in summer, at 4*s.* 7*d.* per day	312 14 6		
		1 Sergeant Park-keeper at 30*s.* per week — 52 weeks	78 – –		
		1 Deputy-Sergeant at 27*s.* per week — ,,	70 4 –		
		8 Park-keepers at 24*s.* per week each — ,,	499 4 –		
		2 do. do. for 26 weeks	62 8 –		
		2 do. do. ,, 17$\frac{3}{7}$,,	41 16 7		
		7 Gate-porters in uniform at £1 4s. per week each — 52 weeks	436 16 –		
		Pay of Labourers employed as Patrols on Sunday and Holidays	280 – –		1,781 3
		E.—*Works* :—			
		11. Purchases for the Museums	200 – –		
		12. New Potting Shed	100 – –		
		13. Laying New Mains and Continuing Work at Experimental Well	900 – –		
		14. Completion of Filter Bed	185 – –		
		Minor Works	200 – –		1,585 – –
		Carried forward			10,318 14 5

* Residence rent free.

† This officer is Turncock for Kew Palace, Kew Gardens, and Richmond Park ; and his wages are apportioned between the Votes for those places, viz., £22, £58 11*s.* 9*d.*, and £3 3*s.*, making £83 14s. 9*d.* for 1900–1.

‡ Some of these Lectures are delivered by Officers of the Establishment at Kew.

1900–1 — KEW BOTANIC AND PLEASURE GARDENS AND GREEN—*continued*

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S. 29 Nov. 1900.

	£. s. d.	£. s. d.	£. s. d.
Brought forward	- - -	- - -	0,318 14 5
F.—*Maintenance*:—			
1 and 2. General works on Lawns, Walks, and Shrubberies, Flower Beds, Palm Stove, Plant Stoves, and Greenhouses:			
a. Materials	2,100 – –		
b. Labour	6,800 – –		
c. Horse and Cart Hire	150 – –		
d. Purchase and Repair of Implements	180 – –		
		9,230 – –	
3. *a*.—(1.) Lodges, Palm House, and Greenhouses, Painting Palm House and Temperate House, Pagoda and Summer Houses, Boundary Walls, Fences, Director's and Curator's Residences, Drinking Fountains, and Public Conveniences, &c.	6,110 – –		
4. *b*. Water Supply in connection with High Service Reservoir, Richmond Park			
Expense of Water from Mains of Southwark and Vauxhall Water Company (Proportion of total cost B. $\frac{80}{54}\frac{42}{2}$)	497 – –		
		6,607 – –	
5. Supply of Gas	- - -	20 – –	
6. Do. Fuel	- - -	1,800 – –	
7. Contingencies (including Freight)	- - -	312 19 4	
Women Attendants at Cloak Rooms and North Gallery, 8 months at 10*s*. 6*d*., 4 at 17*s*. 6*d*., and Substitutes	- - -	130 – 8	
			18,100 – –
G.—*Furniture*:—			
New Furniture and Ordinary Repairs to Furniture, Fittings, &c.	- - -	- - -	300 – –
H.—*Rents*:—			
Tithe Rentcharge (about)	20 3 7		
Acknowledgments to Richmond Vestry for Water-pipe and Drain	– 2 –		
Foreman's House, Kew Green	36 – –		
Queen's Cottage Grounds (transferred from Vote for Palaces in 1899)	45 – –		
		- - -	101 5 7
TOTAL £.	- - -	- - -	28,820 – –

Extra Receipts:—

	£. s. d.
Sale of Timber and Old Materials, and Miscellaneous	10 – –
Acknowledgment Rent	1 – –
Refreshment Pavilion Rent	250 – –
(Agreement for five years from 1st August 1895.)	
£.	261 – –

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

ROYAL GARDENS, KEW, 1900–1901.

LIST OF STAFF—MAY 1900. (AGES TO MAY 1st.)

* Salaries charged to Subhead A. † Salaries paid by India Office.

A.P., Army Pension. R., Reserve. A.D., Army Discharged. N.D., Navy Discharged.

Office.	——	Name.	Salary.	Date of Entry into Service.	Age next Birthday.
		HEAD OFFICE.	£ s. d.		
*Director	(Residence)	W. T. Thiselton-Dyer	1,200 – –	12 June 1875	57
*Private Secretary		S. T. Dunn	150 – –	14 September 1898	32
*Principal Assistant		I. H. Burkill	312 3 4	13 January 1899	31
*Assistant		J. Aikman	147 7 3	7 July 1891	33
Messenger (in uniform)		H. Ruck (A.D.)	1 4 –	4 February 1891	42
*Curator	(Residence)	G. Nicholson	324 1 6	15 February 1873	53
*Assistant Curator	(Residence)	W. Watson	224 1 6	14 July 1879	43
*Assistant		W. N. Winn	129 10 10	1 October 1892	32
*Storekeeper		G. Dear	1 12 –	7 July 1884	37
*Medical Officer		L. C. Burrell	40 – –	1 April 1900	34
		HERBARIUM AND LIBRARY.			
*Keeper	(Residence)	W. B. Hemsley	524 6 8	5 July 1890	57
*Principal Assistant (Cryptogams).		G. Massee	319 1 10	4 May 1893	54
*Principal Assistant (Phanerogams).	(Residence	O. Stapf	350 – –	13 January 1899	44
*Assistant		N. E. Brown	224 1 6	17 February 1873	51
* Ditto		R. A. Rolfe	224 1 6	6 July 1880	45
* Ditto		C. H. Wright	215 16 4	1 September 1884	36
* Ditto		S. A. Skan	125 11 11	16 July 1894	30
* Ditto			80 – –		
† Ditto	(Indian Flora)	H. H. W. Pearson	160 17 1	1 March 1899	31
*Artist		Miss M. Smith	52 – –	1 April 1898	46
*Porter (in uniform)		S. Marshall	1 4 –	October 1876	40
Preparer		Miss A. F. Fitch	– 15 –	30 May 1892	30
Boy		C. Cotter	– 12 –	10 April 1899	18
		JODRELL LABORATORY.			
Honorary Keeper		Dukinfield H. Scott	—	13 September 1892	46
*Porter (in uniform)		W. R. Corrin (A.D.)	1 4 –	29 March 1897	38
		MUSEUMS.			
*Keeper		J. R. Jackson	324 1 6	August 1858	63
*Assistant		J. M. Hillier	135 13 10	15 December 1879	39
†Preparer		G. Badderly	90 – –	1 April 1880	62
*Porter (in uniform)	Museum, No. 1	J. Fulcher	1 4 –	2 October 1899	32
* Ditto ditto	Ditto No. 2	T. Martin (A. P., 30*l.* 8*s.* 4*d.*)	1 4 –	15 May 1882	58
* Ditto ditto	Ditto No. 3		1 4 –		
* Ditto ditto	Packing Room, etc.	J. Hazel	1 4 –	18 October 1897	29
		NORTH GALLERY.			
Caretaker	(Residence)	Mrs. Badderly	0 10 6	4 June 1882	52
		TROPICAL DEPARTMENT.			
Label Writer	Propagating Pits, Nos. 17*a*, 17*b*, 17*c*, 17*d*, 17*f*, 18*a*.	J. D. Jones	1 4 –	17 February 1896	27
Sub-Foreman		W. Hackett	1 4 –	20 September 1897	25
Gardener			1 1 –	—	—
Ditto			1 1 –	—	—
Ditto			1 1 –	—	—
Boy			0 9 –	—	—
Packer		W. Crisp	1 4 –	September 1875	47
Sub-Foreman	Palm House, and Water Lily House, No. 16.	C. P. Raffill	1 4 –	25 July 1898	25
Gardener			1 1 –	—	—
Ditto			1 1 –	—	—
Ditto			1 1 –	—	—
Ditto			1 1 –	—	—
Ditto			1 1 –	—	—
Ditto			1 1 –	—	—
Fireman		C. Browning	1 10 –	January 1879	49
Ditto		J. Belshaw	1 10 –	9 March 1885	40
Sub-Foreman	T Range, Nos. 7, 8, 9*a*, 9*b*, 10, 11, 12; and Orchid Houses, Nos. 13*a*, 13*b*, 14*a*, 14*b*, 15*a*, 15*b*, 15*c*, 15*d*.	J. Mackay	1 4 –	10 May 1897	25
Gardener			1 1 –	—	—
Ditto			1 1 –	—	—
Ditto			1 1 –	—	—
Ditto			1 1 –	—	—
Ditto			1 1 –	—	—
Boy			– 15 –	—	—
Sub-Foreman	No. 1; and Ferneries, Nos. 2, 3*a*, 3*b*, 6*a*. 6*b*.	S. Arden	1 4 –	9 May 1898	24
Gardener			1 1 –	—	—
Ditto			1 1 –	—	—
Ditto			1 1 –	—	—
Ditto			1 1	—	—

Office.	—	Name.	Salary.	Date of Entry into Service.	Age next Birthday.
TROPICAL DEPARTMENT—*continued.*					
Gardener	Succulents, No. 5	- - - - - -	£ s. d. 1 1 –	—	—
Fireman	- - - - -	S. Marshall	21*s.* from May to Aug. 30*s.* from Sept. to Apr.	9 June 1877	36
Ditto	- - - - -	F. Hawkins	Ditto	18 October 1894	27
TEMPERATE HOUSE.					
*Foreman	(Residence)	W. Dallimore	1 16 –	2 February 1891	30
Gardener		- - - - - -	1 1 –	—	—
Ditto		- - - - - -	1 1 –	—	—
Ditto		- - - - - -	1 1 –	—	—
Ditto	- - -	- - - - - -	1 1 –	—	—
Ditto		- - - - - -	1 1 –	—	—
Ditto		- - - - - -	1 1 –	—	—
Sub-Foreman	Nursery Frames, and Pits, Nos. 26, 27.	F. A. Heath	1 4 –	20 June 1898	28
Gardener		- - - - - -	1 1 –	—	—
Fireman	- - - - - -	G. Wood (N.D)	25*s.* for 30 weeks in summer, 28*s.* for 22 weeks in winter.	27 April 1896	40
GREENHOUSE AND ORNAMENTAL DEPARTMENT.					
*Foreman	(Residence)	F. Garrett	2 – –	7 June 1886	41
Sub-Foreman and Label Writer.		J. Coutts	1 4 –	2 November 1897	28
Gardener		- - - - - -	1 1 –	—	—
Ditto	Melon Yard, Nos. 17*e*, 18*b*, 18*c*, 19*a*, 19*b*, 20, 21*a*, 21*b*, 22, 23.	- - - - - -	1 1 –	—	—
Ditto		- - - - - -	1 1 –	—	—
Ditto		- - - - - -	1 1 –	—	—
Boy		- - - - - -	– 6 –	—	—
Labourer		R. Smith	1 1 –	9 March 1885	50
Gardener	No. 4	- - - - - -	1 1 –	—	—
Ditto		- - - - - -	1 1 –	—	—
Sub-Foreman		J. T. Marks	1 4 –	30 August 1897	24
Gardener	Flower Garden	- - - - - -	1 1 –	—	—
Ditto		- - - - - -	1 1 –	—	—
Ganger		G. Powney	1 4 –	1 March 1876	50
Ditto		F. Randall	1 4 –	3 November 1879	44
Ditto		J. Power	1 4 –	8 August 1887	53
Labourer		T. Talbot	1 1 –	9 April 1883	57
Ditto		G. Coleshill	1 1 –	16 October 1883	38
Ditto		G. Goode	1 1 –	16 October 1883	51
Ditto		G. Collis	1 1 –	15 June 1886	59
Ditto		J. Dear	1 1 –	31 October 1887	45
Ditto		H. Young	1 1 –	4 April 1892	57
Ditto		T. Jenner	1 1 –	20 April 1897	30
Ditto	Botanic Garden	J. Casey	1 1 –	23 May 1898	28
Ditto		A. J. Fletcher	1 1 –	9 January 1899	22
Ditto		G. Stannard	1 1 –	20 March 1899	22
Ditto		E. Constable (A.D.)	1 1 –	12 April 1899	41
Ditto		W. Ivey	1 1 –	13 June 1899	27
Ditto		G. Clements (A.D.)	1 1 –	16 October 1899	28
Ditto		G. Phillips	1 1 –	11 December 1899	25
Ditto		A. Fruin	1 1 –	12 March 1900	36
Gardener		- - - - - -	1 1 –	—	—
Ditto		- - - - - -	1 1 –	—	—
Ditto		- - - - - -	1 1 –	—	—
HERBACEOUS DEPARTMENT.					
*Foreman	(10*s.* a week is house allowance.)	W. Irving	2 7 –	20 October 1890	34
Sub-Foreman	Alpine House, No. 24; Propagating Frames and Pit, No. 25.	A. Hutchings	1 4	13 January 1896	25
Ditto	Rock Garden	H. Eavis	1 4 –	16 January 1899	25
Gardener		- - - - - -	1 1 –	—	—
Ditto		- - - - - -	1 1 –	—	—
Ditto		- - - - - -	1 1 –	—	—
Ditto		- - - - - -	1 1 –	—	—
Seed Collector		E. Horton	1 4 –	15 May 1899	25
Boy		- - - - - -	– 14 –	—	—

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

Office.	—	Name.	Salary	Date of Entry into Service.	Age next Birth day.
ARBORETUM.					
			£ s. d.		
*Assistant Curator -	(Residence) - - -	W. J. Bean - - -	101 9 –	1 January 1888 -	37
Label Writer and Time Keeper.	- - - - -	J. Clark - - - -	1 10 –	26 March 1894 -	28
Propagator - - -	Propagating and Pit, No. 28. Frames	C. G. Girdham - -	1 4 –	26 April 1897 - -	24
Gardener - - -	- - - - - -	- - - - - -	1 1 –	—	—
Ditto - - -	- - - - - -	- - - - - -	1 1 –	—	—
Ditto - - -	- - - - - -	- - - - - -	1 1 –	—	—
Ganger - - - -	- - - - -	T. Roffe - - - -	1 4 –	17 February 1868 -	58
Ditto - - -	- - - - -	J. Cotter - - - -	1 4 –	17 May 1881 - -	39
Ditto - - -	- - - - -	T. McDonald - - -	1 4 –	6 March 1882 -	37
Ditto - - -	- - - - -	M. Callan - - -	1 4 –	22 May 1882 - -	40
Ditto - - -	- - - - -	W. Franklin - - -	1 4 –	17 June 1889 - -	35
Ditto - - -	- - - - -	J. Crump - - - (A.P., 19*l.* 15*s.* 5*d.*).	1 4 –	24 June 1889 - -	51
Labourer - - -	- - - -	W. Smith (A.D.) - -	1 1 –	26 October 1881 -	49
Ditto - - -	- - - - -	F. Barrett - - -	1 1 –	6 March 1882 -	60
Ditto - - -	- - - - -	J. Franklin - - -	1 1 –	18 November 1895 -	25
Ditto - - -	- - - - -	P. Dealy - - - -	1 1 –	28 March 1898 -	23
Ditto - - -	- - - - -	J. Cotter, Jun. - -	1 1 –	2 May 1898 - -	23
Ditto - - -	- - - - -	J. Eggleton - - -	1 1 –	19 December 1898 -	29
Ditto - - -	- - - - -	F. J. Edwards - - -	1 1 –	9 January 1899 -	33
Ditto - - -	- - - - -	G. Hickman - - -	1 1 –	1 June 1899 - -	40
Ditto - - -	- - - - -	A. J. Green - - -	1 1 –	16 October 1899 -	23
Ditto - - -	- - - - -	H. G. May - - -	1 1 –	20 November 1899 -	26
Ditto - - -	- - - - -	A. Hatcher - - -	1 1 –	19 December 1899 -	22
Ditto - - -	- - - - -	H. Priest - - - -	1 1 –	19 February 1900 -	21
Ditto - - -	- - - - -	R. Betterton - - -	1 1 –	6 March 1900 -	23
Ditto - - -	- - - - -	J. Farmer - - -	1 1 –	19 March 1900 -	23
Ditto - - -	- - - - -	C. J. Baldock - - -	1 1 –	26 March 1900 -	27
Ditto - - -	- - - - -	W. Brazier - - -	1 1 –	2 April 1900 -	34
Ditto - - -	- - - - -	C. Avery - - - -	1 1 –	24 April 1900 - -	30
STABLES.					
Head Carter - - -	(Residence) - - -	S. Hazell - - - -	1 4 –	2 May 1887 - -	53
Carter - - - -	- - - - -	E. Larter - - - -	1 2 –	31 March 1890 -	35
Ditto - - -	- - - - -	J. Preston - - -	1 2 –	13 October 1890 -	34
Ditto - - -	- - - - -	C. Ruck - - - -	1 2 –	27 June 1898 - -	29
Boy - - - -	- - - - -	- - - - - -	– 13 –	—	—
Ditto - - -	- - - - -	- - - - - -	– 10 –	—	—
Ditto - - -	- - - - -	- - - - - -	– 10 –	—	—
Ditto - - -	- - - - -	- - - - - -	– 7 –	—	—
GATE KEEPERS AND PARK KEEPERS.					
Sergeant Park Keeper -	- - - - -	G. Wilby - - - - (A.P., 45*l.* 12*s.* 6*d.*).	1 10 –	21 April 1883 -	58
Deputy-Sergeant Park Keeper.	- - - - -	J. Stevens - - -	1 7 –	1 March 1875 -	57
Gate Keeper - - -	- - - -	W. Murphy - - - (A.P., 27*l.* 7*s.* 6*d.*).	1 4 –	18 May 1881 - -	60
Ditto - - -	- - - - -	G. Doo - - - -	1 4 –	26 March 1874 -	58
Ditto - -	- - - - -	J. Ballard - - - (A.P., 36*l.* 8*s.* 0*d.*).	1 4 –	30 March 1890 -	60
Ditto - - -	- - - - -	J. Garnett - - - (A.P., 25*l.* 17*s.* 1d.).	1 4 –	3 March 1891 -	52
Ditto - - -	- - - - -	H. Edwards - - - (A.P., 18*l.* 5*s.* 0*d.*).	1 4 –	22 March 1900 -	64
Ditto - - -	Shaft Yard Gate -	H. Allaway (A.D.) -	1 4 –	17 August 1891 -	46
Ditto - - -	Melon Yard Gate -	T. Raggett - - -	1 4 –	25 March 1889 -	40
Park Keeper - - -	- - - - -	R. Walton (A.D.). -	1 4 –	10 June 1880 - -	46
Ditto - - -	- - - - -	J. Barr (A.D.) - -	1 4 –	20 June 1889 - -	41
Ditto - - -	- - - - -	W. Linney (A.D.) -	1 4 –	7 November 1892 -	36
Ditto - - -	- - - - -	W. Finch - - - (A.P., 19*l.* 14*s.* 4*d.*)	1 4 –	1 June 1898 - -	46
Ditto - - -	- - - - -	T. Roberts - - (A.P., 19*l.* 15*s.* 5*d.*)	1 4 –	2 April 1883 - -	60
Ditto - - -	- - - - -	J. Waddup - - -	1 4 –	1 January 1900 -	24
Ditto - - -	- - - - -	E. Young - - - (N.P., 40*l.* 5*s.* 0*d.*)	1 4 –	29 January 1900 -	46
Ditto - - -	- - - - -	H. Burley (A.D.) -	1 4 –	26 March 1900 -	49
Extra Ditto } Six	} - - - -	J. Priest (A.D.) -	1 4 –	1 June 1898 - -	26
Ditto } months	}	H. S. Binge (A.D.) -	1 4 –	22 March 1900 -	43
Ditto } Four	} - - - -	—	1 4 –	—	—
Ditto } months	}	—	1 4 –	—	—
Cycle Shelter Attendant	- - - - -	R. Nixon - - - (N.P., 41*l.*)	1 4 –	14 April 1900 - -	62
POLICE.					
Police Constable - -	Day Duty from 1st April to 30th September.	- - - - - -	61 15 3	—	—
Ditto - - -	Night Duty - - -	- - - - - -	123 3 9	—	—
Ditto - - -	Ditto - - -	- - - - - -	123 3 9	—	—

Office.	—	Name.	Salary.	Date of Entry into Service.	Age next Birthday.
CLOAKROOMS.					
Attendant		Mrs. E. Harper	10*s.* 6*d.* per week for 8 months in winter, 17*s.* 6*d.* per week for 4 months in summer.	7 April 1889	59
Ditto		Mrs. E. Kirby		1 April 1892	47
Ditto		Mrs. M. Gibbs		25 January 1893	56
CLERK OF THE WORKS DEPARTMENT.					
*Clerk of the Works (temporary).	(Residence)	J. Allen	200 – –	10 September 1879	55
*Engine Driver	Ditto	A. Watford	2 – –	March 1877	43
*Turncock	Ditto	F. Frost	1 13 –	April 1878	48
Painter and Writer		W. Gale	1 19 –	June 1866	61
Painter and Glazier		S. Moore	1 10 –	November 1873	61
Painter and Glazier		W. Medland	1 10 –	May 1882	44
Ditto		A. Rowland	1 10 –	June 1885	46
Labourer		G. Emonson	1 1 –	June 1893	56
Ditto		R. Rose	1 1 –	November 1869	57
Ditto		J. Gray	1 1 –	December 1873	56

Office.	Name.	Salary.	Date of Entry into Garden Service.	Date of Leaving Garden Service.	Age next Birthday.
		£ *s.* *d.*			
VOLUNTEERS FOR ROYAL RESERVE BATTALION.					
Gate Keeper	W. Wood	1 4 –	3 March 1891	19 March 1900	35
Ditto	C. G. Norris	1 4 –	7 April 1896	19 March 1900	43
Park Keeper	R. H. Roffe	1 4 –	12 February 1894	20 March 1900	31
Ditto	G. Burgess	1 4 –	31 May 1894	18 March 1900	33
Ditto	W. Callow	1 4 –	20 June 1892	18 March 1900	33
Ditto	F. Stitson	1 4 –	26 June 1893	22 March 1900	32
Extra ditto (Four months)	C. Hopkins	1 4 –	3 June 1896	17 March 1900	34
Fireman	E. Perkins	25*s.* summer 28*s.* winter	31 March 1890	16 March 1900	34
Seed Collector	H. J. Burgess	1 4 –	14 September 1891	17 March 1900	35
Labourer	G. Brennen	1 1 –	1 June 1898	19 March 1900	36
Ditto	G. Avery	1 1 –	3 January 1899	22 March 1900	35
RESERVES CALLED OUT FOR ACTIVE SERVICE.					
Laboratory Attendant	J. A. Mingay	1 4 –	8 June 1898	14 October 1899	28
Extra Park Keeper (Four months)	E. J. Swann	1 4 –	1 June 1898	14 October 1899	29
Ditto (Six months)	E. Stannard	1 4 –	25 April 1898	7 December 1899	29
Museum Porter	T. Sage	1 4 –	12 March 1889	9 December 1899	37
Ditto	J. Stone	1 4 –	1 April 1892	12 May 1900	36
Labourer	W. White	1 1 –	25 April 1899	14 October 1899	30
Ditto	H. Claiden	1 1 –	7 March 1898	30 December 1899	30
Ditto	W. H. Trigg	1 1 –	6 November 1899	20 January 1900	30
Fireman	W. Walker	21*s.* summer 30*s.* winter	18 May 1892	2 March 1900	34
Carter	W. H. Hunt	1 2 –	3 March 1891	23 March 1900	35

XI.

Specimens are not lent to monographers except under very special circumstances. The Kew Herbarium is in constant use, and, besides the risk of loss of what would be irreplaceable, it would be an intolerable impediment to the ordinary daily work if any considerable portions of it were at any time away on loan. Apart from this the extent of the Kew collections is so considerable that it is more reasonable that they should be visited by the monographer than that the specimens should be sent to him.

At the same time when a worker is known to be competent and the purpose he has in view is desirable in the interests of science, an effort is often made to assist him if the material is sufficiently copious to minimise the risk of loss. The following communication illustrates such a case:—

Leipzig, Kaiser Wilhelm Strasse, 9,

August 20th, 1900.

Sir,—I herewith return the five specimens you kindly sent; I thank you for the kind help without which my large work could never be a complete and reliable revision of all known species of Hepaticæ.

I fear I shall be obliged to trouble you repeatedly for the loan of some of the old species.

Most respectfully,

(Signed) F. Stephani.

The Director, Royal Botanic Gardens, Kew.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

Nov. 1900.

A relaxation of the general rule does not, however, always lead to satisfactory results. On very earnest persuasion I lent to Mr. Arthur Lister, Berkeley's types of Myxomycetes for the purpose of an important monograph of the group, on the ground that he could not satisfactorily study them except at home. What he actually produced was not the expected monograph, but what professed to be "a descriptive catalogue of the species in the herbarium of the British Museum." These were not, however, at the time the catalogue was made, actually in the possession of that institution, but were largely, as I understand, subsequently contributed by Mr. Lister himself. A complete catalogue of the specimens both at Kew and at Cromwell Road would have been of value. But the catalogue only partially enumerates the Kew material, while it credits the British Museum with what the writer added to it, including, as I am informed, a series of preparations made from the Kew types. On the whole, science has probably gained by the transaction, but the mode in which it was carried out leaves a good deal to desire. And it cannot be said that the promise of an ample monograph which was the ground on which an altogether exceptional privilege was extended to Mr. Lister has been fulfilled by the production of the catalogue.

The number of specialists who can be attached to such an institution as Kew is necessarily limited. Their services are nevertheless often required for the correct discrimination of special groups. To meet the difficulty a small grant of £100 a year is at the disposal of the Director. Undetermined collections, say, of Liverworts, are sent on arrival to a specialist, usually abroad, who gives them the necessary preparation, determines them, and returns them in a state ready for intercalation in the herbarium.

XII.

1. Bulky carpological and structural specimens and woods generally are preserved and exposed to the public in the museums; those belonging to Dicotyledons and Coniferæ in Museum No. I.; to Monocotyledons and Cryptogams in Museum No. II.; and timber specimens of large size in Museum No. III.

The arrangement is not wholly satisfactory, though it works fairly well in practice. Many specimens of technical value and importance are of insufficient general interest for public examination. Space which might be put to better account is therefore needlessly occupied. It would be desirable that such specimens should be withdrawn from public exhibition and preserved in presses with drawers at the herbarium. This has only been done so far in the case of saxicolous lichens. Any extension of the system is at present impossible for want of space.

2. The specimens are all poisoned with a solution of corrosive sublimate in methylated spirit. This has answered well for more than half a century. Recently, however, in a few cases the sheets have been found to be blackened by the reduction of the mercury salt. The Principal of the Government Laboratory obligingly took much trouble in looking into the matter, and the mischief was apparently traced to some wood-pulp paper supplied by the Stationery Office which was admitted to contain free sulphurous acid. The Stationery Office promised to take special precautions to prevent this in future, and it is hoped there will be no recurrence of the trouble.

3. The specimens are all "glued" down. The ideal arrangement for purposes of study is to have the specimens loose so that they can be examined conveniently from either side. In many public herbaria and in most private ones on the continent this is the method adopted. Botanical specimens with adequate care may apparently be preserved indefinitely. Kew possesses some from Egyptian tombs which are believed to be 4,000 years old, and are still undeteriorated. On the other hand, botanical specimens are mostly rather brittle and liable to disintegration, and therefore to more or less destruction from frequent handling. In a herbarium in frequent use there is practically no choice but to protect the specimens by securely "glueing" them to sheets of stout paper. They will then last practically indefinitely. No other system is practicable in a large public herbarium which is in constant use.

There is a further advantage. In no other way can a large number of specimens be spread out for comparison with so much convenience. There is some reason for thinking that much of the imperfect systematic work which is produced in foreign countries is really due not to want of ability, but to the physical difficulties of properly dealing with the material under review.

There is also another advantage in the Kew system which, though a little painful to mention, cannot be overlooked. Amongst the large body of persons who engage in research at the herbarium there is now and again an individual who cannot resist the temptation of appropriating a portion of a type-specimen. Even glueing down will not absolutely prevent this; but it is a great aid to the preservation of a type-specimen in its integrity, and makes any wilful mutilation comparatively easy of detection.

The final aim of herbarium administration is not merely to preserve its contents, but to aid research. Loose and detached fragments, such as flowers, fruits, etc., are, when available, preserved in separate envelopes ("capsules") on the sheets, and these, with the permission of the keeper, may be used for investigation.

The accompanying notice is placed inside every cabinet.

Visitors studying in the Herbarium are requested to observe that the removal of specimens, or of any portions of them, from the sheets is absolutely prohibited without the permission of the Keeper. No flower, fruit, or leaf is on any account to be detached for analysis without his approval.

Memoranda and drawings should not be made upon the sheets but upon separate slips of paper. These after being authenticated by the author's signature, may be pinned to the sheets with the specimens to which they refer.

W. T. THISELTON-DYER,
Director.

May 16th, 1890.

Messieurs les étrangers venant étudier dans l'Herbier sont priés de se rappeler qu'il est absolument défendu de soustraire les spécimens ou aucune partie des spécimens des feuilles qui les contiennent. Il n'est permis sous aucun prétexte de détacher les feuilles, les fruits ou les fleurs pour les examiner, sans le consentement exprès du Conservateur.

Les notes et esquisses qu'on aura occasion de faire devront toujours occuper des cartons séparés. Ces cartons, revêtus de la signature de l'auteur, pourront être attachés avec des épingles aux feuilles contenant les spécimens, mais il est défendu d'écrire quoi que ce soit ou de dessiner sur les feuilles mêmes.

W. T. THISELTON-DYER,
Directeur.

le 16 Mai, 1890.

4. The principle pursued at Kew which differentiates its herbarium from any other, and has largely contributed to the esteem which it enjoys, is to get every specimen, which after comparison it appears desirable to keep, into its approximate taxonomic place in the herbarium. The determination is carried down invariably as far as the generic position. Further than this, it frequently cannot be carried with the existing available staff. The ideal arrangement would be to at once, if new, name it and publish a description. This no doubt is what contributors of important collections would usually desire. But without a larger staff this is impracticable. The whole object of a large herbarium is to arrive at a recorded knowledge of the existing vegetable kingdom. All that can be practically attained under existing conditions is to present to a monographer in an accessible form, approximately worked up, all the material available at Kew for the study of a particular group.

The accumulation of unmounted material at Kew is consequently always a minimum. Its amount necessarily varies with the varying rate of influx of new collections. But unmounted collections are ordinarily not available till incorporated in the herbarium for "botanic use." Under very special circumstances to obtain the advantage of the assistance of a monographer it may be worth while to sort out from unincorporated material specimens belonging to the group at which he is working for his inspection and opinion.

5. The specimens of fossil plants at Kew are few, and are confined to a limited number, exhibited in the Museums as illustrations of extinct types. They are, therefore, intercalated in the series of recent specimens. Kew possessed a few miscellaneous but inconsiderable collections, accumulated mainly by Sir Joseph Hooker,

who, when attached to the Geological Survey, took much interest in Fossil Botany. As they appeared to possess little significance at Kew, they were transferred in accordance with the principle laid down on paragraph 55 of the fourth report of the Royal Commission on Scientific Instruction to the British Museum.

The subject of vegetable palæontology is one of increasing interest and importance. The extraordinary preservation of the tissues in most palæozoic and many mesozoic vegetable fossils offers peculiar facilities for their study in the light of our modern knowledge of plant anatomy. As no other botanist appeared willing to take up the detailed investigation of palæozoic plants, the Honorary Keeper of the Jodrell Laboratory did so with the assent of the Director. By a personal arrangement, Dr. Scott was enabled to examine systematically the important Williamson collection, which has now become the property of the Natural History Museum, and has based upon it a series of important memoirs, which he proposes to further continue.

6. The arrangement and generic nomenclature of all the collections throughout the establishment, as well as of its publications, follows the Genera Plantarum of Bentham and Hooker. No attempt is made to depart from this in view of new taxonomic theories. The mere sequence of orders and genera in a herbarium is a matter of little practical moment so long as the material which it is desired to consult can be readily found. To perpetually rearrange the herbarium on some more fashionable but probably not more permanent basis would serve no practical purpose, and would waste much time needed for more serious purposes.

The species in large genera are, however, arranged from time to time in accordance with some accredited monograph. The principle in every case is to make some standard work serve as a catalogue for a larger or smaller part of the herbarium, as the case may be. Widely distributed genera and species are arranged geographically according to the annexed scheme :—

GEOGRAPHICAL DIVISIONS for the arrangement of the herbarium, 1892.

No.		
1	Europe	Europe.
2	North Africa and Orient.	Madeira, Canaries, Azores, extra-tropical North Africa and Orient, including Baluchistan and Afghanistan, and Arabia south to tropic.
3	Northern Asia	Central and Northern Asia, country north of Indian Tibet and China, including Mandshuria and Saghalien.
4	China and Japan	China and Japan, Hainan, Formosa, Luchu Archipelago, Bonin Islands, Corea and Kurile Islands.
5	India	India, including Ceylon and Burma, the Malayan peninsula to Singapore, Andaman, Nicobars, Laccadive and Maldive Islands, and Southern Tibet-watershed of the Indus and Brahmapootra.
6	Malaya	Tonquin, Anam, Siam, Cambodia, Saigon, Malayan Islands (including the Philippines), Keeling Islands, and New Guinea.
7	Australia	Australia, including Tasmania and Lord Howe's Island.
8	New Zealand	New Zealand, Norfolk and adjacent islands, Kermadecs, Auckland, Campbell, Chatham, Antipodes and Macquarie, westward to Kerguelen and Marion.
9	Polynesia	Polynesia, including Hawaiian Islands (Sandwich Islands) and New Caledonia.
	Tropical Africa	Tropical Africa, including St. Helena, Ascension and Cape Verds, Tropical Arabia and Socotra.
11	Mascarene Islands	Madagascar, Mauritius, Bourbon, Seychelles and islets, including Comoro Islands.
12	South Africa	South Africa, including Tristan d'Acunha, Gough, St. Paul and Amsterdam Islands.
13	North America	Canada, United States, Greenland, Bermudas, and Lower California.
14	Central America	Mexico and Central America.
15	West Indies	West Indies.
16	E. Tropical, South America.	Brazil, the Guianas and Paraguay.
17	W. Tropical, South America.	Venezuela, Colombia (New Grenada), Ecuador, Peru, Bolivia, Galapagos, and Cocos Island.
18	Temperate, South America.	Chili, Argentina, Uruguay, Patagonia, Juan Fernandez, Falklands, and South Georgia.

GEOGRAPHICAL DIVISIONS for the arrangement of the herbarium, 1892—*continued*.

Sir W. T. Thiselton-Dyer, K.C.M.G. F.R.S.

23 Nov. 1900.

Some redundancy is inevitable if the study of geographical distribution is to be kept in view. It would, however, be rash to assume that the absolute amount of actual redundancy is considerable, as probably no species exhibits uniformity over a large area. And this is perhaps true even of cosmopolitan weeds of recent dispersion.

The living collections are arranged according to their cultural requirements. These only accord with a geographical arrangement if the areas in view are very large.

In the museums the arrangement is for the most part strictly taxonomic. The contents of the Timber Museum (No. III.) are, however, arranged geographically.

7. The cabinets employed at Kew are inexpensive, and made of painted deal. They have fixed shelves. There appears to be no advantage in the use of movable trays, which increase the expense, and take up room unnecessarily. It would be an advantage if the cabinets in use were more dust proof, but with the precautions which are taken there is little evidence of injury to the collections in this respect. It may be a question whether it would not be desirable in the future to replace the cabinets by presses of sheet-iron or steel.

8. The standard size sheet for the Herbarium is $16\frac{1}{2} \times 10\frac{1}{2}$ inches. For palms and a few other small groups paper of a larger size $20\frac{3}{4} \times 14\frac{3}{4}$ inches is employed, necessitating the use of correspondingly larger cabinets.

9. It will be inferred from what has been said above as to the Kew system of Herbarium administration, that the preservation of separate subsidiary collections is, as far as possible, avoided. Where a collection is acquired by purchase, gift, or bequest, it is at once broken up, and so much as it is desirable to preserve is sorted into the general series, each specimen being accompanied with a printed label indicating its history and source. The rest is distributed. The few subsidiary herbaria which are kept separate are mostly already mounted on paper of a different size ; such are Lindley's type collection of orchids, Hewitt Cottrell Watson's British Herbarium, and Carey's North American Herbarium, etc. Subsidiary collections are in every way objectionable ; their contents get out of sight ; a monographer requires all his material to be brought together, and not to have to seek it in different places.

10. Specimens can be prepared by boiling for dissection in the keeper's room, which is cut off from the Herbarium proper by fireproof doors. This is a necessary precaution against fire, as no light, under any circumstances, is permitted in the herbarium building itself. The performance of the necessary operations under the keeper's eye is a guarantee against undue waste of material which could not be readily replaced.

For anatomical investigation and fungus-cultures requiring more elaborate appliances, recourse must be had to the laboratory, which is amply provided with microscopes, etc.

11. Neither the Herbarium nor the Museums (except perhaps No. III.) are even approximately fireproof. This was a constant source of anxiety to the late Director, Sir Joseph Hooker. Soon after my own appointment he

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

addressed an urgent letter to me on the subject, which I laid before the First Commissioner. As a result, Sir Eyre Shaw was requested to examine the Herbarium building. He made the following report to the Office of Works:—

Metropolitan Fire Brigade,
Headquarters, Southwark Bridge Road, S.E.
February 4, 1889.

MEMORANDUM concerning the Herbarium, Kew Gardens.

I have visited this building, which is little more than an ordinary dwelling-house with the addition of one large room consisting of wooden floors, wooden galleries filled with a considerable number of light wooden and paper boxes containing dried flowers and herbs fastened on paper.

The place is heated by means of hot-water pipes leading from a boiler outside, and if it may be assumed that some artificial heat is necessary, the mode adopted appears satisfactory, particularly if the hot-water pipes are in no part nearer than three inches to the woodwork, as, I was assured, is the case.

If a light were applied to one of the wooden boxes on the ground level the probability is that every floor with all the contents would be in a blaze and beyond the hope of safety within five minutes. All the arrangements, therefore, should be made in such a way as to be available in less than this time.

I made some inquiry about a watch being kept, but the replies give reason to hope that something more might be done. The lower windows are absolutely unprotected, and in their present condition are at the mercy of any evil-disposed or thoughtless person.

I saw two fire-engines, one of which was in good order, though of such a type as to be unworthy of a place in a valuable building. This might be removed, and a fire-engine of modern pattern, with six-inch cylinders and eight-inch stroke of piston substituted for it.

The other engine is not of much value, but might be allowed to stand in some part of the premises, not where it is now, in the engine-house, at some distance away.

The hose is of three different sizes, and this is not safe. It should all be of one size, and the most suitable for the purpose would be a diameter of $2\frac{3}{8}$ inches in the pipes, which would allow a diameter of two inches in the couplings.

The head of water is stated to be 160 feet, and the quantity in the reservoir 250,000 gallons. I had no means of verifying these figures; but, if they are correct, the arrangements in that respect are satisfactory.

The nine hydrants within the building are sufficient; but at least four should be added to the two outside.

The quantity of hose should be made up to 2,000 feet, in any lengths which those in charge consider most convenient, but it is probable that twenty hundred-feet lengths would answer best.

All the existing copper branches should be removed, and replaced by leather branches of the modern type, and six half-inch nozzles and six three-quarter inch nozzles should be provided.

I was informed that the turncocks can be called by telegraph, and I think this very satisfactory; but I should recommend that the engineer, whose presence at the early stages of a fire would be of much greater importance, should be called in the same way.

The firemen should be frequently practised in the use of the appliances with the low pressure service, the high pressure service, and the fire-engine, and should at every practice mount to the roof and other upper parts, both from inside and outside.

I received the greatest attention from the Director of the Gardens and his assistants, and all questions which I asked were promptly and intelligently answered.

(Signed) EYRE M. SHAW,
Chief Officer, Metropolitan Fire Brigade.

As a result of that report a variety of detailed improvements were made in the arrangements for fire protection. What I myself most dreaded was the effect of lightning. A new system of conductors was accordingly provided under the direction of Sir William Preece. The lower windows still, however, remain unprotected.

American botanists who have worked at Kew and take an especial interest in the Kew Herbarium, have repeatedly expressed their dissatisfaction that it is so imperfectly protected against fire. The following letter stated the view taken of the matter in America so clearly that I laid it before the First Commissioner.

Professor Underwood to Royal Gardens, Kew.

Columbia University in the City of New York,
Department of Botany,
October 15, 1897.

DEAR DR. DYER,—On my return to America I take this first opportunity to write you to again thank you for the facilities extended to me during my stay at Kew. My appreciation of the pre-eminent value of the Kew Herbarium as an international institution was only heightened by subsequent visits to others on the Continent, particularly at Paris, where I spent a fortnight after leaving Kew.

So many of the types of the early explorers in America are preserved in your magnificent collection, particularly of regions to the south of the United States, which must become the working ground of Anglo-American botanists in the future, and your collection is represented by so wide a series of specimens that we must always depend on Kew for supplementary study of the American flora.

And this leads me to express the hope that your Government will realise the international importance of your Herbarium, and provide for it a new fireproof building, where it will be placed beyond the possibility of loss by fire. I was astounded when I learned for the first time that the priceless treasures of Kew were not housed in a fireproof building. I could conceive of no more dire calamity that could happen to botanical science than would result from the loss of the Kew Herbarium.

We have had the same problem to grapple with here in America, and I am happy to say to you that even since my return the City of New York has authorised the payment to the New York Botanical Garden of the sum of a half million of dollars for the construction of buildings, which include a fireproof museum building which will house our own herbarium, now the largest on this continent. The contracts for building the museum are already in, and bids will be opened on next Monday. We hope to be able to occupy the building by the winter of 1898.

I shall hope to soon hear that the English Government has been as liberal toward the Kew Herbarium.

Again thanking you for all the kindness shown me during the past summer.

I am,
Yours very truly,
(Signed) LUCIEN M. UNDERWOOD.

Sir John Taylor was in consequence instructed to examine the building. He made the following report:—

i. The Herbarium, as it now stands, cannot be said to be secure from risks of fire, as no part of the building (or of the Library attached to it) is of fireproof construction, but, on the contrary, is such that it would burn rapidly if it caught fire.

* * * * *

ii. It appears to me that all reasonable precautions are at present taken to safeguard the existing buildings, subject to the improvements named in clause 5.

iii. The Herbarium itself could at a reasonable cost be made fireproof, but the Library portion of the building could not be so dealt with, owing to its age and construction. In the event of the Board deciding to make the Herbarium fireproof, it would be necessary to vacate the building, say from four to six months, in order to substitute iron, concrete, and cement construction in the floors, roof, etc., for the woodwork now there, and to make such other alterations and additions as may be considered necessary.

* * * *

v. It is desirable to substitute an iron and concrete floor for the wooden one in the Library building immediately adjoining the heating apparatus, as pointed out on the spot, and to provide a small spirit store outside the building so that the spirits now stored in the basement may be placed there. These alterations should be done at once.

10/11/97. J. T

Sir John Taylor's suggestions were immediately carried out. At my own instance an adjoining building was pulled down. The Herbarium is now, therefore, completely isolated. But its inflammable structure still remains as described by Sir Eyre Shaw.

Every contrivance has been exhausted for finding space in the existing Herbarium building for the continual accessions. I, therefore, submitted to the First Commissioner a comprehensive scheme for dealing with the whole question. I proposed that a new fireproof building should be erected, for which there is ample space, that the present Herbarium should be removed to it when completed, and that the existing building should be made fireproof as a provision for future expansion.

The Office of Works pressed the matter on the attention of the Treasury. It received the following reply:—

[COPY.]

Treasury to Office of Works.

Treasury Chambers,
January 17, 1898.

Sir,—The Lords Commissioners of Her Majesty's Treasury have had before them Mr. Brett's letter (B. 64/98) of the 6th instant as to the Herbarium at Kew, representing that the present building is not fireproof, and is in need of extension to meet the continued growth of the collections.

My Lords recognise the value of these collections, and the necessity for both reasonable security from fire and adequate space for storage of them; and they will be prepared when necessary to ask Parliament to make such provision for these purposes as upon full consideration may appear necessary.

The present proposal, however, comes before them at too late a stage in the preparation of the estimates to obtain full discussion in time to make any provision in 1898-99, and my Lords therefore suggest that it be withdrawn for the present, for the purpose of receiving more detailed consideration in the course of 1898, together with the various building questions which will arise in connection with Her Majesty's gracious surrender of her rights at Kew.

I am, etc.,
(Signed) R. W. HANBURY.

The First Commissioner of Works.

With regard to the last paragraph I am not aware that the Queen has actually surrendered any rights at Kew. On the contrary, the hope that the much needed accommodation for the Director's Office might be found in one of the Crown houses has been indefinitely deferred. In any case, I am quite unable to conjecture what building questions could under any circumstances have arisen in connection with the surrender.

Professor Rusby, of the Institute of Pharmacy, New York, dwelt forcibly on the subject in a lecture delivered by him in America after a visit to Kew. I quote the following passage from the "Druggists' Circular and Chemical Gazette" for January, 1898, in which the lecture was reported:—

"No sum of money could well be named as a compensation for the loss of these collections, for there is no basis of estimate. If it were possible to duplicate them the cost of doing so would be its value, but types can never be thus replaced. A great herbarium is something like a diamond, its value increases in geometrical ratio with its size. The value of types is like that of records in regard to legal tenure, a comparison which Government officials surely should be able to understand. The extent of the calamity involved in the loss of such a collection can scarcely be exaggerated. Its effect would almost immediately be felt with paralysing force in the most distant colonies wherever the economics of vegetation have come to depend upon the resources of this unique establishment. Many contingencies regarding fire can be guarded against by careful vigilance, but some cannot. A lightning stroke, the match or apparatus of a careless working man, the bomb of the dynamiter, riot, the act of a madman—who can say that none of these will take effect in any single year? Yet any one of these would probably be completely destructive to such a tinder-box as that now in use at Kew."

I should add that in the event of fire in any part of the establishment, we are dependent for its prompt extinction on a supply of water from one reservoir in Richmond Park. It holds 250,000 gallons; but this is only sufficient for a day's consumption for garden purposes in summer. This is a state of things from which I am unable to derive any feeling of security.

W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

21 Nov. 1900.

12. Every building devoted to botanical study is now filled to overflowing. It became, as will have been seen, the Director's duty to represent to the Government in 1898 the urgent need of the erection of a new wing to the Herbarium, which, as the Kew buildings are of the most utilitarian character, would have been a matter of little expense. The application was not acceded to, but the appointment of the present Committee admittedly rose out of it. The question is raised in principle as to whether the Kew Herbarium should be maintained at all, and this amounts to the consideration of the disestablishment of Kew as a scientific institution. This was elaborately threshed out by the Royal Commission on Scientific Instruction, which recommended in its fourth report, issued in 1874, "that the collection at Kew should be maintained and arranged with especial reference to systematic botany." I think it is proper in this connection to draw attention to the Treasury Letter on the subject of January 23, 1873.

Treasury Chambers,
January 23, 1873.

SIR,—The Lords Commissioners of Her Majesty's Treasury, having had before them your letter of the 3rd instant, and the Memorial inclosed with it from various gentlemen engaged in the pursuit of botany or in instruction therein, with respect to the transfer to the branch of the British Museum about to be constructed at South Kensington of the scientific collections and library now existing at the Royal Gardens, Kew.

Their Lordships desire me to request that you will inform the memorialists that Her Majesty's Government have not formed the intention of removing the collection to South Kensington, and that, should anything lead them hereafter to entertain the idea, they will take care that ample notice shall be given, and that the judgment of the persons most accomplished in botany shall be fairly weighed in the first instance.

I am, etc.,
(Signed) WILLIAM LAW.

The Rev. M. J. Berkeley,
Sibbertoft, Market Harborough.

It will be observed, on reference to the report of the Commission, that, while it recommended the separate maintenance of the herbaria at the British Museum and at Kew, it suggested their specialization in different directions. The former was to have in view geographical distribution, the latter, as stated above, systematic botany. From a scientific point of view the distinction is impracticable; the two aspects of herbarium research go hand-in-hand and cannot be separated. The geographical distribution of a species cannot be ascertained till the systematic limits of that species have been accurately determined, and if there is one feature more than another of Kew work it is the detailed and constant attention which is given to geographical botany.

A distinction can be drawn between the two herbaria, but of a different kind. The principle which runs through every department of the British Museum is the accumulation and preservation of things interesting and valuable in themselves. This is the primary object, and research, though not neglected, is subsidiary. At Kew the policy which has always animated the establishment is precisely the opposite. The herbarium has always been regarded as an instrument for research, and for determining problems in systematic and geographical botany. The distinction is a real one, and constantly comes into operation in considering purchases. It may happen, and no doubt has frequently done so, that a purchase which would commend itself to the Trustees, and rightly so from their point of view, would not be agreed to at Kew, and, equally rightly, Kew has in fact not hesitated to transfer to the British Museum objects for which it seemed a more fitting repository.

With regard to the museums, the pressure on their space has long been acute. In order in some measure to obviate it, I undertook personally a complete revision of their contents. A great number of duplicate and deteriorated specimens especially on the economic side were withdrawn, and a large proportion of others reduced in size. This occupied me for five years (1876-80).

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

In 1899 I applied for an inexpensive annexe to relieve the congestion in Museum No. III., and especially for the exhibition of a large series of prints and photographs illustrating foreign, colonial, and Indian botanical establishments, the latter being especially calculated to give some idea of the botanical work of the Empire as a whole. The application was absolutely ignored, although the Treasury Minute of July 24th, 1872, prescribes that the opinion of the Director is to be taken on such points.

13. The position of Museums No. I. and No. II. is cramped, and it would be difficult to add to them. Any further museum accommodation would have to be in the form of a separate building. Museum No. III. could be easily relieved by the erection of an inexpensive annex.

The Herbarium stands in a separate precinct, and several acres of land are available for extensions.

14. It is necessary to premise that the herbarium and library are intended for research as well as for the current scientific business of the establishment. Duly qualified persons are freely admitted on making proper application. Persons with definite enquiries, and travellers seeking instruction are also received. But the general public is not admitted, and could not be with the existing staff and accommodation as to space. The regulations governing admission have been already set out.

The collection of prints and drawings is perhaps the largest in existence. It is contained in 464 portfolios, and the number of sheets is approximately 66,000, containing 106,000 figures.

It is not available for public use, if by that is meant that anyone may turn it over. But it is accessible, like the herbarium, to qualified persons. Artists and horticulturists are also allowed access to it, and for the identification of cultivated plants it is more useful than the herbarium itself. The staff of the Royal Gardens make constant use of it for this purpose. It cannot be doubted that such a collection saves the herbarium much wear and tear.

Attention may be drawn to the fact that Sir Joseph Banks attached great importance to the existence of a collection of drawings at Kew, and bequeathed for its use those (1,484 in number) made at his expense of plants which had grown there, besides providing for the salary of Francis Bauer, as resident draughtsman, after his own death.

15. The official publications are:—(i.) The *Kew Bulletin*, commenced in 1887, at the instance of Parliament, and directed to be the vehicle for publication of any information whether official, economic, or scientific to which it was desirable to give publicity. It is edited by the Director, and printed and sold for the Stationery Office. (ii.) The *Icones Plantarum* is published in parts from time to time, and contains figures and descriptions of new or interesting plants drawn from the Herbarium. It is prepared by the scientific staff and edited by the Director. It is the property of the Bentham Trustees, for whom it is published and sold. (iii.) The *Botanical Magazine* is a quasi-official publication in so far as its contents are prepared at the Herbarium, and it is mostly devoted to coloured figures and descriptions of new or interesting plants which have flowered at Kew. It is edited by the late Director, Sir Joseph Hooker, and published by private enterprise.

This, however, gives a very imperfect idea of the amount of work annually turned out at Kew by members of the staff, or by others working there. Publication is obtained in various ways, either independently, through the medium of societies, or in scientific journals.

Mr. E. S. Salmon, for example, has published his elaborate monograph of the Erysiphaceæ, prepared at Kew, in the memoirs of the Torrey Botanical Club in America.

"The material examined has been for a large part found in the rich collection of Erysiphaceæ in the Royal Herbarium, Kew. This collection includes the types of Cooke and Peck's American species, and is especially valuable in containing Berkeley's herbarium. In this occur, besides Berkeley's types, no less than ninety-eight specimens sent by Léveillé to this author (Léveillé's herbarium, M. P. Hariot informs me, was destroyed in 1870 during the Franco-Prussian war); also a number of specimens sent by Castagne, Roberge, etc., and a few examples from Schweinitz's herbarium. For the great facilities afforded me in the use of this collection I am under obligations to the Director of the Royal Gardens, Kew." (E. S. Salmon in "Memoirs of the Torrey Botanical Club," Vol. ix., p. 26).

The following statement which was prepared for another purpose may serve as an example of the annual output from all sources:—

PUBLICATIONS, OFFICIAL AND SEMI-OFFICIAL, issued from Kew during the year 1894.

——	Volume.	Pages.	Plates.
Flora of British India	VI.	673–792	—
Botanical Magazine	CXX.	circa 120	7332–7391 =60
Icones Plantarum	Parts of XXII.-XXIV.	circa 100	100
Index Kewensis	II. pt. i.	640 4to	—
Kew Bulletin	VIII.	490	9
Flora Sinensis	II.	60	2
Flora Ins. Tongarum	—	60	3
Flora Kinibaluensis	—	195 4to	10
Flora Tibetana	—	40	2
Flora Karakoramensis	—	8	—
New Ferns	—	12	—
Cyperaceæ Africanæ	—	167	—
Grevillea	XXIII.	134	2
Diseases of Grape Vine	—	3	2
Orchid Review	II.	384	34 figs.
Gardeners' Dictionary	—	250	—
Hand-list of Trees and Shrubs grown in Arboretum	Pt.	296	—
TOTAL	—	3,079	224

The most important present official work is the continued preparation of the series of Colonial and Indian floras. This when completed will form a detailed botanical survey of the whole Empire. The scheme was projected in 1856, and finally adopted by the Colonial Office in 1863.

The following qualified persons not members of the Kew staff may be specified as engaged at the present time on considerable works at the Herbarium.

Sir Dietrich Brandis, K.C.I.E., F.R.S., Forest Flora of India (expense defrayed by Government of India).

Colonel Sir Henry Collett, K.C.B., Flora of Simla (private venture).

Sir George King, K.C.I.E., F.R.S., Flora of Straits Settlements (expense defrayed by Colonial Government).

Dr. Cooke, C.I.E., Flora of Bombay.

C. B. Clarke, Esq., F.R.S., monograph of Cyperaceæ (private venture).

16. The library of the Royal Botanic Gardens contains approximately 19,000 volumes. It originated in the libraries of the late George Bentham, C.M.G., F.R.S., which was acquired by gift in 1854, and in that of the late Sir William Hooker, F.R.S., which was acquired by a special Parliamentary grant in 1867.

The Kew library is essentially a working library. Great pains have therefore been taken to acquire books which bear in any way on the study of systematic botany. Some valuable books of which the British Museum possessed duplicate copies have been presented to it by the Trustees. It contains a very valuable collection of books of travel. It is as far as possible complete in itself. But on occasions recourse is had to the libraries of the Royal Society and of the Royal Geographical Society.

Binding is done without limit as necessary by the Stationery Office. It is executed with more care than formerly, but requires careful watching. In two cases valuable books have been unaccountably lost by the binders.

17. There is a printed catalogue of the library, of which a copy is submitted. This was prepared at the expense of a special grant. It was published in 1899, and a limited number of copies are on sale at the Royal Gardens. A list of additions has since been

issued annually as an appendix to the "Kew Bulletin."

18. The Stationery Office takes a vote of £170 for the purchase of books for the Kew Library. Up to 1890 it supplied them on requisition. Scarce books, however, have to be hunted for in booksellers' catalogues. They require prompt application, and the Stationery Office generally failed to secure them in time. When procured they also defaced them with an unsightly stamp. They further insisted on damaged or mutilated copies being accepted if procurable at a cheap rate. After considerable discussion it was eventually arranged that Kew should buy its own books through a bookseller, accounting for the expenditure to an amount not exceeding the sum voted for the purpose. Amongst other advantages this allows of books being inspected before their purchase is finally decided on. Modern books, the titles of which are attractive, often prove not worth purchasing. Copies of old books are never purchased if, on inspection, they prove imperfect.

The peculiar character of taxonomic science requires that a library such as that of Kew should possess every book in which a new species is described. It is therefore necessary to have a large series of periodicals. Keeping these up is a task of no small difficulty, especially with very limited means. The method may be summarised as follows:—

(i.) A considerable number of foreign, colonial, Indian, and home societies are desirous that such a library as that of Kew should possess a complete set of their publications. The scientific bodies of the United States are especially generous in this respect. Kew is under particular obligations to Professor Britton, of Columbia College, for taking an immense amount of trouble to get its sets and periodicals made complete.

(ii.) The Director is usually a member of various foreign scientific societies, and as such receives their publications. These go to the library.

(iii.) A certain number are obtained in exchange for the "Kew Bulletin."

(iv.) Others are received by the Bentham Trustees in exchange for the "Icones Plantarum," and these are presented by them to the library.

(v.) The remainder, not obtainable through any of these channels, are purchased.

ADDENDA.

The two following documents alluded to in the foregoing reply have been supplied by the Public Record Office with the sanction of H.M. Treasury, and H.M. Office of Works respectively.

ADDENDUM A.—Letter from the Commissioners of Woods and Forests (Lord Duncannon, Sir B. C. Stephenson, and Mr. A. Milne) to the Lords Commissioners of H.M. Treasury.

[COPY.]

Office of Woods, &c., 24th April, 1839.

My Lords,—We received with Mr. Spearman's letter, dated 28th April, 1838, the report of a Committee appointed by your Lordships to enquire into the management, superintendence, and expenditure of the several Royal Gardens, together with the report of Dr. Lindley and other accompanying papers, and being desired by your Lordships to consider the various suggestions of the Committee, and to communicate with your Lordships our opinion, so far as these suggestions concern matters connected with this Department, we now beg leave to bring under your Lordships' attention so much of the report of the Committee as relates to the Royal Botanic Garden at Kew, and the separate report of Dr. Lindley on that garden.

It appears from Dr. Lindley's report that the Royal Botanic Garden occupies about fifteen acres, that it contains many fine exotic trees and shrubs, a small collection of herbaceous plants, numerous specimens of grasses, ten different stoves, and greenhouses built at different times as occasions required, and crowded together without plan or arrangement, all heated by different fires, producing a quantity of soot, from which great inconvenience is experienced; that these houses contain a great variety of rare and valuable tropical plants, in excellent health, clean, and well attended to; that besides the houses above mentioned there is in the pleasure grounds a fine Old Orangery filled with orange trees and other plants of great size and value, and also a new architectural greenhouse, the building of which had but lately been completed; and that, as regards the cultivation of the whole, it does credit to those who have had the charge of the garden, considering the crowded state of the houses, and the inadequate funds allowed for its support.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

From these last-mentioned causes, and the present very insufficient extent of the garden as a national institution for the encouragement and extension of botanical science, it does not now appear to fulfil the objects for which it was established; neither does it seem to be useful as a private Royal garden, being only resorted to for supplies of flowers and plants on occasions of great entertainments at the Royal Palaces.

Of late years the means of maintaining this garden appear to have been considerably reduced, one of two collectors sent abroad in 1814 for collecting seeds and plants and communicating with similar establishments in other countries, having been recalled in 1823, and the other in 1830. Up to the latter period a portion of the expenses is stated to have been defrayed by issues of money under the immediate authority of your Lordships' Board, but more recently we believe that the whole expense of managing and cultivating the garden has been chargeable in the Lord Steward's Department, upon which it has been a heavy burden without any adequate return, and with which establishment the garden in its present state appears to have little or no connection.

The average amount of that charge paid by the Lord Steward is stated to have been about £2,500, and there has been the additional expense in this Department of keeping up the building, green and hothouses, walls, &c., amounting on an average to from £1,000 to £1,200 a year, exclusive of the cost of the new greenhouse, which has amounted to about £5,300.

It is stated both by the Committee and in the report of Dr. Lindley that it is useless to maintain this garden in its present state, being from its local situation unavailable as a private Royal pleasure garden, and not adapted in its extent, establishment, or arrangement for a national institution, and it is added that it does not seem to be reasonable that the present expense, much less any additional charge, should be borne by the Civil List.

To render the establishment effective as a botanic garden of science, instruction and exhibition, and supply for useful purposes (for which the present garden would form a most valuable foundation), it is reported by Dr. Lindley that it should be enlarged by at least thirty acres, which could readily be added out of the adjoining grounds of Kew, and that the original outlay in the formation of the establishment upon an adequate scale would not at the utmost exceed £20,000, and that £4,000 a year would be quite sufficient for the future maintenance of such an establishment, exclusive of repairs, additions, and alterations to the walls and buildings.

If your Lordships shall be of opinion that this establishment ought to be maintained, and placed upon a footing calculated to promote botanical science in this country, it will be necessary that provision be made by Parliament for the cost to be incurred in the first instance, and if Parliament shall be pleased to grant the necessary funds for the purpose, in addition to the current annual expenditure, the outlay of the £20,000 for the new works might be extended over a period of three or four years.

On the subject of the transfer of the garden to this department, as suggested in the report of the Committee, we beg leave to state to your Lordships that in the execution of the necessary works for the enlargement of the garden, and in the supervision of the annual expenditure for its future maintenance, the services of this establishment may be available; but your Lordships will be aware that in its scientific management, and in adapting it to useful purposes, neither this Board nor its officers can render any efficient assistance, and that such management and the control of the whole establishment will be most properly vested in trustees, to be named by Her Majesty, and to consist of persons holding high offices in the State and others at the head of institutions in the Metropolis for education and science, as suggested in the report of the Committee.

We are, my Lords,
Your Lordships' very humble servants,

(Signed) DUNCANNON,
B. C. STEPHENSON,
A. MILNE.

The Right Hon.
The Lords Commissioners
of Her Majesty's Treasury.

Sir W. T. Thiselton Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

ADDENDUM B.—Memorandum on the Banksian Herbarium, by Sir William Thiselton-Dyer, with correspondence between the Office of Works and the principal Probate Registry, enclosing copies of the two codicils to the will of the Right Honourable Sir Joseph Banks, Baronet, concerning the testamentary disposition of his botanic collections, and a letter from Sir Joseph Hooker respecting the collection of drawings by Francis Bauer, alluded to in the said codicils.

[COPY.]

PRINCIPAL PROBATE REGISTRY TO OFFICE OF WORKS.

Principal Probate Registry,
Somerset House, London, W.C.
January 20th, 1899.

Sir,—I am desired by the Senior Registrar to acknowledge the receipt of your letter of yesterday's date, and to say that the will of Sir Joseph Banks does not in any way relate to the disposal of his scientific collections and library, but that the two codicils, a copy of which is enclosed herewith, will probably give all the information which Mr. Akers-Douglas desires.

I am, etc.,
(Signed) B. D. ADAMS.

H. J. Hapgood, Esq.

EXTRACTED from the Principal Registry of the Probate, Divorce and Admiralty Division of the High Court of Justice, in the Prerogative Court of Canterbury.

The following is a copy of two codicils to the will of the Right Honorable Banks deceased:—

This is a codicil to the last will and testament of me, the Right Honorable Sir Joseph Banks, of Spring Grove, near Heston, in the County of Middlesex, and of Kings, otherwise Soho Square, in the same County, Baronet, one of His Majesty's Most Honorable Privy Council, Knight Grand Cross of the Most Honorable Military Order of the Bath, and President of the Royal Society, which will is dated the seventh day of January instant. Where as I am seized of, and entitled to, the leases of certain farms and lands held for lives and years; and I have not by my said will provided any fund for renewing the same. Now, it is my will, and I hereby expressly direct that the same leases shall be renewed from time to time during the life of my dear wife, Dame Dorothea Banks; and that the fines, fees, and expences necessary for that purpose shall be borne and paid out of the rents of my estates in the County of Lincoln, and that the amount of such fines, fees, and expences shall remain, and be a charge on the inheritance of the same estates, so as to secure to the legal personal representative of my said dear wife the repayment of a due proportion of such fines, fees and expences, with legal interest, upon a calculation as between a tenant for life, renewing at her own expence and the persons having the absolute interest in such renewals, or in case my said wife shall make any such renewals out of her own monies that then a proportion of the amount thereof according to such calculation as aforesaid, with interest, shall in like manner remain a charge on the inheritance of my said estates, I give and bequeath unto my indefatigable and intelligent Librarian, Robert Brown, Esq., an annuity of two hundred pounds, payable quarterly, to commence from my decease, and to continue during his life. I also give to the said Robert Brown the use and enjoyment during his life of my library, herbarium, manuscripts, drawings, copper-plates engraved, and everything else that is contained in my collections, usually kept in the back buildings of my house in Kings, otherwise Soho Square, and fronting on Dean Street, impeachable for wilful waste only, and after his decease then I give and bequeath the same to the Trustees for the time being of the British Museum, or if it shall be the desire of the said Trustees and the said Robert Brown, shall consent to have the same removed to the British Museum in his life time, he shall be at liberty to do so, such consent to be testified in writing, and the said Robert Brown to be provided to his satisfaction with the proper means of access thereto for himself and his friends; and it is my will, and I hereby declare that the aforesaid bequests in favour of the said Robert Brown are upon the express condition that he continue to use my library as his chief place of study in the same manner as he now does. And that he assists the Superintendent of the Royal Botanic Gardens at Kew as he also now does, and continues to reside at London. and does not undertake any new charge that may occupy his time. I give and bequeath my leasehold house in Kings, otherwise Soho Square, in which I now reside, with the appurtenances to my said dear wife during her life, or so long as she shall choose to reside therein, and the household goods and furniture therein of every description I give to her absolutely, and after her decease, or her giving up possession of the house, then I give and bequeath the same unto the said Robert Brown for his own absolute use and benefit, but subject to the condition hereinbefore contained. And it is my will, that so long as my said wife shall continue to inhabit the said house she shall supply the said Robert Brown with firing, candles, cleansing, attendance of servants, and such other easements as the library now receives from the other part of the house. I give and bequeath unto Mr. Frederic Bauer of Kew Green, who has been employed by me as a draughtsman for thirty years, one annuity of three hundred pounds, payable quarterly, to commence from my decease, and to continue during his natural life, or until he shall have been admitted into the service of any other person. And it is my will, and I hereby declare that the said annuity is given to the said Frederic Bauer upon condition that he continues to reside on Kew Green, and employ himself in making drawings of plants that flower in the collection at Kew in the same manner as he has hitherto done, and the drawings which he shall so make be added to the collection now in his hands, and which revert to me or to my representatives at the time of his death, as will appear by a paper in my possession, written and signed by the said Frederic Bauer. But as it is difficult to foresee and provide for all events that may happen, it is my wish that if any doubts should arise as to my meaning in the conditions before imposed on the said Robert Brown and Frederic Bauer, the same shall at all times be construed in a manner so as to be most favourable to them. I give and bequeath unto Charles Joseph Briscoe, Esq., of the Stamp Office one annuity of two hundred pounds, payable quarterly, to commence from my decease, and to continue during his natural life, or until he shall have obtained an increase of salary, so as to make up his income to one thousand pounds a year, without any aid from such annuity. And I hereby charge all the said annuities, and also the annuities given by my said will, to my servant John Phillips, on all my estates in the said County of Lincoln, in exoneration of my personal estate. And I in like manner charge on my said estates the duties, which shall be payable to Government in respect of the said annuities, it being my intention that the several annuitants shall receive their annuities in full, and without any deduction whatsoever. And it is my will and intention that my manors, farms and lands of Fulstow and Marsh Chapel shall contribute their proportion to the said annuities and duties notwithstanding I have by deed settled the same manors, farms and lands on the Honorable James Hamilton Stanhope, and his heirs. I give and bequeath the use and occupation of my cottage and garden at Spring Grove, adjoining the Bone Mill, to my said servant, John Phillips, during his life, and after his decease to his wife during her life as a residence for them. And in all other respects I hereby ratify and confirm my said will, in witness whereof I, the said Sir Joseph Banks, the testator, have to two parts of this codicil to my last will and testament contained in four sheets of paper, each set my hand and seal (that is to say) to the first three sheets hereof set my hand, and to this fourth and last sheet my hand and seal this twenty-first day of January in the year of our Lord one thousand eight hundred and twenty.

JOSEPH BANKS (L.S.).—Signed, sealed, published and declared by the said Sir Joseph Banks, the testator, as and for a codicil to his last will and testament, in the presence of us, who in his presence, at his request, and in the presence of each other, have hereunto subscribed our names as witnesses—Henry Bateman, Lincoln's Inn; William Hepburn, Edwd. John Horton, Clerks to Messrs Bateman and Jones.

This is a further and second codicil to the last will and testament of me, the Right Honorable Sir Joseph Banks, of Spring Grove, in the parish of Heston, in the county of Middlesex, and of Kings, otherwise Soho Square, in the same county, Baronet, one of His Majesty's most Honorable Privy Council, Knight Grand Cross of the most Honorable Military Order of the Bath, and President of the Royal Society, which will is dated the seventh day of January last. With every feeling of that dutiful homage and humble attention justly due from a loyal

subject to a most gracious Sovereign, I do hereby give and bequeath to His Majesty for the use of the establishment of the Royal Botanic Gardens of Kew all those drawings and sketches of plants that have grown in the said gardens and have been made at my costs and charges by Mr. Frederic Bauer, of Kew Green, and are now deposited in his custody. Deeply impressed by an opinion which I still continue to hold and believe to be founded in truth, that the establishment of a botanic garden cannot be compleat unless a resident draughtsman to be constantly employed in making sketches and finished drawings of all new plants that perfect their flowers or fruits in it be a part thereof, I long ago determined to fix such a person at Kew and maintain him at my own expense, and I accordingly engaged Mr. Frederic Bauer, who has now filled that station for several years, and whose collection of drawings and sketches will, I trust, prove a valuable addition to the important science of natural history. I did this under a hope amounting almost to an expectation that the truth of my opinion would in due time become manifest, and that the charge of maintaining Mr. Bauer would then be transferred from me and placed on the establishment of the Garden. This pleasing hope is still warmly cherished in my bosom, and receives ample support from the well-known and often experienced love of science which makes a part of the character of our beloved King. In case, however, of its being deemed inexpedient by His Majesty's advisers to make this small addition to the Royal Establishment of the Gardens, it is my will, and I hereby in confirmation of the codicil to the said will direct that my heirs or the persons in whom under my will my Lincolnshire estate shall in succession become vested as long as they continue to receive the rents and profits thereof, pay to Mr. Bauer annually in equal quarterly payments the sum of three hundred pounds during the term of his natural life, provided that he continues to make drawings and sketches as he has hitherto done as long as his health will permit, and deposits the same in the hands of William Townshend Aiton, Esquire, and his successors, to be added to those before by me bequeathed to the Royal Establishment of the Botanic Gardens at Kew. And it is my will and desire that my dear relative, Sir Edward Knatchbull, Baronet, be requested to look over all my boxes of papers and other things deposited in my room and the passage room next to it in my house in Soho Square, and that he do burn all papers in my handwriting except such as have reference to any part of my estate or to the County of Lincoln, and that he do deliver all such other written or printed papers as shall be found in any of them to the persons to whom he thinks they will be most acceptable. The papers respecting the Royal Society and the affairs thereof to the Royal Society, those respecting the Mint or Coinage to the Mint, and that all papers and letters relative to the County of Lincoln be sent to Revesby Abbey and be deposited in the evidence room there. My foreign correspondence bound and unbound to be sent to the British Museum, and all the other things in the said rooms to be disposed of as the said Sir Edward Knatchbull shall think best. And I hereby ratify and confirm my said will and codicil in witness whereof I the said Sir Joseph Banks have to this further and second codicil (and to a duplicate thereof) to my last will and testament contained in two sheets of paper set my hand and seal this seventh day of March One thousand eight hundred and twenty. Jos. Banks (LS). Signed, sealed, published and declared by the said Sir Joseph Banks as and for a further and second codicil to his last will and testament in the presence of us who have subscribed our names as witnesses in his presence and of each other—Henry Bateman, Lincoln's Inn; William Hepburn, Edwd. J. Horton, Clerks to Messrs. Bateman and Jones, Lincoln's Inn.

Proved at London with two codicils 19th September, 1820, before the Worshipful Stephen Lushington, Dr. of Laws and Surrogate, by the Oaths of the Honble. James Hamilton Stanhope, Sir Henry Hawley, Baronet, and Sir Edward Knatchbull, Bart., three of the executors to whom Admon. was granted being first sworn duly to administer power reserved to Dame Dorothea Banks, widow, the relict the other executor.

[COPY.]

Sir J. D. Hooker to Royal Gardens, Kew.

The Camp, Sunningdale,
January 3, 1899.

My Dear Dyer,—I have been endeavouring to trace the history of Bauer's drawings of Kew plants. I think that there can be no doubt that they were, after Banks's death, transmitted as executed to the British Museum, where, according to a statement in the obituary notice of Bauer's life (Proc. Linn. Soc. i. [1841], 102) they are now.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900

With regard to any other drawings deposited at Kew, they must have formed part of the herbarium which accumulated at Kew under the direction of the two Aitons. These, my father informed me in 1843, were (previous to his appointment) under instructions from Mr. Brown (keeper of the Botanical Department, B.M.), transferred by Mr. Aiton to the B.M. It is not probable that any drawings by Bauer were amongst them.

You are probably aware that many drawings by Bauer were sold after his death.

Bauer must have regarded some of his work as private property, if I am right in supposing that he lent the drawings of orchids to Lindley for publication by the latter under the title of "Illustrations of Orchidaceous Plants," 1830-1838.

Ever affectionately yours,
(Signed) Jos. D. HOOKER.

[COPY.]

BANKSIAN HERBARIUM.

Secretary,—I submit the following observations on these interesting papers.

The botanical (living) collections at Kew were commenced in the middle of the last century by the Princess Dowager of Wales.

Whatever we may think of George III. as a statesman, it cannot be doubted that he was a man of wide culture and scientific tastes. He was also devoted to the memory of his mother.

Under George III. the botanical work of Kew was carried on with extraordinary vigour. The moving spirit was Sir Joseph Banks, who was a personal friend of the King, a Privy Councillor, and President of the Royal Society.

It is evident from such of the Brabourne papers as are available (I have addressed you separately on this matter) that under Sir Joseph Banks the botanical work of Kew was carried on very much on its present lines. He not merely had the ear of the King, but the confidence of Ministers. Expeditions were despatched for the scientific exploration of the southern hemisphere, a long series of collectors were sent out, and botanical enterprise was vigorously pushed in the West Indies. Banks himself accompanied Captain Cook in one of his voyages, and he promoted the well-known voyage of the "Bounty," which incidentally led to the foundation of the great Dutch garden at Buitenzorg in Java.

Banks was allowed to retain all the fruits of this work, and in this way the Banksian Herbarium was built up. There can be no doubt that it was virtually public property, and it was probably so regarded by Banks. It is believed that the present herbarium house was purchased by the Crown for its reception, though I can adduce no documentary evidence of the fact.

In 1820 things came to a crisis. The King was dying. It was probably seen that his successor in no way shared his father's tastes. There was no probability that he would maintain the scientific character of Kew, which still remained the private property of the Crown. Banks's own health was failing. By the first codicil he therefore bequeathed his herbarium to the British Museum. This was probably the best thing he could do under the circumstances.

It is, however, important to observe that Banks expressly stipulates that his herbarium is to continue to be available for the service of Kew, and it is provided that its keeper, the well-known botanist, Robert Brown, shall continue to "assist" the superintendent as he had previously done. The clear inference is that at that time the Banksian herbarium performed the same functions towards the establishment that our own herbarium does now.

Banks and the King both died in 1820. George IV. was more interested in Brighton than in Kew. William IV. devoted some attention to Kew, but not in a scientific direction. Public interest was, however, still maintained. The proposal to disestablish it on the accession of the Queen was defeated. Kew received a fresh start under a new Director, Sir W. Hooker.

He started with a complete *tabula rasa*. Not a single book, paper, or specimen relating to the previous work

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

of the establishment was handed over to him. How this came about I will endeavour to explain.

Up to 1841 Kew, although performing public functions, was technically a private establishment. Banks was a sort of "go-between" the scientific world and the Government. He retained all the documents. These in the second codicil he left to Sir Edward Knatchbull to dispose of. His purely scientific correspondence he bequeathed to the British Museum. That relating to the affairs of the Mint to it. But he made no specific directions as to the destination of his Colonial and Kew papers. This was probably because at the time there was no obvious recipient.

The younger Aiton, who was retired on the appointment of Sir William Hooker, made a clean sweep of all the local documents and records.

According to information derived from Sir Joseph Hooker there was a small but valuable herbarium of introduced exotic plants which had been cultivated at Kew. The loss of this has often been deplored. It was apparently transferred to the British Museum by Robert Brown.

The second codicil provides for the continuation of the services of a draughtsman, Frederic Bauer, to make "sketches and finished drawings of all new plants." These were to be deposited "in the hands of William Townshend Aiton, Esquire, *and his successors* to be added to those before by me bequeathed to the Royal establishment of the Botanic Garden at Kew." None of these are here now, and it appears from a statement in the Proceedings of the Linnean Society for May 24, 1841, p. 102, that they "are now preserved in the British Museum." It seems clear that they are the property of this establishment.

It seems pretty clear from this recital that the Botanical Department of the British Museum owes its existence to Kew, of which it is in fact a mere accidental offshoot. It is at any rate largely composed of collections made by men sent out from Kew. W. T. T. D.

P.S.—My impression is that Banks foresaw what Kew was destined to be, but the circumstances of the day were adverse to the realisation of his plans.

9/2/99. W. T. T. D.

ADDENDUM C.—Copy of a draft of a letter in the hand-writing of George Bentham, Esq., C.M.G., from internal evidence addressed to the Right Hon. Edward Henry, 15th Earl of Derby, and written some time in the week preceding the 29th July, 1872.

[COPY.]

My Lord,—Observing that your Lordship has given notice that you intend to call the attention of the House of Lords to the case of Dr. Hooker on Monday next, I trust that you will excuse the following observations on the part of one who apart from all party feeling in science as politics, has devoted a long life to the cause of natural science, who has for the last fifty years been thoroughly acquainted with the working of continental national botanical institutions, who, himself, took some part in the establishment of the one at Kew, which has now outrivalled all the continental ones, who has so long enjoyed the intimacy of the most eminent foreign botanists as to be fully aware of the appreciation of our success in this department, and who has maintained, and has in this country had constant intercourse with the cultivators of natural science, having been honoured with the Presidency of the principal Natural History Society for the last eleven years. The first five or six years of my botanical life were spent on the Continent, and I had there the opportunity of witnessing the benefits to pure science, as well as to its practical application to industrial medical and other social purposes resulting from such national or government establishments as the Jardin des Plantes, at Paris, only not subject to the vacillations and uncertainties of those which depend only on private enterprise or voluntary support, and after my return home I could not but feel deeply our absolute deficiency in this respect, the need for such a national establishment becoming daily more apparent with the general progress of our industry, a need which could be by no means supplied by the most flourishing of our private societies, such as the Linnean and Horticultural. The opportunity long watched for came at last. In 1840 a communication from one of the branches of the then Government reached me as Honorary Secretary of the Horticultural Society, through Dr. Lindley, then Assistant Secretary of the Society, stating that it was intended to break up Kew Gardens (then about to be handed over from the private domain of the Sovereign), and offering the collections it contained to the Horticultural Society. Indignant at such a proposal Dr. Lindley and myself applied to our President, the late Duke of Devonshire, who at once proceeded to the Prime Minister, Lord Melbourne, and had the less difficulty in convincing him of the disgrace that would follow such an open discouragement of science, and of the advantages which would ensue from the converting Kew Gardens into a National Institution, as Lord Melbourne himself had had no part in the original proposal. Upon this opening, Sir W. Hooker, supported by his friend the Duke of Bedford and others, succeeded in the foundation of such a national centre for the study and application of botanical science as he had long in contemplation, and of which he now accepted the direction at a considerable sacrifice of income. The result fully answered our expectations. Kew, under his able management, rapidly rose into an eminence fully acknowledged by my friends abroad, and to a practical usefulness equally admitted at home. Observing that several successive Governments had seen the advantage of leaving the practical details of the management in the hands of so eminently qualified a director, and believing that such a management responsible to the Government of the country, and through them to the nation at large, was the best security for the permanence of the establishment, more especially as I foresaw a long continuance of the same management in the prospect of its continuance after Sir William's death in the person of his equally eminent son, I thought I could not do better than offer for its use my own collections and botanical library. The acceptance of these collections was followed up by various important gifts of a similar description, all useful supplements to that unrivalled private herbarium of Sir William, which he allowed the use of to science at large.

Thirteen years later, having seen that successive Governments had equally appreciated the advantages of submitting all the practical, and as it is were, professional details of the management to the advice and control of so eminently qualified a director, and feeling confident that future Governments would find it their duty to follow a similar course so long as they were able to secure the services of men of equal competence, I was induced in 1854 to offer my own botanical collections, accumulated during 35 years, together with a working botanical library of above 1,000 volumes, to the national establishment of Kew, as the one which gave the greatest security for its being maintained, extended, and applied to the use of science. It was hoped at the same time that this would be a nucleus which would attract other similar donations, and that ultimately the whole might become amalgamated with the still more important collections of Sir W. Hooker as one great national Museum, Herbarium, and Library, forming an indispensable adjunct to the Gardens themseles, a hope which the subsequent history of Kew up to recent events has fully realised.

After eleven more years (in 1865) Sir W. Hooker died, and during the unexpected delay that occurred in the appointment of his successor I received through a friend a private communication to the purport that some members of the Government had a strong objection to anything that had the appearance of a hereditary claim to appointment under Government, and asking me whether I would accept this one if offered to me. To this I at once replied that independently of the claims which Dr. Hooker's long training, and the practical part he had for some years taken in the management, might have given him, his scientific eminence, superior even to that of his father, his administrative abilities, and his social qualifications were so generally acknowledged that the superseding him on this occasion would be received with the greatest disfavour, and would be seriously detrimental to the establishment, and that it was thus my great desire to promote his nomination by every means in my power. Dr. Hooker was approached; indeed, I believe that there was fortunately no real wish to supersede him, and under his direction the yearly increasing efficiency and prosperity of the institution confided to his care has been evident to all who have had communication with it, and fully acknowledged by all my foreign friends. I could not but feel tempted to congratulate myself on having from the first contributed in some degree towards the securing it for the nation.

Under these circumstances your Lordship will readily understand the painful feelings with which I have witnessed the petty annoyances and vexations to which Dr. Hooker has been subject for the last twelvemonth, which

are not only peculiarly galling to anyone having the feelings of a gentleman, but which are seriously working to the detriment of the establishment, and if continued will degrade it from its lofty position, disgrace it in the eyes of the scientific world, and entirely defeat the objects of those who have since its foundation so liberally contributed to it. Your Lordship is already in possession of the facts of the case in the Memorial to the First Lord of the Treasury, to which my signature is amongst others attached, but, as owing to my having always kept aloof from the world of politics my name must be unknown to you, I have ventured thus to lay before you the grounds upon which I conceive myself to have been placed in a position peculiarly adapted to the appreciation of the merits of the case, and to justify me in protesting to the best of my power against proceedings tending to the ruin of an establishment I have taken so much interest in.

1266. (*Chairman.*) Perhaps one ought to have stated, in transmitting those questions to you, that we gave you full liberty to put the answers in any form that seemed to you most desirable?—There has been a little difficulty on the part of my Board in quite grasping the object of the inquiry, and some of the questions seemed to me to be ambiguous, and, of course, without some explanatory memorandum on the part of the Committee, it was rather difficult to conjecture exactly what kind of information was desired. I have done the best, and there it is. Of course, I have submitted a copy to the Office of Works to let them see what I have said, and this document is therefore now fully official.

1267. I gather from that memorandum that the Royal Gardens at Kew serve various purposes. On the one hand, we may regard them as a great instrument for botanical research, research in scientific botany; on the other hand, they are a great instrument for economic botany for the Empire, and especially for the Colonies, India, and our other possessions; and then they are an instrument of high scientific, horticultural education; while at the same time they are an instrument of popular instruction as well as recreation?—Yes. I think that is a kind of summary. I may say that, strictly speaking, our proper title is, "Royal Botanic Gardens." I think that is perhaps rather important, because the dropping out of the word "Botanic" has led Ministers and others probably to think we are more of the nature of a park than is actually the case. In all those matters you have mentioned, we have simply carried out what seemed to be the intention of Parliament in the document which I believe is before the Committee, and which was the result of a report of a Departmental Committee appointed in 1838. That I think has generally been taken as the programme of the operations of the establishment.

1268. "The Royal Botanic Gardens" is your proper title?—Yes.

1269. I gather also from the memorandum that the herbarium is at it were the scene of all your varied activity?—Certainly.

1270. Both for botanic research, economic botany, horticulture, and the general maintenance of the Gardens?—Yes.

1271. And that if that herbarium were removed or even if it were replaced by anything inferior, to use your own words in your introductory letter, you would be "paralysed"?—Not merely paralysed, but any step of that kind would, in my opinion, simply mean the disestablishment of the institution. Of course, as Her Majesty's Government has created Kew for the purposes which they defined, they may also, if they think proper, abolish it. That is a political matter.

1272. The question was rather directed to ascertain whether the herbarium, as part of the Royal Botanic Gardens, was, so to speak——?—This is rather a difficulty I have met; you cannot dissociate the herbarium, for instance, from the library, museums, and the laboratory; in fact, Kew is a sort of organic whole, and you cannot take away one part without impairing the efficiency of all the rest.

1273. That is your opinion, and that is just what we wanted you to lay definitely before us?—It is exactly analogous to the case of the Observatory at Greenwich. You might have the Astronomer Royal here, and ask him if he could do his work without telescopes.

1274. We have reason to believe that your herbarium differs in some respects in composition from that at the British Museum. The British Museum possess certain collections which are not at present in your collection, so that from that point of view your collection is not complete for the purpose of research?—That expression does not convey very much meaning to my mind. No herbarium can be complete under terrestrial conditions. Our herbarium, of course, differs from that of the British Museum, just as it differs from that of Paris or Berlin, or Petersburg. Every herbarium, as every picture gallery, contains something that others have not. The idea of a complete herbarium is purely a transcendental one. The difference in that respect between the Kew herbarium and the herbarium of the Botanical Department of the British Museum is that the collections relating to the British possessions in different parts of the world which were formed in the last century and the beginning of this are at South Kensington and not at Kew. In that sense, as representing the result of botanical research throughout the Empire, certainly the Kew herbarium is not complete, because it lacks the Banksian herbarium, and all the plants collected in the Southern Hemisphere during Cook's voyages and other great expeditions.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S. — 29 Nov. 1900.

1275. So that it results frequently, I suppose, that botanists who have carried on their investigation at Kew, in order, as I might say, to complete their investigations as far as possible, subsequently consult the British Museum, or those that have consulted the British Museum come to you?—I presume so. I have not really very much knowledge on the subject. A person who is writing a monograph will consult all the material that he can get hold of. Some men visit every herbarium in Europe. It entirely depends on what part of the world the man is studying. If a man is engaged in botanical research with regard to our Indian possessions, I should be very much surprised to hear that he had found anything important at South Kensington that we had not got. If he wanted to study the collections of the Pacific, or of Australia, made in the last century, and which were published by Robert Brown, of course he would have to go to the British Museum. I do not think you can generalise as to the use to which the two establishments are put in that respect.

1276. Are you of opinion that the incompleteness to which you have just referred, incompleteness resulting from certain collections being at the British Museum, affects the usefulness of your own herbarium in your own work?—I cannot accept the term "incompleteness."

1277. May I put it in this way. You have stated that there are collections referring to British possessions which are at the British Museum, and are not at Kew?—I must explain a little more. I do not believe the British Museum has anything that is not at least represented at Kew. The value of the collections at the British Museum which are of interest to us, is based on their historical character. You must have had plenty of technical evidence on this point from other witnesses. When a botanist is engaged, say, in a scientific research, he wishes to see the actual specimens which were used and worked upon by the persons who first described a particular plant. We may have a cabinet full of that plant at Kew, but that does not exonerate an exact monographer from examining what is called the type material. Therefore, the use of the word "complete" or "incomplete" without very careful definition, would convey to the Committee an entirely erroneous opinion. I have no hesitation in saying that the Kew herbarium is the most complete in the world—the most complete in existence. It would not be materially supplemented from the South Kensington collection, except from a historical point of view.

1278. That is just the information I wish to elicit from you, because I suppose that that point of view, and that which results from any investigation from the historic point of view, does not affect your own administration of the gardens?—Personally, I am aware of the existence of a herbarium at South Kensington, but I cannot say I ever give it a thought as regards the conduct of my own establishment.

1279. So far as the internal activity of your own establishment is concerned that would not be greatly assisted by the transference of the herbarium at present at the British Museum, to the Royal Botanic Gardens, Kew?—Certainly not.

1280. Are you of opinion that the science of botany in general—because now we may leave out the work carried on at Kew—gains any advantages, or does it suffer disadvantages, from the existence and maintenance of the collections at the British Museum in their

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

present form, together with the maintenance of your own at Kew?—I really have not considered the matter. I consider the resources of Kew are practically ample for every branch of botanical research, and I do not see that we are hampered in any way by what is going on at South Kensington.

1281. It has been represented to us that in the interests especially of botanical research, it would be a great advantage to have the two collections in one spot?—You must remember I am an official administrating an establishment; I cannot speak for persons engaged in research—you must hear their story. You have commenced your examination, as I understand, with regard to my official functions, and I am only answering in regard to those. I am not aware—it does not come officially before me—that the fact of the existence of a Botanical Department at South Kensington is an impediment to the work as far as I know it, but you must understand I am not speaking as a researcher. Occasionally I find it necessary to send one of my staff to South Kensington to verify some particular fact, but I have also to send occasionally to Paris or to Berlin. I cannot say that is a working disadvantage. As I have explained, you cannot practically concentrate in one place all the material available for one particular kind of research—it is impossible.

1282. You do not attach any great importance to any inconvenience which may result from your having to send your officials to the British Museum to consult the specimens?—Gloucester Road Station and Kew Gardens Station are only 22 minutes apart, and I can send a man up in the course of a morning, and the British Museum, when they think proper, can in the same way come to us.

1283. The question which I addressed to you with regard to the influence upon botanical science in general was under the idea that in your position you had an opportunity of observing botanical work, and although the answer would not be an official one, it would be one which we could take from you?—There is not the smallest doubt, of course, that if a man is engaged, as a large number of people are engaged, in carrying on independent research at Kew, it would be an advantage to have all the material in one place. But it would be equally convenient to have the collections from Paris at Kew also; there is no doubt about that. People who are working do not want to spend their time in travelling.

1284. It has been represented to us by various authorities that it would be desirable in the interests of botanical science to amalgamate the general herbarium at the British Museum with that at Kew?—It is always desirable to have available material concentrated in one place.

1285. Does that amalgamation present any objections to you as the Director of the Royal Gardens at Kew?—It depends on what you mean by amalgamation. I can only deal with the thing as an administrator, and if you will assist me by explaining what you mean, I may be able to answer your question.

1286. There are three methods of amalgamation suggested to us, first, complete incorporation of the two herbaria?—I think I had better explain my view about that at once. I have stated in this memorandum that the herbarium at South Kensington, as far as I know it, and the herbarium at Kew, are administered on entirely different principles, and that if there were no physical difficulties, which alone I consider make the thing impracticable, I should certainly absolutely decline to amalgamate the two herbaria, as wrong in principle. The Kew herbarium has always been administered as an instrument of research. A mere accumulation is a thing that my predecessors and I have always set our face against. The material is always selected with the view to a definite object. At the British Museum they amass material; I do not want to criticise proceedings entirely within their right, but I consider that this has been done without very responsible consideration of the object in view. I mean that the general tradition which I think runs all through the British Museum is accumulation. That is not our principle. Therefore to amalgamate the two herbaria which have been brought together from a different point of view, would simply paralyse us by inundating us with an enormous bulk of undigested material, and would throw our machine absolutely out of gear. It would be far better to leave things as they are than to attempt anything of that sort.

1287. Including the weeding out of what seemed undesirable to keep?—Who is to weed out? Weeding can only be done by instructed people, and it would take a lifetime to critically sort from the accumulations they have at South Kensington what would be valuable, and what would not. When the thing is done it would not produce a herbarium better than that at Kew, but simply produce a selected duplicate. The only possible mode in which the problem can be approached is that of collocation, placing the two things side by side.

1288. Do you think that on the whole would be an advantage to Kew, or do you think it would be a disadvantage?—I think it would be no advantage to Kew, but it would be an advantage to men working at Kew.

1289. But it would be neither an advantage nor a disadvantage to the general administration of the Royal Botanic Gardens?—I suppose it would impose a great deal more responsibility on my shoulders as Director, and I do not know that there would be any compensating advantage as far as I see.

1290. The advantage would be confined to botanical research?—Yes, certainly. You must remember that the object of Kew is not merely the administration of the establishment; it is also to promote botanical research throughout the country—that was the object with which Mr. Bentham and other persons made large gifts to Kew.

1291. You purchase collections from time to time for the herbarium?—Constantly. That is not the way, however, in which Kew has been mainly built up. Kew has been mainly built up by correspondents, and by the assistance that we get. Our grant for purchases for the herbarium and museums only amounts to £200 a year, which is a very small sum indeed. I have no official knowledge on the subject, but I imagine the British Museum has much larger sums.

1292. When a person is going out on an expedition does he ever offer to collect for you on certain terms?—You cannot run a place like Kew without taking an enormous amount of individual trouble. Things will not drop into your mouth merely by keeping it open. If we hear of anybody going to an interesting part of the world we endeavour to get into personal relations with him to encourage him and instruct him how to collect.

1293. And you pay him?—Usually we supply him with a collecting outfit. When the collections come back we name them, and assist in their publication, and, of course, in every possible way stimulate new investigation. No money could do that.

1294. But some money is spent; a small amount?—There are a certain number of people in America, Germany, and elsewhere who start small expeditions on their own account, and they send round to all the large herbaria a circular saying that they are going to, we will say, the Cilician Taurus, or some interesting place, and ask us if we will subscribe to that collection. Every case is dealt with on its own merits, and if the thing seems promising we undertake to subscribe, and in that way we buy collections. That is a considerable item. But I consider that the mass of new material has been acquired by private encouragement. For instance, I may take the case of Dr. Henry, who is an officer of the Imperial Maritime Customs under Sir Robert Hart. He was perfectly unknown to me, but he wrote to me a letter on some trivial botanical point, and I answered it, and a correspondence sprung up. Dr. Henry has been one of the most successful botanical collectors of modern times; I suppose he has collected some 8,000 species in Western China. He told me it was simply due to his surprise that I courteously answered a letter from a stranger. No love of money would tempt Dr. Henry to do what he has done out of love of science.

1295. I asked the question, because we have evidence that the British Museum also acquires collections sometimes by purchase. Do you think that there has been any disadvantage through competition arising between the Royal Botanic Gardens and the British Museum with regard to the expenditure of money for the purpose of collections?—Yes. There is a certain amount of competition now and then. Of course they naturally want to polish their own counter at South Kensington, and I think they are a little sharp sometimes in snapping up things.

1296. But from the point of view of the public purse, that is insignificant?—I should think so. Of course, I do not know, as I have no facts to go upon. I have drawn the attention of the Committee to one question that came

under my notice—that is, the purchase of the Bescherelle collection, which was offered to me. I went very carefully into it, and came to the conclusion that at the price asked it was not a purchase that ought to be made out of public funds. When I was over in Paris the other day I heard that the British Museum had bought it. I do not know whether you can call that competition—that is their affair. It certainly seems to me rather striking that you should have two establishments with the same object, one making a purchase and the other declining. It is a matter more for the Treasury than for me.

1297. You say that the housing of your collection is at present insufficient?—Absolutely.

1298. And you have urgent need for extension?—Yes. Of course, I could only as an administrator bring under Her Majesty's Government the state of matters. The matter was pressed very strongly on the Treasury by the First Commissioner; that was in January, 1898. The Treasury postponed consideration, and then they raised a question which I confess is perfectly unintelligible to me. You will find it on page 97 of my memorandum. You see that they say, "For the purpose of receiving more detailed consideration in the course of 1898, together with the various building questions which will arise in connection with Her Majesty's gracious surrender of her rights at Kew." That may have been intended, of course, to hang the whole thing up indefinitely, but what it meant on the face of it, I have not the ghost of a notion. Now, of course, things have come to an absolute deadlock. I suggested that you should have the keeper of the herbarium to tell his own story. Persons engaged in research at Kew are positively being hampered in their work.

1299. We learn from your memorandum that you maintain the collections at the British Museum are historically an offshoot from Kew?—That only applies to the Banksian herbarium. Of course, it does not apply to the collections made since 1880. I have known the Botanical Department of the British Museum, I suppose, for about forty years. Before 1880, when it was removed to South Kensington, it was a small affair; it was practically the Banksian herbarium, which was a herbarium kept in the same cases as in Sir Joseph Banks's house, but a historical collection of the greatest importance and interest. Then a great gallery was built at South Kensington, which, I suppose, roughly, we may put as having cost something like £150.000, and the staff of the Botanical Department, which, when I first knew it, only consisted of two persons, was very much increased, and there was an enormous expansion. The great bulk of the British Museum herbarium, as I understand, has been accumulated since 1880. What it consists of I really do not know.

1300. We had a letter laid before us from the India Office, stating that they had authorised you to make any statement on their behalf to any question in which the interests of India would be concerned in the present inquiry, and I understand that the Colonial Office regard the matter in the same way?—My official position, of course, places me in a different category to other witnesses. The official members of the Committee will be perfectly aware of what that position is. I am not authorised to give any evidence before this Committee without, of course, the explicit sanction of the Board to which I belong. I applied in the ordinary course for instruction, and to begin with I was told that this was an educational inquiry. Then that has been modified to a certain extent, and I am instructed that I may give evidence with regard to the work at South Kensington. That again is ambiguous, because I have ascertained that botanical work at South Kensington is going on at least in four institutions which I know very little about. But I am afraid that with regard to the India Office and the Colonial Office, I do not feel authorised to speak on behalf of two Secretaries of State who have given me no instructions. I have received a private communication from the India Office, saying that Lord George Hamilton wishes me to represent the India Office, but I am not an official of the India Office, and I only do work for them which they send me. I think it is their business to explain to the Committee the nature, and, if they think proper, the value of that work. It is the same with the Colonial Office. I really do not think I can speak for branches of the Government with which I am not connected.

1301. I think the view of the India Office was that they were quite content you should state your opinion as to any interest that the Indian Empire might have in the present inquiry in any way that it might affect Indian interests?—It is for the Secretary of State for India in Council to state whether he thinks the work for the last sixty years that has been done for India by Kew is work which ought to continue or not.

1302. The question before the Committee is a comparison between the collections and the work done at Kew and the British Museum. We are not concerned with the absolute value of the work at Kew, but only with a certain point in which the two collections overlap or coincide?—I must frankly tell the Committee that I altogether object to the position in which I am placed before this enquiry. In the year 1885 the Treasury requested me, without the smallest suggestion on my part, to take charge of the administration of Kew. I have administered Kew for the last fifteen years precisely on the lines on which I found it and on which it had grown up. I am not supported on this Committee by any member of my own Board, although the British Museum is represented by two of the Trustees. I cannot get any intelligible instructions from my own Board. I am asked to speak on behalf of the Colonial Office and India Office, with which I am not officially connected, and I am asked to take the whole burden of supporting the work of Kew on my own shoulders. I am only the servant of the Government to carry on work which either they approve of or they do not, and if they will not defend the institution they have committed to my charge it is really not my affair to do their work for them. Ordinarily when a Committee of this kind is appointed it is due to the fact that there has been some public complaint as to the efficiency of the establishment that is being investigated. If the Committee have any suggestions of that kind to make I shall be very happy to answer them, and very happy to supplement the memorandum I have put in by any oral information which will make anything obscure plain. But I am not really going to assume the functions of the central Government.

1303. Then I gather you are not in a position to make any statement as to how the botanical interests of India would be affected by any of the changes which have been under consideration?—Of course I have my own private view, but I do not come here to give you that. The First Commissioner suggested I should come before the Committee as a scientific expert, and of course I cannot appear except in an official capacity. I think you ought to get independent evidence. You can have Sir Charles Bernard, or even Lord George Hamilton himself. He is constantly asking my advice, and if the advice is worth anything why does he not come and say so?

1304. (*Mr. Godman.*) I did not quite understand whether you said you thought the addition of the Banksian collection and such collections as that would not be particularly desirable at Kew, or whether you thought they would be?—I am perfectly clear that it is an advantage to have the material on which you are working in one place instead of two. That is a matter of convenience.

1305. And the collection of cryptogams, which I believe is more extensive than at Kew, would also be a great advantage?—I should be very sceptical as to that. I apprehend that the collections at South Kensington may be more extensive than those at Kew in bulk. That I think is an evil. I daresay the cryptogamic collection is bigger than ours, but that is a very serious difficulty to my mind. For instance, the Bescherelle collection contained 15,000 specimens, of which I should imagine perhaps not more than 100 would be of any use to me. Having refused to have that particular collection at Kew I should not view with any satisfaction its being sent down from the British Museum, because I do not want it. I do not think that the cryptogamic collections at the British Museum, as far as I know anything about them, are in any way comparable to ours in value, although they may be larger in bulk. We have the Berkeley herbarium, one of the most valuable in the world; we have certainly the most valuable fern herbarium; and in every particular I should say our collections are far superior to those at South Kensington. I should very much doubt whether we should get much by amalgamation.

1306. But the Banksian collection and such collections would be a great advantage?—They are, of course, a part of the national archives; they are the actual plants collected when the Southern Hemisphere was first explored. They were worked upon by persons like Robert Brown, and they are authentic types which of course remain of importance for ever. Wherever they are they will always be regarded with interest and respect.

1307. Do you look upon it as a distinct advantage to have them altogether at Kew instead of in two collections

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

as they are now?—Certainly, but it is a luxury rather than a necessity. If I had been a member of this Committee, the question to consider, I should have thought, would have to be this;—that inasmuch as it is exceedingly difficult to get from Her Majesty's Government funds for scientific purposes, the question is whether the maintenance of two independent collections is so necessary as to require both to be kept up. I should look upon it as a purely administrative and financial matter.

1308. (*Sir John Kirk.*) Referring to the work you have done and are doing at Kew for the various Departments of the Government connected with our Colonies and Protectorates, I suppose it would be quite impossible for you to carry on that work if the herbarium were removed from Kew?—Absolutely.

1309. Nor could you assist the Board of Agriculture in the way you have been doing if you were deprived of the herbarium?—In 1899, at the request of the Board of Agriculture and with the sanction of the Treasury, in view of the abolition of the post of technical adviser to the Board, Kew undertook its technical work as far as it is purely botanical.

1310. (*Chairman.*) Is it worth while going into this? It is hardly germane to the inquiry, is it?—Yes, it is rather important, because it is an illustration of the mode in which the work of Kew grows. At any rate we took over the work, and that work cannot be done without our cryptogamic collections. This summer there has been a new disease in the swede, which has been the subject of research at Kew, and which at one time seemed to be likely to assume very considerable importance.

1311. (*Mr. Seymour.*) With regard to the administration of your vote, have you a free hand within the limits of your vote as to the arrangements you make at Kew yourself, or have you to get the agreement of the First Commissioner of Works?—The arrangement is rather peculiar. The arrangement is defined in a somewhat ambiguous way by a Treasury minute.

1312. (*Mr. Spring Rice.*) Do you refer to the one of July, 1872?—That is the one. As I have stated in the memorandum, there is occasionally a good deal of unnecessary friction between myself and the Office of Works, arising, I think, from the fact that my relations to the Board have never been properly defined. Practically what the Treasury said in that minute was that, with regard to science, the Director must have a free hand, but with regard to the administration he is subordinate to the Board; and that is the general principle on which I endeavour to work. Occasionally the Board will take it into its head to jib at some scientific expenditure, and then we have more or less of a row. For instance, Sir Henry Primrose disliked museums, and he used to squabble with me over museum specimens, and I did not think it was within his competence. Lord Esher has recently taken the same course, with the same result. Practically you will see the heads of administration in the memorandum.

1313. (*Mr. Seymour.*) Anything that comes within the sum that you have in the vote to spend for scientific purposes you can spend practically without consulting anybody else?—Yes. At page 89 of the memorandum you will see: "F.—Maintenance 1 and 2, General works on lawns, walks, and shrubberies, flower beds, palm stove, plant stoves and greenhouses; (a) materials, (b) labour, (c) horse and cart hire, (d) purchase and repair of implements," totalling up to £9,230. They do not interfere with me about that. Then "3, Lodges, palm houses, etc., and 4, water supply"—that is not under me at all; that is under the surveyor of the Office of Works. The Office of Works take all the work which they themselves understand out of my hands.

1314. That is the general line you go on, and you keep all that within the bounds of your estimate under the different sub-headings; you deal with scientific matters, and they deal with administrative matters?—Well, you will not call growing red geraniums scientific, but they give me practically a free hand with regard to technical matters, and they take care of the repairs of the buildings and so on.

1315. Do they do that without your asking?—I have a resident clerk of the works, and we work together. Of course, you cannot turn a gang of workmen into a houseful of valuable plants at a moment's notice. It requires some give and take, but on the whole it works now very smoothly.

1316. In a letter to Mr. Jackson you said, "It is of the deepest moment to India and the colonies that the botanical assistance which the home country can supply to them should not be impeded by defective organisation for affording it." I was going to ask you: Does that mean that at present your organisation is not sufficient to enable you to keep up with the demands made upon you?—I think it does fairly. I have nothing to complain of. What I meant there was to express a general opinion that if the present arrangements were upset that work on its present basis could not go on.

1317. That was supposing it was contemplated to take away anything at present connected with Kew?—Yes.

1318. You say in your printed statement that you are borne on the Colonial Office list?—I do not know whether I used the expression, "borne" on it. I said that the Colonial Office list included a reference which gave a sort of quasi-recognition.

1319. As you have now been officially noticed by the Colonial Office by the inclusion of an account of the establishment in the Colonial Office list, that does not imply in any way that the Colonial Office has any jurisdiction over you at all?—No, it is a quasi-official recognition; that is all. I only drew attention to it for what it was worth.

1320. A quasi-official recognition of what?—Of the utility of Kew work to the Colonial Office. You will see it on page 83 of my memorandum.

1321. (*Professor Balfour.*) Will you let me ask you a question, which is one of those I intended to ask you, on what you said just now would be the point of this inquiry, namely, do you think it is a right thing that there should be two such botanical establishments kept up at such distances to one another as Kew and the British Museum?—No, I certainly do not. But as I said, personally, I think that is a matter for the central government. An official is not like a professor. I do not think it is becoming for an official to criticise the proceedings of his masters, and I think I have said somewhere that if the Government thought fit to have a dozen botanical establishments I do not think I ought to point out any objection to that course. The mouths of officials are closed on matters of policy.

1322. (*Mr. Seymour.*) Surely if you are sent here or come here to answer questions put you by persons appointed by the Government, your mouth is open to express an opinion?—I have asked for leave to give evidence on this point and have been refused.

1323. (*Professor Balfour.*) As a botanist can you express any opinion that you cannot express as an official? Can you give any information on this subject?—I do not think so.

1324. There is one point in your statement which I do not quite understand. It has to do with furnishing of information, and you say on page 67: "This convenient mode of furnishing information is, however, often frustrated by the neglect of the Stationery Office to print sufficient copies to meet the demands of the public." How do you requisition for the publication?—I have nothing to do with it. I produce the manuscript, and the Stationery Office do what they like, and if the numbers run out of print they decline to reprint them.

1325. Do you not state the number that you think should be printed?—I have nothing to do with that.

1326. (*Mr. Spring Rice.*) Are you aware that the Stationery Office profess themselves quite ready to issue a second edition if they have reason to think there is a reasonable public demand for it?—That is a counsel of perfection.

1327. You are aware that they do so?—Yes, but I do not attach any value to the statement; I do not believe they mean to do it.

1328. Is that a statement that you wish to go on the notes?—What I should like to go on the notes is this: that I have drawn their attention repeatedly to the fact that they are not meeting the public demand, as I find by evidence addressed to me, and I have not observed that any result has followed that intimation. I should like that to go on the notes.

1329. (*Professor Balfour.*) Supposing that the transference of the British Museum herbarium was made to Kew, do you anticipate there would be much saving of expense in that to the Government?—You see, these are not matters that concern me in the smallest degree. I understand that the building at South Kensington for the botanical department, from a rough calculation I have made, has cost something like £150,000. That is, I

roughly calculate, the outside capital expenditure on Kew ever since it was founded. If the British Museum herbarium were moved to Kew we should house it in a building which would cost £10,000 at the outside, and that space at South Kensington would be available for something else. But it is really not my affair.

1330. Looking at the British Museum herbarium as having the character you have described, you say there would be a vast amount that would be really no use to you at Kew?—It is my conviction—I have no ocular evidence of the fact, but it is my conviction that there is an enormous amount of unarranged material at South Kensington.

1331. Of course, there must be an enormous amount of duplicates. There are these collectors which are constantly being sent out from America. They bring home collections, and no doubt the Museum buy them as you do?—You have a typical case in the Bescherelle Herbarium, which I have mentioned. The British Museum bought that. I do not want those 15,000 specimens forced on to me, as I have already declined, as I told you, to purchase them.

1332. One of the things that Kew prides itself upon is that it is a clearing house for the Empire. Do not you think that if the British Museum herbarium was removed to Kew, it would be a very good bit of work for Kew to distribute the duplicates and get rid of them?—Where am I to find storage room and the staff?

1333. But supposing the staff was provided?—You must have trained people for distributing a herbarium.

1334. Did you not distribute the collection of the India Office?—That was done with reference to the investigation of the flora of India; that was part of the general operation. But simply to undertake to deal with the accumulation of another establishment seems to me an ungrateful sort of undertaking without very much practical outcome as far as I can see.

1335. Is it your opinion that Kew ought to be the chief national collection?—It is not for me to answer all these questions. I am put in charge of a particular institution which I administer——

1336. Then in your administration do you endeavour to make Kew the chief national botanical collection?—I endeavour to do my duty by the establishment.

1337. You would do so if you were doing your duty?—I do not go in for swaggering about the national collection. We try to make the instrument of research committed to us as perfect as possible, just as the Astronomer Royal would naturally try to get the best telescope an optician could make. As to calling it national or anything of that kind, that is another matter.

1338. In your endeavour to make it such as you describe, would it be an advantage to you to have the best collection, but not duplicates, under your charge?—Certainly. I have already stated that I should like to have the collections even from Paris.

1339. Would you like to have the Wallich collections from the Linnean Society?—Yes; but I am not very keen about it. I want the Committee distinctly to understand that I am not an accumulator. I want things as perfect as possible for a particular kind of research, but as for grabbing everything that comes in my way, I do not do it.

1340. You are aware that a certain number of people do go to the British Museum to work, and do no come to Kew?—I know nothing about it.

1341. Do you think it would be—for those people who work at the British Museum—any inconvenience to go to Kew, as compared with the British Museum?—As I have said, the two adjacent railway stations are 22 minutes apart.

1342. (*Mr. Darwin.*) In one of your answers you stated that collocation would be the only way of dealing with collections from the British Museum in the case of their being moved to Kew. I should like to understand what you mean by collocation. Would it mean that the collections as a whole from the British Museum would be moved and planted in a building built for that special purpose, or would it be possible to have a kind of modified amalgamation? Assuming you have a new building altogether at Kew for the herbarium, which I suppose you must have, would you put the cabinets, say, of certain natural orders from the British Museum in the same room with the cabinets holding those natural orders of Kew?—I do not think it is possible.

1343. You think it is not a practicable suggestion?—I do not think it is. I have thought it out, but I think it is impracticable. I think the only plan, supposing the British Museum herbarium or any other herbarium were brought to Kew, would be to put some plain simple buildings adjacent to the buildings now there. We have plenty of room, and we could have another wing connected to the existing Herbarium by a corridor. The advantage would be that people, instead of having to leave Kew to go to South Kensington, would go into another wing. That is all it amounts to. If the British Museum herbarium came to Kew, I should stop its growth at once; and no doubt gradually it would have to be weeded.

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

1344. (*Chairman.*) It was represented to us by one of the gentlemen who have given evidence before us that for the purpose of botanical research it was of very great importance to have all the specimens spread out before them on a table at the same time. Of course, that could not be done in your plan?—Certainly it could. You could bring the specimens from the two herbaria and spread them out, and then put them back again. We borrow a collection from Paris or from Copenhagen, and it is spread out. We get them even from Calcutta.

1345. (*Mr. Darwin.*) I should like to ask you one question if you can answer it as a private individual rather than as an official; if you cannot answer it as a private individual, I do not care for an answer. Can you in the least estimate the amount of advantage it would be having this collection brought down and placed in a wing of your herbarium?—I really do not think I could estimate it, because my knowledge of the present British Museum herbarium is really very limited. Ever since the removal to South Kensington, when the great extension of the British Museum herbarium began in 1880, I have been incessantly occupied at Kew, and the number of times I have been in the British Museum could be counted on the fingers of one hand. The Banksian herbarium I know very well, but that, I imagine, is only a very small part of the whole thing. Therefore, not knowing what the nature of the present British Museum herbarium is, I could not offer an opinion as to its value. I may say I have not a very high opinion of it. I do not see how a herbarium rapidly accumulated in a short period, as most of it has been, can be worked up so closely as to be of much assistance. From hearsay evidence, I understand that although there is a vast amount of material, the information got from it is rather disappointing.

1346. (*Mr. Spring Rice.*) I should like to ask you on a hypothetical case what the effect would be on the herbarium for which you are responsible. Supposing two people go out independently, let us say, to Madagascar, and one of them has been in relation with you in the way in which you described the gentleman in China to have been; the other happened to have got into similar relations with the British Museum. They come back, each with a collection of plants, including novelties, rarities, or what you will, and because of these accidental previous relations one of these collections goes to one institution and one to the other. Would you say that state of things was advantageous to the institution in your charge?—Certainly not.

1347. Should you say that that state of things was distinctly disadvantageous?—Of course, it limits the material available for studying the flora of Madagascar, but, on the whole, the resources of Kew are so overwhelming that I do not grudge the British Museum occasions on which it is able to secure something we have not got. The fact of it is, that the amount of material at Kew is so vast that we cannot keep pace with working up what we have got, and therefore we lok philosophically on the other institution.

1348. You are so great that you can afford to be generous?—Yes. I mean these little things, relative to the amount of material we have, are so inconsiderable that it is not worth while vexing one's soul about it.

1349. But you do not think it is happening to an extent that is materially injurious to you?—It might.

1350. I want to know whether you have any impression on the point?—They have begun too late in the day to do us much harm—that is the fact.

1351. (*Chairman.*) It would be desirable that you should have at Kew the whole of the flora obtainable at Madagascar, instead of part of it going to Kew and part of it to the British Museum?—Certainly it would be.

1352. That is a disadvantage not only to yourself but to botanical researchers who visit Kew?—You cannot help it. You have to put up with these little disadvantages in research. With regard to Madagascar, as Madagascar is now governed by France, the bulk of the material that used to come to us through missionaries now goes to Paris. Supposing you could suppress the activity of the British

Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.

29 Nov. 1900.

Museum with regard to Madagascar, the situation only reproduces itself elsewhere.

1353. (*Mr. Spring Rice.*) I only put it as a hypothetical case, the first that came into my head?—If Professor Balfour started great activity in Edinburgh we might desire to suppress him.

1354. (*Professor Balfour.*) As a case very similar to what Mr. Spring Rice has put to you, has not it already occurred in connection with the tropical Africa flora that the British Museum have got the Milanji plants, which they have published, and workers at Kew doing the tropical Africa flora have to go to the British Museum and spend a great deal of time there?—I think that is so.

1355. (*Mr. Spring Rice.*) I believe we have it in evidence that there is somebody now working at the British Museum collection of Central and West African flora, and I believe under your direction some work is being done on the flora of the same part of the world at Kew?—I think it is very probable.

1356. As a matter of fact, you have been working at the flora of West Africa?—We have been working at the flora of tropical Africa for the last 30 years. The British Museum certainly does show a disposition, if we take up a subject, to strike in and make a little show, but you can hardly wonder at that.

1357. There is only one other point I should like to ask you a question about. In paragraph 7 of your covering letter you refer to the recommendations of what is known as the Devonshire Commission, and you say that a kind of compromise was suggested which was not readily intelligible, and was certainly unworkable. Have you considered whether, taking things as they are, any amendment of those suggestions could be made which would be workable?—No. What they suggested was that collections were to be arranged geographically at South Kensington and systematically at Kew. [This was apparently due to a suggestion made by Sir Joseph Hooker.] I do not see that any compromise is possible at all. You must have either independent autonomy or fusion—there is nothing between.

1358. That Commission made three recommendations, if I may recall them to your memory. The first is the one to which you have referred with regard to geographical distribution on the one hand and systematic botany on the other. The second is as follows: "That all collections of recent plants made by Government expeditions be, in the first instance, sent to Kew, to be there worked out and distributed, a set being reserved for the British Museum, and that all collections of fossil plants made by Government expeditions be sent to the British Museum"?—I did not refer to these two points, because I fancy they have been generally accepted. We had a few fragmentary collections of fossil plants at Kew, and we sent them off to the British Museum promptly.

1359. You appear to have practically no fossil plants now at Kew?—No.

1360. Do you feel the want of a collection of fossil plants for the work at Kew?—No, and I do not think that the Botanical Department ought to have fossil plants either. It is a very much debated question, but I have made up my mind that the method of palæontology requires that a fossil should be in the hands of experts and not in the hands of either zoologists or botanists. I believe that has been carried out now at South Kensington.

1361. Referring to the work of your own department you have not found that researchers coming to you have complained of your staff or the absence of a collection of fossil plants?—No.

1362. The third recommendation of the Devonshire Commission was: "That opportunities for the pursuit of investigations in physiological botany should be afforded in the Royal Gardens at Kew." That I believe is now done by the Jodrell Laboratory, is it not?—You will find a statement about the Jodrell Laboratory in my memorandum.

1363. I just want to get it from you that you consider that recommendation has been met by the Jodrell Laboratory?—It was, no thanks to the Government. That was done by private munificence.

1364. But as a matter of fact that has been done?—Yes. I am afraid there ought to be more done in that direction. I should like also to point out that the keeper of the Jodrell Laboratory is not paid any salary. I do not think the Government has assisted Kew in carrying out that recommendation.

1365. It is not a question of giving credit to anybody. I wanted to get from you the facts on that point?—As you appear to view the fact of the recommendations of the Committee having been carried out with satisfaction I wish to ear-mark it with the statement that it is not due to the Government.

1366. (*Chairman.*) With regard to the fossil plants, it has been represented to us by more than one person that the botanical interest in fossil plants is greater than the geological interest—they are more valuable to the botanist than to the geologist, and it has been also represented that in the interests of botanical research it would be an advantage if the fossil plants were not, as at present, in the British Museum, but at Kew, where they could be studied in close proximity to the living plants. It was represented that for the study of fossil plants the immediate recourse to living plants was of greater advantage than the recourse to dry herbarium specimens. I suppose fossil plants could be accommodated at Kew?—Yes. There are 300 acres of land, and you could accommodate anything you please. It is an exceedingly complicated and interesting subject, that of the determination of fossil remains. I am less and less inclined to dogmatise on these points. I think every problem must be taken on its own merits. In the case of palæozoic fossils, which have to be worked out mainly from study of histological detail, I have no doubt that an immediate reference to fresh material is of importance, and herbarium material is practically useless. When you go to the other end, to the more recent plants, I think it is probable that the use of herbarium material, the convenience of being able to go to a cabinet and immediately get out a large series of leaf forms, where you have leaf impressions, and so on, is probably the correct way of doing the work. As I say, I am not prepared to dogmatise about it. The argument that experience has impressed upon me is this, that the treatment of fossils does require its own special technique, and therefore there ought to be a palæontological department, neither zoological nor botanical. The mode of developing fossils and preparing collections, and the whole technique of the subject is quite separate. I should be always afraid that if a collection of fossils were placed under the charge of a botanist justice might not be done to them. I think the palæontological department of the British Museum, so far as I know, is one of its striking successes, and that is due to the fact that they have trained experts who know how to treat the fossils and extract from them the information which they contain. I think that is a very important thing.

1367. I suppose it would be possible if the fossil plants were separated from the fossil animals to have an expert in palæo-botany. He would have to be an expert *sui generis*. The method of treating fossil plants is different from treating fossil animals?—It is a principle of administration that the more you split a thing up the less well it is done. If you have a department you can have men better paid and better placed. If you break the thing up into driblets, then you come down to one man, and there is always a difficulty.

1368. Is it not the case with regard to your arguments as to there being a special technique for palæontology that this is met by the argument that the technique of palæobotany is quite distinct from the technique of palæozoology?—I do not think it is. If you have a block of sandstone with a fossil in it, it does not matter twopence whether it is an animal or a plant. An experienced man will develop that fossil by methods of his own.

1369. (*Professor Balfour.*) There is one question on the administration which I should like to ask you. When your assistants lay in the plants, if they think they are new, they just put them into their genus?—I have explained in my memorandum that we do not attempt to carry determination down beyond generic rank.

1370. Do you allow any attempt at research to your staff?—Yes, I think the work of an establishment like mine, especially when men are driven pretty hard as they are under my direction, is monotonous, and calculated to deaden intellectual activity, and therefore part of my system is to allow a portion of each day for them to do scientific work in the institution independently, in order to prevent their "drying up."

1371. A great part of that work consists in the examination and description of new species, does it not?—Yes; but that is more interesting than the mechanical work of putting things in their place.

1372. I suppose that work when it is done is published through the transactions of societies or journals?—Yes.

1373. Do you think it would be an advantage to have that all published from Kew as official work under your direction?—I do not believe in crystallising things too much. I think if a man works out a little paper half the fun is in publishing it where he likes.

Adjourned.

APPENDIX I

SUMMARY OF PREVIOUS ENQUIRIES.

	Page.
Origin of the British Museum	111
Enquiry into the state of affairs at the British Museum, 1835	111
Abstract of evidence	111–112
Dr. Lindley's Report on the condition of Kew Gardens, 1840	112
Memorial of the British Association and other scientific societies, 1847	113
Royal Commission on the British Museum, 1847–50	113
Extracts from the Report	113–117
Evidence of Mr. R. Brown, Mr. J. J. Bennett, and Mr. A. Panizzi	114–117
Memorial deprecating the breaking up of the British Museum, 1858	117
Enquiry by the Trustees of the British Museum, 1858	118–122
Evidence of Sir W. J. Hooker, Dr. J. D. Hooker, Mr. J. J. Bennett, Dr. Lindley, Prof. R. Owen, Mr. G. Bentham, Prof. Henfrey, and Dr. Falconer	118–121
Letters from Sir C. Lyell, and Mr. C. Darwin	121–122
Report of the Sub-Committee of the Trustees	122
Various criticisms on the foregoing	122
Memorial on the National Natural History Collections, 1858	122
Parliamentary Enquiry;—Select Committee of the House of Commons, 1860	124–126
Evidence of Mr. G. R. Waterhouse, Mr. J. J. Bennett, Mr. A. Panizzi, Prof. R. Owen, and Mr. N. Story Maskelyne	124–126
Enquiry of 1868–69	126–127
Memorandum of the Secretary of H.M. Office of Works, with Mr. J. J. Bennett's reply	126–127
Royal Commission on Scientific Instruction and the Advancement of Science (Devonshire Commission), 1871–75	127–149
Evidence of Dr. J. D. Hooker, Mr. G. Bentham, Mr. J. Ball, Dr. T. Thomson, and Mr. W. Carruthers	127–135
Paper handed in by Mr. Carruthers	135–138
Report of the Commissioners on the foregoing, with Appendixes (Correspondence, statements by Mr. G. Bentham, Mr. J. Ball, Mr. W. Carruthers, Memorial to H.M. Treasury, Notes on the Museum of Natural History, Paris)	138–147
Evidence of Admiral G. H. Richards, and Captain D. Galton	147–149
Enquiry of 1872	149–157
Memorial to H.M. Treasury	149
Extracts from Memorandum of the First Commissioner of Works on Kew Gardens	151
Statement relative to the Botanical departments respectively under the Trustees of the British Museum and the Commissioners of Works	151–154
Extract from Treasury Minute, 24 July 1872	154
Dr. Hooker's reply to Prof. Owen's "Statement"	155
Remarks on Dr. Hooker's "Reply" to the "Statement"	156
bliography	157–158

COMMITTEE ON BOTANICAL WORK

CARRIED ON AT THE

NATURAL HISTORY MUSEUM,

AND AT THE

ROYAL GARDENS, KEW.

APPENDIX No. 1.

A Summary of previous Enquiries into the Management of the Botanical Department of the British Museum, and of Kew; prepared for the Committee of Enquiry, appointed by the Lords Commissioners of Her Majesty's Treasury, 1900.

ORIGIN OF THE BRITISH MUSEUM.

The British Museum collections date from the death of Sir Hans Sloane, Bart., who died on 11th January, 1753, by his will leaving his collections to the nation, on a payment of £20,000, which was estimated to be about one-fourth of the actual value of the collections themselves. The Act of Incorporation, 26th Geo. II., was passed in 1753; it included in its scope the Cottonian and Harleian manuscripts, to which the Royal Library was added in 1757. These additional collections were as follows:—

Sir Robert Bruce Cotton's manuscripts, presented to the nation by William III. in 1700; about 861 volumes, some injured by fire.

2. The Harleian collection of 10,000 volumes of manuscripts and 16,000 rolls and charters, formed by Robert Harley of Hereford, afterwards Earl of Oxford and Mortimer; it was bought by the nation in the same year as the Sloane collection.

3. The Old Royal Library, which had been in course of growth from the time of Henry VII., made over by George II. to the British Museum in the year 1757.

Montague House received these various collections in 1754-57, and on 15th January, 1759, it was opened to the public. The Departments then existing were: (1) Manuscripts and Medals; (2) Natural and Artificial Productions; and (3) Printed Books. In consequence of this preponderance of literary material, the chief officer was styled Principal Librarian, his subordinates in charge of the three departments being termed Under-Librarians, and their immediate subordinates, Assistant-Librarians.

The botanical portion of the British Museum then consisted of the Sloane herbaria, with the plants pasted into folio volumes, frequently without any attempt at a systematic arrangement, the only guide to the contents of the said volumes being a large paper copy of Ray's Historia Plantarum, in which index entries had been made by Sloane himself, the process of reference being to find the name of the plant as given by Ray in his work, then to ascertain the volume and folio of the dried plant itself. Besides these volumes were fruits, woods, gums, and similar vegetable productions.

The collection under this head does not appear to have increased much during the sixty years following the opening of the British Museum, that is, during the lifetime of George III. and Sir Joseph Banks, who acted as the monarch's scientific adviser, which his position as president of the Royal Society amply warranted. The library and herbarium of Banks became the centre of botanic activity in the kingdom, under the skilful conduct of his successive librarians, D.C. Solander, Jonas Dryander, and Robert Brown.

Sir Joseph Banks, whose connection with the Royal Gardens at Kew will be given on a subsequent page, died on 19th June, 1820. He left an annuity to his librarian Robert Brown, with a life-interest in his library and collections, and the reversion of them to the nation, as given in the evidence cited below, and on pages 114-117.

In 1823 the May number of the "Edinburgh Review" had a very severe article on the state of the natural history contained in the British Museum, which evidently made a deep impression on the public mind, for it is to be found constantly quoted in the proceedings before the Select Committee of the House of Commons in 1835-36. That part which bears on the botanical portion of the collections was as follows:—

> "As a supplement to the devastation which has taken place in the zoological collections of the Museum, we shall offer a few remarks on the state of Sloane's collection of vegetable nature. Of the 12,506 specimens of vegetable substances, including woods, seeds, gums, resins, roots, etc., the condition is not satisfactory; for a small part of them only can now be seen, and these in a very slovenly state. This immense herbarium filled 334 volumes, including what he himself had collected in the West Indies, and the *horti sicci* of some distinguished botanists. About fifty or sixty volumes only are now visible, piled up on some lofty shelves in one of the rooms, on a level with the library; and these are black with the dust of half a century, which has not only defiled their exterior, but has penetrated into their inmost recesses; while the leaves and the plants are equally the prey of worms, undisturbed in their sacrilegious banquets. Such a collection should have been preserved in well closed cases; and how long they may thus be kept unimpaired, can be well understood by those who have witnessed the perfect preservation of the herbarium of the celebrated Linnæus, in the hands of the distinguished botanist [Sir J. E. Smith] who has enriched his country by the acquisition of this treasure. . . . In short, the whole Zoological and Botanical Department of the Museum is disgraceful to the nation, and very discreditable to the Trustees, to whose charge it has been consigned." (p. 390).

The author of this article was Dr. Thomas Stewart Traill, of Liverpool, on information supplied by William Swainson, as shown by the Swainson correspondence in the possession of the Linnean Society.

ENQUIRY INTO THE STATE OF AFFAIRS IN THE BRITISH MUSEUM.

In the Report of the Select Committee of the House of Commons which was printed in 1835, is given the evidence as to the state of the botanical collections in the British Museum, from which the following is taken, omitting matter now irrelevant by effluxion of time and other reasons.

Mr. Charles König, Under-Librarian of Natural History, asked if any eminent naturalists were officially connected with the British Museum, replied that they had Mr. Brown, "the greatest botanist in the world." His position was quite independent of Mr. König, inasmuch as he administered the department of the Banksian collections, but the Trustees had quite recently decided to hand over to Mr. Brown the care of the botanical department of the Museum.

Mr. Robert Brown, in his evidence, stated that he was

an under-librarian of the Museum, and designated Keeper of the Banksian Botanical Collections; his salary in gross was £350, without apartments; his assistant being Mr. J. J. Bennett, who had been with him from the beginning of the department; his own duties were the "keeping up the arrangement of the collection and incorporating with the arranged collection the unarranged materials already in his custody, and other similar materials that from time to time may come to the Museum." In the resolution of the Trustees respecting his appointment his duties were confined to the Banksian botanical collections, which he brought with him to the establishment; but having more than once expressed his wish to have charge of all the botanical materials within the building, his wishes had lately been agreed to by the Trustees. The transfer is in progress; but the delay which has arisen is due to want of space in the Banksian rooms, a geological collection having been till within the last few months accommodated in the same rooms. These have now been assigned new quarters in the new building, and part of the botanical collections referred to have been placed in the rooms. He has examined a part of the Sloane herbaria, but not the whole. From that portion which he has inspected, he should consider that the condition of the Sloane herbaria is as good now as it probably was fifty or a hundred years ago. It is in the nature of such collections that, provided they are kept free from damp and insects, they are capable of being indefinitely preserved; and that the volumes in question have preserved the plants in as good a state as the Linnean herbarium, that is, as regards the thirty or forty volumes known to him by actual inspection.

He looked upon the statement in the "Edinburgh Review" as overcharged, but could not assert what was the number of the Sloane volumes till he had had them transferred to his department. They had always been more or less accessible to those who required access to them; but in future they would be still more so. Previously no officer was definitely charged with the special oversight of them, due probably to the limited space at command formerly. There was no library attached to the Department of Natural History. In his own department he had merely a few books of reference which were absolutely essential. The Banksian library, when transferred to the trustees, was rich in works up to the death of Sir Joseph Banks in 1820, but then the accessions ceased. "Sir Joseph Banks bequeathed to me for my life 'the use and enjoyment' (to employ the terms of the will) of his library and botanical collections; he also bequeathed to me an annuity, but not for the superintendence and care of the library and collections, though doubtless all possible care is implied in the bequest. Neither the library nor collections were ever open to the public generally. Whoever had access to them had it through me. Sir Joseph Banks entrusted to my discretion an important charge, and I endeavoured, as far as circumstances of some difficulty enabled me, to fulfil his probable intentions. I have entered into these particulars chiefly because the question now put seems to imply that I had an actual duty to perform to the public generally, and for the performance of which the annuity in question was given; and I have done so in some measure also with reference to what at length took place, namely, the transfer of the library and collection to the Museum."

He then gave some account of the circumstances under which the Banksian collections became the property of the Trustees. The library and botanical collections were left to Mr. Brown for life, and upon his death were to be conveyed to the British Museum; the Trustees, however, had the power to receive them at an earlier period by arrangement with the tenant for life. Negotiations were opened up by the Trustees, as they conceived that these collections, being kept in the house in Soho Square, which was formerly occupied by Sir Joseph Banks, were in a state of possible danger from fire, being in a private house, and surrounded by other like edifices; by 1827 the terms of transfer had been agreed upon by both parties, and the whole handed over to the British Museum; this appears in greater fulness in evidence given by Mr. Brown before the Royal Commission of 1847-49.

The library, though kept apart from the other books, became merged in the printed books, but the fullest facilities were afforded to the Banksian keeper for using such botanical books as he needed. At first there was no provision for increasing the collections by purchase, but later on a sum of £80 per annum was allowed for such accessions, and still later, augmented to £100. He further deprecated any transfer of his department after his death to the regular officers of the Museum, as contemplated by the Trustees in 1833.

In the concluding portion of the report, which was presented in 1836, the Select Committee did not make any recommendation with regard to the Banksian or Botanical Department.

The title of "Under-Librarian" for the head of a department was subsequently changed to that of "Keeper."

DR. LINDLEY'S REPORT ON THE CONDITION OF KEW GARDENS.

The Royal Garden at Kew was the private possession of the King, as detailed by Sir W. T. Thiselton-Dyer in his historical account of the garden in the Kew "Bulletin of Miscellaneous Information" for December, 1891, pages 279-327. During the lifetime of Sir Joseph Banks the scientific supervision of the garden was confided to him, and remained in his hands till his death in 1820. The seeds sent home by various collectors were forwarded to Kew, and the plants thus raised, together with those introduced in a living state, were described in the "Hortus Kewensis," a work of three volumes, published in 1789, with the name of William Aiton, the King's gardener, on the title page as author. It was actually the work of Daniel Carl Solander and of Jonas Dryander, in succession librarians to Banks; the original dried specimens from which the descriptions were drawn up are incorporated in the Banksian herbarium, which is now at Cromwell Road. The second edition of this book in five volumes, nominally the product of William Townsend Aiton, son of the elder Aiton, was written partly by Jonas Dryander, who succeeded as Banks's librarian after the death of Solander, and completed by Robert Brown, who became librarian when Dryander died in 1810; the book appeared in 1810-1813.

The younger Aiton succeeded his father, and became Director-General of the Royal Gardens, but the details of cultivation were left almost entirely to subordinates. In the year 1838 a committee of enquiry was appointed by the Lords Commissioners of Her Majesty's Treasury, to investigate the condition of the Royal Gardens at Kew. The Committee requested Dr. John Lindley, Professor of Botany at University College, and Secretary to the Horticultural Society, to make a survey, which he did in conjunction with Mr. (afterwards Sir Joseph) Paxton and Mr. — Wilson, both practical gardeners. The report was signed by Dr. Lindley, dated 28th February, and printed in May following.

The first part deals with the garden structures and the plants in cultivation. The reporter continues:—

"So far as the mere cultivation of this place is a subject of observation, it is due to those who have charge of it to say, that it does them credit, considering the crowded state of the houses, and the inadequate funds allowed for its support.

"It is impossible to speak of the general management in similar terms. It has always been maintained as the great botanical garden of this country, and, whether as a private or as a public establishment, it was the duty of the officer entrusted with its administration to render it effective to the extent of his means as a botanical garden, that is, as a garden of science and instruction; yet no kind of arrangement (one of the first features in a botanical garden) has been observed; no attempt has been made, till lately, to name the multitudes of rare plants it comprehends, and thus to render it a place of public utility. No communication is maintained with the colonies, nor anything done, so far as can be discovered, to fulfil the objects of the institution, except to raise the seeds which Government collectors and other persons have profusely contributed, and then to take care of the plants.

"It is admitted that there is no classification observed in the garden."

"What names are to be found in the garden have been furnished by Mr. Smith, the foreman, and the Director does not hold himself answerable for them. This was most particularly inquired into, and most distinctly avowed; so that by far the most difficult part of the duty of the principal officer—a duty on the perfect execution of which the credit and utility of the garden essentially depends—a duty which can only be executed properly by a man of high scientific attainments, aided by an extensive herbarium and considerable library; this most important duty is thrust upon a foreman, paid small weekly wages for cultivating plants, who, whatever his zeal and assiduity may be (and in this case they have been such as to deserve the greatest praise), has no sufficient means of executing such an office. A considerable number of

names have been recently affixed to the plants; and Mr. Aiton is so anxious to declare his opinion of their utility, that he has written the following letter upon the subject:—

"Royal Botanic Garden, Kew,
"22 February, 1838.

"Sir,—To correct any misunderstanding as to my opinion of naming plants in the garden, I take this opportunity to state that, for the advantage of the visitors generally, as well as for the instruction of the gardeners in employ, I consider each individual species should be distinctly and carefully labelled with the ascertained scientific name, etc.

"I am, etc.,
"(Signed) W. T. Aiton.

"To Dr. Lindley."

"It is difficult to reconcile this statement with the fact that up to a recent period no means had been taken to carry such an object into effect.

"That no communication is maintained with colonial gardens is apparent from the garden-book of deliveries. . . It will be seen from this document that since the year 1830 the only deliveries to colonial gardens, or in aid of the British Government, have been one to the garden of New South Wales and one to Lord Auckland, when proceeding to his Government in India. Mr. Aiton states that all such applications have been complied with. . . . It is well known that a great desire is felt in the colonies to produce plants from this country; it is equally well known that applications to other gardens for such assistance are extremely common. It is therefore singular that what happens so frequently elsewhere should so seldom happen in the botanical garden of Kew. . . . Mr. Aiton states that in this matter he has acted upon his own judgment, and by virtue of his authority as director-general of the Royal Gardens; that he has always regarded the botanical garden a private establishment; that the only rule which he has observed in giving away duplicates has been to assist those who were likely to aid the Garden in return; and that, in his opinion, it is desirable that the Garden should be conducted upon the most liberal plan consistent with the safety of the collections.

"Undoubtedly it has been in one sense a private garden of the Crown, inasmuch as its ordinary charges have been defrayed by the Lord Steward's department; but, on the other hand, all the large expenses for foreign collectors having been for many years paid by the Treasury or Admiralty, it must be considered, to a certain extent, a public garden also. . . .

"After all the explanation that has been offered, after allowing full weight to the assertion that the botanical garden at Kew has always been a private establishment, admitting, moreover, that a larger number of plants has been given away than is generally supposed, and that in many cases applications for plants have been liberally complied with, which is undoubtedly the fact, it really does seem impossible to say that it has been conducted with that liberality or anxiety to promote the ends of science, and to render it useful to the country, which it is usual to meet with in similar institutions elsewhere.

"If the botanical garden of Kew is relinquished by the Lord Steward, it should either be at once taken for public purposes, gradually made worthy of the country, and converted into a powerful means of promoting national science, or it should be abandoned. It is little better than a waste of money to maintain it in its present state, if it fulfils no intelligible purpose except that of sheltering a large quantity of rare and valuable plants.

"The importance of public botanical gardens has for centuries been recognised by the governments of civilised states, and at this time there is no European nation without such an establishment except England. . ."

The reporter then gives in detail his ideas as to the functions which such a garden should fulfil in order to carry out the proper duties of a national botanical garden. These, being chiefly of cultural import, are omitted.

Mr. W. T. Aiton intimated his intention to retire by resigning his positon at the end of 1840; the management was transferred to the Commissioners of Woods and Forests, and ultimately Professor, afterwards Sir William Jackson Hooker, Regius Professor of Botany at Glasgow, was appointed Director of the Royal Gardens, Kew, his duties beginning on 1st April, 1841.

The new Director had brought with him a very large herbarium, which was accommodated in a house, West Park, specially rented by Government, till some years later other arrangements were made by which the Director's residence was in close proximity to the Gardens themselves, the herbarium being lodged in other Government property, and West Park quitted.

MEMORIAL OF THE BRITISH ASSOCIATION AND OTHER SCIENTIFIC SOCIETIES.

A copy of a memorial to the First Lord of the Treasury (Lord John Russell), presented on the 10th day of March, 1847, by members of the British Association of Science and of other scientific societies, respecting the management of the British Museum, with the names affixed, began:—

> "We, the undersigned members of the British Society for the Advancement of Science, and of various scientific societies, respectfully submit to the consideration of your Lordship that a strong feeling pervades the naturalists of our country, that the promotion of the science of natural history is very inadequately provided for by the present constitution of the Board of Trustees of the British Museum." It proceeded to point out that so long as the Museum consisted of a library and limited collections of antiquities and natural curiosities, it was easily managed by such a body, but the memorial goes on to say: "We would earnestly represent to your Lordship that the qualifications of these gifted individuals do not necessarily include an interest in, or the ability to judge of, many of those measures which may best promote natural history, and consequently that there is no effective provision (in the absence of other men of science) for the proper guidance of the natural history department, or for having at the Board Trustees who can explain to their associates the desiderata of naturalists, and estimate the value of new specimens, either offered to or purchased by the nation.
>
> "Fully acknowledging that in their accomplishments and high characters the present Trustees offer the best sureties for the satisfactory execution of any duties connected with their own pursuits, we still think that with the best disposition (and they have already done much good service) these distinguished men are unable adequately to direct the vast and rapidly increasing natural history departments of the Museum, and we can even well suppose that they would themselves be happy to be relieved from the heavy responsibility which must be attached to the application of the large sum annually voted by Parliament for the support of natural science.
>
> "Deeply impressed with these sentiments, we beg to suggest, for the consideration of your Lordship, that steps should be taken to effect such an improvement in the constitution of the Trust as shall render the management of the Natural History departments of the British Museum, as far as possible, independent of the other divisions; and on this point we would beg to refer your lordship to the original plan of Sir Hans Sloane.
>
> "In offering this suggestion, we do not contemplate a separation of the Natural History collections from the other departments of the British Museum, as we well know that the cultivation of natural science cannot be efficiently carried on without reference to an extensive library."

This memorial was signed by Sir Roderick Impey Murchison, President of the British Association, the Right Reverend Edward Stanley, Bishop of Norwich and President of the Linnean Society, and fifty-five other signatories of distinction in science.

ROYAL COMMISSION ON THE BRITISH MUSEUM.

A Royal Commission was issued, dated 17th of June, 1847, with a supplementary Commission dated the 5th of May, 1848, "for the purpose of inquiring into the constitution and government of the British Museum, the administration of its funds, and the organisation, arrangements, and present condition of the several departments of that establishment, with the view of ascertaining in what manner that national institution may be made most effective for the advancement of literature, science, and the arts," which commission reported in 1850.

The attention of the Commissioners was principally directed to matters which do not fall within the province of this Committee, but the portions which are relevant are as follows:—

"The additional space likely to be required for the exigencies of the library may probably be calculated with some precision, so as to cover any specified period. The task obviously becomes more difficult in the case of any of the departments of natural history, with the exception,

perhaps, of the botanical. We believe, indeed, that in various quarters the notion has been entertained of partially or totally relieving the Museum from its collections of natural history. To any scheme embracing this notion, whether it involve the removal of the present collections or the interruption of their due progress towards completeness, we have seen objections *in limine* sufficient to deter us from giving it any detailed consideration. The comprehensive character of the Museum, the origin of which may be traced to the heterogeneous nature of Sir Hans Sloane's bequest, doubtless makes it difficult to provide for the expansion of its various branches according to their relative demands upon the space and light which can now be applied to their accommodation. Any attempt, however, to diminish now that difficulty by segregating any portion, or by scattering in various localities the components of the vast aggregate, would involve a sacrifice of great scientific advantages which are not the less inherent in their union because that union was in its origin fortuitous. The temporary difficulties, expense, and inconvenience attending the transfer, however serious, are, in our opinion, quite subordinate to this consideration. Some passages of our evidence will be found to illustrate the difficulty of drawing a line of separation for purposes of management and superintendence between certain collections which, in some respects, are sufficiently distinguishable from each other. . . Its occurrence indicates strongly the value to science of the accidents which have placed in near juxtaposition the collections of mineralogy, of forms of existing and of extinct animal and vegetable life. (p. 36.)

* * *

The botanical department is under the charge of Robert Brown, and certain suggestions which he made as to internal arrangements, are approved ; they need not be set out at length here, as the circumstances then existing have entirely altered. He gave in a list of visitors to the department, of which the Commissioners say :—"This list being only a record of first admissions, gives us no information as to the number of visits paid by any of the individuals mentioned to the collections. It shows, however, by the names recorded, that this department, though hitherto possessing little attraction for ordinary observers, is an object of great attraction to men of scientific eminence of this and other countries. To all such that attraction is doubtless at present much enhanced by the European reputation of its present curator." The intended exhibition of part of the collections is then alluded to, and in commenting on the other natural history departments the sentence occurs, "The botanical department should contain all the collections of the vegetable kingdom, both recent and fossil" (p. 43).

Robert Brown was the first witness examined as to his own department. He described himself as the keeper of the botanical collections, his appointment as under-librarian being dated 19th September, 1827 ; he bringing his department with him. This he had previously explained before the Select Committee ; by it he meant that he brought with him the collection of Sir Joseph Banks. When he came to the Museum he had charge of nothing but what he brought with him, and that continued for more than seven years ; then, having repeatedly pressed upon the Trustees the desirability of having control of all the botanic materials which were in the Museum, they at length directed that the transfer should take place, which was done in July, 1835, including the Sloane collection, itself very extensive, and whatever additions had been made to it, which did not amount to much. For some years after the Banksian collections had been brought to the Museum, he had no funds to augment them, but in his report to the Trustees of July, 1834, he had said :—

" . . . . to preserve the relative importance and the actual utility of the Banksian Herbarium as a collection of reference, an annual sum not exceeding perhaps somewhat under £100, is necessary to enable him to make such additions to it as may be occasionally obtained by purchase." In the estimate for the following year he obtained a grant of £80, which in 1840 was increased to £100. When any addition was contemplated he always sent in a report to the Trustees, and his recommendations were not always adopted, probably from motives of economy. In 1828 he had pointed out that he was accumulating material for an exhibition of botanical products ; in June, 1847, in response to a Minute of the Trustees, he specified the room required for the material already prepared for public display, but stated that in order "to give due extent to the present collection, it would be necessary to make an addition to the sum of £100 now annually allotted for the purchase of specimens to be added to the arranged herbarium, and which, though he has hitherto found it sufficient for that purpose, would certainly not enable him to obtain such specimens as are fitted for exhibition. An annual addition of £50 would, he believes, answer the purpose. The principal materials fit for exhibition would be the following :—1st, Specimens of structure, illustrating vegetable anatomy and physiology, and such as are of remarkable appearance, chiefly monocotyledonous, calculated to give a notion of the most striking peculiarities in the vegetation of distant parts of the world. Of this class several very rare and valuable specimens have already been obtained. 2nd. The fructification of palms especially, but also of many other tribes of such size as necessarily to exclude them from an arranged herbarium ; and of this division also many interesting specimens are already in the collection. 3rd. Woods from various parts of the world, the existing collection of which is yet very limited, and requires preparation, but which might, both by presents and purchase, be greatly increased ; and, fourthly, there is already in the department a collection of models of English fungi, accurately made by the late Mr. James Sowerby, and purchased from his son several years ago. Most of the specimens now referred to are deposited, or rather, warehoused, in the outer room of the Botanical Department, where the duties of the attendants, chiefly in fixing specimens, are performed, which is fully occupied by the geographically-arranged specimens in upright presses, and by tables in the centre of the room, containing the old collections of plants bound in volumes, chiefly of the Sloane Museum." The report concluded by stating that this exhibition might be useful in attracting the attention of travellers and of naval officers, who might then be induced to collect and forward other specimens from various parts of the world. He did not recommend an exhibition showing the adaptation of vegetable tissues to economical purposes, deeming that beyond his department, and more adapted to the Society of Arts.

In his report to the Trustees of 9th June and 8th December, 1847, Mr. Brown had again referred to the proposed exhibition in the outer room of the Botanical Department. He considered it obviously unfitted for that purpose, and that the suggestion would not have been made "had due attention been paid to the manner in which the room in question is occupied, and to the importance of its principal contents in relation to the systematically arranged herbarium contained in the cabinets of the inner room. . . The upper and principal division of the upright close presses of both sides of the outer room contain, and are nearly filled with, specimens of plants from various countries, geographically arranged. From these materials selections are constantly made for incorporation with the systematically-arranged herbarium of the inner room ; uninterrupted access to these presses is obviously necessary for this purpose, which, in fact, forms the principal duty of the department. The specimens so selected and prepared are then properly fixed by the attendants in the outer room. The lower and smaller divisions of the upright fittings contain collections of seeds and seed vessels, in part belonging to the Sloane Museum, partly to the Banksian, and others more recently obtained. To these collections free access at all times is also necessary. The upright glazed presses at both ends of the room contain such specimens as from their bulk and nature can form no part of a systematically-arranged herbarium, but which are interesting to the scientific visitor. The greater part of these specimens are also fitted for public inspection, but they would form a very small part of the intended exhibition, are too much crowded in their present state, and the space now occupied by the presses containing them will very soon be required for a more important purpose, namely, for the necessary extension of the systematic herbarium, which already very nearly fills the inner room. The centre of the outer room is fully occupied by tables containing, chiefly, the various herbaria, in bound volumes, of the Sloane Museum. . . It will appear from the account of the outer room now given that its contents are of great importance, and cannot be removed or disturbed without essential detriment to the department ; that the room, in its present state, is wholly unfitted for an exhibition ; and that, were the case otherwise, it could not be so applied without manifestly and greatly impeding the most important duties of the Botanical Department."

No decision has been come to on the part of the Trustees as to the accommodation required for the exhibition, although witness had called their attention to it on the occasion of the last visitation in May, which annual event is the only opportunity he had of personally reporting to

the Trustees, and that does not afford time for any long representation.

Questioned as to there being any library connected with his department, witness stated that Sir Joseph Banks's library accompanied the collections; that he had no charge of it, but a few books of essential importance were selected, but they were not of sufficient extent to enable him to carry on the duties in his department. Books could be procured from the library, but owing to the regulations of the Printed Book Department he was obliged three times every year to return all borrowed volumes; consequently for two or three days on each occasion he was deprived of the use of those books. Quite recently an allowance had been made him of an annual grant of £25 for the purchase of books absolutely essential for the duties of his department. No part of the accessions which came to the Museum under the Copyright Act were delivered to him, not even duplicates.

He considered that hardly any advantage would result to the botanical student from the connection of his department with living specimens of plants. "That is to say, I think it would be much more than counterbalanced by the inconvenience of removing the collection to Kew, for example, as being the only botanical garden of any importance in the vicinity of London, but from which it is much too distant for the convenience of botanists." It is true that there is a botanical garden at Regent's Park, but he only knew that it was an establishment belonging to a society, and that its principal subscribers live near it, and to whom it affords a promenade. It also has exhibitions of flowers and fruit, which are attractive and well conducted. Of its scientific merits he could not say anything, but believed that scientific instruction was not its principal object.

Witness was asked, "Do you not think that it would be advantageous to the botanical student if your collection could be united with a good botanical garden, both of them being within a moderate distance of the wants of the metropolis?—The only such garden in existence, namely Kew Garden, is much too distant from the metropolis. I think, by transferring the collection, without a corresponding library, such as Sir Joseph Banks's was, and such as I have access to here, although not equally convenient access, it would become a dead letter. It could not, in short, be consulted with effect, nor could the duties of the department be satisfactorily carried out." It might be remedied by transferring the whole collection and the library also, but inconvenience would still remain to the student. The botanical portion of the library could hardly be separated; "many most important botanical memoirs in the transactions of scientific societies, and periodical publications, and much valuable information, especially on the geography of plants in books of travels, are only to be found in a general library." He did not see how that suggestion could be applied to the Banksian bequest. In the Museum there is a room containing nearly the whole of the Natural History Department of books, and in that room is also kept the Banksian library; there have been many additions to it, with many costly works; it is probably as expensive a department as any on that ground.

He had been ten years librarian to Sir Joseph Banks, and had been for several years librarian to the Linnean Society. He was thereupon closely examined as to the catalogue of Banks's books which was drawn up by Dryander, and printed in 1798-1800. It was kept up in manuscript from the date of issue, and that interleaved copy was in his custody. The keepers of the departments were never asked what books they considered desirable should be bought.

The principal duties of his department were, "first, to keep up the arrangement of the general herbarium as nearly as possible to the actual state of systematic botany, consequently modifications in classification, chiefly respecting the limits of genera, become from time to time necessary, in accordance with such alterations as are considered judicious, and are generally adopted; secondly, to examine and incorporate with the systematically-arranged herbarium additional species and more complete specimens from the unarranged materials which either existed in Sir Joseph Banks's collections, when the department was formed in 1827, or which have since been received as presents or by purchase. To these a third duty has lately been added, namely, the forming a botanical exhibition, for which a room adjoining the department has very recently been appropriated by the Trustees."

"The principal assistance in these duties has been that of an assistant keeper, Mr. J. J. Bennett, whose appointment bears the same date as my own, and who in diligence, general information, and in every respect, is a highly valuable officer. For seven years (that is, from 1827 to 1835) I had no attendant whatever, and during that period received only occasional assistance to relieve Mr. Bennett and myself from the merest drudgery, which assistance was not alway obtainable when wanted, and when obtained seldom satisfactory." On the transfer of the Sloane collections to his care he obtained some assistance. As to the facilities afforded to the scientific public in consulting the botanical collection, "As soon as I reported the Banksian Herbarium to be in a state admitting of inspection, which was exactly one month after its removal to the Museum, the Trustees directed me to state to them my opinion as to the times when it ought to be opened to scientific visitors desirous of consulting it, and also as to the manner of their obtaining access. In compliance with this direction I proposed to open it on two days in the week, from eleven to four o'clock, and that the introduction should be that of a Trustee, an officer of the Museum, or of a botanist of reputation. This plan was approved of by the Trustees, and it has been acted upon ever since. It is slightly deviated from in extending the privilege of foreign botanists to five days in the week, and in not strictly adhering to the prescribed mode of introduction when the person applying is a stranger in London and I am able to ascertain that he has a definite object."

A list of visitors is kept, but it does not supply any information as to the number of visits paid to the department, as it only records the first visit of any given person. Witness continued: "For the purchase of specimens, from the date of my appointment to 1834 I had no allowance whatever. But having then earnestly represented the absolute necessity of making additions to the Banksian Herbarium by purchase, to keep up its character as a collection of reference, and having proposed the annual sum of £100 or perhaps less, as probably sufficient to enable me to obtain such collections as were likely to occur, the Trustees granted me £80. This sum, until very lately, continued to be the annual grant for that object. It is now increased to £100, and last year I applied for and obtained £50 more to enable me to purchase specimens necessary for the formation of the intended botanical exhibition. At the same time I was allowed £25 annually for the purchase of works absolutely necessary for carrying on the duties of the department. So that for purchases of every kind I have the sum of £175. Of special grants for the purchase of more extensive collections which occasionally occur, I have been able to obtain one, which was for £400. On a previous occasion, when the sum of £1,000 was applied for to enable to make a most important addition to the Herbarium, and the purchase was recommended by the Trustees, the Treasury refused to accede to the application. It was to purchase the large Russian herbarium formed by J. D. Prescott, which was afterwards bought" [by Mr. H. Fielding, of Garstang, near Lancaster, was presented in 1852 to the University of Oxford, and now forms the main part of the general collection.]

"The general, or arranged herbarium, at present consists of about 30,000 species, certainly not more, possibly somewhat less. The unarranged, or geographically-arranged collections, may probably furnish 5,000 or 6,000 additional species. This altogether is a small number, compared with the estimated extent of several other public, and even of some private collections, and probably the Herbarium of the Museum is actually inferior to more than one of those; but the numbers in the published estimates have always appeared to me greatly overrated. Besides these arranged and unarranged collections there are several partial herbaria, highly valuable, as consisting of the authentic specimens on which many of the Linnæan species, as well as those of other authors, were founded. All these herbaria belong to the collection of Sir Joseph Banks. The extensive herbarium of Sir Hans Sloane, contained in about 300 folio volumes, and which formed the most valuable part of the natural history collections of the British Museum on its first establishment, still exists, it may be said, uninjured, and contains the actual specimens figured in Sloane's own work, and in those of other English botanists of that period. In addition to the herbaria now enumerated, there are many specimens that, from their great size, are not admissable into an herbarium, properly so called; but which will be available and important for the intended exhibition. There are also collections of seed-vessels and seeds, belonging both to the Sloane and British Museums. Numerous specimens of woods, with a considerable number of plants in spirits, chiefly such as cannot be preserved in any other manner. And, lastly, a collection of very accurate models of English fungi, by the late Mr. James Sowerby, who had particularly studied that branch of the science. The Department

also contains manuscripts, mostly botanical, and relating to the plants in the herbarium ; but also zoological, which are chiefly descriptions of the animals observed by Sir Joseph Banks and Dr. Solander, in Cook's first voyage. Of drawings there are, first, both those of plants and animals made by the natural history draughtsman employed by Sir Joseph Banks, in Cook's first voyage, amounting to 1,163 ; and of Cook's second voyage, a smaller number, 301, made by the younger Forster, the assistant-naturalist in that voyage. A volume of drawings, 48 in number, by the late Mr. Francis Bauer, illustrating the structure and diseases of wheat. Miscellaneous finished drawings and sketches of the same artist, chiefly of the more remarkable plants which had flowered in the Royal Gardens at Kew during half a century—that is, from the date of Mr. Bauer's connection with that establishment in 1789 to the time of his death in 1840, amounting to 1,484 ; all of which were made at the expense of Sir Joseph Banks. A collection of finished drawings of New Holland plants, 203 in number, made during the voyage of Captain Flinders, by the late Mr. Ferdinand Bauer, who was employed as natural history painter in that voyage. A volume containing 510 drawings and sketches by Ehret, the most celebrated botanical painter of his time, chiefly of plants which had flowered in the gardens in the vicinity of London, about the middle of the last century ; and a considerable collection of drawings of Guiana plants by Sir Robert Schomburgk. Besides all these, there are other botanical drawings of various artists and different periods, most of them of less importance than the foregoing, but altogether amounting to 4,660. The collection of drawings forms a highly interesting series, from the earliest and rudest attempts at delineation of plants in the 15th century, to the finished drawings of the two brothers, Francis and Ferdinand Bauer, which for beauty, accuracy, and completeness of details, are unequalled in this or any other country of Europe. The engraved copperplates mentioned in Sir Joseph Banks's will, and which are still unpublished, are of plants found by Sir Joseph Banks in Cook's first voyage, amounting to 743, and a smaller number of plants observed by Forster, in Cook's second voyage. The drawings of both series having been made in those two expeditions." These were all the materials of importance.

The Witness then submitted some observations with regard to the future of the Botanical Department of the Museum, quoting a resolution of the Trustees printed in 1837, as follows :—"That so long as the botanical collections remain in the care of Mr. Brown no change take place in the offices or emoluments of Mr. Brown and Mr. Bennett. That in the case of a vacancy occurring in the keepership of the botanical collections, the salary of the future keeper be £350 a year, for six days' service in each week ; and that subsequently to this event, the place of assistant-keeper be abolished." To account, in some measure, for the Trustees having come to this determination respecting the Department of Botany, it is necessary to state the circumstances attending the origin of that Department in 1827. Sir Joseph Banks, who died in June, 1820, by a codicil to his will, dated 21st January of that year, bequeathed to me "the use and enjoyment" during my life of his library, herbarium, manuscripts, drawings, and copperplates engraved, and after my decease to the Trustees of the British Museum ; or, if the Trustees desired to have the same removed to the British Museum during my lifetime, and I gave my written consent, the removal might take place. In March, 1827, the Trustees did express a wish to obtain my consent to the immediate transfer ; and I then stated to them that if they agreed to form an independent botanical department in the Museum, I was willing to take charge of it, on condition that I should be received into the establishment as an under-librarian (the title then of the principal officer of each department), in every respect, namely, in rank, salary, additional days' employment, and in having apartments ; and I offered at the same time to take charge of all the botanical collections previously existing in the Museum, as well as of the Banksian Herbarium, and everything belonging to or connected with it, the library excepted. This proposal, at first objected to in regard to amount of salary and to apartments, was at length, in June, 1827, agreed to, with two slight modifications only, namely, I limited my stipulation for additional employment to two days each week instead of three, which all other under-librarians then had ; and in lieu of apartments I agreed to take an equivalent in money, or in additional leave of absence, until such time as apartments could be provided for me, as the Trustees expressed it in the following resolution regarding my appointment :—

1st. That Mr. Brown shall be appointed an officer of the Museum by the name of an under-librarian for the custody and management of the Banksian collection, at the usual salary of £200 per annum for two days' attendance in the week, together with the usual allowance for two additional days per week, at the rate of £75 per annum each.

2nd. That Mr. Brown, while he continues in the Museum, shall, in conformity with the codicil annexed to the will of the late Sir Joseph Banks, have the exclusive care and management of the Banksian Botanical Collections, viz., the herbarium, the botanical manuscripts, with the unpublished drawings of plants and copper-plates engraved, subject to the rules of the establishment and the control of the Trustees ; and shall have access to the Banksian Library of printed books, as well as other portions, both manuscript and printed, of the library in the Museum, at all times that may be consistent with the duties of the officers under whose care they may respectively be placed.

3rd. That Mr. Brown shall be employed for the four days in the week, as above mentioned, in arranging the herbarium and other botanical materials belonging to the Banksian collections ; with which, if the Trustees think proper, all similar collections now in the Museum may be incorporated ; and that he may have full liberty to assist the Superintendent of the Royal Botanical Gardens of Kew in like manner as during the life-time of Sir Joseph Banks.

4th. That Mr. Brown be allowed an annual sum of £150 to enable him to procure a proper person as his assistant in the above duties, which assistant shall be appointed by the Trustees on the recommendation of Mr. Brown, and shall attend five days in each week throughout the year, excepting the usual holidays.

5th. That while there are no means of providing apartments for Mr. Brown in the Museum, he shall receive in lieu thereof either an annual allowance of £75 (in which case he will only be entitled to the usual vacation in the summer of six weeks), or, should this allowance in money not be agreed to by the trustees, that the vacation allowed to Mr. Brown be extended to fourteen weeks, to take place between the 1st of July and the 1st of November in each year.

(Signed) ROBERT BROWN.

30th June, 1827.

In making this arrangement with the Trustees, I had obtained for the important bequest made to the Museum by Sir Joseph Banks the same kind of superintendence which his collection had always had in his lifetime, and I believed I had secured the permanency of a Botanical Department, obviously wanting in the Museum, although in the first instance my duties were confined to the exclusive care and management of the Banksian botanical collections. In this belief I continued until the appearance of the statutes printed by the Trustees in 1833. In the fifth paragraph of chapter 2nd of these statutes, it is resolved that, on the vacancy of the keeper of Sir Joseph Banks's botanical collections, the whole care of these collections should be ultimately transferred to the regular officers of the Museum. The most obvious meaning of which is, that these botanical collections were to share the fate of those of Sir Hans Sloane, and of all other botanical material which had been presented to the trustees. In my evidence before the Committee of the House of Commons, in July, 1835, I adverted to this declared intention of the Trustees, expressing my hope, and indeed, confidence, that this intention would be reconsidered and abandoned. And I added, that in the present advanced state of natural history generally, and of the collections in the British Museum, its subdivision into distinct and independent departments had, in my opinion, become so obviously necessary, that the reunion of a division already admitted appeared to me a measure not likely to be ever adopted. I have entered into this subject at some length, chiefly to show that the Trustees had greatly underrated the importance of the bequest of Sir Joseph Banks, as well as of all the botanical collections previously belonging to the Museum. And although they have now determined to provide permanently for botany in admitting it to rank as a branch of natural history, and in placing its collections under the charge of an independent keeper, yet as they have rated that keeper greatly below those of the zoological and mineralogical branches, it would seem that they have not entirely divested themselves of their original value respecting it.

According to the resolution in question, it is intended that the Botanical Department, in the event of its keepership becoming vacant, shall be materially reduced in number and appointments of its officers. The salary of the future keeper is to be £350, for which he is to give six days' service instead of four, which the present keeper, having the same salary, gives. He is not to be entitled to apartments, nor to any equivalent such as the present keeper has, and the office of assistant keeper is to be abolished; consequently, the assistance he is to have must be of a very inferior description, possibly no other than that of an attendant. Reckoning, therefore, the value of an officer's time as it has always been reckoned in the Museum, and the moderate sum of £75, as an equivalent for a house, which I proposed, and which the Trustees appear to have admitted, the emoluments of the future keeper will be £225 less than those of the present, while the senior officer of the other two branches of natural history, whether he have the charge of the mineralogical or zoological collections, is for the same amount of attendance to have a salary of £600, with a house that may be reckoned at £125, or rather more than double; and the junior officer, whose salary is £450, with a house of the same value, somewhat less than double the appointments of the keeper of the botanical branch, whose condition no length or service can improve. It may be assumed, however, that the trustees, in establishing these three branches of natural history, intended to provide equally for the proper arrangement and increase of their respective collections. To account for this degradation of botany it will hardly be alleged that, as a science, it is inferior to either of the other two branches, or that less minute and accurate investigation is required for its advancement. It may, indeed, be allowed that it does not admit of exhibition to the same extent or equally attractive to the general public, and that hitherto little or none has been attempted in the British Museum. This, however, is not entirely owing to the nature of botanical collections, for fossil vegetable remains, which more properly belong to the botanical than to the mineralogical department, where they are now placed, along with illustrative specimens of recent forms and structures, would of themselves form no inconsiderable exhibition, independent of all the other materials of which I have already given a general account to the Commissioners. But, conceding the inferiority of botany in respect to a public exhibition, I venture to state, that the number of really scientific visitors to the botanical branch is nearly equal to that of both the other branches, and that the facility of access to, as well as the accommodation in consulting it, at least, not inferior to either of them. As a botanist, however, among naturalists is not reckoned inferior in education or intelligence, or in the importance of his subject, to the zoologist or mineralogist, so the Trustees can hardly expect to secure abilities of the first class for an office which they thus choose to reduce; neither can they expect that in future they should receive valuable bequests to a department looked upon in so inferior a light. There is certainly no scientific establishment in Europe in which botany is considered inferior, either in its importance as a subject, or in the appointments of its officers, to the other two departments of natural history. I may cite in proof of this, that in the Jardin des Plantes at Paris there are three professors of botany, all of whom are members of the Academy of Sciences in the Institute of France, and that two of the assistant officers in charge of the Herbarium are members of the same Academy, a quality of assistance not existing in any of the other departments of that establishment. In St. Petersburg the principal officer in charge of the Herbarium is a member of the Imperial Academy of Sciences, to which Academy the natural history collections belong. And at Berlin the Herbarium has a competent establishment of officers, and is also distinct from the Botanic Garden. For the light in which botany continues to be viewed by the trustees I can no otherwise account than that, for nearly half a century, that is, from the death of Dr. Solander, in 1782, to 1827, it had been almost entirely neglected in the British Museum. It may also be said that the Sloane collections, bound in volumes, in which the specimens were fixed and placed without order, did not admit of any improved arrangement, and could not, therefore, have gained much from the superintending care of an officer."

In reply to questions, the witness stated that he was one of the eight foreign members of the Academy of Sciences (Paris); that in the paper he had just read, it was his wish to deprecate any measures which in the future would tend to degrade the status of the department, believing that by the intended reduction its duties could not be adequately discharged, nor the proper qualifications of the keeper secured.

The association of the botanical collection at the Jardin des Plantes is in connection with a garden of living plants, but that is due to the garden being in the town. Asked if that did not give a great advantage to the collection of dried plants, and render it of greater interest than if the two were separate, he said, "I am not of opinion that it does so with respect to scientific consultation. Consulting an herbarium, and visiting a garden are two things so entirely different that they are seldom thought of together." He continued, that "a great many persons at Paris consulted the herbarium without making any reference to the living plants in the Jardin des Plantes." The Berlin collection is not in connection with the garden, which is at some distance from it, they being perfectly distinct establishments; the professors of botany in the University are directors of the garden, but the witness could not state how far they are connected with the herbarium. Furthermore, he considered the fossil plants were wrongly placed in the mineralogical collection, and considered that they would be better placed in the Botanical Department, in proximity to the recent types; that is so in Paris, where there is a large collection of fossil plants; he was not sure whether that proximity could be ensured for the animal fossils, as he considered that outside his province. Fossil botany is almost a new science, which has arisen since the decision of the Trustees as to his department. Lectures on botany were given at the Jardin des Plantes, but in Berlin they were delivered in the University.

A fine collection of palms exists at Berlin, and another one at Potsdam, the private garden of the King in the Pfauen Insel.

With reference to his former evidence as to exhibition, he stated that a room had now been assigned to him, and was in course of being fitted up. The rate of progress was governed by questions of expense. Possibly the exhibition might be opened to the public during the summer of 1849, but great additions must be made to it to make it a satisfactory exhibition.

He reiterated his former opinion that the removal of the herbarium to any garden or establishment at a distance from London, thus removing it from the Museum, where it was in close proximity to the library, would be very detrimental to the science of botany; it was requisite not only to have the ". . . books expressly botanical that you must have, but likewise all periodical publications which profess to have natural history in any degree. You must have the memoirs of academies. . . and you must have voyages and travels; you must in fact have access to the general library." When he gave up the custody of the Banksian Library, he retained very few books. . . . . "chiefly those which had manuscript notes, but very few else, one of my objects being to preserve together all the manuscripts that belonged to Sir Joseph Banks, in conformity with my agreement with the trustees." Several of the volumes are still retained by him, 26 in all, bound in 149 volumes, and he believed all of them to be duplicates.

Mr. John Joseph Bennett, described as secretary of the Linnean Society and assistant to Mr. Brown in the Botanical Department of the Museum, was examined almost entirely with regard to classed catalogues, and Dryander's catalogue in particular. Nearly twenty years before, it was proposed that he should prepare the botanical portion of the general catalogue of the library, but the work was not prosecuted.

Mr. Antonio Panizzi, in the course of his evidence, repeatedly referred to Dryander's catalogue of the Banksian books and manuscripts, but no light was thereby thrown on the subject before this Committee.

Memorial deprecating breaking up the British Museum Collections.

In 1858 a memorial was addressed to Her Majesty's Government deprecating any removal of the natural history collections from the rest of the collections and the library; it was entitled:—

> "Memorial of the Promotors and Cultivators of Science on the subject of the proposed severance from the British Museum of its Natural History collections, addressed to Her Majesty's Government.
>
> "The report of the Royal Commission appointed to inquire into the best site for a National Gallery, and recent discussions in Parliament having led to the contemplation of breaking up the British Museum, by severing from it the Natural History collections, we, the undersigned, promoters and cul-

tivators of natural knowledge, beg to record our strong objections to such removal, and for the following reasons:—

"The British Museum, when established by Act of Parliament in 1755, was essentially a Natural History collection, the enlightened views of its founder, Sir Hans Sloane, being that it should be rendered as useful as possible, as well towards satisfying the desire of the curious as for improvement, knowledge, and information of all persons.

"This object of Sir Hans Sloane has been so satisfactorily carried out that according to the report of the last Royal Commission, which inquired into the whole state of the Museum (1849), the evidence of men of the highest authority in science was referred to with great satisfaction, to show that the Natural History collections were, as a whole, equal if not superior to any in the world.

"In reference to other suggestions that have been vaguely thrown out, of a breaking up of the Natural History collections of the nation into several parts by transferring, *e.g.*, the minerals to the Government School of Mines, the stuffed animals to the Zoological Society, the insects and shells to the Linnean Society, etc., we have first to observe that not any of the above institutions, two of which are only voluntary associations of individuals, possesses the space or means for the reception and display of such constituent parts of the great national series of illustrations of nature; and, further, that as the chief end and aim of Natural History is to demonstrate the harmony which pervades the whole and the unity of principle which bespeaks the unity of the creative cause, it is essential that the different classes of natural objects should be preserved in juxtaposition under the roof of one great building.

"We further strongly object to the proposed transference, because those engaged in the study of Natural History have in the British Museum the paramount advantage of consulting every work which can aid their researches; whilst a removal of the collections would either involve a conjoint transference of a very large portion of the National Library, or necessitate a very expensive purchase of a special Natural History Library.

"Whilst such are the prominent reasons against the removal of the Natural History collections from the site where they have been established, for upwards of a century, in the centre of London, we beg to add the expression of our opinion that such removal, particularly if to any situation distant from that centre, would be viewed by the mass of the inhabitants with extreme disfavour, it being a well-known fact that by far the greater number of visitors to the Museum consists of those who frequent the halls containing the Natural History collections; whilst it is obvious that many of those persons who come from the densely-peopled districts of the eastern, northern, and southern parts of London would feel it very inconvenient to resort to any distant locality.

"For these reasons, as based on scientific advantages, the convenience and instruction of the people and the saving of a large sum to the nation, we earnestly hope that the Natural History collections may not be interfered with, but be allowed to remain associated with the many other branches of human knowledge which are so admirably represented in this great national establishment."

The list of signatories was headed by Lord Wrottesley, President of the Royal Society, and 113 other naturalists.

ENQUIRY BY THE TRUSTEES OF THE BRITISH MUSEUM.

Next in order comes a Return to the House of Commons, dated 1st July, 1858; Copies "of all Communications made . . . . . to the Trustees respecting the want of space for exhibiting the collections in that Institution . . . . . and of all communications between the Trustees and the Treasury upon the same subject," &c.

"The Principal Librarian to the Lords Commissioners of the Treasury.

"British Museum, 14th June, 1858.

"My Lords,—I am directed by the Trustees of the British Museum . . . to state to your Lordships that, in consequence of the death of Robert Brown, Esq., the Keeper of the Botanical Department, which took place on the 10th instant, the Trustees have been induced to institute an examination into the question whether it may be expedient or otherwise to remove the botanical collection from the Museum, as it presents a case in some degree peculiar.

"By the will of Sir Joseph Banks, his library, herbarium, manuscripts, etc., were bequeathed to Mr. Brown for life, and afterwards to the British Museum, with permission to Mr. Brown to allow them to be removed to the Museum during his lifetime, should the Trustees desire it. Mr. Brown, having consented to the latter arrangement, was appointed an officer of the Museum in 1827, under certain conditions which were to continue during his life.

"I am to add that, on account of the present state of the question with respect to the Botanical Department, and also of the real urgency of the case as it respects the demands for accommodation beyond that department, the Trustees are anxious to be supplied with further and early information of the views of the Government . . . . and of any wishes they may entertain as to inquiries to be undertaken or further information to be supplied by the Trustees.

"I have, etc.,
(Signed) A. Panizzi.

"The Right Hon. the Lords Commissioners of Her Majesty's Treasury."

House of Commons, 1858, n. 379 (pp. 64-65.)

This letter was immediately followed by the investigation itself, as follows, the account of it being extracted from another return, dated 11th March, 1859:—

> "Extracts from the minutes of the Trustees at a Sub-Committee on Natural History, 16th June, 1858. . . . Read: The extract from the will of the late Sir Joseph Banks, entered upon the minutes of the general meeting of 8th July, 1820, and the minute of the Committee of 30th June, 1827, containing the terms of agreement entered into by the Trustees with Mr. Brown . . . Sir William Hooker, Dr. Hooker, and Dr. Lindley, who were in attendance at the special request of some members of the Sub-Committee, were then called in."

The evidence of Mr. Robert Brown was then read so far as it related to his agreement with the Trustees (see page 116), and his opinion as to the slight connection between herbaria and botanic gardens.

The Sub-Committee then proceeded to take evidence upon the question of moving the Botanical Department from the British Museum to Kew.

Sir W. HOOKER. 1858.

Sir William Hooker examined: He was of opinion that the removal of the botanical collection to Kew without the Banksian library would be expedient for the safety of that collection, inasmuch as it would be to purer atmosphere; it has certainly suffered from the smoke and dirt of London. "Its advantage will depend on the extent and nature of the collection, with which I am not familiar." To study plants effectually it is essential that a great many specimens and books should be exposed at the same time, often for many hours consecutively; he considered it desirable that herbaria should be in connection with living plants; the Kew herbarium is much more extensive and better named than that at the British Museum, it consists partly of his own, and partly of a very valuable herbarium given by Mr. Bentham to the establishment on the condition that it should be available to working botanists; the Museum specimens are to a great extent duplicates of the Kew collection, but amongst them are many of great historic interest; the Kew collections are frequently consulted, and many works have emanated from these consultations.

"There is scarcely a day when a student is not employed in consulting the collections. During last autumn there were no less than four distinguished foreign botanists at one time residing at Kew for the sole purpose of working in the herbarium. I would take the liberty of drawing the Committee's attention to my report for 1857, where the attendance at the herbarium of working botanists from all countries is fully dwelt upon and the results detailed.

It is only within the last six years that there has been a herbarium available to the public at Kew. Its value to us and to working botanists has become more and more apparent every year, and I do not find that botanists complain of coming out to Kew to consult the collections; they come and reside there days, weeks, and months. The power of consulting the living plants, together with the two museums of Economic Botany at Kew, and the fact of the botanical library being in the same suite of

Sir W. HOOKER. 1858.

apartments with the dried plants, add to the utility and facility of working there.

There is a very extensive library at Kew. It consists of: 1. My own private library, which I have been upwards of fifty years in forming, regardless of cost; it is a very extensive and complete botanical library, and is at present available to the public. 2. The very valuable public library, consisting of a donation of 1,200 volumes of works of the greatest practical utility to botanists, by Mr. Bentham; of a legacy of 600 volumes, including many costly illustrated works by Dr. Bromfield; and, lastly, of additions by purchase with £100 a year annually granted by Government for that purpose.

The specimens are of recent plants generally. We have only a very few fossil plants in the Museum of Economic Botany attached to the Botanical Gardens.

There would be no particular inconvenience if the Sloane collection were retained at the British Museum, the other collections being removed to Kew, but the value of the transfer would be diminished. The Sloanean collection is chiefly of historic value, and that is very great.

It is not likely that there would be any danger of injury to the botanical collections in removing them from the British Museum to Kew.

The plants in the herbaria at Kew, for the most part, are my own private property. My private collection is perhaps from four to five times more extensive than the public one. The building in which the herbaria are now contained is the private property of the Queen; I have the use of it by special favour from Her Majesty, upon the condition of my giving every facility for scientific botanists (who are properly recommended as such) to work in it and make proper use of it. On my taking office at Kew there were no libraries or herbaria, and I was obliged myself to keep these up, chiefly for the use of the establishment; in consideration of this the Government allowed me first house rent for the accommodation of the herbarium, and latterly (on my being transferred to an official residence) the building to which I have alluded was assigned to its accommodation. Mr. Bentham's herbarium and library, and Dr. Bromfield's, were at a subsequent period deposited in the same building."

Dr. *Hooker* examined.

Dr. HOOKER.

"I can corroborate everything that Sir W. Hooker has said. There are two circumstances which I think the Trustees should bear in mind in dealing with the question of the transference of the botanical collections from the British Museum to Kew. 1. That it is in one sense immaterial to us at Kew what becomes of the British Museum herbarium; for a first-rate herbarium and library must be maintained at Kew, and are indeed essential to Kew for naming the plants in the garden and museums of Economic Botany, and for giving to botanists and gardeners the information daily demanded of us. The garden cannot exist as a scientific establishment without these adjuncts. 2. That their being indispensable to Kew, and in constant use for the garden purposes, is no obstacle to their being consulted to any extent by other botanists, nor does it at all interfere with the facility of consultation. A herbarium and library of such value and extent as that at Kew must be, though originally maintained expressly for the use of the garden, cannot with propriety be closed to scientific botanists.

That portion of the library that belongs to Government requires increasing, upon which increase we expend an annual allowance of £100, but we do not increase it to the extent we might, because we can avail ourselves of Sir W. Hooker's library, and do not, therefore, feel justified in asking for a larger allowance."

The separation of this herbarium from the British Museum library will cause "no practical inconvenience, as we are now circumstanced at Kew, for we have now as I have stated, an excellent library there, and which is quite sufficient for all the ordinary purposes of scientific botany."

With regard to the comparative facilities for consulting the herbaria at the British Museum and at Kew; "it is generally admitted by botanists that it is not practically more inconvenient to consult the collections at Kew than at the British Museum, on account of the easier access to the library at Kew, and on account of the much greater extent of the named herbarium there, though it takes a longer time to go to Kew: the time thus occupied is far more than saved by the facilities of consultation at Kew. The proof of this is that foreign botanists coming to this country for the purpose of study invariably reside at Kew for the sake of being near the herbarium there; and find it to be an inconvenience to have to go into town to consult that of the British Museum."

Dr. HOOKER, 1858.

John Joseph Bennett, Esq., was then sent for, and examined.

J. J. BENNETT

The Hermann Herbarium "forms part of the Banksian. Part of Mr. Brown's collection made during Flinders's voyage has been laid in, in the general collection; a very large proportion of those plants which were loose at Sir Joseph's death has also been laid in."

Mr. Brown, with reference to the future destination of the botanical collections, "expressed his strong desire that they should remain at the Museum; recently, and to the very last."

The Sloanean collection remained in this Museum for the greater part of a century without a botanical department, "it has been a good deal consulted by Mr. Brown and myself, but scarcely at all by any other botanist, unless his attention was called to it by us."

Mr. Bennett then withdrew.

Dr. *Lindley* examined.

Dr. LINDLEY.

With regard to transferring the botanical collections to Kew without the Banksian Library, "I consider that the transfer would be of the greatest advantage. The herbarium at Kew being made up of two of the greatest herbaria in the world, must, necessarily, be consulted by botanists. It is very desirable, in many cases, that the Banksian Herbarium should be consulted also; you have, therefore, two centres to which a botanist must go, one here, and the other at Kew. It is extremely inconvenient to come from Kew to the British Museum, because the same materials are not found at the Museum as at Kew. The great value of the Banksian Herbarium is, that it contains a large quantity of authentic materials which require to be compared with others not at the British Museum. Comparison of objects at distant points is difficult, and attended with great loss of time. Were the collections together, comparison would be easy, and much time saved."

It is extremely desirable that herbaria should be in establishments in connection with living plants. "I have been a working botanist for 40 years, and the result of my experience is, that the power of consulting living plants, in connection with the dry ones of a herbarium, can hardly be over-estimated.

"I do not think there would be much inconvenience" if the Sloane collection were retained at the British Museum, the other collections being removed to Kew, "though there might be some. I understand the Sloane collection to be principally valuable on account of the West Indian plants it contains. In the case of a botanist working on a West Indian Flora, it would be inconvenient to him to be obliged to come from Kew to the British Museum to study what he might find here in the Sloanean collection; but this is an exceptional case. It would be better, on the whole, that the collections should be together.

I agree with what has been said by Sir William and Dr. Hooker, that persons go to live at Kew to study, and that there is, therefore, no practical inconvenience felt by the collections being kept there."

Sir W. Hooker, Dr. Hooker, and Dr. Lindley, having withdrawn,

Professor *Owen* was called in and examined.

Professor OWEN.

He was "of opinion that the botanical collections might be removed to Kew without any material disadvantage to the other great natural history collections now in the Museum. The only disadvantage would arise from the loss of certain specimens of recent botany that are required to illustrate fossil plants; in specifying which disadvantage I speak merely as the superintendent of the Natural History Collections, and not in reference to the wider questions of the relations of a national collection of botany in the British Museum to the advancement of that science.

Asked "How far are you of opinion that the transferring the botanical collections to Kew without the Banksian Library would, or would not, prove of advantage to science?" Replied, "Assuming that the botanical collection at Kew fulfils at present, in a certain degree, the functions of a national collection of botany, the advantage which it would derive from the addition to it of the collection of botany now at the British Museum, would be in the ratio of the species of plants new to the Kew collection, and in the ratio of the

Professor OWEN. — 1858

historical value which attaches to parts of the British Museum collection of botany, as, for example, to the Banksian Herbarium.

As to whether it is desirable to remove the British Museum collection to Kew: "That question opens out a wider view of the subject. I would first beg to express my conviction of the advantage of the nation possessing only one museum of any department of natural history. Two public or national museums in different localities mutually impede the perfection of either. They raise the market price of the specimens of the same class. If it be a very rare specimen, and the heads of the two respective establishments are desirous to have it, they bid against each other. Then it involves the necessity, occasionally, of the scientific investigator of a particular subject having to visit two museums under a certain disadvantage in each, when he would otherwise have to visit but one, under more advantageous circumstances for his inquiries. Believing that, for some years past, the present botanical collection at Kew has, to a certain extent, fulfilled the functions of a national one, I should be disposed to regard that locality as the more advantageous one for carrying out the design of a complete national botanical collection."

I am "aware that the greater portion of the herbarium and library at Kew is the private property of Sir William Hooker; and I beg to add that wherever it be determined to place the national collection of botany, it would, in my opinion, be essential to include in it such private collections."

The answer given has no bearing whatever on the severance from the British Museum of the other collections of natural history. "The circumstances influencing my opinion on the botanical department do not exist in relation to any other department of the natural history collections in the British Museum.

I think that a national collection of botany should include the fossil plants, and that they are as essential to a complete view of the forms of that kingdom of nature as they are indispensable for a collection of palæontology in relation to geology. I am, therefore, of opinion that a series of fossil plants should exist both at the British Museum for the geology, and at Kew for the botany."

In the event of the botanical collection being removed from the British Museum, I believe that "a small selection could be made sufficient to illustrate fossil botany; a small series would be quite sufficient, and I think it essential to the usefulness of a collection of fossil plants."

* * *

Professor Owen then withdrew.

At a subsequent meeting, on 21st June, 1858, *George Bentham*, Esq., Professor *Henfrey*, and Dr. *H. Falconer* being in attendance, were called in and examined.

George Bentham, Esq.

G. BENTHAM, Esq.

"I am of opinion that the removal of the whole botanical collection to Kew would not be advantageous to science; but that, under certain circumstances, the removal of the Banksian Herbarium forming part of the botanical collection might be advantageous.

"Supposing Government to carry out, as contemplated, the plan of providing a suitable building at Kew for the national herbarium, and adding to the present national herbarium Sir W. Hooker's Herbarium, and providing a proper staff for the use of that herbarium and library; under such circumstances, I think the Banksian Herbarium would be more useful at Kew than at the British Museum. By Banksian Herbarium, I mean the botanical collection left by Sir Joseph Banks."

Questioned: "You have presented, we understand, a valuable herbarium and library as public property to the Royal Botanical Establishment at Kew; now, what are your views in making this donation?"—Answered: "I thought that at that time there was no herbarium and library in London sufficiently open for the use of botanists, and I presented them on condition that they should form the nucleus of a national herbarium and botanical library, to be kept up at the expense of Government, and open to the free use of botanists, under such regulations as the Director of the Kew Gardens should establish."

The portion of the whole herbarium at Kew (the larger part of it being the private property of Sir W. Hooker), my collection constitutes, "as near as Dr. Hooker and myself could calculate, about one-fifth."

Supposing that there were buildings at Kew capable of receiving a large public herbarium provided with a staff competent to manage it, and that it should be hereafter considered desirable to transfer thither the botanical collections of the British Museum; "I think the Sloanean is of more value at the British Museum than it would be at Kew, and I think that a great portion of the additions to the Banksian Herbarium since Sir Joseph's death, are duplicates of those already at Kew. With regard to many unarranged plants at the British Museum, I am unacquainted with them.

G. BENTHAM Esq. — 1858.

"I think" that, for the advantage and convenience of botanists resident in London, it would be desirable to retain a consulting herbarium at the British Museum in addition to that at Kew. "It may be of use to botanists—not, perhaps, working botanists—to have a herbarium to consult in London, without going to Kew."

I have paid a great deal of attention, as a systematic botanist, to the natural order of the *Leguminosæ*; and am cited in Lindley's "Vegetable Kingdom" as an authority for the fact, than in the year 1845 there were about 6,500 species of that family then known.

"I became acquainted with nearly the whole *Leguminosæ* through the medium of herbaria. There are not many hundreds that I have seen living."

As to the proportion of these 6,500 species seen in the living state, "I have examined very few in botanical gardens; very few indeed."

I have published several thousand new species of plants; I have never published one without examining it in a herbarium, and I have examined very few in botanical gardens.

It is absolutely necessary for the good use of a herbarium that it should be in close connection with a good botanical library. A botanical library is useful without a herbarium, but not a herbarium without the library.

I do not think it necessary for the study of a herbarium that there should be a collection of living plants in connection with it.

It appears to me of great consequence that so long as natural history is exhibited to the public in the British Museum, a botanical collection should be included in that exhibition."

Professor *Henfrey*.

Professor HENFREY.

I generally agree with Mr. Bentham, and do not differ "in any points of importance. The only point of importance I would dwell on would be that of keeping a botanical collection at the British Museum.

I think that a botanical collection in the British Museum should be devoted to the illustration of the science of botany, and not to its application."

Dr. *H. Falconer*.

Dr. H. FALCONER.

Invited to explain to the Committee what posts he had occupied as a director of a public botanical garden; said, "I held the office of superintendent of the botanical garden at Saharunpoor in the North-western Provinces of India, near the foot of the Himalayah Mountains, from 1831 to 1843, as the immediate successor of the late Dr. Royle, and in succession to the late Dr. Wallich. I was superintendent of the botanical gardens of Calcutta from 1847 to 1855, making jointly a period of about twenty years. In Calcutta I was ex-officio professor of botany to the medical college, and as such I had annually to give a course of lectures upon the science.

I have read the evidence given by the late Mr. Robert Brown (*see* page 117) on the occasion referred to, and I entirely agree in the opinions expressed by him regarding the objects and practical uses of a herbarium kept up distinct from a botanic garden. Mr. Brown, from his acknowledged pre-eminence, was entitled to give his opinions with the weight of authority; he did not enter in detail into the reasons on which they were founded, and the Royal Commission seems to have received his statements without asking for explanations. I believe that there is a good deal of general misconception on this subject, and I am desirous of giving the reasons for the opinions which I hold. The scientific object of a botanical garden is to grow the greatest possible number of species of living plants, illustrative of the largest number of genera and natural orders, as near as may be to the state in which they occur in nature; the whole methodically named and classified, so as to exhibit an *ensemble* of the range of vegetable forms, of the plan upon which they have been designed by nature, of their mutual affinities, and of their properties and uses. But from the different media in which plants are produced, and the great range

Dr. H FALCONER 1858.

of climate, temperature, elevation above the sea, and other physical conditions under which they occur in nature, it is impracticable to embrace the whole range of vegetable forms in the living state, in any one botanical garden. The united contents of all the botanical gardens in the world will, in all probability, never be able to accomplish this. A botanical garden, therefore, on the most liberal scale of maintenance, as a national institution, and under the ablest management, can never be more than a repository of selected examples of living plants in cultivation. It may be surpassingly rich in examples, like the matchless national institution at Kew, but in the nature of things it can never include all existing forms of vegetables. A herbarium, on the other hand, supplements the objects that cannot be attained by a botanical garden. Plants, as objects of systematic arrangement, are distinguished by means of their flowers, fruit, and seeds, in conjunction with their leaves. A single dried branch presenting these organs carefully preserved, or a series of branches in collocation, presenting them in different states of growth, are in most cases sufficient for the purposes of identification and arrangement. A herbarium is a compendium of a species of plants in this state: and it may fulfil the conditions that are impossible in a botanical garden, namely, it may contain an example, in a determinable state, of all known or described vegetable forms, arranged irrespective of media, climate, or physical conditions, but solely according to the relation of affinity in which they stand in nature; the attainment of this object being the highest aim of the science of botany. This measure of completeness has nowhere as yet been arrived at; but every possessor of a good herbarium strives to attain it, in some one department or other; and, already, numerous herbaria in the possession of private parties are known to contain a much greater number of species than have ever been grown at one time in any botanical garden in the world. A herbarium, therefore, with the adjunct of an extensive library, which is indispensable to it, may be complete, and eminently useful, practically, although wholly separated from a botanical garden. But the converse cannot be affirmed; it is impossible to conceive a botanical garden, as a scientific institution, without the adjuncts of a first-class herbarium and library. I may illustrate this view by a parallel example; an arranged and named collection of shells or of corals bears the same kind of relation, as a part of the animal kingdom, to an aquavivarium, that a herbarium, as a whole, does to a botanical garden. Vast collections of shells have been formed, scientifically described, arranged and maintained as practically useful means of reference, without any connection with a molluscous vivarium. From the nature of things an aquavivarium, to comprehend living forms on the scale of a botanic garden, is practically unattainable. But the general ends of scientific arrangement are accomplished without it; and so is the arrangement of plants in a herbarium considered apart from a botanical garden. In actual practice the contents of the herbarium are more in request, and more frequently consulted, in researches on systematic botany, than the living plants cultivated in a botanic garden. The latter, in most cases, serve more as exponents of the results which have been attained in classification than a means of attaining them. The natural order of the *Compositæ* has been estimated to comprise upwards of 9,500 species, or one tenth of known plants. Probably no botanical garden in existence contains a tenth part of the species. For the identification or comparison of a collection of this family brought from a previously unexplored locality, a botanist would refer to the contents of a herbarium, and not the living plants in a botanical garden. Many instances of the same kind could be cited of other families. Certain genera among the *Dicotyledones* are described in systematic works as containing 600 or 700 species, and of these genera not more than 50 species, at the utmost, will be found cultivated in any botanic garden; examples of the rest can only be seen in herbaria. In all such cases it is to the contents of a herbarium, in conjunction with a good library, that the botanist looks for what he wants.

I have no exact knowledge of the extent to which the herbarium in the British Museum, in connection with the Banksian Library, has been used by practical botanists; but I consider that access to a collection, in the centre of London, containing upwards of 30,000 species of plants, arranged by or under the superintendence of so eminent a botanist as the late Mr. Robert Brown, and connected with a library like the Banksian, was highly calculated to be useful and important to practical botanists, and to promote the advancement of systematic botany. Where a doubt or difficulty occurred, they had the means, in very many cases, of solving it close at hand. One circumstance that may have contributed to diminish the resort is, that the British Museum Herbarium is reputed to be considerably less rich numerically in species than even certain private collections; and a person will not go to a public collection for information respecting a point on which he has more materials at home, or can more conveniently consult elsewhere. But the privilege of ready access to so many authentic specimens of old or celebrated collections was and is an important advantage to those interested in botanical pursuits."

Dr. H. FALCONER. 1858.

In addition to a botanical establishment at Kew, "I believe that a separate public herbarium and library in the centre of London, and easily accessible, are so useful and necessary, that it would be in the highest degree inexpedient to do away with them, whatever might be the excellence and richness of the collection at Kew. I would be for having a good public herbarium at both places. For strangers, Kew may be the most convenient, and that most resorted to; but for people living in London, and having business engagements, it is inconveniently distant.

The inconvenience of dust and soot applies to specimens of every description kept in the middle of London. It is certainly a great nuisance, but I do not regard it as incompatible with the preservation of a herbarium in a fit condition for scientific consultation."

I am acquainted with some old collections of the earlier botanists contained in the Banksian Herbarium which are still in a condition for advantageous consultation." I have referred to one of Kæmpfer's specimens, upwards of 170 years old, now preserved in the Banksian Collection, and I have been able to use it with advantage as a standard of comparison, no other being available elsewhere. (*See* Transactions of the Linnean Society, vol. xx. p. 285.)"

As an example within my own knowledge of the advantages accruing to the science of fossil botany, by a ready access to the collection of the British Museum and to their late keeper; "Dr. Buckland, in his memoir on the stems of *Cycadeoideæ* from the Portland Oolite, which was at the time considered, both at home and abroad, to be an important step in vegetable palæontology, was materially aided in the identification by the counsel and suggestions of the late keeper of the botanical collections in the British Museum, and was indebted to him for the recent stems which he used and figured for comparison."

A collection of woods such as exists in the British Museum is important for the illustration of the numerous fossil plants in the Museum. "There certainly ought to be, under the same roof, collections of the recent structures to illustrate and compare with the fossil forms."

I agree generally with the opinions expressed by Mr. Bentham; but "I do not agree with that part which would sever the Banksian Herbarium from the British Museum collection and transfer it to Kew. I am of opinion there ought to be a collection of standard and authentic specimens, that is to say herbarium specimens, in the British Museum."

The juxtaposition of a herbarium in connection with living plants is of advantage with reference to the study of structual and physiological botany. "I cannot conceive a botanic garden being used for scientific objects without a herbarium and library."

Mr. Bentham, Professor Henfrey, and Dr. H. Falconer then withdrew.

LETTERS from Sir *Charles Lyell* and *C. Darwin*, Esqrs., to Sir *R. I. Murchison*, were read, and ordered to be printed, together with the Evidence taken at the last meeting of this Sub-Committee, as well as at the present meeting.

Sir *Charles Lyell* to Sir *R. I. Murchison*.

53, Harley-street, London, 21st June, 1858.

My dear Murchison,—

I heard with the greatest concern of the proposal of removing any part of the botanical collection from the British Museum to Kew. I have been hoping for years to see that collection enlarged, and part of it, *e.g.*, the woods and fruits, opened freely to the public, and the rest, the herbarium, made accessible to scientific men.

Such treasures might not last so long in the dust and smoke of London as in the country, but if they were ten times or a hundred times more consulted when here, then London is the place where they ought to be stationed.

When the late Sir William Symonds began a collection of the woods used in shipbuilding, and of the fruits of

the trees from which those woods were derived, hundreds went to Somerset House to see them; and besides their usefulness in an economical point of view, they were often advantageous, as I can testify, to palæontologists.

I take for granted the botanists will give the Trustees good reason of their own why an extensive herbarium should be placed within their reach in the metropolis. I shall, therefore, confine myself to the bearing of a collection of specimens of the vegetable kingdom on our own science. You may remember that Professor Phillips told us at one of our last meetings at the Geological Society, that he should have been unable to draw up the paper which he read to us on a fossil fruit from Purbeck, had he not been able to compare it with a large assemblage of recent fruits, of different families of plants, which he found in the Kew Museum.

Professor Heer, of Zurich, now, perhaps, the most active and successful cultivator of fossil botany in the world, told me last summer that the progress of that department of palæontology is seriously impeded by the want of a great collection of the leaves and fruits of living plants, which, as yet, exists nowhere in Europe. It is becoming almost as indispensable for the advance of geology as the rich collections of the skeletons of mammalia and fish which we must now go to Paris or Vienna to consult. I set a high value on the new Museum of Economic Botany at Kew, but we want a collection of a more comprehensive kind of plants, whether they be commercially useful or not. Some of these would be purely of scientific interest; but many others might be made as instructive and attractive, if placed in glass cases, as are the corals, shells, or many other departments of natural history, to which crowds now resort.

Believe me, &c.
(Signed) *Cha. Lyell.*

Charles Darwin, Esq., to Sir *R. I. Murchison.*

Down, Bromley, Kent, 19 June.

My dear Sir Roderick,—

I have just received your note. Unfortunately I cannot attend at the British Museum on Monday. I do not suppose my opinion on the subject of your note can be of any value, as I have not much considered the subject, or had the advantage of discussing it with other naturalists. But my impression is, that there is much weight in what you say about not breaking up the natural history collection of the British Museum. I think a national collection ought to be in London. I can, however, see that some weighty arguments might be advanced in favour of Kew, owing to the immense value of Sir W. Hooker's collection and library; but these are private property, and I am not aware that there is any certainty of their always remaining at Kew. Had this been the case, I should have thought that the botanical collection might have been removed there, without endangering the other branches of the collections. But I think it would be the greatest evil which could possibly happen to natural science in this country, if the other collections were ever to be removed from the British Museum and Library. Pray believe me,

Yours, &c.
(Signed) *Ch. Darwin.*

The Sub-Committee then proceeded to the consideration of their report, which was agreed to as follows:—

The Sub-Committee on Natural History, to whom it was referred to take evidence as to the expediency of transferring the botanical collections now in the British Museum to Kew, beg to report that while all the botanists they have examined are of opinion that it would be advantageous to form a botanical establishment at Kew, comprising an extensive herbarium and a good library, as an addition to the garden of living plants, there are differences of opinion respecting the desirableness of also keeping up in the metropolis such a herbarium in connection with the extensive library of the British Museum.

Sir William Hooker, Dr. J. Hooker, and Dr. Lindley have given reasons in favour of the removal of the collections from the British Museum to Kew, with the view of rendering that establishment more complete, but Dr. H. Falconer, long at the head of the Botanical Garden of Calcutta, and Professor Henfrey, support the opinion of the late eminent botanist, Mr. Robert Brown, and believe that such a removal would be of great disservice to science by depriving the consulting botanist of ready access to a central metropolitan herbarium and library.

In this view Mr. Bentham coincides, with this exception, that he wishes the herbarium bequeathed by Sir Joseph Banks to be removed to Kew.

In reference to the scientific importance of the botanical collection in its illustration of the geological specimens in the Museum, the opinion of Sir Charles Lyell is decidedly in favour of retaining such a botanical collection in the metropolis.

It is stated in evidence that a herbarium may be eminently useful to the student even when entirely separated from a garden, and such evidences affords an answer to any argument in favour of a removal, which might be apparently derived from a consideration of the expediency of uniting all the constituents of a botanical collection in one place.

The herbaria at Kew, and the library there, are, by far the greatest part of them, private property, and only accessible to the public under certain conditions; there are no buildings belonging to the gardens in which the united collections could be deposited, and no staff sufficient for its care, and the arrangement of necessary accessions. It is also stated that the number of specimens common to the collections at the British Museum and Kew is very large.

In addition to the above considerations it is clear that such a transfer as above alluded to cannot be made at present, nor, as it appears to your Sub-Committee, can the question be seriously entertained until the Government has decided upon erecting the necessary buildings at Kew, and providing a sufficient establishment in that locality.

We are, therefore, unanimously of opinion that it is not desirable to recommend the translation of the botanical collection from the British Museum to Kew.

We further suggest that the vacancy caused by the death of Mr. Brown should be filled up, according to the Minute of the Trustees of the 26th January, 1837, §54.

[This was accordingly done by the appointment of Mr. J. J. Bennett as Keeper of Botany.]

VARIOUS CRITICISMS ON THE FOREGOING.

"Quarterly Review," July, 1858. Art. VII. (On the British Museum, Official Papers, 1835-58.)

This article gives a short history of the entire collections from the time of Sloane's bequest onwards. On page 213 the writer demands that the collections of natural history should be separated from the rest, and housed in a building to be specially erected for their reception, preferably at Burlington House, or else at Kensington Gore.

"The Natural History Collections in the British Museum." "Gardeners' Chronicle," 14th August, 1858, pp. 620, 621.

An article by Mr. George Bentham, signed with his initials. He refers to the "Quarterly Review" article, and continues, " . . notwithstanding the Memorial. . . an impartial perusal of the above article leads to the conviction that such a step [as the removal of the collections in question] is now indispensable," and urges the transference of the botanical collections to Kew, with the exception of the "Sloane Herbarium."

Leading article on the same subject, ib. 28th August, 1858, pp. 651, 652, by the Editor, Dr. Lindley.

Further extracts from the previous paper, House of Commons, 1859, n. 126.

Professor *Lindley* to the Principal Librarian.

21, Regent Street, S.W.,
Dear Sir, 19 November 1858.

Will you have the goodness to place before the Trustees, when they next meet, the accompanying copies of a memorial that has been to-day sent to the Treasury, on the subject of the natural history collections in the British Museum?

Yours truly,
A. Panizzi, Esq. (signed) *John Lindley.*

PUBLIC NATIONAL HISTORY COLLECTIONS.

Copy of a Memorial addressed to the Right Honourable the Chancellor of the Exchequer.

Sir,

The necessity of the removal of the natural history departments from the British Museum having been recently brought prominently before the public, and it being understood that the question of their reorganisation in another locality is under consideration, the undersigned zoologists and botanists, professionally or otherwise engaged in the pursuit of natural science, feel it their duty to lay before Her Majesty's Govern-

ment the views they entertain as to the arrangements by which national collections in natural history can be best adapted to the twofold object of the advancement of science, and its general diffusion among the public —to show how far the scientific museums of the metropolis and its vicinity, in their present condition, answer these purposes and to suggest such modifications or additional arrangements as appear requisite to render them more thoroughly efficient.

The scientific collections or museums, whether zoological or botanical, required for the objects above stated, may be arranged under the following heads :—

1. A general and comprehensive Typical or Popular Museum, in which all prominent forms or types of animals and plants, recent or fossil, should be so displayed as to give the public an idea of the vast extent and variety of natural objects, to diffuse a general knowledge of the results obtained by science in their investigation and classification, and to serve as a general introduction to the student of natural history.

2. A complete Scientific Museum, in which collections of all obtainable animals and plants, and their parts, whether recent or fossil, and of a sufficient number of specimens, should be disposed conveniently for study; and to which should be exclusively attached an appropriate library, or collection of books and illustrations relating to science, wholly independent of any general library.

3. A comprehensive Economic Museum, in which economic products, whether zoological or botanical, with illustrations of the processes by which they are obtained and applied to use, should be so disposed as best to assist the progress of commerce and the arts.

4. Collections of living animals and plants, or Zoological and Botanical Gardens.

The Typical and Popular Museum, for the daily use of the general public, which might be advantageously annexed to the Scientific Museum, would require a large building, in a light, airy, and accessible situation. The collections should be displayed in spacious galleries, in glass cases, so closed as to protect them from the dirt and dust raised by the thousands who would visit them; and sufficient room should be allowed within the cases to admit of affixing to the speciments, without confusion, their names, and such illustrations as are necessary to render them intelligible and instructive to the student and the general public.

The Economic Museums and Living Collections in botany might be quite independent of the zoological ones.

The Scientific Museum, in zoology as in botany, is the most important of all. It is indispensable for the study of natural science, although not suited for public exhibition. Without it, the naturalist cannot even name or arrange the materials for the typical, economic, or living collections, so as to convey any useful information to the public. The specimens, though in need of the same conditions of light, airiness, etc., as, and far more numerous than, those exposed in the Typical or Popular Museum, would occupy less space; and they would require a different arangement, in order that the specimens might, without injury, be frequently taken from their receptacles for examination. This Scientific Museum, moreover, would be useless unless an appropriate library were included in the same building.

The union of the Zoological and Botanical Scientific Museums in one locality is of no importance. The juxtaposition of each with its corresponding Living Collection is desirable, but not necessary—although, in the case of botany, an extensive herbarium and library are indispensable appendages to the Garden and Economic Museum.

The existing natural history collections accessible to men of science and to the public, in or near the metropolis, are the following :—

In Botany.—The Kew Herbarium, as a scientific collection, is the finest in the world; and its importance is universally acknowledged by botanists. It has an excellent scientific library attached to it; it is admirably situated; and being in proximity with, and under the immediate control of the head of the Botanic Garden, it supersedes the necessity of a separate herbarium for the use of that garden and museum. But a great part of it is not the property of the State; there is no building permanently appropriated for its accommodation, and it does not include any collection of fossil plants.

The botanical collection of the British Museum, consisting chiefly of the Banksian Herbarium, is important, but very imperfect. It is badly situated, on account of the dust and dirt of Great Russell Street; and the want of space in the existing buildings of the British Museum would prevent its extension, even were there an adequate advantage in maintaining, at the cost of the State, two herbaria or scientific botanic museums so near together as those of London and Kew. The British Museum also contains a valuable collection of fossil plants, but not more readily available for science than its zoological collections.

There exists no Typical or Popular Botanical Museum for public inspection.

The efficiency of the Botanical Gardens and Museum of Economic Botany at Kew, as now organised, and the consequent advantages to science and the public, are too generally recognised to need any comment on the part of your memorialists.

In Zoology. * * *

The measures which your memorialists would respectfully urge upon the consideration of Her Majesty's Government, with a view to rendering the collections really available for the purposes for which they are intended, are the following :—

* * *

Your memorialists recommend that the whole of the Kew Herbarium become the property of, and be maintained by, the State, as is now the case with a portion of it; that the Banksian Herbarium and the fossil plants be transferred from it to the British Museum; and that a permanent building be provided for the accommodation at Kew of the scientific museum of botany so formed.

The consolidation of the herbaria of Kew with those of the British Museum would accord the means of including in the Botanical Scientific Museum a geographical botanical collection for the illustration of the colonial vegetation of the British Empire, which, considering the extreme importance of vegetable products to the commerce of this country, your memorialists are convinced would be felt to be a great advantage.

Your memorialists recommend, further, that in place of the Banksian Herbarium and other miscellaneous botanical collections now in the British Museum and closed to the public, a Typical or Popular Museum of Botany be formed in the same building as that proposed for the Typical or Popular Museum of Zoology, and, like it, be open daily to the public.

Such a collection would require no great space; it would be inexpensive, besides being in the highest degree instructive; and, like the Typical or Popular Zoological Collection, it would be of the greatest value to the public, and to the teachers and students of the metropolitan Colleges.

That the Botanical Scientific Museum and its Library, the Museum of Economic Botany, and the Botanic Garden remain, as at present, under one head, directly responsible to one of Her Majesty's Ministers.

The undersigned memorialists, consisting wholly of zoologists and botanists, have offered no suggestions respecting the very valuable mineralogical collection in the British Museum, although aware that, in case it should be resolved that the natural history collections generally should be removed to another locality, the disposal of the minerals also will probably come under consideration.

18 November 1858.

Thomas Huxley, F.R.S., Professor of Natural History, Government School of Mines, Jermyn-street.

George Bentham, V.P.L.S.

W. H. Harvey, M.D., F.R.S., and Z.S., etc., Professor of Botany, University of Dublin.

Arthur Henfrey, F.R.S., L.S., etc., Professor of Botany, King's College, London.

J. S. Henslow, F.L.S. and G.S., etc., Professor of Botany in the University of Cambridge.

John Lindley, F.R.S., and L.S., Professor of Botany in University College, London.

George Busk, F.R.S. and Z.S., Professor of Comparative Anatomy and Physiology to the Royal College of Surgeons of England.

William B. Carpenter, M.D., F.R.S., and Z.S., Registrar of the University of London.

Chas. Darwin, Esq., F.R.S., L.S., and G.S.

This memorial was reproduced in "The Gardeners' Chronicle," 27 November, 1858, p. 861; and a leading article, being an abstract of the foregoing appeared in the same journal, 15 January, 1859, from the pen of the Editor. Somewhat similar notices may be found in the same, under date of 16 April, 1859, pp. 335-336, and 24 December, 1859, pp. 1035-1036.

PARLIAMENTARY ENQUIRY IN 1860.

A Select Committee of the House of Commons was appointed in 1860, and reported during the same session. The Report adverts to the proposed separation of the Natural History Collections from the remainder and the library, but its direct recommendations as regards botany are merely, "The Keeper of this department states that with a small amount of easily accessible store-room, he would have ample space for all his present collections future wants."

The Minutes of evidence given before this Committee comprise many items of interest and value, as follows:

Mr. G. R. WATERHOUSE. — 1860.

Mr. George Robert Waterhouse, Keeper of Geology, in the course of his evidence was asked—

847. Are you at all aware whether the British Museum is in what I may call the centre of the scientific quarter; do a number of scientific men dwell in the neighbourhood? and replied—

"I do not know that; I only know that some time ago, when the subject was introduced as to whether the natural history collections should be removed, it created a very great sensation amongst naturalists, and a memorial was drawn up and numerously signed, and I was very much struck with the circumstance of meeting amongst the signatures, the names of persons who live very far from the Museum. There was a question at one time as to the removal of the herbarium from the British Museum to Kew; but one of our active botanists who was living at Hammersmith, and was consequently within a short distance of Kew, stated that it was much more convenient for him to come to London to examine the collections than to go to Kew. His explanation was this, that he constantly had occasion to come to London for other purposes; at least, I believe, that was the explanation; and he then took advantage of his visit to clear up his doubts upon botanical questions, whereas he was seldom led out in the direction of Kew. I have to-day heard of another person, living at Turnham Green, also a botanist, who has said that it was more convenient to him to consult the herbarium in London that at Kew."

Questioned with regard to the plan of separating the natural history collections from the rest, Professor Thomas Henry Huxley said that he considered the fossils should go with the recent forms, but did not consider it absolutely necessary for the botany to go with the zoology.

Mr. John Joseph Bennett, Keeper of Botany, was examined, and preferred to give his views in writing, as under:—

Mr. J. J. BENNETT. — 1860.

1215. "I believe the first question on which the Committee is desirous of information is, with reference to space. My answer on that point is this: The Botanical Department consists of two principal subdivisions, the herbarium, which is open to consultation, and the exhibition, which is open to the public at large. The herbarium, which is one of the most extensive in existence, and of high authority throughout the world, is contained in two rooms lighted from above, with about 3,000 feet of floor space; but a portion of this space is now occupied with store presses, or with presses containing specimens geographically arranged, or in progress of arrangement. for which a good and easily accessible store-room would be sufficient. If this were provided, there is ample space for our present herbarium, and for the probable additions of half a century to come. The exhibition, which is of small importance as compared with the herbarium, but in which, since its opening, we have found the public take a great deal of interest, is provided with about 1,500 feet of floor-space, also lighted from above. A part of this space is at present unoccupied, but we have materials to fill it. I do not contemplate any great addition to this part of the collection. It was always Mr. Brown's object, as it has been my own, to limit it as much as possible to structural botany, leaving the useful applications of vegetable products to the economical museums of Kew and Kensington. The result is that there is no pressing necessity for any immediate extension, and that with the addition of a small amount of easily accessible store-room we should have ample space for all our present possessions and future wants.

1216. I am strongly of opinion that no material advantage would arise from the removal of the botanical collections to Kew; but, on the contrary, great and serious disadvantages. In the first place, such a removal would deprive the great mass of Londoners, and of visitors to London, whether foreigners or from the country, of the privilege and advantage of ready and easy access to a very large and well-named collection of plants, which they have enjoyed for a great number of years, at a very small cost to the nation, the whole expenditure on the Botanical Department being under £1,000 a year. I have no hesitation in saying, that this would cause serious inconvenience, and in many instances pecuniary loss, not only to botanists and amateurs, but to artists, students in public institutions, persons engaged in trade, and others who are in the habit of seeking information of the officers, which they have always been ready to afford to the best of their ability, and which it is often of importance to obtain without loss of time. In the second place, the separation of one department of natural history from the rest, cannot be effected without injury and mutilation to all. Such a separation would at once destroy that unity and completeness on which Professor Owen and others have so strongly insisted as essential to a National Museum of Natural History. Many naturalists, indeed most, do not limit themselves to the cultivation of a single branch, and it is in the highest degree convenient to them to pass from one department to another under the same roof. It would be extremely hard upon them if this privilege were taken from them; and if, instead of passing directly from palæontology to botany or from botany to zoology, they were compelled to traverse many miles in order to connect the different branches of their study. Then, again, palæontology is the natural bond of connection between all. To deprive a zoologist or a botanist of ready access to the palæontological collection, is equivalent to mutilating him of a limb; while, on the other hand, the whole science of palæontology reposes on the power of readily and immediately comparing fossil with recent specimens, whether animal or vegetable. But even if little weight were attached to these considerations, which, I have no hesitation in saying, are of the highest importance in the minds both of naturalists and of the public at large, the question of the transfer of the botanical collections to Kew is a very wide one, and opens up an entirely new field of investigation, in which the construction of new buildings, and the providing an efficient staff, become prominent and essential objects. At present the herbarium of the British Museum is the only very large herbarium belonging to the nation. Only a small portion, about one-fifth, of the Kew herbaria, is the property of the nation; the remaining four-fifths are the private property of Sir William Hooker. If this magnificent collection were to become, as in my opinion it ought to become, the property of the nation by purchase, it would form a noble accompaniment to the splendid garden of which Sir William Hooker has the direction. But there is no national building for its reception; it is at present lodged in a house which is the private property of the Queen, and is graciously lent by Her Majesty as a special favour. There is absolutely no space for the reception of the herbarium of the British Museum. This herbarium, I may add, would add but little to the number of species in the Kew collections, more than nineteen-twentieths of the species being identical; so that London would be greatly injured by its removal, without any corresponding benefit elsewhere. In a letter of Sir William Hooker, addressed to myself, under date of 18 June 1858, he says, speaking for himself and Dr. Hooker: "We think that the collection would be more useful, if combined with those of Kew than by remaining in London; but the more I look into the matter, I see insurmountable difficulties arising to such a removal, whether of the Sloanean or Banksian collections, to say nothing of what Brown had destined for the British Museum, if the conditions were acceded to. To us (Dr. Hooker and myself) it literally and truly can be a matter of no consequence; such collections might and would add to the character and respectability and usefulness of ours, but we have enough for our own purposes and the means of increase." There are many others objections to which I refer, but I will only add one, viz., the strongly expressed intentions of the founders and donors of the collection. Sir Hans Sloane, in his will, directed his "dried samples of plants," together with his other collections, to be offered to the

Mr. J. J. Bennett. 1860.

nation at a price very greatly below their original cost and their market value, "to remain together, and not be separated, and that chiefly in and about London, where I have acquired most of my estates, and where they may, by the great confluence of people, be of most use." The most authoritative part of our collections is the herbarium of Sir Joseph Banks, with which the more recent acquisitions have been incorporated, and which was specifically bequeathed by him to the British Museum. Now, Sir Joseph Banks was, during the whole of his life, the great promoter of the Botanic Garden at Kew. It was he alone who took any scientific interest in it, and who recommended all the scientific arrangements connected with it. He bequeathed a considerable salary to a highly talented botanical artist [Francis Bauer], whom he had attached to it, and did everything in his power for the promotion of its interests as a garden. But he felt the paramount importance of a central situation, and of an intimate connection with the other branches of natural history for his herbarium, and he therefore bequeathed it, together with his library, to the British Museum. Mr. Brown himself, the highest botanical authority that could be quoted, left his collection of fossil woods, the most valuable in existence, "to be placed in the British Museum, but only on condition of the Trustees determining to allow it to form part of the botanical exhibition, under the charge of the keeper of botany." Should they decline to receive it on this condition, he added, "I bequeath it to the Edinburgh Museum"; which, like the British, is a general collection of all the branches of natural history. In his evidence before the Museum Commission of 1848-9, Mr. Brown expressed himself strongly against a then suggested removal of the herbarium to Kew; and I will conclude by directing the attention of the Committee to a striking passage at p. 36 of the Report of that Commission, in which the Commissioners state their entire concurrence in the objections then made to the dismemberment of the British Museum."

1217. The amount of the estimate for the department "is between £900 and £1,000. It is £150 for purchases, £25 for books, and the salaries and wages bring it up to about £950."

1218. The removal of the collection would necessitate the creation of a new botanical library.

1219. "Of merely botanical works, 10,000 or 12,000; but of other works necessary for the elucidation of the collection, a great multitude."

1220-1221. A very great many of them would be costly.

1222. Illustrated works, "of course, would be the costly ones. There are many others, of great rarity, in the Banksian Library, which would hardly be obtainable."

1223. He did "not think the collection would have nearly so many visitors with a definite object if removed to Kew" as it has in London.

1224. "It is greatly referred to by students and by artists, whom I have always found unwilling to go as far as Kew, although I recommend them to go there to study the living plant. Rather than go to Kew, they will take the dried plant in the herbarium. It is also a good deal referred to by mercantile men who are interested in the objects which come into the market, and are desirous of knowing all that can be known about them."

1225. From knowledge of Mr. Brown's request with regard to his collection, if the collection were removed from the British Museum, it would probably be lost to the metropolis and go to Edinburgh. "I am quite sure that that was Mr. Brown's intention; I had it from his own lips."

1226. There are not, "with the exception of gardeners," many intelligent persons of the working classes, who come to examine the plants in the herbarium.

1227. Who are the chief botanists among the working classes? "The weavers," who "are specially addicted to floriculture; but I cannot say that many of the working classes study botany in London."

1228. Asked: "Supposing you endeavoured to exhibit the entire collection of plants and botany, so that the student might from those which were exhibited have a general idea, if he wished to refer to any particular species he must go to the herbarium?"—Answered: "We can hardly do that. The exhibition is rather to show structure than to exhibit specific distinction."

1229. We "do not show a general arrangement of plants; such a thing would occupy a very large space, and even such an arrangement as that would only give a very general idea."

Mr. J. J. Bennett. 1860.

Mr. A. Panizzi, in the course of his evidence, alluded to previous evidence, and said:—

Mr. A. Panizzi.

246. With regard to the botanical collection, an investigation has been held by a sub-committee on the natural history collections of the British Museum, as to whether those botanical collections might not be removed to Kew . . . the evidence generally given upon that occasion, and the weight of the authority, was, that it would be advantageous for the herbaria to be placed in connection with the living plants, and merely to retain in the British Museum a small type collection of botany. "The gentlemen who gave their evidence differed very much amongst themselves, and the sub-committee came to the conclusion that the botany, even according to that evidence, ought to remain at the Museum."

3524. ". . . . If the Committee will refer to the answer given to Q. 847 in the evidence of Mr. Waterhouse, they will see that botanists who lived at Hammersmith and at Turnham Green had expressed a strong opinion that the botanical collection should not be moved from the Museum. Now, inasmuch as Dr. Lindley lives near Hammersmith, at Turnham Green, and is a great botanist, I wrote to him to ask him whether he had expressed this opinion, and I have here his letter, which I beg to read and put in. He says: "I rather think that Mr. Miers, who lives at Hammersmith, and is a botanist, did express an opinion in favour of keeping the botanical collections in the British Museum, instead of sending them to Kew. It is also just possible that the late Professor Henfrey, who resided at Turnham Green, may have said something of the sort, yet I should doubt it much; because, first, his peculiar line of research must have led him seldom to Great Russell Street, and frequently to Kew; secondly, he was one of us working men who signed the memorial to the Chancellor of the Exchequer on the 18th November, 1858. For myself, who also live at Turnham Green, you may assure the Committee that I entertain the strongest possible opinion in favour of removing the botanical collections in the museum to Kew, and have the greatest objection to their remaining where they are. All botanists now necessarily resort to Kew for the sake of the immense scientific materials collected there, and it is a great inconvenience to be obliged to travel to Great Russell Street upon the mere chance of picking up some small piece of additional information in the Banksian herbarium." That is the opinion of Dr. Lindley.

3525. Three rooms, a very good large room and two smaller ones, "are taken up by the botanical collection"; one of them is used for an exhibition of woods, and the other is to be used for another public exhibition, but there is nothing in it yet; it is a small room.

3526. If a botanical museum is established, or if a natural history museum in general, detached from the British Museum, is established anywhere, I am of opinion that it ought to have the very best possible natural history library connected with it. If the Committee recollect, when I heard it stated that such a library as I have in my eyes for such an institution might be purchased for £20,000, I said that I certainly thought it could not be purchased for that sum. I thought so then, and I think so still, more and more; I mean not for botany only, but for a general collection of natural history; a botanical library would cost not so much.

3527. Very likely it would be more than £30,000 for a general natural history collection; but much less for a botanical collection only.

3528. But I should not say that even £30,000 would be sufficient for a general collection; a library for a botanical collection only would not cost so much, but it would be very expensive; it would be a library of at least 20,000 volumes, and many of them illustrated works.

3529. Some of them would be very expensive in consequence of the illustrations.

Professor Richard Owen, Superintendent of the Department of Natural History in the British Museum, in the course of his evidence, said:—

Professor R. Owen.

773. . . . "I find, on reference to my evidence before the Commission in 1848, that only two of the departments of natural history had at all suggested themselves to my mind as subjects for the question of removal or otherwise, viz., botany and mineralogy. At that period, I inclined to think that the evil of removing

Professor R. OWEN. 1860.

the botany would be greater than the good; the circumstances in regard to that department have since changed, and with them my opinion; so also with regard to mineralogy; circumstances have so altered in reference to the capability of receiving such collections in any national establishment out of the British Museum, that I am most decidedly of opinion now, that the mineralogy could not be better situated than where it is.

576. The circumstances in regard to the collection of botany were the development of Kew Gardens, and the subsequent development of a Museum of Botany in juxtaposition with those gardens, neither of which existed at the time when I gave my evidence. The question as to the mineralogy related to the rapid filling up of the Museum in Jermyn Street; in 1847 there had been a suggestion that the mineral collection might have been transferred to the Museum of Practical Geology in Jermyn Street.

* * *

579. The increasing number of botanists, and of persons interested in botany, visiting Kew, particularly visiting the Museum and herbarium, and acquiring instruction from them, led me to see that the transference of the comparatively small collection of botany in the British Museum might have been made there."

580. He thought that it might be with advantage transferred to Kew.

581. As to whether the mineralogy might be transferred with advantage, if a suitable place could be found for it. "I do not think so now; I think it would detract from the character of a great national collection of natural history to be wanting in that great class of natural objects. I think they should all go together, or stay together."

Mr. Nevil Story Maskelyne stated in reply to the question:—

Mr. N. STOREY-MASKELYNE

954. Have you any reason to think that such an establishment as that at Kew, under the care of Sir William Hooker, has in itself been very advantageous to botanical science?—"In the highest degree; Kew, both in respect to its methods of administration, and in respect to the results achieved, I look upon as being a complete success. If it was possible to have Kew round the British Museum, and the British Museum not to lose its locality as to London, in its being nearly the centre of gravity of the population of London, I think both would rise, and each would become greater.'

955. The gardens at Kew, notwithstanding that they are a considerable distance from London, been an object of great interest and great convenience to the public; "to the public who can go in carriages, and even to the labouring public, who can go on great holidays. I look upon Kew, however, not only as a place of scientific resort, but also as a place to which it is a great recreation to go to enjoy gardens of that kind in the open air, surrounded by everything that is beautiful, the various forms of the vegetable world flourishing around you in the highest perfection; that alone is a vast attraction, and is not to be put on the same footing with a collection of dried plants, or a collection of minerals, or a collection of antiquities such as are found in the Museum."

957. Speaking of those who can only give a portion of their time to scientific study, he instanced a man of business," whose heart is in his work, and his work is in the middle of London, to go to Kew is only a walk for him in the evening, or in the afternoon, or on a holiday; but it does not lie in his daily path; he cannot turn in for half an hour or an hour as he does continually now at the British Museum, and the number of such persons who come into that Museum is enormous."

ENQUIRY OF 1868-1869.

The following papers refer to an investigation set on foot in consequence of a memorandum sent by the Secretary of Her Majesty's Office of Works to the British Museum, but as there is no record of its having been officially received on behalf of the Trustees, and from its notice by the Superintendent of Natural History, Sir Richard Owen, it is probable that the matter was dealt with by him from first to last. (See below, page 152). These documents have not previously been printed.

I.

MEMORANDUM from the Secretary of H.M. Office of Works, No. 18919/68.

Memorandum respecting the botanical collections of the British Museum and Royal Gardens, Kew.

The British Museum collections differ from those at Kew in containing various herbaria of historical interest, as Cook's, Banks's, etc., and a fine collection of fossil plants and microscopical objects.

As a general herbarium the British Museum is far inferior to that of Kew in extent, arrangement, and nomenclature; in wanting the plants of the Government expeditions of late years, and in having no efficient library attached to it.

In the opinion of Dr. Hooker it would not be for the interests of science to send all the British Museum collections to Kew, nor that two great independent herbaria, such as Kew and the British Museum, should be kept up on their present footing.

Dr. Hooker states that besides the obvious necessity of there being a perfect and complete herbarium attached to the Royal Gardens, the advantages of Kew as a site for the principal national herbarium are now universally recognised, whence it follows that part of the Museum collections should be transferred to Kew.

It is his opinion that the fossil plants, in which geologists are even more concerned than botanists, should remain in London, and be there accompanied by a herbarium and library of reference for the use of botanists and geologists, amateurs and others, resident in London or passing through it, who may want information which it would not be worth their while going to Kew to procure.

Such a herbarium for reference would be an inexpensive one. The British Museum herbarium, minus the specimens required for Kew, would supply a good one, and have space for future increase.

The authorities at Kew should be responsible for supplying this herbarium from time to time with such additional specimens as may be required, authentically named, in which they would be aided by the Museum authorities.

The technical operations of mounting specimens, etc., would be best performed at Kew, and the cost would be insignificant.

The library of reference might be supplied from the Banksian Library of the British Museum, supplemented by a small annual grant such as Kew has (£145 for books and binding).

By such an arrangement a large saving might be effected on the joint expenses of the two existing botanical establishments, and a good inexpensive herbarium and library be provided for the use of Londoners, and especially geologists and amateurs.

The extra work which such an arrangement would entail at Kew would be chiefly in the first arrangement of the accumulated unarranged collections of the British Museum, which are said to be vast, and this had best be accomplished by temporary assistants. It would be more rapidly and effectually done at Kew than at the British Museum. This accomplished, no permanent increase of the staff at the Kew herbarium need necessarily follow, though there should be an increase of salary to the herbarium officer charged with the additional responsibilities.

(Signed) GEORGE RUSSELL.

Office of Works, etc., Dec. 31st, 1868.

II.

Rejoinder to the foregoing from the Keeper of Botany, British Museum.

PAPER sent in January 15th, 1869.

NOTES on Mr. RUSSELL'S "Memoranda respecting the botanical collections of the British Museum and Royal Gardens, Kew."

1. The important differences between the two collections are fairly stated.

2. I do not admit that the herbarium of the British Museum is so "far inferior in extent, arrangement, and nomenclature" as is here assumed. It is true that we have not in the Museum the plants of several Government expeditions of late years, as these have been sent to and retained at Kew. Our departmental library of reference is a good one, and we have the great library of the Museum always at hand, which gives much more efficient aid than that of Kew, or any other special library, could possibly give.

3. I quite agree in opinion with Dr. Hooker that it would not be for the interests of science to send *all* the British Museum botanical collection to Kew; and I do not think, for reasons to be hereinafter given, some of which seem to be recognised by Dr. Hooker himself, that it would be expedient to send *any* of them there.

On the contrary, I maintain that the herbarium of the British Museum should be kept up in as perfect a state as possible.

4. There is no greater obvious necessity for there being a complete herbarium attached to the Royal Gardens than for such a herbarium being retained in the heart of London. I cannot admit that "the advantages of Kew as a site for the principal national herbarium are universally recognised." On the contrary, a very large proportion of the students who frequent the herbarium of the Museum concur in stating that it would be very inconvenient for them to have to go to Kew, and many declare that it would not be possible for them to find time for so doing. There cannot possibly be a more convenient site than that of the Museum for the great majority of workers.

5. There can be no doubt, as Dr. Hooker himself admits, of the advantages of the collection of fossil plants remaining in London, and of their being accompanied by a herbarium; but that herbarium would lose nearly all its value to geologists, and only serve (like all other imperfect sources of information) to mislead the inquirer, if it were not as complete as it could possibly be made. The various classes for whose use Dr. Hooker admits that botanical collections in London would be desirable comprise the great bulk of those interested in botanical and geological science.

6. "Such a herbarium for reference" as Dr. Hooker proposes, or any herbarium that could be of real utility at the Britism Museum could hardly be less expensive than the present one, which is maintained at a cost of about £1,400 per annum.

7 and 8. The continual transfer of specimens between the two establishments, as proposed, could not be effected without additional assistance, and would give rise to much inconvenience and frequent discussions without any countervailing advantages.

9. I must leave it to the Keeper of the Printed Books to answer as to what would be the effect in his department of the proposed mutilation, which would add largely to his expenditure in supplying the deficiencies to be thus created in the general library, as it would be absurd to leave such a library shorn of a great number of books relating to our particular branch of science. A large portion of Sir Joseph Banks's library (which previous to its receipt at the Museum was estimated for insurance by direction of the Trustees at £7.300) was collected by him with a special view to botanical purposes; and he bequeathed both his books and herbarium with an anxious desire for their being kept together as mutually illustrative of each other.

10. No possible saving could be effected by the proposed arrangement. The only practical suggestions with reference to expenditure in the memorandum have quite the contrary tendency. Dr. Hooker requires, in case of the proposed transfer, the appointment of "temporary assistants" at Kew, and "an increase of salary to the herbarium officer" there. He also suggests that the library of reference to be retained in London should be "supplemented by a small annual grant such as Kew has (£145 for books and binding)." Our actual allowance for this purpose is £30 per annum, which, in consequence of our ready access to the books of the general library is found sufficient.

On the whole, both in the interests of science and with regard to considerations of economy, I have not the smallest doubt that the herbarium of the British Museum should remain intact and in its present position. The intimate relations between all the different branches of natural history require that they should all be cultivated under one common roof, and it would be highly injurious that any one should be separated from the rest. At the British Museum the collections are easily accessible to the inhabitants of every part of London, as well as to the visitors from the country and from abroad. And, to crown all, the advantages of this immediate proximity to the great library are inestimable.

January 14th, 1869.

(Signed) JOHN J. BENNETT.

THE ROYAL COMMISSION ON SCIENCE.

The evidence taken by the Royal Commission on Scientific Instruction and the Advancement of Science, commonly referred to as the Devonshire Commission, embraces much that is relevant to the enquiries of this Committee:—

JOSEPH D. HOOKER, ESQ., M.D., C.B., F.R.S.; Examined.

J. D. HOOKER, Esq., M.D., C.B., F.R.S. — 1871.

6657. "I am Director of the Botanic Gardens both as a scientific establishment and as a place of popular resort; of the Herbarium, the Library, and of the Economic Museums."

6658. The nature of the scientific work which is turned out from the Herbarium at Kew "is partly public and it is partly private. It is public in so far as this, that for about 40 years the Herbarium now at Kew has been the recipient of almost all collections made by Government expeditions, and the chief recipient of contributions from the herbaria of Continental museums, and of both British and foreign travellers. It has furnished during this period materials for the publication of about 140 volumes on botanical subjects, many of these being accounts of plants collected by Government expeditions, monographs published by officers conected with the Herbarium, colonial floras, and works of that description. Some of these have been paid for by the Government, some issued at the expense of the author, others at that of the publishers."

6659. Besides which "various monographs have been chiefly published in the Linnean Transactions."

6660. What have been the relations of the Museum at Kew with the British Museum?—They are competing bodies; but hitherto the chief Government collections have been sent to Kew.

6661. Has there been insufficient space in the British Museum for the reception of specimens and the enlargement of its herbaria, or has any other obstacle interfered?—With regard to the British Museum I do not think any person can answer that except the officers of the establishment. I do not think that the nature and extent of its botanical collections, or their condition, is well known except to its officers.

6662. Of museums proper at Kew, apart from the Herbarium, there are three; they were designed primarily to demonstrate to the public the uses to which plants are put, by exhibiting specimens that illustrate useful plants, maps showing their distribution, diagrams showing their structure, and specimens of the products which they afford. They are arranged scientifically, according to the Natural System, and, as far as they have been procured, all the products of the plants are shown. At the same time it is the receptacle for all specimens that are not fitted to be kept in an herbarium; for instance, there are many fruits and seeds which are interesting from their structure or from their appearance, but which, though they are not of economic value, are placed in the museums, because they could not be put into the herbarium. Thus the museums serve a double object. They are ancillary to the herbarium in containing specimens not fit to be placed in the herbarium, and they are instructive to the public, inasmuch as they show the uses to which the plants of all natural orders are put.

6663. Hitherto there has been no competition between them—this Industrial Museum and that which exists at South Kensington—as far as I am aware; for the Museum at South Kensington contains chiefly manufactured articles, arranged according to their uses. For instance, in Kew the fibres used for textiles are arranged under the Natural Order to which each belongs; the European flax going into the case illustrating the Natural Order to which the flax plant belongs; the New Zealand flax under another order, and the hemp under a third; but in South Kensington all the flaxes would be brought together. Further, South Kensington exhibits extensive series of manufactured articles, whereas at Kew little is shown beyond the raw product, and one or two manufactured articles to attract public attention immediately to its uses. South Kensington, as I understand it, affords a complete illustration of the uses of vegetables as applied to art, arranged under their applications.

6664. The museum collections occupy three buildings. I may say that we prefer three buildings to one building, because of the immense numbers that visit the establishment in summer, and the consequent crowding around attractive objects like the museums. For the three museums there is one curator, who has a maximum salary of £150 a year. The scientific arrangement of the museums devolves upon myself and upon the Keeper of the Herbarium and Library, who is my principal scientific aid in the establishment. He has a salary of £400 and a house, and he has two assistants and a clerk; that is the whole of the scientific staff at Kew.

6665. Nothing yet been done in the way of illustrative

J. D. HOOKER, Esq., M.D., C.B., F.R.S. — 1871.

conversations or lectures to persons visiting or to particular or special classes visiting the museum.

6666. Only twice that I can remember have any special applications at any time been made from working men's colleges or other societies for mutual instruction, expressing a desire to avail themselves of such methods of instruction.

6667. The tickets generally give as much detailed information concerning the plants as is likely to be read, and this sometimes is very considerable. The Board of Trade returns of the quantities introduced during the year of sugar, coffee, spices, and so forth, are given, the countries from which these products come, their native names, as far as we can ascertain them, and very often interesting information culled from books of travels.

6668. There is also a Scientific Library at Kew "in the same apartments with the herbarium."

6669. It is entirely a library of botanical reference.

6670. Kew is much resorted to by foreign botanists. No botanical monograph is considered complete which has not been worked up with the materials at Kew.

6671. Botanical societies throughout Europe and the civilised world are more or less in relation with Kew. We are in communication with almost everybody of the kind in America, India, and in the Colonies as well as in Europe.

6672. Both for the purpose of exchanging specimens and likewise for communicating the latest observations in botany.

6673. We do not take into account those who come for a day or so, but of working botanists who come and stay for some time at Kew, there are sometimes as many as 20 foreign students in a year, and when one comes he very often does duty for several others.

6674. We never have had applications from local museums in England for specimens of plants from the herbarium, and to a very limited extent indeed from the museums. We occasionally have applications from professors for duplicates of tree-fern stems, and objects of that description, and these are complied with when possible.

6675. From the resources which Kew has at its disposal, or might have, from marine expeditions and other sources, if a system of distribution were organised at the Government establishments, Kew could supply, supposing such a desire to arise, a considerable number of duplicates very largely. "The difficulty is in making application at the right time. Hitherto duplicates have been distributed as fast as possible, because they take up a great deal of room and encourage insects. My plan has hitherto been, whenever I receive a collection, whether from a Government expedition or from a private source, to have it at once named and catalogued, the first complete set deposited in the herbarium or museum, and the duplicates distributed."

6676. Two things would therefore appear to be necessary, some means by which the local wants should be ascertained by persons properly qualified, and likewise a constant knowledge of the means which the Botanic Garden Museum at Kew has of supplying those wants.

6677. "It could be easily accomplished" by an Inspector of Museums. "The demand for botanical objects would be always very small, and confined to such as are striking or attractive, whilst a vast number of economic products such as local museums would want might be bought anywhere, as cocoa-nuts, sugar, rice, starch, and so forth. Special objects like sections of tree ferns, or rare woods, would be rarely sought by local museums, but there would be no difficulty in supplying them."

6678. In the North of England there are what are called naturalists' societies, composed of men really very anxious to improve themselves in the study of botany among other subjects.

6679. If a well-ordered museum existed in which the various blanks were from time to time supplied, so as to have a complete series of specimens for consultation, such a museum situated in a populous district might be of great use in cultivating a knowledge of natural science; but "as far as herbarium specimens are concerned I think it should be almost confined to a collection of local, or at most British plants. I do not think that there is any prospect of a general herbarium being valued even in populous districts; but a typical herbarium might be useful."

6680. "At present the herbarium is accommodated in an old house that is not fireproof. The collection being the most valuable in the world, illustrating the rise and growth of systematic botany during the last half century (because of the enormous number of typical specimens which it contains), should be accommodated in a fireproof building."

J. D. HOOKER, Esq., M.D., C.B., F.R.S. — 1871

6681. A project has been put forward for the transference of the Natural History collections of the British Museum to South Kensington?—I think it would be of very great importance if that were done, that the British Museum and Kew should be no longer in any sense competing bodies, but that they should be brought into harmonious relations, and each made ancillary to the other.

6682. The two museums should have certain separate functions to a great extent.

6683. As to the proper distribution of duties between the two museums:—"With regard to one very important branch of botany, the palæontological, I think it would be best that it should remain in or near London, it being as essential to geologists as to botanists. It requires illustration by an herbarium, but not by an herbarium of the extent and description of the great Kew herbarium, which would be extremely cumbrous to use in relation to a palæontological collection. Wherever that palæontological collection is, there ought to be a good herbarium, and I think it would be very advantageous if, instead of being arranged as the Kew herbarium is, primarily upon botanical principles, it should be primarily arranged geographically. It would be a very great advantage, to persons coming from Australia, for instance, and bringing plants which they wished to know something about, if they could consult a local collection of Australian plants, and thus name their specimens by simple comparison. Such an herbarium would, I conceive, be also more useful to the palæontologist, because the key to fossil botany is very much a geographical one. There should also be with the palæontological collection special collections of recent fruits, leaves, &c., directly illustrative of known fossil plants, and placed along with them in their cases."

6684. Besides the transference of the collection of fossil botany to South Kensington, is there no other change which you would desire to make in the Museum at Kew?—I would still keep Kew as the great scientific working herbarium, to which, as hitherto, all botanists must come; and I think that the Herbarium at the British Museum should be named comparatively and consistently with that at Kew.

6685. Therefore, the two establishments being ancillary, should be under one common head?—I think that the two herbaria should be rearranged under one head, and be brought under one system of management.

6686. The several officers should in future work in harmony, but the two Herbaria should be under the direction of the heads of the establishment at Kew and of the new Natural History Museum at South Kensington respectively.

6687. As to "any separate functions which the museum at South Kensington might fulfil, which you would not expect to be fulfilled by that at Kew, I think that a herbarium affording the ready and rapid means of naming plants would fulfil one function, and the use of the same for the purposes of the palæontological collection a second; and I think that there ought to be besides this, at the British Museum, an instructional botanical collection for public exhibition, which would show the relations of plants to one another, their structure, and the functions of their organs; and illustrate by drawings and dissections of flowers, woods, and fruits, &c., the general features of the vegetable kingdom."

6688. Respecting any scheme of instruction such as that which was adverted to in a previous part of my evidence, it would be more likely to be successful at South Kensington, from its vicinity to London, than at Kew, not "only from its accessibility, but from the nature of our climate, which would render it difficult to collect an audience at Kew."

6689. The relation of the director of Kew Gardens and the whole establishment there to the Government is that "I am immediately responsible to the First Commissioner of H.M. Works.

6690. I address all letters and my annual report to him."

6691. There is "at Kew nothing like the body of Trustees which exists in connection with the British Museum."

6692-95. It would not be advantageous to have any such body in connection with Kew. There would not be the same objection to a board of visitors as the visitors

J. D. HOOKER, Esq., M.D., C.B., F.R.S. — 1871.

to the Royal Observatory, if that was thought necessary, having the power of recommendation to the First Commissioner of Works, after consultation with the director, but not having the power of making appointments taken out of our hands.

* * *

6697. Lectures and demonstrations are occasionally given to the young gardeners, but this is voluntary on the part of the officers.

6698. It would be possible for "certain able and active" officers of the gardens to combine the function of giving public lectures together with their present duties, "but I think that it would be highly inexpedient to require it of them."

6699. The business of conservation and naming of plants is one which is quite sufficient to occupy a man's whole time, and "to keep him abundantly occupied."

6700. A man might be an exceedingly good namer of plants and a very accomplished botanist, but perhaps he might be a very inefficient expositor.

6701. The Herbarium is looked upon as a sort of object library.

6702. It is consulted in the same way as the library of the British Museum.

* * *

6721. We are not at all troubled with dust at Kew compared with London.

6722. The impediment that it is to keeping specimens in museums in London is "very great; but I think that might be obviated to a great extent by placing the museum within a grassed area planted with trees."

6723. Still, wherever you might put your Natural History Museum there is no doubt that if you have thousands of persons walking through it, those persons will create an enormous amount of dust, "but I question whether that amount is so great as what the atmosphere otherwise brings, especially in cases where the road or open street abuts on to the building. The quantity intercepted by grass and by trees, if you can have them, is very great."

6724. The main process by which the dust is got into the cases in which specimens are exhibited is the sort of pumping arising from the alternate heating and cooling of the air, as the result of which the dusty air in the interior of the building is pumped into the cases and the dust is deposited upon the specimens.

6725. Your plan of hermetically sealing the face of the case which is turned towards the public mainly with a view of preventing that pumping operation?—Yes, mainly for that, and also for the greater convenience of working naturalists, who are thus not interfered with by the public when getting access to the specimens.

6726. There would be nothing to prevent a museum so arranged being open to the public every day all day long.

6727. On the other hand, the curator and persons who wished to work at the specimens could always get them every day and all day long without interference.

6728. With regard to duplicates, "I generally keep a list of the establishments to which each class of duplicates will be most useful, and distribute them very much accordingly. Sometimes there are as many as 25 or 30 sets of duplicates in one collection, and, so far as the specimens are concerned, we distribute them ticketed with a name or number corresponding with the name or number they bear in the Kew collection, so that each specimen is the authority for Kew."

6730. Supposing that in addition to my present work I had thrown upon my hands the superintendence of the botanical collection in the museum which it is proposed to erect at South Kensington, "I think that with the aid of the museum officers I could bring the collections under one system. There would be a good deal of assistance required in the first arrangement, but after that I think it would simply be the duty of one establishment to supply the other with specimens."

6731. When the specimens are sent to foreign museums, of course, there is an end of trouble.

6732. "The arrangement of the herbaria once effected the trouble of supplying the South Kensington Museum with specimens would be very trifling. On their arrival at the British Museum they could be put into their places by the officers there, the operation being as simple as that of putting books on a shelf."

6733. A subordinate would be sufficient for arranging the botanical part of the South Kensington Museum, and for keeping up its herbarium. "After the first rearrangement was effected a subordinate at the museum could intercalate the additions; but if you keep a palæontological collection at the British Museum you must have a good botanist there at any rate. I think it would be a great pity that there should not be resident in London a good botanist, in connection with the Natural History Museum; and such officer, who would have the charge of the fossil botany, would be fitted to take charge of the herbarium there too.

J. D. HOOKER, Esq., M.D., C.B., F.R.S. — 1871.

6734. I do not say that the two botanical departments should be under one control, but that the two herbaria should be managed upon one system.

6735. When formed, the South Kensington herbarium would remain under the control of the botanist attached to the Natural History Museum, and be continuously added to from Kew.

6736. Undoubtedly the fossil plants ought to be in the Botanical Department of the Natural History Museum. I think that the Palæontologist (vegetable) should be supplied with a complete, well-named, geographically-arranged collection of plants."

6737. I would divide the Palæontological Department at South Kensington into two divisions, animal and vegetable.

6740. "As far as the fossil plants and the herbarium are concerned, they should be under the direction of the museum authorities."

6741. I would keep the fossil plants under the Superintendent of the Natural History collections.

6742. The fossil plants and herbarium of the museum should be placed in juxtaposition, and the keeping of both should devolve upon the same officer of the museum.

6743. The person who had the fossil plants would also have charge of the recent herbarium. He would look to Kew to be supplied with herbarium specimens.

6745. He would then simply draw his supplies from Kew. "It would be part of the duty of the first herbarium in the country to supply the British Museum with as complete and well named a set of herbarium specimens from the several geographical areas as possible."

6746. And those specimens once supplied to South Kensington would be in charge of the Superintendent of the Natural History collection and under his government.

6747. The Director of Kew would be responsible for the new museum at South Kensington being supplied with everything that Kew could supply, the object being defined, namely, the keeping up of a thoroughly well-named typical set of specimens arranged geographically.

6748. The system of government at Kew is one which might be with advantage transferred to the British Museum. "I think that the plan should be of having one supreme Director responsible solely to a Minister of the Crown."

6749. I have considered the very different magnitude of the two institutions.

6750. Particularly in respect of the patronage that would be placed in the hands of such a Director. "I am not quite sure that the difference is so very great. You would have in the British Museum more accomplished naturalists; but, on the other hand, you would have very much fewer temporary subordinate appointments of value."

6751. But more appointments of some value and importance.

6752. At Kew there is but one office that might be described as an office of some importance in respect of emolument—"that is, the Keeper of the Herbaria and the Library, and he has two scientific men under him."

6753. Those are places of a still more subordinate character; "but, on the other hand, I have garden officers, and I have labourers and gardeners in such numbers as you would probably not have in the Natural History Museum."

* * *

6759. I do not think it advisable that the duty of giving lectures upon the specimens under their charge should be imposed upon the Keepers of the different departments at the British Museum.

6760. It might "be advisable that some advantage should be taken in the way of illustration and lectures to the public of the specimens in the British Museum, whoever might be appointed to deliver those lectures, but that opens up an entirely new question, as to whether the

J. D. HOOKER, Esq., M.D., C.B., F.R.S. — 1871.

Government should supply lecturers as well as supply museums, which I am not prepared to go into."

6761. There is a very great objection to having valuable specimens taken out and handled and knocked about and put back in the cases; but might not such an object be perfectly well served by using duplicate specimens? —"That is a question of detail, and I should think it would be a very good arrangement to have a set of duplicate specimens to be lent out for such purposes under certain conditions and under certain guarantees."

* * *

6768. "The principles which I have laid down with regard to the Botanical Department I think are clear to the members of the Commission. I think all other points, as to what parts of the present botanical collections should remain where they are, and what parts should be re-organised, and what additions should be made to the South Kensington Department, are questions of detail, which would be entered into by the Director of the Museum, in conjunction with the present Keeper of the Botanical Department of the British Museum and the Director of Kew."

George Bentham, Esq., F.R.S., President of the Linnean Society, examined.

G. BENTHAM, Esq., F.R.S.

7204. There are at present two large national botanical establishments, one in London and the other at Kew. Is the maintenance of both those institutions an advantage for scientific purposes?—Not as rival establishments for the same objects, but I think it very important that there should be two botanical establishments, one in London and the other at Kew, working in harmony together, but for different purposes.

7205. The keeping up at the public expense of two great rival national botanical establishments, the one in London, the other at Kew, in a state of continual competition, with, instead of aid to each other, whilst a third independent one, also national, may occasionally come into collision with one of them, seems to be a waste of public money, without any advantage to science or to the public, and attended with many inconveniences.

At the same time two great botanical museums and herbaria, the one in connection with the Natural History Museum in London, the other with the Botanical Gardens at Kew, working in harmony with each other, but for different purposes, and separated by a clear line of demarcation from the economic museums of South Kensington, would always be productive of great benefit to science and gratification to the public.

The main purposes of a botanical museum and herbarium may be said to be threefold; the study of plants, their comparison, and their exhibition; the first purely scientific, the second sometimes scientific, sometimes popular, the third chiefly popular. For the first, Kew affords incomparable advantages; the second and third would probably be best promoted in town, provided always that the two establishments work in perfect harmony, with the unity of plan, both in general arrangements and in matters of detail.

1. For the close study of plants—the only sound foundation upon which the science of botany can be usefully established—for their accurate determination and practical classification, the requisites are: that the herbarium should be as rich as possible, not only as to the genera and species, but as to the variations of all sorts and repetitions of the same form from different localities and stations; that the herbarium should be a single one, the geographical arangement being kept in subservience to the scientific classification, and without any detached smaller herbaria, except such definite historical ones as only require occasional reference like the books of a library; that there should be good accommodation for the sorting of unnamed collections and fresh arrivals, ample means for the dissection and examination of specimens, not only by the staff of the establishment, but also by scientific botanists in general, who, under special regulations, are allowed to work in the herbarium, and store rooms for duplicates required for exchanges, etc.; that there should be in the same suite of rooms as the herbarium a botanical library, as complete as possible, and a series of drawings of plants, also as complete as possible; that the herbarium should be in close connection with the National collection of living plants; and that it should be under the keepership of a resident scientific botanist, with the requisite staff of scientific assistants. All these essentials are at present afforded by the herbarium at Kew, in a degree far beyond what can be met with in any other establishment at home or abroad.

G. BENTHAM, Esq., F.R.S. — 1871.

2. The comparison of plants, their practical and rapid determination without dissection, or the obtaining a general idea of natural groups from the order down to the species, as required by the general naturalist, by the follower of sciences in immediate connexion with botany, especially the palæontologist, or by the mere amateur, demands a very different herbarium and museum from that of the working establishment. It should consist of accurately named select specimens, representative of as many species or well marked varieties as possible, without duplicates in the same collection. It might be advantageously divided into two separate collections, one a general typical one, the other geographical. Separate collections also of leaves and of fruits, all accurately named, and so arranged as to enable them to be rapidly glanced over, would be most useful to the palæontologist. Such a museum would require no space for the sorting and determining of unnamed collections, nor for the storing of duplicates, and no provision for the dissection of specimens, except for the personal use of the keeper and his assistants, being supplied only with such tables or other appliances for consultation as are usually required in a library. Its library should be extensive, but select rather than complete, and should include various palæontological and other works on kindred sciences not required in the working herbarium. It should be in near connection with the National Museums for kindred sciences, especially with other palæontological collections. The keeper should be a scientific geologist as well as botanist, and would probably require but one scientific botanical assistant.

3. The exhibition of plants, or rather of botanical specimens, if for the purpose of exciting the interest and gratifying the curiosity of the general public, and for this herbarium, strictly so-called, is of no use, the public would never look beyond the outside of the cases. It requires the display in glass cases of such selected specimens of plants or their parts, accompanied by explanatory notes and diagrams, as may give at a cursory glance some idea of the characteristic features of the principal groups of plants, and to these might be usefully added a few specimens remarkable only for their beauty or singularity, for the purpose of attracting the eye and riveting the attention of the observers. As these specimens when once placed, require no further handling, and no care beyond the inspection of an ordinary assistant, and as the objects of visitors to such a museum would be much promoted by a ready connexion with the public museums in other branches of Natural History, it would seem highly advantageous that it should be attached to the herbarium for comparison and form part of the London botanical museum in close proximity to the National Museums of zoology and geology.

We have now no museum in any degree adequate to those two purposes of comparison and exhibition, but were the two National collections of the British Museum and Kew combined, all unnamed plants, duplicates, and specimens of interest only to the scientific botanist, removed to Kew, and in return, from the immense mass of materials there accumulated, the London herbaria completed by accurately named representative specimens, there would result collections richer in species, and far more useful than any actual continental ones; and as science advances and materials increase, these collections would be constantly kept up to the mark by named specimens from Kew, whilst their scientific arrangement and application to use could not be under a direction better qualified than that of the recently appointed Keeper of the Botanical Department of the British Museum.

In this London botanical museum would be also appropriately placed various pre-Linnean and other botanical collections, having only a historical or other adventitious interest, but there would be little use in attempting there anything corresponding with the Museum of Economic Botany, which has acquired so much importance, and is so well placed at Kew. That could only come into competition with the economic collections at South Kensington, but all prejudicial collision between the two is clearly avoided, and each one will increase its own practical utility by strictly adhering to the rule, that at Kew the products are arranged according to the plants they are derived from; at South Kensington according to the uses they are put to.

G. BENTHAM Esq., F.R.S. — 1871

I might mention, perhaps, in some respects how my experience has been formed; that it is not only from a knowledge of the herbaria of this country, but also from a practical acquaintance with most of the principal continental botanical museums; that is to say, I have worked for weeks or months together in the National and other principal herbaria of Paris, Berlin, Vienna, Munich, Geneva, and Florence, and I have examined into the working of the National herbaria of Leyden, Copenhagen, Upsala, Stockholm, St. Petersburg, and Madrid, besides those of several smaller towns in France, Germany, and Italy. During the last 50 years I have been a working botanist. My first botanical paper was published in 1821, and, for the last 37 years, botany has been the business of my life, and, therefore I consider that few persons have had so much experience of the working of these establishments as myself.

7206. In reference to the collection of plants which should be in the National Natural History Museum, the Keeper should be a scientific geologist as well as a botanist, and would require probably but one scientific assistant. I would propose to make the botanical collection in the National Museum subordinate to vegetable palæontology, but "very partially so—not fully subordinate to the palæontology, because that is only one of its subjects."

7207. To a certain degree only, it should be subservient to it. "So far as it is a typical museum it is quite independent of palæontology for the use of a number of persons who do not want to go to work in the herbarium, but merely wish to look over a number of plants to get a general idea of their general aspect, and to compare their own specimens as far as they can do it merely by looking through them without examination. There are a large number of persons who have collected a few plants, and who want themselves to ascertain whether they have correctly named them, and who only require to look through a well-arranged typical herbarium to see whether they are right as to the genera or as to the species; and for that a large working establishment like the one at Kew is not suited, because there are a great mass of specimens of the same species which take a long time to go over. That is one of many purposes for which a herbarium in London would be eminently useful for amateurs and others, quite independently of palæontology; and, therefore, I can by no means consider it as entirely subservient to palæontology."

7208. It would be a better plan that the Keeper should be a botanist, and that he should have assistants who had specially devoted themselves to the palæontology of plants, "for the palæontological part he would require palæontological assistants, and for the botanical part a botanical assistant; but I think it very essential that he himself should be both."

7209. Whether the Keeper of the Botanical Collection in the National Museum should be subordinate to the Superintendent of all the collections there, or should he be in any way subordinate to the Director of Kew "is a very delicate question, in which very many interests are concerned. Of course, so far as the botanical collection is concerned, it would be very essential that he should work in harmony with Kew; and, therefore, if the two were under one head it would be an advantage. On the other hand, it requires that he should work in harmony with the zoological and geological museums, and be in close connexion with them; and that is a reason for the whole being under one management; but that is a complicated question, rather beyond my province, excepting, so far as I think, that every precaution should be taken that the two botanical departments should work in harmony together."

7210. There would be very great difficulty in administration if there were in the same building a Keeper of the collection who was wholly independent of the general Superintendent, "and, therefore, I think it would never do to place the London collection under the direction of the Director of Kew."

7211. There is no proposal to place in the National Museum anything corresponding with the Museum of Economic Botany. "I think that the two collections that we have are quite sufficient for that purpose. It is very essential that they should be as extensive as possible, and it would be too much to require the nation to keep up three collections. Two collections for two different objects are very useful, and these two objects may be clearly defined as I have above stated, by the products being arranged in the one, as at Kew, according to the plants they proceed from, an object which, although a purely scientific one, has great practical advantages; and in the other, as at South Kensington, according to the uses they are put to, for food, for clothing, or for other purposes.

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G. BENTHAM, Esq., F.R.S. — 1871.

John Ball, Esq., M.A., F.R.S.; Examined.

7213. (*Chairman.*) I have devoted much attention to the natural sciences—mainly to botany.

J. BALL Esq., M.A., F.R.S.

7214. In some degree I have considered the question of our National botanical collections. "I have had occasion to personally make use of collections in various countries, and necessarily also at home. I have not been living in England much for the last ten years, but I know enough of the Kew herbarium and collections generally to be pretty familiar with them. I believe I may say that it is admittedly, not only the richest, but also in every way the most valuable and available to science of any collection in the world."

7215. I am partially acquainted also with the collection at the British Museum.

7216. "I think it desirable that there should be a collection, speaking more strictly, an herbarium, a collection of dried plants made as complete as it can be in the metropolis; but I do not think that it is desirable that there should be anything like a competing collection. The collection at Kew is more valuable to science, being there close to the great garden, possessing as it does materials which it would be in vain to try to collect, even at any outlay of money. You could not bring together again such a herbarium as there is now existing at Kew. The British Museum contains certain valuable and interesting collections, some of them unique, and it is, I think, generally felt by the cultivators of science that it would be very desirable that they should be united to the unrivalled collection at Kew, while at the same time I consider that the collection at the British Museum might be made more valuable to science and to scientific men than it now is, even although you took away from it some portions of the materials that are now there.

7217. I would say that it is by no means a conclusion come to exclusively from observing our own collections, but I have everywhere seen that the keeping up of a great Natural History collection in any branch of science is a thing that requires a concurrence of favourable circumstances that are very rarely united. I am familiar with the collections in various parts of Europe, which, in spite of the materials being there, are not made so available to science as they might be and as they should be, not because they have not eminent scientific men connected with them, but because the system is not adequate to attaining a most difficult object—namely, maintaining a very large collection in a complete state available for reference. I will not go into detail as to those which I have in view at this moment in Paris, in Germany, and in Italy; but I may say that very often it depends upon the traditions of a place. We had in the British Museum the most eminent botanist of the present century, and, perhaps, of any century, Mr. Robert Brown, unrivalled for his powers in his own department, but yet he had not that combination of qualities which makes a good administrator of a National collection. And I venture to say that the traditions of the British Museum have not been favourable to making the collections there as available for the general purposes of science as might be desired. At the present moment there are two very competent gentlemen at the British Museum, but I do not think that it would be within their power to make the collection there at all a rival to that at Kew. Having one National establishment such as Kew, which I take to be as near perfection as it is possible in human affairs to attain to, it would be easy from their rich stores of duplicates to supply not only the British Museum, but such other institutions as may be fixed upon, and as it is desirable to aid in that way with correctly-named duplicates, which would enable you to have herbaria for reference, not only at the British Museum, but also at other centres that may be fixed upon in the United Kingdom. I believe that that could be done; of course, there I speak under the correction of those who manage the department; but I believe it could be done without any large increase to the present establishment at Kew. The tendency, perhaps, of National collections and public establishments placed under men who are themselves distinguished in science, and who naturally are carrying on original inquiries or studies of some kind, is to let what appears to them to be in great measure the mechanical work fall into arrear; and it is only when a very excellent system has been well established, and has become part of the tradition and rule of the place, that you can combat this tendency, not only of the chief, but of his assistants. They are

J. BALL, Esq., M.A., F.R.S. — 1871.

generally young men of zeal for science, and who are anxious to distinguish themselves (I have seen it over and over again in foreign museums); and their tendency is to give as much time as they can to their own inquiries, and to let, in a great measure, the mechanical work of keeping up the collection fall into arrear. At the present moment, I happen to know that there are in the British Museum collections of plants of very great interest, one of which I had occasion to examine lately, but which I believe had not been opened since the time of Sir Joseph Banks. I believe he was the last person who opened the parcels which I saw within the last fortnight."

7218. With regard to such collections as those, I think it desirable that they should be transferred to Kew.

7219. "I think that if the National collections were under the immediate supervision of a competent officer, feeling a direct sense of responsibility, that is the best security that you can have. I venture to doubt whether the present mode of governing the museum is very favourable to that."

7220. It is decidedly desirable that there should be a connexion between the Director of the establishment at Kew and the Keeper of the botanical collection in the British Museum, "but I am not prepared to suggest the precise nature of the connexion, or how it may best be established. The two institutions may very easily serve each other. It happens that the gentleman who is, I believe, either actually appointed or about to be appointed (for I am not quite aware of the fact) to the head of the botanical department in the British Museum, is an eminent cultivator of fossil botany. There is no objection, that I can see, and no reason why that department should not remain at the British Museum. Its essential function is subservient to the geological collections rather than to the study of recent plants. Anyone at the head of such an institution at Kew could easily aid in various ways that particular department of science which might have its centre at the British Museum and *vice versâ*."

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7227. The general work of the botanical establishment would be kept at Kew, I presume. "Kew, as a matter of fact, is the place in Europe to which all cultivators of botany who have important work on hand do resort. Botany is not a science which has a very numerous body of cultivators, but in proportion to the numbers Kew has a large number of students from foreign countries, and visitors who are most of them eminent men of science who come there, and it is most desirable not only that it should be maintained, but, if possible, made a still more complete collection there. Perhaps, if I may recur to what I said, in order that it should not be understood that I am wishing to make any charge either against the past or present management of the botanical collection in the British Museum, I may say that it is a matter of some very considerable difficulty to arrange and name collections which arrive from distant and little known countries, and that can be done with anything like ease and correctness only where there is already a very large mass of materials arranged. Any gentleman who has cultivated any branch of natural history, and knows what it is to get, we will say, 100, or 200, or 300 objects coming from a distant and imperfectly known country, unless he has at hand collections of a very large description, enabling him to see the place of those new objects in the general series of natural productions, will feel what an enormous difficulty there is, and how much time will be wasted. I venture to say that the unnamed collections in the British Museum could by the very same person be named and classed, and placed in one quarter of the time at Kew that they could be at the British Museum itself, by the same person acting with the same motive for zeal and efficiency."

7228. All unnamed collections should be sent down to Kew for that purpose.

7229. There is an accumulation of objects of that kind in the British Museum. "I cannot venture to say how large it is. I know, because I have had a recent instance of one, that some very interesting collections have, I will not say disappeared, but cannot now be found, and they may very possibly be lying in cases there.

7230. There would be no reason for removing the named collection at the British Museum, but I should propose to add to it and complete it as far as may be from the collections at Kew. It would be very much enlarged, and it would still require the services of, we will say, two or three competent persons to keep it in order, and to correct errors which may arise, and from which no collections are exempt. Of course, I presume it would not be possible to refuse collections specially given hereafter to the British Museum, and, therefore, there should be a small staff there adequate to keep them in order.

J. BALL, Esq., M.A., F.R.S. — 1871.

7231. What I would suggest is with reference to the unnamed collections sent home by travellers, who express a special wish that they should be at the British Museum, I should recommend that, at all events, they should in the first instance go to Kew, and be dealt with there, and then sent in accordance with the wishes of the donors to the museum. That, I presume, would not be considered a departure from their special wish, but I should decidedly prefer that those who did make gifts to the nation should let them go to the central establishment at Kew, as I believe most present travellers or officers in the public service do.

7232. I may perhaps say that I think it would be very easy to make the collections at Kew available, not merely to complete the collections at the British Museum, but also for other institutions in various parts of the empire. I believe it would tend very much to the progress of science if collections, for instance, even of the ordinary plants of our own islands, or of Europe, could be sent out to the colonial institutions, and it would tend to increase the intercourse that there is between naturalists at home and those in our colonies or distant settlements.

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Thomas Thomson, Esq., M.D., F.R.S.; further examined.

T. THOMSON, Esq., M.D., F.R.S.

7239. I am to a certain extent acquainted with the National botanical collections, both at Kew and in the British Museum, and very well with that at Kew.

7240. "In one sense, and only in one sense, they may be said to be competing, in so far as they would both purchase collections nowadays, but in no other sense are they at all competing. There is a perfectly good understanding between the two. The Kew collection has only recently been a Government collection, it was for a very long time the almost entirely private collection of Sir William Hooker, and it was only on his death that it assumed fairly the position of a Government collection, having been purchased from the owner."

7241. I do not consider it desirable that the two collections should both be maintained.

7242. "I speak without the same intimate knowledge of the British Museum collection that I have of the Kew herbarium, that the one at Kew is at present the more available for scientific research of the two, and I think that it is at least quite as accessible to scientific men as the other. I am, therefore, strongly of opinion that it would be most desirable that some at least of the British Museum collection, if the Natural History department is removed, should go to Kew, so far at least as it would not be merely a collection of duplicates, and I think it would be very desirable so far as it is a duplicate collection (and it would be so to a very large extent), to have a separate collection in London for reference; but for all scientific research I think Kew is quite as accessible and quite as available, and more convenient for botanical specimens than anywhere in the immediate neighbourhood of London."

7243. While making Kew the main botanical collection of the nation there would be advantages in also keeping up a botanical collection to a certain extent in the British Museum, "but not independently of the other. I think wherever the head authority is, whether the head authority was at Kew or in London itself, the two should be correlated, and should work in unison, and that one of them should be the head establishment and the other the branch.

7244. The palæontological department has never been attended to at Kew, and I think it would be desirable that that should remain with the Natural History department of the British Museum.

7245. Kew never has concerned itself with palæontological collections at all, and I do not think it would be desirable to make any difference in that respect from what is the present system."

7246. Whether the palæontological collections, so far as botany is concerned, should be with the other botanical collections at the British Museum, rather than have it in a separate department, "is a point upon which I am not able to give any definite opinion.

7247. I do not know that the Superintendent of the botanical department of the British Museum should be appointed by the Director of the Kew establishment, but if Kew is considered as the head establishment he should be subordinate to him, I think."

7248. He should be under his direction certainly, I

T. THOMSON, Esq., M.D., F.R.S. — 1871.

think. In whatever hands the appointment lies is a different question.

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William Carruthers, Esq., examined.

W. CARRUTHERS, Esq.

7714. I am the Keeper of the Botanical Department at the British Museum.

7715. "There is no connexion between the two collections" at the British Museum and at Kew.

7716. "I do not see, upon the face of it, any reason for any connexion being established between the two collections.

7717. I believe the nation does" derive advantage from possessing these two collections independent of each other. "But it is my impression that, inasmuch as we have collections in different parts of the country, in Edinburgh and in Dublin, kept up at the national expense, it is necessary in such a large centre of population as London, and much more as London is the attraction for science throughout the whole country, we should have national collections there, so that I would not put the necessity for a collection existing in London, apart from the necessity of a collection at Kew, on the requirements of the nation so much as on the requirements of the enormous population of London, and of the scientific visitors who are in the habit of visiting London."

7718. As to the two collections having different objects, "I consider that Dr. Hooker, if you will allow me to refer to his statement, has put it very clearly in a document which I thought might be of use in connexion with this natter, namely, a Return to the House of Commons, 'Of all communications made by the Officers and Architect of the British Museum to the Trustees respecting the want of space," and so on, ordered by the House of Commons, on the 11th of March 1859. At page 4, Dr. Hooker says: "There are two circumstances which I think the Trustees should bear in mind in dealing with the question of the transference of the botanical collections from the British Museum to Kew. 1. That it is in one sense immaterial to us at Kew what becomes of the British Museum herbarium; for a first-rate herbarium and library must be maintained at Kew, and are indeed essential to Kew for naming the plants in the Gardens and Museums of Economic Botany, and for giving to botanists and gardeners the information daily demanded of us." That is Dr. Hooker's own statement of the first necessities for the herbarium at Kew. In the British Museum we do not contemplate any object of that kind at all. It is a purely systematic and scientific collection of plants for the use of systematic botanists. In the second place, Dr. Hooker says: "That their being indispensable to Kew, and in constant use for the garden purposes, is no obstacle to their being consulted to any extent by other botanists, nor does it at all interfere with the facility of consultation. A herbarium and library of such value and extent as that at Kew must be, though originally maintained expressly for the use of the garden, cannot with propriety be closed to scientific botanists." I think that Dr. Hooker clearly separates the principal object of the British Museum herbarium, from that of the herbarium at Kew."

7719. A large number of persons make use of the collections at the British Museum for the purposes of study. "I made a note of the number of visitors. I may say that previous to 1867 no record was kept of the number of visitors. In the beginning of April of that year, by the instruction of the Trustees, a regular record was begun, and has been ever since kept. In the nine months of 1867, the collections were visited by 811 persons for scientific information; in 1868, 840 visited it; in 1869, 974; in 1870, 1,041; and during the first three months of this year the number of visitors has risen to 406, which is a much larger proportion than we have known on previous occasions, being at the rate of 1,600 a year.

7720. The herbarium consists of two portions: first the systematically arranged herbarium, which is by far the largest portion of the whole; indeed, it contains, I may say, the collection, and that is carefully and systematically arranged, and accessible with the greatest facility; and the remainder of the collection consists of the plants that we are continually receiving either by donation or by purchase, or plants that have been similarly received in former times which have not yet been laid into the general herbarium. The great bulk, I may say nineteen-twentieths of the collection, is carefully arranged, and any one plant can be obtained in a few minutes.

7721. The numbers that I have given just now are the numbers of students—by students I mean not only men who come to investigate plants systematically, but also men who come for information which can only be obtained by application to the officers in the private studies of the museum.

W. CARRUTHERS, Esq. — 1871.

7722. The herbarium is never opened to the public. There are two rooms open to the public, but of the numbers who visit those we have no record, as they are perfectly free, and the public pass freely through them without any special record being made of their numbers. The herbarium is separated from the public rooms, and before access can be obtained to the herbarium the bell must be rung, and special application must be made. I have only here a record of those who have come for botanical information, not personal friends who have called upon the officers."

7723. I have the power of admitting anyone who wishes to examine the collection in the herbarium.

7724. Without reference to any other superior officer.

7725. "The full staff, as it existed on the occasion of the retirement of Mr. Bennett, is a keeper and two assistants."

7726. The assistants are under my direction. "At present there is a vacancy, so that there is only one assistant, but I hope that the vacancy will be speedily filled up."

7727. I have been consulted in the appointment of my assistants. "I may say that I have only been a few months an officer, and I have been consulted with regard to the appointment of the assistant, and I know that my own appointment was obtained directly through the recommendation of Mr. Bennett, the then keeper, and that the appointment of my colleague, Dr. Trimen, was similarly obtained."

7728. (Asked by *Professor Huxley.*) Do not you think it might be a material advantage to the country in general, as well as a saving of expenditure, if the herbaria at Kew and the herbaria at the British Museum were put in some sort of relation; that either should stock the other with what materials are superfluous in itself: for example, as Kew must often obtain a very large number of duplicate specimens of plants, would not it be desirable that such specimens as you might wish to have should come from Kew to the British Museum and *vicê versâ?* —Witness replied: I believe that it might be an advantage to us at the British Museum to have such specimens as were *desiderata*, but in the case of additions to the British Museum it has been the practice carefully followed by all the officers there never to acquire duplicates, to obtain only sets of plants, so that the number of duplicates that we have in the collection there is extremely few, and all of them are most unimportant.

7729. Are there not in the British Museum collections which have never been thoroughly worked out and named. Mr. Brown's collection, for example?—Mr. Brown's collections are not in the British Museum. The series of plants collected by Mr. Brown, and which were presented by him to Sir Joseph Banks, are all named and accessible in the museum, but Mr. Brown's own herbarium is not public property.

7730. It is at present accommodated there, but it has no connexion whatever with the museum. It is accommodated in a store room in the museum, but it is not the property in any sense of the British Museum.

7731. It is the property of Mr. Bennett.

7732. It is simply accommodated there, in the same way as any book of mine, in my room in the Museum, may be accommodated there.

7733. Are there no collections which have not yet been worked out and examined in the British Museum? —I have explained that we have a considerable store of plants, which, of course, are being continually worked up, as there must be in all collections, but those plants are all arranged geographically, and a large proportion are also arranged with regard to the great natural orders systematically, so that while they are in store they are all accessible to students and are continually being brought out for the benefit of workers, whenever they think that they are of any use.

7734. As a matter of fact, the collection at Kew is the only great scientific herbarium at present, is it not; I mean that the extent of accommodation and working is far greater than anything that you have at the British Museum?—I do not think so. I believe that the herbarium at Kew is more extensive and contains a larger number of plants, but for thorough systematic work, for

W. CARRUTHERS, Esq. — 1871.

the existence of a large number of authentic species and specimens that have been actually described, I believe that our British Museum herbarium is unequalled in the world; and that is not only the opinion which I myself have formed, for I am not very extensively acquainted with herbaria abroad, but it is the universal testimony of men who have become sufficiently acquainted with the British Museum herbarium to form an opinion worth considering.

7735. I believe that the British Museum is visited by all the foreign botanists that come to this country, and I may say that I ran over, a few days ago, the visitors that we have had during this year, just to form a rough idea of who they were, and I find amongst the foreign botanists, who have been in the habit of visiting the museum, the names of Cosson, Baillon, Triana, and Welwitsch, who have been here during the year 1871.

7736. I should say that Cosson has paid probably thirty visits to the museum, day after day, going systematically through a part of them.

7737. Would you recommend that the Government of the country should go on as it appears to be doing at present, keeping up two first rate herbaria, the one at Kew, and the one at the British Museum?—I should like to submit to the Commission statements made by men who are better able to judge of that than myself. In the first place, Mr. Robert Brown was distinctly of that opinion, and expressed it very strongly on several occasions. Mr. Bentham, the President of the Linnean Society, also expressed very strongly the same opinion in the paper out of which I made an extract from Dr. Hooker's statement in the earlier part of my examination.

7738. Did not Mr. Bentham subsequently modify that opinion in a paper which he published in "Nature"?—I am not aware of any paper published by Mr. Bentham in "Nature." It was not stated to be by Mr. Bentham.

7739-40. It has been stated before the Commission that it was by him, and in that paper I think he expressed a rather different opinion?—I will come to that presently if you will allow me. Mr. Bentham, in the evidence in 1859, to which I have referred, states distinctly that the removal of the botanical collections to Kew would not be advantageous to science, and he also says, "I think the Sloanean is of more value at the British Museum than it would be at Kew, and I think that a great portion of the additions to the Banksian Herbarium since Sir Joseph's death are duplicates of those already at Kew." He further says that it would be desirable to have a herbarium in London. Professor Henfrey at the same time insisted that it was important to keep a botanical collection in London. Dr. Falconer, who had the charge of both the Gardens and Herbarium at Calcutta, distinctly stated, as Dr. Hooker had already done, the necessity for a herbarium in connexion with the botanical gardens; but he also said, "I believe that a separate public herbarium and library in the centre of London and easily accessible are so useful and necessary that it would be in the highest degree inexpedient to do away with them." Sir Charles Lyell was strongly opposed to the removal, and Mr. Darwin thought that a National collection ought to be in London, but he could see that some weighty arguments might be advanced for Kew. As the result of that investigation, the Committee came to the following conclusion, which you will find at page 11 [see p. 122]: "Sir William Hooker, Dr. J. Hooker, and Dr. Lindley have given reasons in favour of the removal of the collections from the British Museum to Kew with the view of rendering that establishment more complete, but Dr. H. Falconer, long at the head of the Botanical Garden of Calcutta, and Professor Henfrey support the opinion of the late eminent botanist Mr. Robert Brown, and believe that such a removal would be of great disservice to science, by depriving the consulting botanist of ready access to a central metropolitan herbarium and library. In this view Mr. Bentham coincides, with this exception, that he wishes the herbarium bequeathed by Sir Joseph Banks to be removed to Kew. In reference to the scientific importance of the botanical collection, in its illustration of the geological specimens in the museum, the opinion of Sir Charles Lyell is decidedly in favour of retaining such a botanical collection in the metropolis." For what reason I cannot tell, but a few months after that a memorial was prepared, which intimated a complete change in the opinion of several of those men. As this memorial was headed by one of the Commissioners present at this table, probably he may know something about it; but Mr. Bentham, in this memorial, completely upset the opinion which he had given two or three months before, an opinion which was in accordance with the opinions entertained by Mr. Robert Brown, by my predecessor, Mr. Bennett, and by many other distinguished botanists.

W. CARRUTHERS, Esq. — 1871.

[Interpolated by *Professor Huxley*. No proposition has been made before this Commission to remove the herbarium from the British Museum, but the question which has been brought before us is the possibility, or the desirableness, of bringing the two herbaria to some sort of relation to one another, so that the Government should not be actually doing two things twice over, seven or eight miles apart.]

Then, with regard to this particular statement which is published in "Nature," the same views were already expressed in an official document which was presented two years ago to the Trustees of the British Museum from the Board of Works, and this statement is nearly a reproduction, in slightly altered language, of that document, which was fully dealt with and answered, and this answer was sent to the Board of Works, and it was then understood as being perfectly satisfactory, both to the Trustees and to the Board of Works. I do not think it would be very difficult for me to show how utterly hopeless the study of botany, and especially palæontology, would be, if the London Herbarium were put in the position that is mentioned by Mr. Bentham.

7741. Will you be kind enough to tell us what is the date of the document in which the answer is contained, so that we may be able to procure it?—I do not know that the document has been published—it was an official document.

7742. (*Chairman.*) Was it not laid before Parliament?—No. I find that the date of the official document is December 1868.

7743. (Question put by *Professor Huxley.*) Is it your opinion that the two herbaria should be equally perfect and equally complete, without any relation the one to the other?—It is my opinion that it is absolutely necessary for the gardens at Kew to have a herbarium for naming the plants, as Dr. Hooker clearly puts it. It is also my distinct conviction that a herbarium for the study of systematic botany has no connexion whatever with a botanical garden. It ought to be in a position where it can be most freely consulted by all students of botanical science, and there is sufficient evidence that London is the best situation for such a herbarium.

7744. What is, in your judgment, sufficient evidence that it is better than Kew?—The number of visitors that are in the habit of coming to the department, and the kind of visitors that come. I made some notes from the same list from which I gave the names of the foreign botanists to show the kind of visitors that come for the scientific purposes to the British Museum. There are two clergymen who are on official duty in London who are somewhat eminent in botany; one is, perhaps, one of the most distinguished of British lichenologists, who would not be able to visit the collection if he were required to go to Kew to do so. We have also had visits during this time from two medical men who are in active practice in London, who are able to run in only for a short time on occasions, and who visit us for some special purpose to settle some precise point, in the one of these instances with regard to some species of moss, and in the other with regard to some fossil plants. Then I have the names of six men who are either in business or engaged in professional work in London, whose time is of great importance, and who could not possibly have gone to a great distance to consult a collection. There are two men who have come from the country to London on business, and who find it convenient to come to the museum to consult the collections, but who could not have gone during their short visit to London to any distance. There are other men living in London who are able to come and settle points on a short notice, which they could not do if they had to spend a day in seeking for the information. On that account I should consider that it was more convenient to have it in London. And then I find Mr. Waterhouse, who is a Keeper in the Museum, in evidence given in June 1860, makes the following remarkable statements with regard to the convenience of London as the site for a herbarium. He made this statement, which has not been contradicted, and I believe I know the parties referred to, and can confirm the statement if that were needed:—"One of our active botanists who was living at Hammersmith, and was consequently within a short distance of Kew, stated that it was much more convenient for him to come to London to examine the collections than to go to Kew. His explanation was this: that he constantly had occasion to come to London for other purposes, and he then took advantage of his visit to clear up his doubts upon botanical questions, whereas he was seldom led out in

W. CARRUTHERS, Esq. 1871

the direction of Kew. I have to-day heard of another person living at Turnham Green, also a botanist, who has said that it was more convenient to him to consult the herbarium in London than at Kew."

7746. We have an infinitely better botanical library rather to stop accumulation at the general herbarium at Kew and increase the accumulation in London?—That is my judgment. I conceive that they must have a herbarium at Kew for the purposes of the garden, but that the great scientific herbarium ought to be where it is most easily consulted, and that is in London. That there is no connexion whatever between a herbarium and living plants in a garden, is clearly evidenced to by Mr. Bentham, who was asked in the document to which I have referred, at page 7, "Are you not cited in Lindley's 'Vegetable Kingdom' as an authority for the fact that in the year 1845 there were about 6,500 species of that family" (that is the *Leguminosæ*) "then known?—(A.) I believe I am so quoted by Dr. Lindley. (Q.) If so, can you state in a general way how many of these 6,500 species you became acquainted with only through the medium of herbaria?—(A.) I became acquainted with nearly the whole *Leguminosæ* through the medium of herbaria. There are not many hundreds that I have seen living. (Q.) What proportion of these 6,500 species may you have seen in the living state in botanical gardens; one-half, one-third, one-fourth, one-fifth, one-eighth?—(A.) I have examined very few in botanical gardens; very few indeed. (Q.) In your researches on systematic botany, have you been indebted most to herbaria or botanical gardens?—(A.) I have published several thousand new species of plants; I have never published one without examining it in a herbarium, and I have examined very few in botanical gardens." So that for the purposes of the systematic botanist, the value of botanical gardens, on the testimony of Mr. Bentham, is almost nothing. The one consideration, as it seems to me, is to obtain a large and most complete herbarium, thoroughly arranged, and in the most convenient place; and the testimony, so far as I know, invariably is, that the most convenient place is London.

7746. We have an infinitely better botanical library. at the Museum than at Kew, inasmuch as we have the whole library of the British Museum.

7747. It is "infinitely better, inasmuch as for botanical purposes you require not only works specially devoted to botany, but you require Transactions and Publications where botany is sometimes included; you require books of travels, where occasional references are made to botany; and you require series of works which it is next to impossible to collect together in any library, especially in one formed for work in one department of science."

7748. Is it not a fact that the library at Kew contains the transactions of all those learned societies which give space to botany?—Not so extensively as the library of the British Museum. I may say, as a matter of fact, that the men who are in the habit of working at Kew frequently bring references to books which they cannot obtain at Kew for me to obtain for them in the British Museum library.

7749. (*Professor Smith.*) Is there at present any plan in which the naming of the two herbaria at the British Museum and at Kew is made comparative with one another, and consistent throughout?—None whatever. They are named by independent workers on their own powers of determination.

7750. Do you suppose that much discrepancy would be found if a comparison were made between the two?—No doubt very great discrepancy, inasmuch as when you are dealing with materials that vary so very little, and have for their determination short diagnostic descriptions, it is extremely difficult for two men working perfectly independently to arrive at precisely the same reasons as to the value of the diagnosis in relation to, say, half-a-dozen allied specimens before them.

7751. Do you suppose it would be desirable for the interests of science that the two collections should be compared?—Practically they are in the interests of science. Workers seldom publish without working at the herbaria at Paris, in London, and at Kew, and at all the great herbaria. I do not mean those particular places alone but also Geneva and other great herbaria. When anyone is engaged in any great exhaustive work he must consult all of them.

7752. There is no arrangement at present by which it is possible actually to compare those specimens about the naming of which there might be discrepancies; in fact, you cannot send specimens from the museum to Kew, or specimens from Kew to the museum, in order to compare them one with another?—No specimens of any kind received into the museum can be allowed to leave the museum except under very exceptional laws, which would never be put into operation under the circumstances to which you refer.

W. CARRUTHERS, Esq. 1871.

7753. I believe that the maintenance of that strict rule is for the interest of science on the whole. "There are disadvantages connected with it, but there are advantages which seem to me to be more important."

7754. I attach great importance to the proximity of the botanical collection of the British Museum to a great general library.

7755. Do you think that the removal of the botanical collection from its present site to South Kensington will be seriously prejudicial, by depriving you of that advantage?—I believe that it will be a serious injury to science if the removal takes place, but I suppose that that is decreed, and must take place; but it will be an injury to science, which it would be impossible ever to recover in some aspects of scientific investigation.

7756. Do you not consider that the collection at Kew and the collection in the British Museum might be scientifically used for two different purposes in any way?—Practically it is so: according to the original notion of the foundation of them, and according to the uses of them, the herbarium at Kew is employed for the naming of plants, as Dr. Hooker says, in the gardens, and in the museum of "Economic Botany"; and the fundamental notion of the collection at the British Museum is for the study of systematic botanists.

7757. (*Chairman.*) Are there any instances upon the continent, at Paris, or Berlin, or Vienna, of duplicate collections similar to those which we have in this country?—I am not aware that there are any such collections.

7758. In most cases probably the botanic garden is nearer to the capital than is the case in this country?—In Paris certainly it is in the capital; but just there, as here, the systematic botanists consult the herbarium and not the garden. In Berlin it is in close proximity, although not actually in the metropolis.

7759. If the botanical and other natural history collections are moved to South Kensington, do you consider that it will be necessary to have a subsidiary library?—It would be absolutely necessary, and I believe that unless the value of the herbarium were to be greatly destroyed, the Banksian library will be required to form a portion of that subsidiary library, inasmuch as the Banksian collection was in continual use while the Banksian herbarium was being formed, and the volumes that form that library were annotated by the workers in the herbarium, so that if the books were left behind and the plants separated anywhere from the annotations on the books, the value of the plants in their cross references to books would be completely destroyed.

7760. I have referred to the facilities for consulting the collections which have been the same from the beginning, and, as far as I know, there is perfect freedom in examining anything in the herbarium accorded to everyone who asks for such a liberty, and this has been the practice, as I believe, from the beginning of the institution of the herbarium.

APPENDIX XV. (See Questions 7739–40.)

Paper handed in by Mr. Carruthers

I had carefully read and considered the proposals contained in the anonymous communication on "Botanical Museums," published in "Nature" on the 23rd March last, and was fully prepared to deal with them had they been made the subject of examination. Indeed, at the close of my answers to questions 7739-40, I was proceeding to deal with them, when I was interrupted by a question which gave a different direction to my examination. I treated the communication in "Nature" as one is accustomed to treat anonymous papers, estimating only the value of its arguments. Now, however, as it appears with all the weight which the name of Mr. Bentham carries with it, I desire to submit to the Commissioners my views:—

1st. On the statements contained in the paper.

And, 2ndly, on the matters naturally flowing out of those statements.

I. *The statements contained in the paper.*

1. The views expressed by Mr. Bentham regarding the main purposes of a botanical museum and herbarium, and the requirements of a collection for such a close study

of plants as would supply a "sound foundation upon which the science of botany can be usefully established," arise from his estimating the science of botany as limited to that particular department of it to which he has devoted his life, and in which he has done important service. The profound study of plants is, in his view, "their accurate determination and practical classification," and he states that he requires for its prosecution nothing more than an exhaustive herbarium of the fragments of plants supplying the diagnostic characters at present employed for distinguishing genera and species, with a complete library and staff of officers. This is, in my opinion, a very defective estimate of the science of botany, and of the materials required for its advancement.

Robert Brown took a very different view of the profound study of plants, and in the Botanical Department of the British Museum he tried to develop that masterly grasp of the science which is to be found in his works, by illustrating, as far as possible, the structure of all the parts from the lowest to the highest, both existing and extinct. Accordingly, the National Herbarium, large as it is, forms but a part of the botanical collections. The specimens placed in the outer rooms, which exhibit chiefly the form and structure of the stems and roots of plants, are as necessary a part of the purely scientific collection as the dried foliage and flowers in the herbarium. While such specimens "excite the interest" and "gratify the curiosity" (and, what is more important, instruct the minds) "of the general public," these are very far from being their principal, still further from being their only purpose in a botanical museum, as Mr. Bentham appears to imply. The scientific investigator, whose notion of systematic botany is somewhat larger than ascertaining the technical name and order of a plant, consults these specimens as he does the herbarium. It is, therefore, a mistake to suppose that they, "when once placed, require no further handling."

The purely scientific collection of the British Museum consists of:—

I. The Herbarium, comprising—

a. The General herbarium.

b. The British herbarium.

c. Various separate small and complete herbaria of historical interest.

II. The Structural series, comprising—

a. The fruit collection.

b. The collection of gums, resins, and other natural products.

c. The general collection, exhibiting the form and structure of plants, and consisting of the larger specimens chiefly exhibited to the public; and

d. The microscopical preparations, illustrating the minute structure of recent and fossil plants.

2. The limitation of the science of botany to the plants now existing on the earth is another grave defect. No subject has recently received more attention from biologists than the relation between existing and extinct plants and animals. Every philosophic estimate, or systematic classification of the one kingdom or the other must include the fossil as well as the recent. This is fully acknowledged and acted upon by zoologists, and no better illustration can be adduced than Professor Huxley's "Introduction to the Classification of Animals" (1869). In botany, also, in the standard and only complete *Genera Plantarum*, by Endlicher, the fossils are ranged in their systematic position with the recent plants. It is true that the *Genera Plantarum* now in progress, of which Mr. Bentham is one of the authors, ignores all extinct plants. This retrograde step is in entire accordance with the views expressed by Mr. Bentham in "Nature." A systematic account of the *Lycopodiaceæ*, which took no notice of the arborescent forms of the palæozoic age, or of the *Cycadeæ*, which ignored the numerous forms and remarkable variations of this order in the secondary rocks, would be obviously very incomplete and unsatisfactory. In forming a collection to supply a sound foundation for the science of botany, it would be as reasonable to exclude the plants of any existing botanical province—say Australia—as to omit those which have existed at any particular period of the earth's history—say that of the Wealden.

3. The distinction which Mr. Bentham draws between a herbarium "for the close study of plants" and one for their "rapid determination without dissection" is most undesirable, and, in my opinion, practically impossible. No botanist has so extensive an acquaintance with the vegetable kingdom as to be able to make "a close study," in his necessary work, of every group of plants he may be naming or arranging; he must in many groups make a "rapid determination without dissection." If Mr. Bentham's distinction were in force, and the two herbaria he proposes existed, he would himself, when rapidly naming some of the important collections which have passed through his hands, have often been driven from the great scientific collection to work in his single specimen herbarium with the "general naturalist," "the palæontologist," and "the mere amateur." Every systematic botanist is at first, and more or less all along, a "comparer" of plants. The man who begins as a mere comparer, naturally becomes a close student under the influence of the collection he is consulting, and the workers he encounters in that consultation.

4. Mr. Bentham's single specimen herbarium is chiefly intended for the palæontologist, and, in addition, he proposes to provide him with "separate collections of leaves and fruits, . . . so arranged as to enable them to be rapidly glanced over," and these, it is added, "would be most useful." No better testimony to the utter worthlessness of such materials for the purpose proposed can be adduced than the criticisms of Mr. Bentham himself, on the evidence for the existence of the natural order *Proteaceæ* in Europe, from leaves found in Tertiary strata. Mr. Bentham was specially fitted to deal critically with the hundred fossil species referred to this Order, as he had just made the analysis and detailed descriptions of between five and six hundred *Proteaceæ*. The Order is also the best fitted to test the value of the leaf characters on which the fossils had been referred to it, because, as he testifies, it "is one of the most distinct and most clearly defined amongst phanerogams," and is without "a single plant intermediate in structure between that and the nearest allied Orders." With regard, then, to the leaves of this Order, Mr. Bentham says: "I must admit that there is a certain general facies in the foliage of this Order that enables us, in most, but not in all, cases, to refer to it with tolerable accuracy—leafy specimens known to have come from a proteaceous country, even without flowers or fruit—but as to detached leaves, I do not know of a single one which, in outline or venation, is exclusively characteristic of the Order, or of any one of its genera." I cannot reconcile this declaration by Mr. Bentham, to the Fellows of the Linnean Society, as their President, in May 1870, with the statement published by him within a year thereafter, that such a collection of detached leaves, not for a limited and exceptionally defined Order, but for the whole vegetable kingdom, "would be most useful."

Proceedings Linnean Society, 1870, p. lxxxv.

Linnean Collection, p. lxxxviii.

I must further observe, that Mr. Bentham has overlooked the fact that a large proportion of fossil plants have been determined from their internal structure, that is, on evidence which no mere herbarium, however extensive, can supply, far less one for rapidly determining plants without dissection, or a collection of detached leaves. The palæontologist requires the most extensive collections possible for his work, and he must be a working zoologist or botanist. All such work done by mere "geologists," and on such data as Mr. Bentham proposes to supply, would always deserve strong condemnation.

II. In considering the matters naturally flowing out of Mr. Bentham's paper, and the views I have now expressed, I venture first to submit the reasons which make it desirable, in my opinion, to retain the two herbaria as separate and independent institutions.

1. The two herbaria already exist, and are, to a considerable extent, parallel collections. Mr. Bentham, whose extensive private herbarium formed the foundation of the public herbarium at Kew, declared, in 1858, "that a great portion of the additions to the Banksian herbarium, since Sir Joseph's death, are duplicates of those already at Kew." As the Banksian plants form less than a quarter of those now existing in the British Museum herbarium, the duplicates would be, according to Mr. Bentham, about three-fourths of the whole. Sir William Hooker, also, whose large collections form the great bulk of the Kew herbarium, testified, in 1858, that "the Museum specimens are to a great extent duplicates of those at Kew." And the present Director of Kew Gardens corroborated this statement at that time. In 1860, Sir William Hooker further said, in reference to the transfer of the National Herbarium to Kew, as affecting the herbarium there, "To Dr. Hooker and myself it literally and truly can be a matter of no consequence."

Return to House of Commons, No. 126, 11th March 1859, p. 7.

Return to House of Commons, No. 126, p. 3.

Evidence before the Select Committee on the British Museum, 1860, p. 100.

2. The two herbaria have been under different management, and, to some extent, express different results of

"the close study of plants." The important bearing of this consideration on botanical science in Britain can scarcely be overestimated. One practical illustration may be adduced. The most varied views are entertained by botanists as to the limits of a species, and consequently as to what constitutes a duplicate. Thus, in the case of the indigenous flowering plants of Britain, Mr. Bentham considers them to form 1,274 species; Dr. Hooker, in his recent Flora, makes 1,473 species; Professor Babington increases the number to 1,648 species; whilst a botanist adopting the views which Jordan and some continental authors have applied to local floras, would make them three or four times more numerous than even the last estimate. It is quite obvious that these different botanists have each very different notions as to "duplicates," and that a distribution undertaken by Mr. Bentham would certainly result in the loss to the herbarium of plants which Dr. Hooker would consider good species, and the "duplicates" distributed by Mr. Bentham or Dr. Hooker would include numerous plants which would be of the utmost value in M. Jordan's eyes. The two herbaria, existing, as they do, under different directors, to a considerable extent counteract these and other analogous evils.

Handbook of the British Flora.

III. The objects of the two herbaria are fundamentally different, and, in as far as they fulfil their objects, they are employed for totally different purposes. The National Herbarium at the British Museum was founded in 1827 for the use of the scientific botanist, while that at Kew was, as Dr. Hooker says, "originally maintained expressly for the use of the gardens." This was the primary object for which Sir W. J. Hooker accepted the private herbarium of Mr. Bentham in 1855. Before that year the gardens had been fulfilling their proper functions without a scientific herbarium attached to them. The two editions of the "Hortus Kewensis" are the best testimony to the efficiency of the gardens, and to the value of the collections brought together there under the Aitons. No herbarium of any kind, I believe, existed at the gardens during their time. The Banksian Herbarium was often, and for a long time, systematically used for naming the Kew plants; and the strictly scientific portion of the "Hortus Kewensis" was the work of Solander, Dryander, and Brown, the successive Curators of the Banksian Herbarium. Even Sir W. J. Hooker, the successor of the younger Aiton, who raised the gardens to their present eminence, had no public herbarium from the time of his appointment in 1841 till 1855. It is, therefore, evident that a great scientific herbarium is not a necessity to the efficiency of the Gardens at Kew.

Report by Sir W. J. Hooker, on Kew Gardens, in Civil Service Estimates for 1855–56.

Report by Sir W. J. Hooker, on the Progress of Kew Gardens, 1859, p. 10.

It is, however, certain that such a herbarium as Sir W. J. Hooker and Dr. Hooker desired, that is, one sufficient to enable the officials to name the plants in the gardens, would be a most useful adjunct at Kew, as it would save the great waste of time which would be incurred in consulting a herbarium at a distance. Inasmuch as growing plants are, to the extent that they are developed, perfect, and permit thorough examination, it is obvious that the single specimen herbarium, proposed in "Nature," would meet all the requirements at Kew; and this could be kept up, as suggested by Mr. Bentham, from the duplicates not required in the great National Herbarium, all being accurately named before being sent.

Vol. III. p. 401.

IV. The practical difficulties in the administration of two separate, and to some extent independent, herbaria would be numerous and serious, and, in the course of time, a condition of things similar to what at present exists would result. It is needless to speak of a London herbarium, consisting of single specimens of each species, because such a herbarium, if practicable, would, as I have already shown, be utterly worthless for the purposes to which it is proposed to be applied. If the London herbarium were to contain only specimens sent by the keeper of a herbarium whose notion of the science of botany was confined to the "accurate determination and practical classification" of herbarium specimens, it is obvious that the palæontologist would not find there the materials for prosecuting his work. If, on the other hand, the London herbarium were constituted to be of real use to the palæontologist, the keeper must have the power of acquiring, as opportunity offered, the suitable materials, and he would necessarily secure collections which a future agitator might demand to be transferred to Kew, with as pertinent reasons as those Mr. Bentham now employs.

V. It is not an unimportant consideration that the continued separate existence of these two great herbaria is a great security against their destruction by fire.

VI. The expense of the two herbaria is very small. I am unacquainted with the amount granted for Kew herbarium, but it cannot greatly differ from that required by the National Herbarium, which amounted for the financial year lately completed to £1,767. I know of no way in which the country can at once advance the interests of science and encourage its students at a smaller cost and with more important results than by maintaining in their full efficiency the two botanical collections at present existing.

It must be admitted that the formation of a single great National Botanical Establishment, comprising the two public herbaria now existing within a comparatively small distance from each other, is a very attractive scheme, and should the Commissioners think that its realisation is desirable, I submit the following considerations as, in my opinion, essential:—

I. It must form part of the National Museum of Natural History. Such a museum, as far as it is an exhibition of biological science, will consist of animals and plants, both existing and extinct. It is absolutely necessary, in the study of geology, that the plant remains should not be separated from the animal remains; and, further, it is as necessary for the satisfactory interpretation of the fossil plants, as well as for forming a true estimate of the vegetable kingdom, that the recent plants should not be separated from the fossil. The separation of any one department would be a serious injury to all.

II. It must represent the whole science of botany, and not consist of only dried foliage and flowers, which constitute a herbarium properly so called; and, consequently, it must be formed on the principle adopted by Robert Brown, and exhibited in the Botanical Department of the British Museum, and not on the imperfect plan advocated by Mr. Bentham.

III. It must be placed in the position in which it will be most serviceable to the public, and most accessible to botanists, and that place is, beyond all question, London. The statistics which I submitted on the occasion of my examination establish this by showing the extent to which the botanical collections at the British Museum are made use of. Further, it is universally acknowledged that a herbarium for scientific use must exist in London. The long experience of Mr. Brown and Mr. Bennett in the National Herbarium made them entertain and express very decided views as to this necessity. My shorter experience has been long enough to convince me that its removal to Kew would be practically placing it out of the reach of the busy men who frequently use it to the advantage of science. Of course, the working botanist who devotes himself exclusively to the science would follow the collections wherever they went; but the active professional man, and the man of business, who devote their spare hours to botany, would be deprived of the assistance necessary to their work which they now obtain at the British Museum. That such men do a large proportion of the scientific work of the country may be shown in many ways, as, for instance, by the fact that out of the 19 botanical memoirs contained in the last two volumes of the Linnean Transactions, four are produced by professional botanists, and 15 by others.

The late Professor Henfrey, (1) as representing the botanical teachers of London, Sir Charles Lyell (2) for the palæontologists, and Dr. Falconer, (3) Mr. Bentham, (4) and Dr. Hooker (5) have recorded it as their decided opinion that the interests of science require that a public herbarium should exist in London. Such a herbarium, even if used only by palæontologists, must be, as I have shown, as extensive as possible; otherwise, it will tend to mislead, like all other imperfect sources of information.

(1) Return to House of Commons, No. 126, p. 7.
(2) Return to House of Commons, No. 126, p. 10.
(3) do. p. 9.
(4) do. p. 6.
(5) Memorandum respecting the Botanical collections of the British Museum and Royal Gardens Kew, p. 3, 31st December 1868.

I would further add, in favour of London being the proper site for the National Botanical collections, that important collections of plants, both recent and fossil, accessible to students, but not to the general public, now exist and must still remain in London. These are: 1st, the Linnean herbarium, containing the plants described by Linnæus; 2nd, the great Wallichian herbarium; 3rd, the Smithian herbarium of British plants, all belonging to the Linnean Society; 4th, the collection of fossil plants belonging to the Geological Society; and, 5th, the extensive public collection of fossil plants in the Museum of Practical Geology. The

removal of the National Botanical Collection from London would so separate them from these collections as seriously to injure their value to scientific investigators.

IV. The accommodation provided for the Botanical Department in the New Museum of Natural History, the plans of which have been accepted by the Trustees of the British Museum, will be in every way superior to any that exist in the world, and will be amply sufficient to accommodate the proposed single National Herbarium, as well as fully to display the structural histological, and palæontological departments of the science. All the requisites specified by Mr. Bentham for the close study of plants, excepting the connection with a garden, exist to a greater or less degree at the British Museum, and some of them in a greater degree than at Kew. That living plants are a requisite adjunct to a herbarium, is in opposition to the testimony of Mr. Brown and Dr. Falconer, to the effect that there is no necessary connection between a herbarium and a garden; and is opposed, moreover, to the testimony of Mr. Bentham himself, as well as to his declaration that his extensive systematic labours have all been based on herbarium specimens, although they have been carried on in close proximity to the finest scientific garden in existence.

Nature, Vol. III p. 401.

Return to House of Commons, No. 126, p. 9.

Return to House of Commons, No. 126, p. 7.

In the event, then, of its being resolved to maintain only one great national botanical collection, I would submit that it should not be cut off from the allied biological collections, but be placed with them in the same building in London. And that, for this end, the collections presented by Mr. Bentham to the public, and all that have been added to them by purchase or presentation, be removed to London and incorporated with the National Herbarium; and, further, that the extensive botanical library formed at the national expense at Kew be made, with the Banksian library, the foundation of that National natural history library which will be required for the National Museum of Natural History.

It is necessary, in dealing with Mr. Bentham's printed and publicly expressed views on this matter, to bear in mind that he cannot be considered an unprejudiced witness. I have frequently referred to his relations to the herbarium attached to the Royal Gardens at Kew. He has thus stated the reasons by which he was influenced in presenting his herbarium and library to the public in 1855:—"I thought that, at that time, there was no herbarium and library in London sufficiently open for the use of botanists, and I presented them on condition that they should form the nucleus of a national herbarium and botanical library, to be kept at the expense of Government, and open to the free use of botanists." I can assert, in opposition to Mr. Bentham's belief—and a similar opinion has been, I understand, recently expressed—that at that time the National Herbarium and the National Library, as far as it is an adjunct to the herbarium, were fully and freely accessible to botanists, and were largely used by botanists; and this I am able to maintain from the contemporary records of this Department, as well as from the testimony of botanists who were then in the habit of consulting the collections. Under the influence of this erroneous supposition, Mr. Bentham made his own herbarium a national institution, and a rival to the Banksian Herbarium, and, under the influence of this same spirit of rivalry, he now believes that there exists "a state of continual competition" between the two herbaria. I am sure that Dr. Hooker, and the authorities at Kew, will as strongly repudiate this statement as I do now, if it is meant to imply a competition in any way to the injury of science or the public. It is only in keeping with the motives which actuated him at the first that Mr. Bentham now agitates for the incorporation of the Banksian Herbarium with that of which his own forms the nucleus.

Return to House of Commons, No. 126, p. 7.

Nature, Vol. III p. 401.

ROYAL COMMISSION ON SCIENCE; FOURTH REPORT.

The fourth report of the Royal Commission deals with the British Museum as a whole. The Commissioners in their Report, state:—

* * *

18. The evidence which we have received, however, leaves no doubt upon our minds that the Banksian Library ought to follow the botanical collections to South Kensington. On this point Mr. Carruthers says:—"It would be absolutely necessary [to have a subsidiary library, if the botanical and other natural history collections are removed to South Kensington]; and I believe that unless the value of the herbarium were to be greatly destroyed, the Banksian Library will be required to form a portion of that subsidiary library, inasmuch as the Banksian Collection was in continual use while the Banksian Herbarium was being formed, and the volumes that form that library were annotated by the workers in the herbarium, so that if the books were left behind and the plants separated anywhere from the annotations on the books, the value of the plants in their cross references to books would be completely destroyed."

Q. 7759.

* * *

III. THE NATIONAL BOTANICAL COLLECTIONS AND GARDENS.

26. Two institutions for the promotion of botanical science are at present supported by the State in or near the metropolis. Of these, one is lodged in the British Museum, under the charge of the Keeper of Botany; the other at the Royal Gardens, Kew, under the Director of the Gardens.

27. From the date of its foundation in the year 1755, the British Museum has contained a collection of dried plants, the most valuable part of which, at that time, was the Sloanian Herbarium; but botany is said by the celebrated botanist, the late Mr. Robert Brown, to have been almost entirely neglected in the British Museum, from the death of Dr. Solander, in 1782, until the year 1827. In the latter year, however, the botanical collection was made into an independent department, of which Mr. Brown was appointed Keeper; and the Banksian Herbarium, devised to Mr. Brown during his life by Sir Joseph Banks, was provided with accommodation in the Museum. The collections were at the same time opened to general scientific visitors two days a week, and to foreign botanists visiting England five days a week.

Report, 1850. 8317.

Report 1850 8317.

Mr. Carruthers, Appendix XV., vol. i., pp. 44–47

28. The collection, as it now exists, consists of—

1. *The Herbarium, comprising,*

(a.) The general herbarium.

(b.) The British herbarium.

(c.) Various separate herbaria of historical interest.

Report, 1850. 8303.

2. *The Structural series, comprising,*

(a.) The fruit collection.

(b.) The collection of gums, resins, and other natural products.

(c.) The general collection, consisting of the larger specimens chiefly exhibited to the public; and

(d.) The microscopical preparations, illustrating the minute structure of recent and fossil plants.

29. It may be remarked that the general collection of fossil plants is under the charge of the Keeper of Geology.

30. Additions are made to the collection, by purchase, at the discretion of the Keeper, subject to the approval of the Trustees, and by donation.

31. At present the full staff of the Botanical Department is a Keeper and two Assistants, and its cost, during the financial year 1870-71, was £1,767.

Ev. Q. 7725; and Appendix XV., vol. i., p. 46, and Appendix I. to this Report.

32. With respect to the magnitude and scientific importance of the Herbarium, the Keeper of Botany has expressed the following opinion:—"I believe that our British Museum herbarium is unequalled in the world; and that is not only the opinion which I myself have formed, for I am not very extensively acquainted with herbaria abroad, but it is the universal testimony of men who have become sufficiently acquainted with the British Museum herbarium to form an opinion worth considering."

Q. 7734.

"I believe that the British Museum is visited by all the foreign botanists that come to this country. * * * I find amongst the foreign botanists, who have been in the habit of visiting the Museum, the names of Cosson, Baillon, Triana, and Welwitsch, who have been here during the year 1871."

Q. 7735.

33. The Royal Gardens at Kew were the private property of the Crown until the year 1840.

34. In the year 1838, a Committee was appointed by the Treasury to Inquire into the Management of the Royal Gardens, and that Committee desired the late Dr. Lindley, aided by Messrs. Paxton and Wilson, to report upon the condition of the gardens, and make recommendations for their future administration. In consequence, a

"Report upon the present condition of the Botanical Gardens at Kew, with recommendations for their future administration," was drawn up by Dr. Lindley, and was published as a Parliamentary paper in 1840.

35. According to this report, the garden (including the Arboretum) occupied 15 acres, and the collection of herbaceous plants was stated to be then "inconsiderable." The reporter states that "no attempt has been made till lately to name the multitudes of rare plants it comprehends, and thus to render it a place of public utility;" and, further, "What names are to be found in the Garden have been furnished by Mr. Smith, the foreman, and the Director [Mr. Aiton] does not hold himself answerable for them. This was most particularly inquired into, and most distinctly avowed; so that by far the most difficult part of the duty of the principal officer—a duty on the perfect execution of which the credit and utility of the garden essentially depend—a duty which can be only executed properly by a man of high scientific attainments, aided by an extensive herbarium and a considerable library; this most important duty is thrust upon a foreman, paid small weekly wages for cultivating plants, who, whatever his zeal and assiduity may be (and in this case they have been such as to deserve the greatest praise), has no sufficient means of executing such an office."

Report, p 2.

36. Dr. Lindley recommended that the Royal Gardens at Kew should become public property, and be converted into a National Botanical Garden, and brought into close official relations with the Botanical Gardens of the Colonies; that at least 30 acres should be added to the gardens, and considerable additions be made to the houses; that everything should be systematically arranged and named; that there should be nurseries for the propagation of plants for Government exportation or for public purposes; that gratuitous lectures should be given upon botany in a popular form, but not as a regular academical course; and that the most beautiful specimens of the vegetable kingdom should be carefully preserved for exhibition. He further urged the necessity of providing an extensive herbarium and a considerable library.

37. The Royal Gardens became public property in the year 1840, and most of Dr. Lindley's other recommendations were carried into effect by Sir William Hooker, who was appointed Director of the Gardens in that year.

Dr. Hooker's Memorandum, Appendix II.

38. The Gardens at Kew were unprovided with any public herbarium or scientific library when Sir William Hooker took charge of them. As Dr. Lindley's "Report" shows, the naming of the plants was insufficiently attended to by his predecessors. The new and rare plants in the gardens, before Sir William Hooker's time, were named partly by the use of a herbarium in the gardens, which was broken up before their transference to the nation, and partly by the aid of the Banksian Herbarium.

Dr. Hooker's "Reply." Mr. Bentham's Statement. Appendix II. Dr. Hooker's Statement. Appendix II

39. Sir William Hooker brought a large private herbarium (which Mr. Bentham terms the richest in Britain) and library to Kew, and these were increased, at his own expense, until his death in 1865. After his death, the herbarium and library were purchased by the Government at a valuation, and have been added to the public herbarium at Kew, which was founded in 1854, when Mr. Bentham presented his large private collection of plants and botanical library to the nation.

40. In regard to the work done at Kew at the present time, the latter gentleman, who is one of our most eminent botanists, and who has been for many years well acquainted with foreign botanical establishments, observes:—"1. For the close study of plants—the only sound foundation upon which the science of botany can be usefully established—for their accurate determination and practical classification, the requisites are: that the herbarium should be as rich as possible, not only as to the genera and species, but as to the variations of all sorts and repetitions of the same form from different localities and stations; that the herbarium should be a single one, the geographical arrangement being kept in subservience to the scientific classification, and without any detached smaller herbaria, except such definite historical ones as only require occasional reference like the books of a library; that there should be good accommodation for the sorting of unnamed collections and fresh arrivals, ample means for the dissection and examination of specimens not only by the staff of the establishment, but also by scientific botanists in general, who, under special regulations, are allowed to work in the herbarium, and store rooms for duplicates required for exchanges, &c.; that there should be in the same suite of rooms as the herbarium a botanical library, as complete as possible, and a series of drawings of plants, also as complete as possible; that the herbarium should be in close connexion with the National collection of living plants; and that it should be under the keepership of a resident scientific botanist, with the requisite staff of scientific assistants. All these essentials are at present afforded by the herbarium at Kew, in a degree far beyond what can be met with in any other establishment at home or abroad."

Q. 7205

41. For 40 years the herbarium has received almost all collections made by Government expeditions; and it has been the chief recipient of contributions from both British and foreign travellers, as well as from Continental Museums.

Q. 6658

42. At present the Gardens occupy 300 acres, and are estimated to contain 20,000 species of plants; and the following statement of the operations carried on at Kew is taken from a memorial (signed by many eminent scientific men) presented to the First Lord of the Treasury in 1872.

Papers relating to Kew Gardens, p. 43, ordered by the House of Commons to be printed 25th of July 1872. See, also, a Second Memorial, Appendix II

"In no particular does England stand more conspicuously superior to all other countries than in the possession of Kew. The establishment is not only without a rival, but there is no approach to rivalry as regards the extent, importance, or scientific results of its operations. Upwards of 130 volumes on all branches of botany, including a most important series of Colonial Floras, but excluding many weighty contributions to scientific societies and journals, have issued from Kew. To these are to be added guide books and official papers. This vast literature has been produced and published through the efforts of the Directors of Kew, for the most part at no expense whatever to the nation.

"To these labours is to be added the correspondence of the Directors with all parts of the world, a mere selection from which, now bound together at Kew, embraces some 40,000 letters addressed to the Directors, and for the most part answered with their own hands.

"During the 10 years from 1863 to 1872 inclusive, the number of living plants sent from Kew to various parts of the world has been doubled, amounting on an average to 8,000 or 9,000 annually. Of seeds ripened at Kew, or obtained by the Director from various parts of the world, the annual average distributed amounts to about 7,000.

"Of the practical value of these labours, the introduction of the Cinchona plant into India, Ceylon, and Jamaica, the commercial success of which is established, constitutes one of many illustrations. The introduction of ipecacuanha is another.

"In India upwards of 30 gardeners, trained at Kew, are now employed in forestry, cotton, tea, and cinchona plantations, Government gardens, &c., and a far greater number are usefully employed in other parts of the world.

"By the joint efforts of the Directors, a series of complete Floras of India and the Colonies was set on foot at Kew, of which those of the West Indies, all the Australian Colonies, New Zealand, tropical Africa, the Cape Colonies, and British India, are completed or in progress. These are standard works of inestimable value to the countries whose plants they describe, as well as to scientific travellers and institutions in Europe."

43. In addition, there is the work of the Economic Museums, which are thus described by Dr. Hooker:—

Q. 6662.

"Of museums proper, apart from the herbarium, there are three; they were designed primarily to illustrate to the public the uses to which plants are put, by exhibiting specimens that illustrate useful plants; maps showing their distribution, diagrams showing their structure, and specimens of the products which they afford. They are arranged scientifically, according to the natural system, and, as far as we have procured them, all the products of the plants are shown. At the same time it is the receptacle for all specimens that are not fitted to be kept in an herbarium; for instance, there are certain fruits of no known economic value which are interesting from their structure or from their appearance, but which, though they are not of economic value, are placed in the museum, because they could not be put into the herbarium. The arrangement of the herbarium is similar to that of a library. Thus the museums serve a double object. They are ancillary to the herbarium in containing specimens not fit to be placed in the herbarium, and they are instructive to the public, inasmuch as they show the uses to which the plants of all natural orders are put."

44. There is no competition between the Kew and South Kensington Museums; for the Museum at South Ken-

sington consists chiefly of manufactured articles arranged according to their uses. At Kew the fibres used for textile fabrics are arranged under the Natural Order to which each belongs; the European flax going into the case illustrating the Natural Order to which the flax plant belongs, the New Zealand flax under another order, and the hemp under a third; but at South Kensington all the flaxes would be brought together. At Kew little is shown beyond the raw product, and one or two manufactured articles to attract public attention immediately to its uses. South Kensington, on the other hand, affords a complete illustration of the uses of Vegetables as applied to Arts and Manufactures, arranged under their applications.

45. The collection of numerous Vegetable Products in the Food Museum at South Kensington is totally different in object from the Kew Economic Museum, and cannot be said to be intended for the promotion of Botanical Science.

Q. 6664. Dr. Hooker's Memorandum, Appendix II.

46. Besides the Director, who has charge of the whole Establishment at Kew, the Staff consists of a Keeper of the herbaria and library, two Assistants, a Clerk, a Curator of the Museums, and two Attendants, whose pay altogether amounts to £1,792 a year.

47. Three distinct methods of dealing with the two Botanical Establishments now maintained at the expense of the State—the one in the British Museum, and the other in the Royal Gardens at Kew—have been put before us by the witnesses who have given evidence.

Appendix XV., vol. i., p. 40. Q. 7745

1. The first proposal is that of the Keeper of Botany in the British Museum, Mr. Carruthers, who thinks that the best way would be to keep both collections at their full efficiency; but that, if only one great National Herbarium is to exist, it should be lodged in the British Museum, and that Mr. Bentham's collection should be transferred to the British Museum, a second Herbarium of a subordinate character, for use in the Garden and Museum, being provided at Kew. Mr. Carruthers is of opinion that all Collections purchased by the Government, or made at Government expense, should be sent to the British Museum and worked out there, and that the Kew Botanical Library should be transferred to the British Museum.

2. The second proposal is that of the Director of the Royal Gardens at Kew, Dr. Hooker, who agrees with Mr. Carruthers, that the Herbarium at the British Museum and that at Kew should both be maintained in a state of efficiency.

But, in disagreement with the Keeper of Botany in the British Museum, the Director of Kew Gardens recommends that Kew should be the site of the principal National Herbarium; and that it should remain, as heretofore, the centre to which the collections made at the expense of the Government are sent, worked out, and published.

Dr. Hooker further recommends that the collection in the British Museum should be of a subordinate character to that at Kew, and should be arranged chiefly with a view to Geographical Distribution and to the needs of Botanical Palæontology.

Dr. Hooker does not suggest the transference of any of the collections now in the British Museum to Kew; on the contrary, he proposes to recruit the British Museum collection from that at Kew; nor does he think it necessary that any part of the Library of the British Museum should be transferred to Kew.

3. The third proposal is that made by the Superintendent of the Natural History Collections in the British Museum, Professor Owen, to the effect that the Herbarium at Kew should be altogether transferred to the British Museum; and that it should be the duty of the Director of the Royal Gardens to occupy himself exclusively with Physiological and Horticultural Botany.

48. As respects this last proposal, we have already shown that, in the opinion of Dr. Lindley, Mr. Bentham, Mr. Carruthers (the Keeper of Botany in the British Museum), and other eminent Botanists, the possession of an extensive Herbarium is indispensable for the efficiency of the Kew Establishment. In this opinion we concur, and we cannot, therefore, recommend, as proposed by Professor Owen, that the Kew Herbarium or any portion of it should be transferred to the British Museum.

49. With respect to the first and second propositions, we have now not to consider what arrangement might be theoretically best if the Botanical Establishments supported by the Government were to be organised *de novo*; but to recognise the fact that two such Establishments have grown up, each of which is doing its own special work efficiently. We do not think it advisable to interfere with existing arrangements, which are working satisfactorily, for the mere sake of administrative symmetry.

50. The two proposals under discussion, much as they diverge in some respects, agree in advocating the continued existence of two Herbaria, one at the British Museum, and the other at Kew. All Botanists are of opinion that Kew needs a Herbarium. Dr. Lindley, whose opinion we have already quoted, and than whom there could be no more competent judge, thirty-five years ago urged the necessity of an "extensive herbarium and a considerable library" for Kew; and the Keeper of Botany in the British Museum expressly speaks of "the great waste of time which would be incurred in consulting a herbarium at a distance." On the other hand, no one has suggested that the British Museum should be deprived of its Herbarium, and the Director of Kew Gardens, as we have seen, proposes to increase that Herbarium.

Mr. Carruthers's Paper; Appendix XV., vol. i. p. 45.

51. The Keeper of Botany in the British Museum has made suggestions as to the best mode of uniting the two Herbaria, if such a course should be deemed desirable; but he has also stated reasons for the separate maintenance of these two Herbaria, which appear to be so conclusive in favour of that course that we recapitulate them here.

Mr. Carruthers's Paper, Appendix XV., vol. i., p. 45.

1. "The two herbaria already exist, and are to a considerable extent parallel collections." In other words, the collections are to a considerable extent in duplicate, and, so far, nothing could be gained by bringing them together in one place.

2. "The two herbaria have been under different management, and, to some extent, express different results of the 'close study of plants.' The important bearing of this consideration on Botanical Science in Britain can scarcely be overrated."

3. "The objects of the herbaria are fundamentally different, and in as far as they fulfil their objects they are employed for totally different purposes."

4. "The practical difficulties in the administration of two separate, and, to some extent, independent herbaria would be numerous and serious; and, in the course of time, a condition of things similar to what at present exists would result."

5. "It is not an unimportant consideration that the continued separate existence of these two great herbaria is a great security against their destruction by fire."

6. "The expense of the two great herbaria is very small. I am unacquainted with the amount granted for Kew Herbarium, but it cannot greatly differ from that required by the National Herbarium, which amounted for the financial year lately completed to £1,767. I know of no way in which the country can at once advance the interests of Science and encourage its students at a smaller cost and with more important results, than by maintaining in their full efficiency the two Botanical Collections at present existing."

Appendix XV., vol. i., p. 46.

52. In this, as in other cases, we conceive that the State may be asked to aid Science with those Appliances which are out of the reach of private enterprise, and as such we regard the Herbaria at the British Museum and at Kew, each of which, being supported by the State, is as much entitled as the other to the name of a "National Collection." And the evidence which has been laid before us leaves us no alternative but to recommend that these two Botanical Collections, the maintenance of neither of which involves any considerable cost, should not be merged into one, but that both be kept in a state of efficiency, and that the special scientific direction which each has spontaneously taken should be retained.

53. As a matter of fact, the Botanical Department of the British Museum, under its present able Keeper, has inclined in the direction of Botanical Palæontology—a direction rendered particularly convenient and appropriate by the existence of a large and valuable collection of Fossil Plants in the Museum; no less, as a matter of fact, under the late and present Directors of the Royal Gardens, has the Herbarium at Kew become the most complete apparatus for the cultivation of Systematic Botany in existence. It is the centre to which Botanists flock from all parts of the world, and with which Botanists of all parts of the world are kept in communication by a system of Correspondence, of vast extent, which could only have been organised by means of the exceptional physical strength and mental capacity of successive Directors.

54. It may be said that if the Kew Herbarium is to remain a great National Scientific Herbarium, the accommodation to be given to botany, in the new building at South Kensington is excessive. But we do not think that such will prove to be the case. In the first place, we should not be disposed unduly to limit the power of the Keeper of Botany in the British Museum to purchase systematic collections for purposes of palæontological comparison; and, in the second place, it would be highly useful to have a geographically arranged collection in the British Museum as the complement of the purely systematically arranged collection at Kew.

55. We think it desirable, then, that the collection at the British Museum should be maintained and arranged with special reference to the Geographical Distribution of Plants and to Palæontology; and that the collection at Kew should be maintained and arranged with especial reference to Systematic Botany. And we are of opinion that all collections of recent plants made by Government Expeditions should, in the first instance, be sent to Kew, to be there worked out and distributed, a set being reserved for the British Museum; and that all collections of fossil plants made by Government Expeditions should be sent to the British Museum.

* * *

CONCLUSION AND SUMMARY OF RECOMMENDATIONS.

With regard to the National Botanical Collections and Gardens we recommend:

* * *

VI. That the collections at the British Museum be maintained and arranged with special reference to the geographical distribution of plants and to palæontology; and that the collections at Kew be maintained and arranged with special reference to systematic botany.

VII. That all collections of recent plants made by Government expeditions be, in the first instance, sent to Kew, to be there worked out and distributed, a set being reserved for the British Museum; and that all collections of fossil plants made by Government expeditions be sent to the British Museum.

VIII. That opportunities for the pursuit of investigations in physiological botany should be afforded in the Royal Gardens at Kew.

APPENDIX TO FOURTH REPORT.

* * *

Appendix II.

Documents relating to the Botanical Collections at Kew and at the British Museum.

[See p. 5-10, *i.e.* p. 138-141.]

A.—Memorandum with respect to the Herbarium and Library at Kew previous to the appointment of the late Sir W. J. Hooker as Director.

The question of the Commissioners requires some explanations, in order to answer it satisfactorily. The Herbarium which existed at Kew previous to the late Sir W. J. Hooker's appointment as Director, was broken up during the changes that were made when the garden was put upon its new footing as a public establishment. My personal knowledge of the Herbarium, however, antedates my father's appointment to the Directorship. From what I recollect myself, and from what Sir W. J. Hooker told me, I believe that it was, for the period, extensive, that it was arranged chiefly according to countries, and was in part at any rate classified and well named. A large portion consisted of plants collected by botanical explorers sent from the Royal Gardens to various parts of the world, and styled officially "Botanical Collectors to His Majesty." Their original instructions included the preparation of two sets of Herbarium specimens, one for Kew, the other for Sir Joseph Banks. The employment of collectors as a part of the establishment ceased when the gardens were given up by the Royal Family and became Crown property, that is, previous to my father's accession to office as Director.

Towards the close of Sir Joseph Banks's life, a house, called Hunter House, was purchased by the King with the grounds attached, and added to the Royal property. At the instance of Sir Joseph Banks, it was determined to devote this to the accommodation of a botanical Library and Herbarium worthy of the country, and for which the garden collections would afford a foundation.

One of the rooms was at the time fitted up with bookshelves, as a commencement towards carrying out this project.

At Sir J. Banks's death the plan was abandoned; the house remained empty for some years, and was eventually given as a private residence to the late King of Hanover. This house is that now occupied by the Herbarium and Library at Kew, and the bookshelves, which remained undisturbed, have been devoted to their original purpose.

Amongst the collections, of the existence of which in the garden I have evidence during the Directorship of Mr. Aiton, were extensive series of plants from Australia, New Zealand, South Africa, the Pacific Islands, and Brazil, besides named specimens of cultivated plants kept for the identification of those growing in the gardens. Sir W. J. Hooker often deplored to me the breaking up of this Herbarium, depriving him, as it did, of the ready means of identifying many plants in cultivation at Kew which had been sent there by collectors with the native specimens transmitted from the same sources.

I have evidence to show that Richard Cunningham, one of the staff attached to Kew, was for many years engaged in the arrangement of the collections and the determination of the plants in the gardens. He corresponded during a long period with Sir W. J. Hooker, then Regius Professor of Botany at Glasgow. Writing under date January 22nd, 1824 (the project for using Hunter House having fallen through at that time, owing to Sir Joseph Banks's death), Richard Cunningham says, "I have at length persuaded Mr. Aiton to have a room built in the gardens to contain the herbaria altogether, which is now going on with, and as soon as I get things set straight in it, I will commence upon a series of S. African plants."

He refers again to this during the following year (November 3, 1825) in speaking of "the little convenience we have had till lately in the garden room to arrange and compare dried plants with the books."

I am not aware of the extent or condition of the Library at Kew previous to Sir W. J. Hooker's accession. There was one of considerable size, however, which was the private property of the Director, but was used for garden purposes, as was subsequently that of Sir W. Hooker for many years after the commencement of his Directorship.

Annual cost of the present scientific staff attached to the Royal Gardens, Kew:

	£	s.
Director (with house)	800	0
Keeper of Herbarium and Library (with house)	400	0
First Assistant	250	0
Second Assistant, £60 rising to £80	60	0
Clerk in Herbarium	80	0
Curator of the museums (3), £100 rising to £150	140	0
Woman for cleaning Herbarium (with rooms)	15	12
Doorkeeper	46	16
Total	£1,792	8

Jos. D. HOOKER,
Director.

Royal Gardens, Kew,
December 17, 1873.

B.—Statement by Dr. Hooker respecting the Purchase by the Government, of the Herbarium, Library, Botanical Correspondence, Manuscripts, Portraits, Drawings, etc., of the late Sir William Jackson Hooker.

Royal Gardens, Kew,
Dec. 17, 1873.

Sir,

In compliance with your request, I transmit herewith a Statement of the circumstances under which the botanical collections, etc., of the late Sir W. Hooker were purchased by the Government, with the view of their being permanently attached to the establishment at Kew, together with the documents relating thereto.

I am, etc.,
Jos. D. HOOKER.

J. N. Lockyer, Esq., F.R.S.
Secretary to the Royal Commission on Science.

Sir W. Hooker, on his decease on August 12, 1865, left instructions to his Executors that his herbarium (exclusive of such specimens as were exhibited in the Museums at Kew), together with such parts of his library as were required to complete that at Kew, his botanical correspondence, collection of portraits of botanists, his manuscripts, drawings of plants, botanical scenery, etc., should be offered by his Executors to the Government for purchase at a fair valuation, "to be deposited at Kew, as part of the Crown property attached to the Royal Gardens."

In pursuance of these instructions, the offer was made, through the Right Honourable the First Commissioner of Her Majesty's Works, for the purchase of the whole, for a sum of £7,000, viz.:

Herbarium - - - - - - -	-£5,000
Books - - - - - - - -	- 1,000
Correspondence, manuscripts, portraits, etc.	1,000

The sum asked for the herbarium was based on an estimate of the actual expenditure incurred by Sir W. Hooker on the purchase of specimens and the materials for their conservation during the 60 years he had devoted to its formation. He took no account of the value of specimens presented to him by public and private bodies, nor of the value of the returns he made for them; nor of the collections made by persons employed in Government expeditions, and which collections were presented to himself by the Government; nor of the salaries of Curators paid by himself and engaged upon the arrangement of the herbarium during upwards of 30 years.

In reference to the herbarium especially, a memorial (of which a copy is herewith enclosed) was presented to the First Commissioner of Her Majesty's Works, urging its purchase; it was signed by the Professors of Botany in the leading Universities of the Kingdom, the Presidents of the Royal, Linnean, and Royal Geographical Societies, and by the Keeper of the Botanical Collections, and the Superintendent of the Natural History Departments of the British Museum. The memorialists state that the herbarium was "generally acknowledged to be the most extensive in Europe": that it "is in constant and daily use by the Establishment of Kew Gardens; to the due working of which, whether in a scientific or a practical or an economic point of view, we cannot but regard it as absolutely essential," and add their confident hope "that the opportunity may not be lost of permanently establishing the unity of a collection so justly celebrated amongst men of science in all parts of the world."

The offer was unconditionally accepted by the Lords of Her Majesty's Treasury, as shown in the accompanying letter, addressed by the First Commissioner of Her Majesty's Works to Dr. Hooker.

J. D. HOOKER.

(Copy.)

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

We, the undersigned, having understood that in pursuance of the instructions left by the late Sir William Jackson Hooker, his herbarium and botanical collections, together with such of his books as are wanting to complete the Botanical Library at Kew, have been offered through you to Her Majesty's Government, and believing that, under the above circumstances, the sum of £6,000 would be accepted for the whole, beg leave to urge upon your consideration the importance to science in general, and especially to the Establishment of the Royal Gardens at Kew, that these unrivalled collections should be secured to the Nation.

When, in 1852, this herbarium was removed from Sir William Hooker's private residence to the late King of Hanover's house at Kew, it was already generally acknowledged to be the most extensive in Europe, the result of forty years' incessant exertion and liberal expenditure, and has since been largely increased at Sir William's private cost. It has ever been most liberally laid open to Scientific Botanists of this and other Countries, and is in constant and daily use by the Establishment of Kew Gardens, to the due working of which, whether in a scientific or in a practical or in an economic point of view, we cannot but consider it as absolutely essential.

We believe, also, that the Botanical Works not already in the National Library at Kew, but which Sir William allowed the Establishment the free use of, will be found to be numerous and of great value.

We, therefore, confidently hope that the opportunity may not be lost of permanently establishing the unity of a collection so justly celebrated amongst men of Science in all parts of the world.

Charles Daubeny,
Professor of Botany in the University of Oxford.

Charles C. Babington,
Professor of Botany in the University of Cambridge.

J. H. Balfour,
Professor of Botany in the University of Edinburgh.

G. Walker Arnott,
Professor of Botany in the University of Glasgow.

W. H. Harvey,
Professor of Botany in the University of Dublin.

Daniel Oliver,
Professor of Botany, University College, London.

John J. Bennett,
Keeper of the Botanical Collections of the British Museum.

George Bentham,
President of the Linnean Society of London.

Richard Owen,
Superintendent of the Natural History Departments, British Museum.

In thorough conviction of the propriety and importance of adding Sir William Hooker's Herbarium to the Botanical Collections at Kew:

Edward Sabine,
President of the Royal Society.

Rod. I. Murchison,
President of the Royal Geographical Society.

4498. (Copy.)

Office of Works, S.W.,
October 13, 1866.

Sir,—Referring to the correspondence which has taken place on the subject of the herbarium, etc., of the late Sir Wm. Hooker, offered by his Executors, in pursuance of his instructions, to the Government for deposit in Kew Gardens, I am directed by the First Commissioner of Her Majesty's Works, etc., to acquaint you that the Lords of the Treasury have informed him that they are fully sensible of the value of this collection, and that they are willing to sanction the purchase thereof for the sum of £7,000, viz.,

For herbarium - - -	£5,000
,, books - - - -	1,000
,, portraits* - - -	1,000
	£7,000

out of moneys to be voted by Parliament, and have directed that provisions may be made in the Estimates for 1867-8, to be submitted to Parliament next Session.

Their Lordships are desirous, in the meantime, of having a proper inventory of the collection made, and I am, therefore, to request that you will inform the First Commissioner what course you propose to take for effecting this object.

I am, etc.,
GEORGE RUSSELL,
Assistant Secretary.

J. D. Hooker, Esq., M.D., F.R.S.

C.—Statement by Mr. Bentham. (See p. 7.)

(*See* Question 7205, Vol. I., p. 469.)

Sir, 25, Wilton Place, S.W., July 1872.

Since the receipt of yours of the 5th instant I have procured a sight of the First Report of the Royal Scientific Commission and perused the paper handed in by Mr. Carruthers forming the Appendix XV., in which the state-

* Foot note.—This should have been worded "Botanical correspondence, manuscripts, portraits, drawings, &c."—J. D. HOOKER.

ments I made in answer to question 7205 have been in several respects contradicted.

With regard to the comparative advantages of the Botanical Museums of Kew and the British Museum, these may be in a great measure matters of opinion upon which it would be useless in me to enter into any further discussion. I would only observe that my estimate has been gradually formed from long experience, that I have at various intervals paid frequent visits to the British Museum for the purpose of consulting the collections there from the year 1827 to the present time, that I have uniformly met with the greatest courtesy and the utmost facilities, consistent with the regulations, on the part of Mr. Brown and his successors, Mr. Bennett and Mr. Carruthers, and that I have steadily worked in the Herbarium at Kew since the private collections of Sir William Hooker and my own were there brought together in 1854. From this experience I cannot but adhere to my opinion that the facilities for study in the Botanical Department of the British Museum (owing I believe mainly to regulations and other circumstances independent of the Keepers), very limited during Mr. Brown's time, considerably enlarged under Mr. Bennett, still more so under the present Keeper, Mr. Carruthers, but still very far below those afforded by the Kew Herbarium and Museum. I shall be ready at any time to substantiate the details upon which this opinion is founded.

Mr. Carruthers's experience I presume to result chiefly from his connection with the British Museum since Mr. Brown's death in 1858. I am not aware what personal experience he has of the Botanical Museum and Herbarium at Kew; I never recollect having the pleasure of seeing him there, and to this circumstance I must attribute some statements in the above-mentioned paper from which I think it right to record my dissent.

He includes in the "scientific collection of the British Museum" a "structural series" which we are given to understand was due to the different views taken by Robert Brown of the proposed study of plants from that which I had alluded to. To this I beg to observe that the Botanical Museum at Kew includes "a fruit collection," "a collection of gum resins and other products," and "a general collection exhibiting the form and structure of plants and consisting of the larger specimens chiefly exhibited to the public," infinitely superior to those of the British Museum, and occupying three large buildings specially devoted to them. The exhibited portion in the British Museum was only formed after the example of the one at Kew, as was evident to all those who, like myself, watched its progress during the three years it was in the course of formation before it was opened to the public. The only portion of the British Museum collection not represented at Kew is the fossil series.

It is also to the want of personal acquaintance with the history of the Kew collections that I must attribute the following statements:—

That Sir W. J. Hooker "had no public herbarium from the time of his appointment in 1841 till 1855. It is therefore evident that a great scientific herbarium is not a necessity to the efficiency of the gardens at Kew." Sir William, during all this time, allowed his own private herbarium, *the richest in Britain*, to be used as a public herbarium in connection with the garden, although kept entirely at his own expense.

That the primary object for which Sir W. J. Hooker accepted my herbarium in 1855 was for the use of the Gardens. This was not the case. My herbarium and botanical library, of upwards of 1,000 volumes, were accepted in 1854 (not 1855), expressly for the use of scientific botanists.

I would add that I am quite at a loss to discover in which of my works I can have committed the error of treating as duplicates whatever I do not estimate at the value of species.

I have the honour to be, Sir,
Your obedient servant,
GEORGE BENTHAM.

J. Norman Lockyer, Esq.,
Secretary, Royal Scientific Commission.

D.—Communications from Mr. John Ball.
(*See* Question 7229, Vol. I., p. 473.)

I.

Athenæum Club, Pall Mall,
28 Nov. 1872.

Sir,—In accordance with the desire of the Royal Commissioners on Scientific Instruction, conveyed to me in your letter of the 15th inst., I beg that you will have the goodness to lay before them the following statement with reference to the evidence given by me on the 28th March, 1871:—

My attention has been called by Mr. Carruthers, of the British Museum, to the answer given by me to question 7229, which, in his opinion, conveys a charge against him in his capacity as Keeper of the Botanical Department.

As printed in the first volume of the evidence taken before the Commissioners, p. 473, my reply to a question whether there was, at that time, a large accumulation of unnamed collections in the British Museum, stands as follows:—

"There is an accumulation. I cannot venture to say how large it is. I know, because I have had a recent instance of one, that some very interesting collections have, I will not say disappeared, but cannot now be found, and they may very possibly be lying in cases there."

I may be allowed here to mention the fact that I received a proof of my evidence on the evening preceding my departure from England for a journey to Morocco, and thus had not the opportunity usually allowed for carefully correcting errors arising either from slight mistakes on the part of the reporter or from inaccuracy on the part of the witness.

From whichever cause the error may have arisen, the answer above quoted is in one respect inaccurate. It should have stood: "I have heard a recent instance," or otherwise conveyed to the Commissioners the fact that, with the exception of a single visit early in the same year, my *recent* knowledge of the collections at the British Museum was derived from others, and not from personal observation.

It seems unnecessary to add that my answer was not intended to convey, and did not, in my opinion, convey, any charge against the recent management of the Museum collections, since the remainder of my evidence renders such a disclaimer superfluous.

In the course of a correspondence with Mr. Carruthers, having special reference to certain collections which had been supposed to have disappeared, wholly or in part, from the Museum, that gentleman has assured me that all the plants referred to are now in the Museum; and he, moreover, states, with regard generally to all the Botanical collections originally belonging to Sir Joseph Banks, that "everything that became national property in 1827 is still in the collection and available for science."

I place the same reliance on any statements made by Mr. Carruthers, or his assistants, Mr. Trimen and Mr. Britten, as to facts within their own knowledge, that I do on those of other men of science whose experience has been apparently at variance with the above assertions; but I venture to doubt whether, in so general a form, the above quoted statement is capable of full verification. In any case, it appears to me simply impossible that, along with the current duties of their department, the gentlemen above named can have verified, specimen by specimen, the existence and right classification of plants that must be numbered by tens of thousands.

I have no doubt, however, that, under the management of the late and the present Keepers of the Botanical Department, considerable progress has been made towards putting in order and making accessible the unnamed and unarranged collections at the Museum.

That a large accumulation of such collections existed under the management of Mr. R. Brown, and that some of them, being unprotected by poison, were extensively attacked by insects, are facts of which I was personally cognisant, and which were well known to many botanists at home and abroad, as I can testify from my personal acquaintance with a majority of the eminent European botanists for the last 30 years. Knowing, from a rather extensive acquaintance with herbaria, public and private, how difficult it is to get rid of accumulated arrears, I was not surprised to hear, from time to time, specific statements from various botanists as to the impossibility of finding, at the British Museum, plants belonging to some of the old collections; but I cannot say that I made enquiries with a view to fix the precise date to which such statements referred. Having, after many years' absence, resided in London since the beginning of 1870, I have but once visited the Museum collections since that date, and on that occasion, as stated in my evidence, I examined a collection which apparently had not been opened since the time of Sir Joseph Banks.

Under these circumstances, it appears to me that the facts justified a belief in the substantial accuracy of my

answer to question 7,229. The degree in which that answer is inapplicable to the present state of the collections affords a measure of the activity and success that have marked the recent management of the collections, and must be a matter of satisfaction to all students of botany.

That I may not appear wanting in justice to the late Mr. Robert Brown, whose name is revered by all botanists, I may be allowed to remark that his position, in regard to the Museum collections, was peculiar and exceptional. During the lifetime of Sir Joseph Banks, the herbarium was altogether under his management, and after the death of the original owner, it became his private property. The arrangement by which the Banksian Herbarium was transferred to the British Museum, still remaining under the management of Mr. Brown, very naturally did not change the habit of mind of that eminent man. Fully engaged in his own studies, he had no desire to encourage the visits of strangers, a fact obvious to those who sought to consult the collections, though the impression might be diminished through the courtesy and kindness of Mr. Bennett, his assistant, who afterwards took Mr. Brown's place at the Museum.

At that period, the example of other large public collections on the continent afforded, to some extent, a precedent for deficiencies in order and the accumulation of arrears. So far as my knowledge extends, the first instance of a very large collection, of which every portion was maintained in a state available for immediate reference, was afforded by the herbarium at Kew, under the management of the late Sir W. J. Hooker.

Trusting that the Commissioners will be pleased to publish this statement in the Appendix to their next report,

I have, &c.,
JOHN BALL.

J. Norman Lockyer, Esq., F.R.S.

II.

Athenæum Club, Pall Mall,
December 2nd, 1872.

My Lord Duke,—In accordance with the desire of the Royal Commissioners on Scientific Instruction, I have addressed to their Secretary a note respecting a passage in the evidence given by me in March 1871, to which exception has been taken by Mr. Carruthers of the British Museum.

I did not consider myself authorised to take that occasion for offering any suggestion to the Royal Commissioners with reference to the course they may adopt with regard to the national botanical collections; but I think I may without impropriety submit to your Grace the following observations, with the hope that in the event contemplated the suggestion made therein may appear to you not undeserving the consideration of the Commissioners.

I have reason to know that there is a nearly unanimous agreement amongst the most competent British botanists as to the inexpediency of uniting in a single museum the collections now existing at Kew and at the British Museum.

To remove the collections from Kew would be to destroy the scientific character of the foremost botanical establishment in the world, and would be regarded as an act of vandalism, not only by all competent judges in our islands, but by all cultivators of natural science in other civilised countries.

The value and extent of the Kew collections, and especially the fact that they have served as the foundation for many of the most important botanical works published during the last 25 years, make it frequently necessary for the authors of new works to resort to Kew for the purpose of study. The space required for the study and comparison of numerous specimens is considerable, and, in point of fact, the accommodation afforded in the present building at Kew is at times inconveniently limited.

But, in addition to a comparatively small number of men, engaged on works of some length and importance, who resort to the herbarium at Kew for successive weeks, or even months, there is a far more numerous class of students, or persons seeking useful information—many of them returning from the colonies or foreign countries—who seek ready access to a public collection for the purpose of comparing specimens with authentic types, or otherwise verifying the names and characters of certain plants. To require such persons to go to Kew would be inconvenient to them, and doubly so to the small and fully-worked staff at Kew, and to the serious students, who must be disturbed if a large class, of what may be called casual visitors, were encouraged to frequent the herbarium.

On these grounds, apart from others that have been urged in evidence before the Commissioners, it seems highly desirable that the herbarium connected with the British Museum should be maintained in a state of full efficiency.

In case, however, these views should not prevail with the Royal Commissioners, and they should seriously entertain the project of uniting in one establishment the collections at Kew with those at the British Museum, it will become a matter of paramount importance that they should be enabled to judge securely as to the relative advantages and disadvantages involved in a choice between those places.

I venture to suggest that in such an inquiry there is little to be gained by going back through the past history of the collections, and that no very satisfactory result will be attained by hearing statements from the officers connected respectively with Kew and the British Museum, or from persons who, justly or not, may be supposed to have a decided leaning towards either.

A course more likely to assist the Commissioners towards a safe conclusion would be to request two or more competent persons, holding an independent and responsible position, to visit both herbaria, with a view to compare their availableness for scientific research in their present condition, and the resources at the command of each for supplying deficiencies and keeping pace with the increasing range of discovery and exploration.

Although I have no means for knowing that they would undertake such a duty, I do not doubt that the professors of botany in the Universities of Oxford and Cambridge would readily do so in the interest of science.

By allowing the officers in charge of each herbarium to suggest for comparison the names of two or three genera, and adding any others they might of their own motion select, the gentlemen undertaking the inquiry could, without much labour, form a fair comparative judgment as to the present condition of the named collections in both establishments. They should examine into the extent and nature of the unarranged collections in each establishment, and the amount of arrear existing in the shape of plants named, but not intercalated. Besides reporting on the present condition of the collections, the same gentlemen should be requested to examine into the means possessed by each establishment for obtaining new and rare plants from countries still imperfectly explored. The very extensive foreign correspondence, including many remote parts of the globe, set on foot by the late Sir W. Hooker, and continued by the present Director, has probably offered opportunities for obtaining dried plants for the herbarium, along with seeds, cuttings, or living plants for the royal gardens, such as are not enjoyed by any other public institution; but this can best be tested by a comparison of the foreign correspondence of the directors of each herbarium, and of the collections actually received from such contributors during a term of years, exclusive of those obtained by purchase.

I may be permitted here to mention a practical difficulty in the way of the suggested amalgamation of the two herbaria which has not, I believe, been suggested by any of the witnesses hitherto examined. The specimens in both collections are glued down upon stiff white paper, but this is of a different size in each—that in the British Museum being the larger. As it is found that plants laid down on papers of unequal size cannot be intermixed without injury, it would be necessary to find means to equalize them. The British Museum paper could not be cut down to the Kew size without serious damage to many invaluable specimens that cannot be replaced, and it would be necessary to transfer the Kew herbarium to larger paper, or else incur the certainty of damage and inconvenience from mixing the two herbaria. The transference of the Kew herbarium to larger paper would involve the purchase of nearly 1,000 reams of paper, and the employment of from 12 to 20 competent persons, if such could be found, for a year; and, what is more serious, it would gravely interfere with the publication of four of the most im-

portant of modern botanical works: The "Genera Plantarum," "The Flora of British India," "The Flora of Australia," "The Flora of Tropical Africa," not to mention others of less importance. A minor item, yet not inconsiderable, is the fact that the amalgamation of the herbaria would in any case render useless 450 cabinets now in use at Kew each containing 16 compartments for parcels of plants.

I have, &c.,
JOHN BALL.

His Grace the Duke of Devonshire.

E.—Statement by Mr. Carruthers.

(*See* Questions 7216, 7217, 7229, Vol. I., pp. 471-473, and Question 7242, Vol. I., p. 474.)

On reading the evidence of Mr. John Ball, it was apparent to me that his statements regarding the Botanical Department of the British Museum were those of a witness ignorant of the matters regarding which he ventured to testify.

One statement in his evidence (Qu. 7229), as I read it, appeared to reflect personally on me as Keeper of the Department, and I accordingly applied to Mr. Ball for definite information as to the alleged facts.

A second statement (Qu. 7217), being rather a matter of opinion, I resolved to meet by obtaining the testimony of two botanists, whom no one would venture to characterise as partisans, and whose acquaintance with the herbarium at the British Museum and eminence in science would compel respect to their testimony.

I asked for an opportunity to submit the result of these inquiries to the Commissioners, that the errors might be corrected, and the false impressions contained in the evidence be set aside. In accordance with the request of the Commissioners, I now submit my observations in writing.

Mr. Ball's statement, as of fact, in reference to the Botanical Department of the British Museum, contained in his answer to Question 7229, is as follows:—"I know, because I have had a recent instance of one, that some very interesting collections have, I will not say disappeared, but cannot now be found, and they may very possibly be lying in cases there."

In a letter addressed to Mr. Ball, I asked him for the names of the one collection, and the some very interesting collections which could not be found, and were very possibly lying in cases at the Museum. I knew that the single short visit that Mr. Ball recently made to the herbarium was made while it was under my charge. His statement consequently asserted that I, the Official Keeper, was ignorant of several collections in the Museum, with which he, a comparative stranger, was acquainted. In his reply, written from North Wales, on the 31st August, 1872, Mr. Ball says:—"I should tell you that my evidence before the Science Commission was given either one or two days before I left England. I remember that the proof was delivered late on my last evening in London, and that at a hasty glance I saw many passages that I should have wished to correct; some of them errors on the part of whoever took down my evidence; others inaccuracies on my own part. I have not yet seen the published evidence, but if it contains the passage you quote, and I take it for granted that you quote from that source, I cannot be surprised at your calling for an explanation from me." In a subsequent letter (dated 11th October, 1872), Mr. Ball stated that the particular error in his answer to Question 7229 was, that it "should have been printed 'I have heard of a recent instance,' instead of 'I have had a recent instance.'" But it is most obvious that no hearsay information about one collection could supply Mr. Ball, as his answer thus amended states, with personal knowledge of several other collections. In this same letter, Mr. Ball gives me the only information which he has been able to supply as to the foundation of his statement. It is as follows:—"I have little doubt that the collection that I had in my mind at the time was that of Salt's Abyssinian plants, but, from inquiries made within the last two days, I am led to believe that the impression under which I spoke was incorrect." On receipt of this, I demanded the unqualified withdrawal of the erroneous statement, in terms which would be satisfactory to me, and this being refused, I informed Mr. Ball of my intention to use his letters in establishing the truth, and I now seek through this communication to place the facts before the Commissioners, and to secure for this statement as extensive a circulation as that given to Mr. Ball's error.

The matter of opinion to which I take exception, and which is repeated in different forms in the evidence, is plainly stated in the answer to Question 7217, in which while asserting that the establishment at Kew is "as near perfection as it is possible in human affairs to attain to," he declares, "that the traditions of the British Museum have not been favourable to making the collections there as available for the general purposes of science as might be desired;" and he considers "that the collection at the British Museum might be made more valuable to science and to scientific men than it now is" (Question 7216).

I, of course, lay no claim to celestial perfection in the management of the herbarium, but I emphatically repudiate the unfounded statement made by Mr. Ball. I venture to add, that this statement is especially offensive from its being directly associated by Mr. Ball with a name which commands the profound respect of every student of botany throughout the world.

To meet this assertion I addressed letters to two independent botanists, whose work in the herbarium of the Museum would enable them to speak from personal knowledge, asking them to express their opinion as to the availability of the collections for the purposes of science. One of those botanists was Dr. Cosson, in whose company Mr. Ball made the only visit he has paid to the herbarium within the last 25 years. Dr. Cosson had in numerous visits gone systematically through a considerable portion of the herbarium. He writes from Paris, on the 21st September, 1872, as follows:—

"Je pense, dès que j'aurai effectué le déménagement de mon herbier, que je vais transporter dans la construction que j'ai fait établir spécialement pour lui, avoir le plaisir de pouvoir continuer mes recherches dans les magnifiques collections du British Museum confiées à votre habile direction. Ces collections sont en si bon ordre et sont si faciles à consulter qui je pourrai en bien peu de temps comparer toutes mes plantes critiques de l'Algérie, du Maroc, et de la Tunisie avec les précieux types dont le British Museum est si riche. Mon intention est de publier avec M. J. Ball une florule du Maroc et d'illustrer par des planches toutes les espèces nouvelles de ce pays, encore si peu connu, et sur lequel la récente exploration de MM. J. D. Hooker et J. Ball a fourni de si importants documents.

"L'herbier du British Museum est le seul qui avec l'herbier du Museum de Paris offre un aussi grand nombre de collections classiques, et pour le rendre aussi utile que possible aux études botaniques, vous n'avez qu'à continuer à procéder avec le même soin au classement des riches matériaux que vous possédez, et dont chaque jour vous accroissez encore l'importance par de nouvelles acquisitions.

"Je n'aurais comme amélioration à signaler à la belle installation de votre herbier qu'à vous recommander, comme je crois que vous le faites déjà, de munir chaque espèce d'une chemise spéciale portant extérieurement une étiquette indiquant le nom de l'espèce, son numéro d'ordre d'après la monographie la plus récente, et l'indication des pays d'où proviennent les échantillons. J'ai eu à regretter la disparition des étiquettes originales pour des échantillons des anciens herbiers, mais je sais que cette habitude de transcrire les étiquettes au lieu de les conserver religieusement, a toujours été rejetée par vous."

The other botanist to whom I applied was John Miers, Esq., F.R.S., Vice-President L.S. Mr. Miers has worked impartially in the herbarium of the Museum, as in that at Kew, and his numerous independent publications are the best testimonies to the extent, value, and scientific availability of the collection of plants at the British Museum.

Mr. Miers writes:—"The herbarium of the British Museum appears to me well adapted for the purpose of scientific study, and deserves quite as much praise as the Hookerian herbarium in proportion to its relative extent. I should state, however, that I have invariably been able to work more easily at the British Museum than at Kew, because I have found there not only the dried plants but at the same time the carpological collections close at hand, advantages enhanced by the great facility of access to a good botanical library, especially to the rare books in the Banksian collection, together with ready means of referring to the original notes and admirable drawings of Aublet, Solander, and a host of others, necessary to be consulted for purposes of monographing; these advantages are not obtainable at Kew, where the collections of fruits and seeds are too far removed to be easily accessible. In these remarks I do not wish to detract in the smallest degree from the deservedly high character of the Hookerian herbarium, which is unrivalled for its riches, especially as I have there received all the attention I

could desire. But, at the same time, I think in fairness that we should all acknowledge what is due to the Botanical Department of the British Museum for the state of its collections and the facilities there afforded to scientific workers in that branch of knowledge; I say nothing about the convenience to the general body of men of science afforded by the central position of the Museum—one of its greatest advantages, which should never be lost sight of."

I might take further exception to statements in the evidence of Mr. Ball bearing on the herbarium; but, as he has informed me that, "with the exception of a single visit early last year, my personal acquaintance with the collections at the British Museum is derived from a few visits more than 25 years ago," it is obviously impossible for him to give any reliable information from personal knowledge.

This is true also of the evidence of Dr. Thomson in reference to the herbarium of the British Museum. I am not aware that Dr. Thomson has once visited the herbarium during the 14 years in which I have been officially connected with it, and he cannot possibly from his personal knowledge declare that "Kew is at present the more available for scientific research." (Qu. 7242.)

WILLIAM CARRUTHERS.

British Museum, May 14, 1873.

F.—Memorial presented to the First Lord of the Treasury respecting the National Herbaria.

[See p. 7.]

To the Right Hon. W. E. Gladstone, First Lord of the Treasury.

Sir,

The undersigned persons engaged in the pursuit of botany, or in instruction therein, desire to call your serious attention to a subject that deeply concerns the progress of Natural Science, and that of those branches of agriculture, horticulture, forestry, and manufactures that largely depend on Botanical Research.

The First Commissioner of Works, in a Memorandum presented to Parliament before the close of last Session, clearly raised the question whether it is desirable to transfer to the branch of the British Museum about to be constructed at South Kensington, the Scientific Collections and Library now existing at Kew, and further stated that, pending the decision on that subject, he considers it his duty to take care that no new expense shall be incurred at Kew which will embarrass the Ministers of the Crown or the House of Commons in arriving at a decision.

The Lords of the Treasury in their Minute of the 24th July, decline to refer to that portion of the abovementioned Memorandum, and no statement on that subject has since been made by any Minister of the Crown which shows whether it has received the attention of the Government.

Being strongly of opinion that the proposed measure would be highly detrimental to the progress of Science, and injurious to all those interests that depend upon it, we beg to urge upon you that the subject is not one merely of Departmental Interest, and that it would not be unfitting your position, as First Minister of the Crown, to give your consideration to the following reasons, which we beg to urge in opposition to the proposed measure:—

1. That it appears to us that it is absolutely necessary that a great Botanical Garden like that of Kew, which is confessedly far the most important in the world, should be in close connexion with as perfect an Herbarium and Botanical Library as possible; and that these conditions are now fulfilled as far as circumstances and the present state of science will admit.

2. That such a combination of living and dead specimens is requisite for the complete study of plants, as regards their technical, physiological, and economic characters; and that the removal of the Herbarium would be a retrograde step in a scientific point of view.

3. That the records of the Colonial and India Offices will show of what immense importance the Establishment at Kew has been to the welfare of the entire British Empire, and that weighty questions are constantly submitted to the Director which require immediate attention, and which could not, in many cases, be satisfactorily answered without reference to the Library or Herbarium.

4. That every facility for the investigation of the intimate structure and general habit of plants, and the study of them in every point of view, which can reasonably be considered within the scope of pure Botany, is afforded by the Herbarium and Museum of Botany in connexion with the Garden, and that it would be easy to point out important labours in that direction which have been instituted at Kew, while the systematic treatment has always regarded the more minute characters as well as those which are superficial.

5. It has been remarked, indeed, that important works, such as the Hortus Kewensis, have been prepared without the aid of an Herbarium at Kew. We would, however, remark that the statement is not correct, as there was an Herbarium, which was dispersed before Sir W. J. Hooker became Director; and the conditions of Natural Science are at the present time so completely altered, that it is impossible to institute any fair comparison, the number of known species being enormously increased since the date of the publication in question.

6. That the Museums of Structural and Economic Botany, which owe their existence and importance to the late Sir W. J. Hooker, are often found of great value in the decision of critical points in the study of species, and that the severance of them from the Herbarium and Library would be a serious loss.

7. That in the principal Botanic Gardens on the Continent, where effective work is done, there is in every case a large Herbarium connected with them.

8. That, in the interest of Botanical Science, we think it highly desirable that, besides the collections now existing at Kew, an Herbarium, or collection of dried plants, as complete as possible, should be maintained in connexion with the Natural History Museum which it is proposed to place at South Kensington, and that the two Herbariums should be in intimate relation with each other.

9. That from the delicate and perishable nature of its contents, and the necessity of referring to numerous specimens, an Herbarium cannot be made use of by many persons at the same time; and while it is desirable that students should have ready means of access at the National Museum in London to collections which may enable them to identify the plants of any particular country, it is still more essential that the authors of important works in Botanical Science should be enabled, as at present, to pursue their labours at Kew without interruption from casual visitors.

10. That an Herbarium is the least costly of all Collections in Natural History, and that which requires the least amount of space for its proper maintenance, in proportion to the number of objects which it contains.

11. That the arrangements of the Herbarium at Kew are so perfect, and the facilities for study so great, that it resorted to from all parts of the world; and it would, therefore, be unwise to make a change which in the result is almost certain to be detrimental, and which, we are assured, would be especially distasteful to the leading Foreign Botanists.

M. J. Berkeley, Botanical Director to the Royal Horticultural Society of London.
Charles C. Babington, Professor of Botany, Cambridge.
M. A. Lawson, Professor of Botany, Oxford.
J. H. Balfour, Professor of Botany, Edinburgh.
Alexander Dickson, Professor of Botany, Glasgow.
G. Dickie, Professor of Botany, Aberdeen.
E. Perceval Wright, Professor of Botany, Dublin.
Robert Bentley, F.L.S., Professor of Botany, King's College, and to the Pharmaceutical Society of London.
W. T. Thiselton Dyer, Professor of Botany, Royal Horticultural Society, London.
R. O. Cunningham, Professor of Botany and Zoology, Belfast.
W. R. McNab, Professor of Botany, Royal College of Science, Dublin.
George Henslow, M.A., F.L.S., Lecturer at St. Bartholomew's Hospital, (London), and at the Royal Agricultural College, Cirencester.
John Ball, F.R.S.
Maxwell T. Masters, M.D., F.R.S.
James Bateman, F.R.S.
R. Trevor-Clarke, F.R.H.S.
W. Wilson Saunders, F.R.S.
Geo. F. Wilson, F.R.S.
Robert Hogg, LL.D., F.L.S.
W. Sowerby, F.L.S.
D. Moore, Ph.D., F.L.S., M.R.I.A.
Andrew Murray, F.L.S.
William Munro, Major-General, C.B., F.L.S.

M. Pakenham Edgeworth, F.L.S.
John Miers, F.R.S., V.P.L.S.
Frederick Currey, M.A., F.R.S., Sec. L.S.
Daniel Hanbury, F.R.S., F.L.S.,
C. E. Broome, M.A., F.L.S.
Leonard Blomefield, M.A., F.L.S.
J. T. Boswell Syme, LL.D., F.L.S.
Hugh Cleghorn, M.D., F.L.S.
Clements Markham, C.B., F.L.S.
R. C. A. Prior, M.D., F.L.S.
Edward J. Waring, M.D., F.L.S.
George C. M. Birdwood, M.D.
Walter Elliot, K.C.S.I., F.L.S.
J. Forbes Watson, M.A., M.D., F.L.S.
Richard Strachey, Maj.-Gen. C.S.I., F.R.S.
E. W. Cooke, R.A., F.R.S., F.L.S.
Robert Braithwaite, M.D., F.L.S.
William Mitten, A.L.S.
W. Allport Leighton, B.A., F.L.S.
William Phillips.
John Goucher, F.L.S.
J. Leicester Warren, M.A.
Worthington G. Smith, F.L.S.
M. C. Cooke, M.A.
James M. Crombie, M.A., F.L.S.
Alfred W. Bennett, M.A., B.Sc., F.L.S.
A. G. More, M.R.I.A., F.L.S.
Thomas Moore, F.L.S., Floricultural Director to the Royal Horticultural Society of London.
Thomas Thomson, M.D., F.R.S., late Superintendent of the Royal Botanic Garden, Calcutta.
Charles Darwin, M.A., F.R.S.
George Bentham, F.R.S.

Appendix III.

Extract from Mr. Lockyer's Report on the Aid given by the State to Science in France. [See p. 21.]

The General Collections illustrating the Sciences of Observation and Experiment in France.

In England the student of natural history finds in the British Museum the most perfect and complete collection in the world, by the study of which he is enabled to increase his knowledge and to carry on his investigations.

* * *

The Museum of Natural History [in Paris].

The Museum of Natural History is administered by a Director chosen from amongst the Professors of the Establishment; the professors, every five years, sending up the names of three candidates to the Minister of Public Instruction, by whom the choice is made.

All scientific administrative questions connected with the Museum are regulated by a Committee of Professors, which the Director calls together once a month at least, and over which he presides. One of the Professors, who is called the Directeur Suppléant, fills the place of the Director during his absence. This Directeur Suppléant is chosen by the Minister from amongst the names presented by the Committee for the functions of Director, and, like the Director, he is named for five years. The Committee of Professors names annually one of its members as Secretary. The Professors are the Keepers of the collection and are responsible for their order and arrangement. Each Professor presents annually to the Committee of Professors a report on the state and requirements of laboratories and collections under his charge. These reports are transmitted to the Minister with the opinion of the Committee and of the Director. The matériel is inspected once a year.

The present personnel is as follows:—

Director, M. Chevreul.

Directeur Suppléant, M. Milne-Edwards.

The Professors (who are also Administrators of these Departments) are, of—

General Physiology, M. Claude Bernard.
Comparative Anatomy, M. Paul Gervais.
Anatomy and Natural History of Man, M. de Quatrefages de Bréau.
Zoology, Mammals and Birds, M. Milne-Edwards.
Zoology, Reptiles and Fish, M. Dareste.
Zoology, Insects, Crustacea, and Arachnidæ, M. Blanchard.
Zoology, Annelids, Molluscs, and Zoophytes, M. Deshayes.
Botany and Vegetable Physiology, M. Brongniart.
Culture, M. Decaisne.
Geology, M. Daubrée.
Mineralogy, M. Delafosse.
Palæontology, M. Albert Gaudry.
Physics, applied to Natural History, M. Becquerel.
Vegetable Physics, M. Georges Ville.
Organic Chemistry, M. Chevreul.
Inorganic Chemistry, M. Frémy.

All lectures are public and free; the time of the commencement of the course and the programme being settled each September, and submitted to the Minister of Public Instruction for his approval. Each professor gives 40 lectures annually. The lectures are followed by two classes, first the general public (auditeurs benevolés), and, secondly, the students of the Ecole Normale Supérieure of the third year who must attend at least two lectures a week.

The collections are enriched by exchanges, and there is an elaborate system of distributing duplicates from the collections not only to the local museums in France and her colonies, but also even to foreign countries. Thus from the mineralogical collection 1,800 duplicates were distributed between 1860 and 1865, 3,000 being still retained.

I annex the budget for the Natural History Museum for the present year:—

Personnel.	fr.	fr.
Traitements de 16 professeurs, à 7,500fr.	120,000	
,, de 2 maîtres de dessin, à 2,500fr. - - -	5,000	
,, d'un bibliothécaire et d'un sous-bibliothécaire -	8,000	
,, d'un secrétaire, agent comptable - - -	5,000	
,, de 19 aides naturalistes, de 2,000 à 4,000fr. - -	57,000	
,, de 3 gardes des galeries, de 3,500fr. à 4,000fr. -	11,500	
,, d'un jardinier-en-chef -	4,000	
,, de 21 préparateurs, de 1,500 à 2,500fr. - - -	42,800	
,, de 20 employés, controleur, chef d'atelier, jardiniers, inspecteurs, de 750 à 3,000fr. - - -	38,400	
Gages des gens de service - - -	31,680	
		323,380
Indemnités aux voyageurs naturalists -		25,000
Matériel.		
Galeries, laboratoires, cours, etc. - -	83,700	
Jardin et serres - - - -	65,100	
Ménagerie - - - - -	75,000	
Ateliers et entretien - - -	32,800	
Chauffage, éclairage, et frais divers -	30,500	
Bibliothèque, frais de bureau, et de service intérieur - -	42,700	
		329 800
		fr. 678,180

CONTINUATION OF THE REPORTS OF THE ROYAL COMMISSION ON SCIENCE.

The second volume of the Reports of the Royal Commission contains the following extracts from the evidence of Rear-Admiral George Henry Richards, C.B., F.R.S., Hydrographer of the Admiralty.

Rear-Admiral G. H. Richards, C.B., F.R.S. — 1872.

Questioned, 11,600, as to the advisability of instructing naval officers in natural history, he said it would be unobjectionable, but there would be difficulties in making collections in ships of war generally. "In the surveying service, ships are prepared expressly for scientific research, and very generally there is a naturalist attached to each surveying ship," but he was quite sure that it would "be impossible to carry it out to any extent in a regular ship of war."

The collections that are brought home by ships of the navy are not as a rule handed over to the British Museum. 11,602. "The plan I always adopt is, that if there is a naturalist in the ship he himself recommends where the collections should go, and with the approval of the Admiralty they are so sent. Some go to the British Museum, and others go to other departments, such as the School of Mines, or to various museums in the country. where they are made use of."

Rear-Admiral G. H. RICHARDS, C.B., F.R.S. — 1872.

11,603. In this he has always been guided by the opinion of the collector himself, or on consultation with qualified men, or in cases, where there is no naturalist, he has acted on his own judgment, and sent them to "Professors Owen, or Huxley, or Hooker, or others, as I think the case may require."

11,604. The collections which were recently made in the Straits of Magellan were mostly sent to the "British Museum, some were sent to Professor Newton, at Cambridge, and a few were sent to Professor Huxley, and the botanical collections were sent to Dr. Hooker at Kew. 11,605-06. About 27 boxes were sent to the British Museum, some with birds, zoological specimens, botanical specimens, and some fossils and human crania from Patagonia. 11,607. The division was made "on the recommendation of Dr. Cunningham, who was the naturalist," and his wishes were followed. "He had been in communication with the societies before he went out, and he ascertained what would be most useful to each . . .

* * * * * *

11,611. We were not bound to send them to the British Museum, or to any particular place; we take the best advice, and have no interest, but that the collections shall be turned to the best account." (p. 180.)

Captain D. GALTON, C.B., F.R.S.

Captain Douglas Galton, C.B., F.R.S., in the course of his examination, stated:—

12,987. As instances of mischief that have been occasioned by the want of system in the present arrangements, "I think that there is a great waste of force, as you get a duplication of functions; for instance, take the case of the British Museum and South Kensington, it seems to me that each of those departments, to some extent, overlaps the other; but South Kensington started a certain museum of what it calls "economic products," which appertain very much to what should be exhibited at Kew, if it is to be a complete botanic garden or department of that class of science. Similarly, at Kew, to some extent, it has collections of dried plants which trench upon the collections at the British Museum, or the British Museum collection trenches upon that of Kew. I do not wish to lay down any law as to which part should be made the focus of the whole, but I think it is undesirable for the Government to have two separate establishments forming the same collections. Of course, it would be a question whether you should detach your botanical specimens from the British Museum to Kew, or whether you should bring those from Kew to the British Museum, and connect them with your fossil botany . . . it is quite clear, I think, that it is a waste of force to have the duplication which at present prevails. There is no possible means of laying down any rule upon the subject by any proper authority unless you constitute a commission to lay down what are to be the limits of the spheres of the different Museums. . .

* * * * * *

13,005. A disadvantage of the present system is that in the cases of the herbaria at Kew, South Kensington, and the British Museum there is a considerable amount of overlapping. "At South Kensington they have a museum of economic products which appears to be one which would very properly belong to a department like that of the Kew Botanical Gardens. The collection of dried plants at Kew and the collection of dried plants at the British Museum run side by side, as it were, to some extent, or are similar, and I think that one such collection would probably suffice if both departments were under the same administration."

13,006. An opinion has been expressed before us by more than one witness, that it was desirable that there should be collections of dried plants, both at Kew and in connection with the collection at present in the British Museum, arranged according to different systems, the one being more complete as a collection for scientific botany, and the other to be used rather in connection with palæontology; if there are two collections arranged on different systems, must there not necessarily be a considerable amount of overlapping in the sense that the same kind of specimens will be found in both Museums?—No doubt, and it would be the function of such a council to arrange for the limits of each class of collection.

13,007. I do not object to overlapping "in that sense certainly, only overlapping in the sense of a similar collection in two places."

13,008. (*Professor Huxley.*) Mr. Carruthers, the Keeper of the botanical collection at the British Museum, in his evidence given before us, tells us first that there is no connection between the two collections, the one at the British Museum and the other at Kew; secondly, that he does not see upon the face of it any reason for any connection being established between the two collections; and thirdly, in reply to the question, "Do you think that the nation derives advantage from possessing those two collections independent of one another?" he says, "I believe the nation does." And then, at a subsequent part of his evidence, in reply to a question of mine, No. 7743, "Is it your opinion that the two herbaria should be equally perfect and equally complete without any relation the one to the other?" Mr. Carruthers says, "It is my opinion that it is absolutely necessary for the gardens at Kew to have a herbarium for naming the plants, as Dr. Hooker clearly puts it. It is also my distinct conviction that a herbarium for the study of systematic botany has no connection whatever with a botanical garden. It ought to be in a position where it can be most freely consulted by all students of botanical science, and there is sufficient evidence that London is the best situation for such a herbarium." In other words, the whole tenor of Mr. Carruthers' evidence, to which I am now referring, is to the effect that there ought to be two distinct herbaria, one at Kew and the other at the British Museum; and that neither institution could do its work properly without having such herbaria; and that also is the general tendency of Mr. Ball's evidence, and I think I may say of all the evidence upon this subject that we have had before us. The only matter in which the different witnesses differ is as to the proportion which the herbarium in one place should bear to the herbarium in the other; but upon the point of having two herbaria all the practical botanists whom we have consulted are unanimous; that being the case, do you think it is quite certain that a wise government managing those matters would not have admitted the duplication of those two establishments?—What I want is to have a scientific council which should be able to advise the Government as to what should be the limits of the spheres of the different departments, as, for instance, in the case of these herbaria, what should be the functions and the mode of classification in one herbarium as compared with the functions and mode of classification in the other. My argument is all adduced to show that the Government requires some scientific permanent council to advise it on those matters, and to lay down what shall be the functions.

Captain D. GALTON, C.B., F.R.S. — 1872.

13,009. I understand that you have a distinct opinion that Kew has nothing probably to do with an herbarium?—I did not say that Kew had nothing to do with an herbarium, but not with an herbarium of the same nature as that at the British Museum.

13,010. You, I know, are very much interested in science, and pay great attention to many parts of it; if you have chanced to pay attention to systematic botany or zoology, you would be aware that in the proper naming of a plant or an animal it is necessary to have a complete systematic collection of plants and animals, and that it is utterly impossible to undertake to name properly either animals or plants without having a complete systematic collection to refer to?—My argument is adduced merely to try to show that I think that the Government want scientific advice, and very constant advice upon that class of questions.

13,011. You do not wish to state to the Commission that in your judgment either the one institution or the other should be deprived of an herbarium, even although that herbarium must be, by the necessities of the case, a duplicate of the other, because two complete collections of plants cannot be different things, they must be duplicates?—They may be classified differently.

13,012. Your objection is not to the existence of a complete collection of plants at each place?—I do not want here to enter into discussion with Mr. Carruthers, Mr. Ball, or yourself, who have studied the thing much more than I have done; but my own *primâ facie* view was this, that there was a considerable loss of force by having two collections, in different places entering into competition with each other in adding to their collections. I want the scientific department at Kew and the natural history department of the British Museum brought under one governing body.

13,013. Mr. Carruthers, in a document which he has signed, and which forms part of the Appendix of our published evidence, at page 46, makes this statement: "The expense of the two herbaria is very small. I am unacquainted with the amount granted for Kew herbarium, but it cannot greatly differ from that required by the national herbarium, which amounted for the

Captain D. Galton, C.B., F.R.S. — 1872.

financial year lately completed to £1,767"; and then Mr. Carruthers, being particularly interested in the success and completeness of the herbarium at the British Museum, goes on to observe, "I know of no way in which the country can at once advance the interests of science and encourage its students at a smaller cost, and with more important results, than by maintaining in their full efficiency the two botanical collections at present existing." You see that Mr. Carruthers' statement is of an exceedingly strong character?—Yes.

13,014. I cite that more because if there were such a thing in science, it might be supposed that any rivalry that he might feel towards Kew would have rather led him to take another line. The present organisation of Kew, speaking broadly, dates from about the year 1840 . . . when Sir William Hooker was appointed.

13,015. Are you acquainted with the Treasury letter defining the constitution of the gardens at that period?—No.

13,016. Then you are not aware that in that letter there is a distinct statement that the institution shall be to a large extent a purely scientific institution?—I have not seen the letter.

13,017-18. Speaking broadly, the whole constitution of Kew has not been altered, has it, since the time that Sir William Hooker was appointed there? So that anything that has been done there has been done in consequence of the original constitution of the place?—I really knew nothing about Kew till very lately.

13,019. The present Director has held his office only a few years, has he?—I think since 1865.

13,020. Anything which now exists in Kew, any herbarium, for example, existed there at the time when he was appointed?—I have no knowledge on that point.

13,021. As far as the herbarium is concerned, the great mass of it, that which was founded by Sir William Hooker, and to which additions were made by Mr. Bentham and others, could not be said in any sense to have been created by the present Director?—I have no knowledge.

13,022. Is it not, then, a matter of fact that whatever exists at Kew in the way of collections which may be duplicates of the British Museum collections, cannot be said to have been created by the present Director?—I cannot give you any information upon that subject, because I really do not know, but I take it exactly as you say it. My argument has no reference to that. I brought in Kew rather as an instance that a science council was required for the purpose of advising the Government as to bringing scientific institutions into one focus. What I want is for the British Museum to be brought into the same focus as Kew, South Kensington, the Botanical Gardens at Edinburgh, and other institutions.

13,023. It is not absolutely certain, under those circumstances, from the evidence of the botanists to which I have referred, especially of Mr. Carruthers, that the existence of those two collections, even although they were duplicates, should be a waste of public money, or a waste of anything?—It is not absolutely certain.

13,024. I apprehend that you would judge so from the evidence which I have just read from this competent botanist, testifying to the necessity of having two separate collections?—If it is admitted that it is necessary to have two separate collections, of course it is not a waste of public money to have them.

13,025. You would not yourself controvert the evidence that I have just put forward on the part of Mr. Ball or Mr. Carruthers?—Of course these are points which I should not be prepared to admit or to controvert without going into the question more fully. I do not controvert them, because, first of all, I have not read the evidence. I have only heard that part of it which you have read. Of course their evidence would be taken by the Commission on that point as much more valuable than any I should give. They are botanists and I am not.

* * *

ENQUIRY OF 1872.

The last official documents which have to be quoted here are those relating to the management of the Royal Gardens, Kew, as under. They contain an account of the events which led to disputes between the First Commissioner of Works, the Rt. Hon. Acton Smee Ayrton, and the Director of the Royal Gardens concerning which,

A Memorial was drawn up and presented to the First Lord of the Treasury, in which the following passages occur:—

Sir John Lubbock, Bart., M.P., to the Right Hon W. E. Gladstone, M.P.

Royal Institution of Great Britain,
20 June, 1872.

My dear Mr. Gladstone,

I have been requested to forward to you the accompanying memorial from some of our most eminent scientific men, on the subject of the changes recently introduced as regards the botanical establishment at Kew.

The signatures have been intentionally restricted to a few well-known names, but I have reason to know that the opinions expressed in the memorial would be shared not only by the science of England, but by scientific men throughout the world.

I am, &c.,
(Signed) JOHN LUBBOCK.

The Right Hon. W. E. Gladstone,
&c &c. &c.

ENCLOSURE.

To the Right Honourable W. E. GLADSTONE, First Lord of the Treasury, &c.

We, the undersigned, deeply interested in the condition of English science . . . do most respectfully beg your attention to the following statements and observations:—

In the year 1840 the private Botanic Gardens of Kew, which had previously been in the possession of the Royal Family, were handed over by the Queen to the Government.

A commission, then appointed to report on their condition, recommended that they should be enlarged and maintained as a national scientific establishment, which should form a centre of reception for the useful products of the vegetable kingdom, a centre of reference and distribution for England, India, and the Colonies, and a means of augmenting the rational pleasure, increasing the knowledge, and refining the taste of the English public.

The late Sir William Hooker was at that time professor of botany in the University of Glasgow. The founding of an establishment like that contemplated at Kew harmonised so completely with his scientific tastes and power of organisation that at a sacrifice of more than half his income he offered to undertake the superintendence of Kew Gardens; his offer was accepted, and he was appointed Directer of Kew at a salary of £300 a year.

Sir William Hooker was at that time the possessor of an excellent private herbarium, and of a scientific library, both of which were wanting at Kew; to provide house-room for these an additional £200 was granted by the Government. No allowance, however, was made for the maintenance or increase of either the herbarium or the library; the expense of both fell upon the director.

During his residence in Glasgow the excellence of his collections had attracted to the house of Sir William Hooker various active investigators, the number of which increased materially after his arrival at Kew. Fourteen rooms of the house he occupied were devoted to his herbarium, which, for twelve years, was the resort of the scientific botanists of Europe. Unaided by the Government, save to the extent above mentioned, Sir William Hooker devoted his private means to the purchase of new books and specimens, and opened a correspondence with botanists of all lands; he thus made his house the most extensive botanical laboratory in this country, and the most important centre of reference regarding systematic, economic, and descriptive botany, as illustrated by his herbarium.

The Gardens expanded equally under his vigorous and enlightened supervision; in ten years after his appointment they became the first in the world.

For twenty-five years he had been collecting textile fabrics, drugs, gums, dyes, and other products to illustrate the structure, uses, and physiognomy of plants; with these collections, made at his private cost, Sir William Hooker founded in Kew Gardens the first museum of the kind that had ever been established. Of such museums there are now three at Kew; they contain upwards of 50,000 named objects of scientific and economic interest, views of tropical vegetation, and maps illustrating

the distribution of plants over the globe. These museums constitute concrete courses of instruction unrivalled in concentration and completeness, and the public interest in them is proved by the number of persons who avail themselves of the stores of information thus provided.

The contributions of Sir William Hooker to these museums were his free gift to the country, for which he never received a farthing of remuneration.

In 1852 the Director's salary, which had previously been raised to £600 a year, was augmented to £800, together with a house which had become vacant at the time. The herbarium was then lodged in a separate building, and immediately afterwards donations and legacies (some to the Director, some to the Government of the day) poured into it. The labour of naming the collections of expeditions, and of drawing up botanical reports, became at length so excessive that the public need of the herbarium was still further recognised by the Government. The Director had previously borne the expense both of assistance and maintenance: of these he was now relieved, though he still continued to bear the cost of books for his library, and of new specimens of plants.

Without this personal devotion on the part of the Director the development of Kew would have been a simple impossibility. For five-and-twenty years his purchases were made and his collections elaborated at his own expense and risk, though they were constantly employed in the work of the country. Before his death, knowing that his son could not afford to be as regardless of pecuniary considerations as he had been himself, he gave directions to have his herbarium valued by competent persons, and offered it to the Government at the lowest valuation. On these terms the collections which had previously been devoted to the nation's use became the property of the nation itself,

This is a brief but sufficient statement of the relationship of Sir William Hooker to Kew Gardens. It shows him to have been their virtual creator.

The antecedents and achievements of the present Director of Kew may be thus sketched. In 1839 Dr. Joseph Hooker was appointed assistant surgeon and naturalist to the Antarctic Expedition, the most perilous, perhaps, that ever sailed from these shores, and the scientific results of which exceeded in importance those of any other naval exploring expedition in this century. During this voyage Dr. Hooker received from the Government the pay of his rank as a medical officer. His outfit, his books, his instruments, were provided by his father. The expenses of travelling and collecting ashore during his four years' voyage of circumnavigation were defrayed from the same source, though this work was done with the express object of enriching a public establishment.

On his return he waived his claim to promotion in the Navy, and devoted four additional years to the classification and publication of the results of the voyage. He also aided his father, as an unpaid volunteer, in the development of the scientific branches of the Kew establishment.

In 1847 Dr. Hooker was sent to India to explore, in the interests of Kew, an unknown region of the Himalaya; and he was directed to proceed subsequently to Borneo, to report on the vegetable resources. His outfit both for India and Borneo, which embraced a large collection of expensive instruments, cost the Government nothing. To cover all expenses incidental to his three years' travelling and collecting. including the cost of assistants and specimens, a sum of £1,200 was received, while the real disbursements of Dr. Hooker during this time amounted to £2.200. The difference was contributed by Sir William Hooker and his son in the interest of the establishment to which they had consecrated their best energies.

On his return from India, Dr. Hooker again devoted himself to the work of aiding his father in the scientific development of Kew. He was also employed by the Admiralty during the nine years from 1851 to 1860, in publishing the botanical discoveries of various naval and other voyages, from Captain Cook's downwards to parts of the world visited by Dr. Hooker himself. For this service he received three years' pay as a medical officer in the Navy, together with a sum of £500, which was accompanied by the expression of their Lordships' approbation of the zeal, perseverance, and scientific ability displayed in bringing to a successful completion this great botanical work. For three years he was occupied with the arrangement and distribution of his Indian collections and the publication of his journals. To cover the expense incidental to these labours, an allowance of £400 a year was granted by the Government.

Besides the voyages and travels above adverted to, Dr. Hooker has made journeys to various parts of Europe, to Western Asia, and to North Africa. The expenses of these journeys, though they were made with the express object of adding to the interest and completeness of Kew, have been borne by himself, and the results given to the establishment of which he is a director.

We place this data before you, not with a view of founding on them either censure or complaint. The labours of Dr. Hooker and the heavy drain upon his father's purse which his unexampled education as a botanist involved, constituted the discipline which made him the man he now is. But we think it highly desirable that you and England should know as much of his career as will enable you to decide whether its arbitrary interruption by your First Commissioner be creditable to the Government of this country.

In 1855, Sir William Hooker being then seventy years of age, Dr. Hooker was appointed his Assistant-Director, at a salary of £400 a year, without a house; and from this time his share in the duties of the garden were added to his more purely scientific ones. In 1858 his salary was increased to £500 a year, with a house; and in 1865, on the death of his father, he succeeded to the Directorship without an assistant.

The liberality of his father and his own self-denying life in the public service have, we think, been sufficiently illustrated. We will, therefore, ask permission to place before you only one additional specimen of his conduct. As regards the floras of Asia, Africa, and America, the herbarium at Kew had been long unrivalled. Europe, however, was but scantily represented. Three years ago a collection [formed by Jacques Gay, and copiously annotated] embracing the very flora needed for the completion of Kew, was offered for sale in Paris. At his own private cost, Dr. Hooker purchased this collection for £400, and presented it to the Kew Herbarium.

His income at Kew is £800 a year, and here is one-half of it voluntarily devoted to the establishment which it had been the continual object of his father and himself to raise to the highest possible perfection. Had these things been known to the Parliament and public of England, the First Commissioner of Works would, we imagine, have hardly ventured to inflict upon the Director of Kew the unnecessary toil, worry, indignity, and irredeemable loss of time against which the memorial is a remonstrance.

Under the auspices of his father and himself Kew Gardens have expanded from 15 to 300 acres. They have long held the foremost rank in Europe. In no particular does England stand more conspicuously superior to all other countries than in the possession of Kew. The establishment is not only without a rival, but there is no approach to rivalry as regards the extent, importance, or scientific results of its operations. Upwards of 130 volumes on all branches of botany, including a most important series of Colonial floras, but excluding many weighty contributions to scientific societies and journals, have issued from Kew. To these are to be added guide books and official papers. This vast literature has been produced and published through the efforts of the Directors of Kew, for the most part at no expense whatever to the nation.

To these labours is to be added the correspondence of the directors with all parts of the world, a mere selection from which, now bound together at Kew, embraces some 40,000 letters addressed to the directors, and for the most part answered with their own hands.

. . . . . .

By the joint efforts of the Directors, a series of complete floras of India and the Colonies was set on foot at Kew, of which those of the West Indies, all the Australian Colonies, New Zealand, Tropical Africa, the Cape Colonies, and British India, are completed or in progress. These are standard works of inestimable value in the countries whose plants they describe, as well as to scientific travellers and institutions in Europe.

We have hitherto confined ourselves to a statement of Dr. Hooker's services in relation to Kew, and have said nothing of his labours in geology, meteorology, and other sciences, nor of his researches while botanist of

the geological survey. During his single year of office he contributed to the records of the survey two memoirs, which are to be regarded as landmarks in the history of fossil botany. In presenting the Royal medal to Dr. Hooker in 1854, the President of the Royal Society spoke of these memoirs as "one of the most important contributions ever made in fossil botany." We may add a reference to his adventurous explorations of the northern frontier of India, in regions never visited by a European before or since.

* * *

This memorial was signed by Sir Charles Lyell, Mr. Charles Darwin, Mr. George Bentham, President Linnæan Society, Sir Henry Holland, President Royal Institution; Dr. George Burrows, President Royal College of Physicians; Mr. George Busk, President Royal College of Surgeons; Sir H. Rawlinson, President Royal Geographical Society; Sir James Paget, Mr. William Spottiswood, Treasurer Royal Society; Professor T. H. Huxley, and Professor John Tyndall.

MEMORANDUM of the First Commissioner on the Management of Kew Gardens by the Office of Works, and the changes therein.

The powers and duties of management in relation to Kew Gardens, in common with other parks and gardens, are by statute vested in the Commissioners of Her Majesty's Works and Public Buildings. Anything authorised to be done by the Commissioners may be done by the First Commissioner, subject to the orders of the Treasury. The Commissioners are empowered to appoint, with the approval of the Treasury, the technical officers under the Board, and the Treasury is empowered to appoint the secretary, clerks, messengers, and officers, except the technical officers. The Commissioners are empowered to remove any of the officers of the department.

There does not appear to have been at any time any organised code of instructions for the management of Kew Gardens, but it seems that the business has been conducted as follows:—

The establishment at Kew, for the purposes of administration, subject to the authority of the Commissioners, has been divided into four branches—Botany, Horticulture, Police, and Works.

The department of botany is under the immediate direction and control of the Director of Kew Gardens, assisted by a special staff of officers. It comprises the Botanic Museum and Library, the collection and interchange of botanical specimens, whether for the herbarium or cultivation, and all other matters pertaining to the pursuit of botanical science.

* * *

Without any communication with the First Commissioner, Dr. Hooker attended before the Commissioners on Scientific Instruction, and gave evidence respecting the administration at Kew; this having accidentally come to the knowledge of the First Commissioner, he requested the eminent naturalist, Professor Owen, to favour him with his views, raising very interesting questions. (*See* Appendix, No. III.)

The House of Commons having sanctioned an expenditure of more than half a million of money for the purpose of constructing a new museum of Natural History, these important questions will have to be dealt with when the museum is ready for occupation.

Whether it is desirable on the grounds of science, public utility, efficiency, or economy, that two museums should be kept up, with their libraries, and staff of public servants to prosecute the science of botany, or whether an accomplished botanist might be placed in charge of the whole collection to be brought in correlation with Palæontological botany, and the other branches of Natural History. Whether having regard to the fact that the Kensington Museum will be close to one station and Kew Gardens close to another, on a short line of railway, with telegraphic communication between one institution and the other, the chief botanist in the public service might superintend a complete botanical collection at Kensington, and illustrate it by lectures to male and female classes, and might give directions to the horticulturist at Kew to cultivate whatever specimens were required, and to forward such of them as might be necessary or convenient to be added to the museum, or to be used for demonstration; whether the chief botanist could visit Kew as often as he desired, with or without his classes, or reside there, coming to the museum during museum hours. Whether the sum now spent on the collections, library, and establishment for botany at Kew, might be expended in completing and improving the establishment at Kensington, or be saved. Whether the Curator of the gardens, receiving and complying with botanical requisitions, and obtaining botanical advice from the chief Botanist, could manage Kew Gardens as effectually as accomplished and experienced horticulturists manage other gardens; and whether having his efforts recognised by, and known to the public, he would be encouraged to new exertions by the well-merited reward of public approbation.

Though these questions need not, and as the First Commissioner thinks ought not, to be solved until the circumstances which may exist at the time of the completion of the new museum are fully considered, it appears to the First Commissioner to be his duty to take care that in the meantime no new expense is incurred at Kew, which will in the least embarrass the Ministers of the Crown or the House of Commons in arriving at a decision.

* * *

Acton S. Ayrton,
First Commissioner.

15 July, 1872.

* * *

APPENDIX, No. III.

STATEMENT relative to the Botanical Departments respectively under the Trustees of the British Museum and the Commissioners of Works.

The British Museum, the Zoological Gardens, and the Royal Gardens at Kew, subserve in different degrees the instructive recreation of the public, and the advancement of science.

The contrast in this respect, or diversity of application, agreeably with the original design and will of the State, is greatest between the "Botanical Department under the Trustees of the British Museum" and the "Botanical Department under the Commissioners of Works."

The first, founded and supported by the State, primarily for the advancement of botanical science, fulfils in but a small degree, from its very nature, as a herbarium or museum of dead plants, the recreation of the public. The Royal Gardens at Kew not only minister in a great degree to the recreation of the public, but afford the means of adding to the wealth, instruction, and enjoyment of the people by scientific treatment and systematic grouping of living plants. The menagerie in the Regent's Park has relations to the animal kingdom, like those of the gardens at Kew to the vegetable kingdom; its chief application is in the instructive pleasure of the public, its scientific one is mainly in economical relations. But, as it is not supported by the public purse, the Management avails itself of the zoological collections of dead animals and parts of such, and of the library, in the British Museum, "for naming the animals in the menagerie, and for giving to zoologists and zoological travellers the information they require."

In connection with the healthy and instructive resort of the public, the Royal Gardens at Kew have, or ought to have, for their aims and applications:—

I. To promote the introduction and naturalization of new and useful species of plants, in relation to food, to constructions, manufactures, and ornaments.

II. To effect the establishment of new and useful varieties of plants by experimental hybridization, intercrossing, progressive selection, artificial soils, and the like influences, for which the means and space at the command of the Kew Director may be available.

III. To encourage and instruct the colonies in the conservation of useful indigenous plants, liable to be diminished or extirpated in the absence of such provision, with rules and methods for their propagation, based on sound instruction; to introduce and naturalise in colonies, with suitable soils and climates, useful plants, not indigenous thereto; to establish systems of interchange of living plants and seeds. (This appears, from the reports of the Director, to be well carried out.)

IV. To aid and instruct the agriculturist, by the results of scientifically conducted experiments on manures, and the application of manures, such as the subterranean pipe-conveyed liquid manure, applied by Charpentier to the improvement of vineyards. In our climate such experiments, resulting in the demonstra-

tions of the fittest species of grasses for particular soils —the kinds of grasses which yield the best quality and greatest quantity of food—through methods of irrigation, promoting absorption of manures, would, if scientifically carried out, result in a national benefit, repaying manifold the cost to the State of the present department of botany under the Commissioners of Works. Experience and analogy justify the hope and expectation that grasses may have their nutritive qualities increased by methods of cultivation and feeding, guided by experimental botanical physiology, in a degree analogous to the acquisition of the potato from the poisonous *Solanum tuberosum*, and of the yams from the wild Dioscoreæ.

V. To inform and guide the taste of arboriculturists and horticulturists by the example of the grouping of trees and shrubs, by the arrangements, forms, and associations of smaller ornamental plants, by the disposition and treatment of rock works, of ornamental waters, and of garden sculpture.

VI. In its relations to the science of botany, the establishment under the Commissioners of Works stands as the sole National "Botanical Garden" in England. To the extent in which the vegetable kingdom is exhibited by living species, such species are there favourably presented to the study of the botanist, especially in relation to the anatomy and physiology of plants as subjects for dissection and experiment: next, in the degree or proportion in which the plants are arranged according to their natural affinities, in groups, *e.g.*, illustrating natural orders and families, with ample and conspicuous labelling, such proportion of the gardens at Kew, at present limited to the herbaceous grounds, affords the means of instruction to visitors of all classes in the elements of botany.

To such visitors also, the National Botanical Garden would give useful and interesting knowledge in the degree in which the plants were arranged, according to the countries or continents to which they are indigenous, in other words, according to their "geographical distribution." The extent to which this instructive or scientific application of the Kew Gardens might be there effected, may be judged of by the disposition of the garden of James Bateman, Esq., F.R.S., F.H.S., at Biddulph, Staffordshire, as described and illustrated in the "Gardener's Chronicle" [for 1856 and 1862, by Edward Kemp].

VII. The museum attached to the National Botanical Garden should have for its more especial object, to illustrate the industrial and economical relations of plants, showing the products as extracted from them and prepared for commence, agreeably with its original design as a centre of reception for the useful products of the vegetable kingdom.

The foregoing are important national objects, which would worthily and thoroughly occupy the time and labours of the Director and his appropriate staff.

The national establishment under the Trustees of the British Museum, ought to be, and is, able to supplement and supply the further scientific needs of the gardens at Kew, as it does the menagerie in the Regent's Park. The Department of Botany, in the British Museum, is the instrument for the direct advance of that science, whereby new plants are recognised and made known and their affinities determined.

The instrument is the more perfect to this end, in the degree in which the entire vegetable kingdom is represented by the preserved plants and parts of plants essential to the comparisons and researches of the scientific or species-naming botanist. The present President of the Linnean Society has stated:—"I have published several thousand of new species of plants. I have never published one without examining it in a herbarium, and I have examined very few in botanical gardens." Mr. Bentham also states:—*"That dried specimens subserve the main amount of the scientific work, for a vastly greater proportion of the vegetable kingdom can be preserved and arranged, conveniently for use and reference, in the "herbaria" of a museum, than, as live plants, in a botanical garden, even of the noble extent of that which exists at Kew." But the present Director of the Royal Gardens affirms that "a first-rate herbarium and library must also be maintained at Kew;" and the reasons he assigns are, that they are "essential to Kew for naming the plants in the gardens and museums of economic botany, and for giving to botanists and gardeners the information daily demanded of us."*

Again, in an official document submitted three years ago by Her Majesty's Office of Works to the Trustees of the British Museum, Dr. Hooker asserts that "the necessity of there being a perfect and complete herbarium attached to the Royal Gardens is obvious;" and, further, that "the advantages of Kew, as a site for the principal national herbarium, are now universally recognised, whence it follows, that part of the British Museum collections should be transferred to Kew." No reasons are offered for this averment. The Administrator, cognisant of the fact of a national establishment already existing, and supported by the State, to fulfil the purposes alluded to by Dr. Hooker, will be able to form a correct judgment, in which, however, he may be aided by "The Notes on Mr. Russell's 'Memoranda' respecting the Botanical Collections of the British Museum and Royal Gardens of Kew," by the then Keeper of the Botanical Department, British Museum, which reply, dated 15th January, 1869, to Dr. Hooker's statements, was sent by the Trustees to the Office of the Commissioners of Works. To this reply I beg to add a few remarks.

The necessity for a herbarium or museum of dead plants and parts is obviously as great for the determination of new species of living plants received into the Botanical Gardens, as is the necessity of a museum of preserved and prepared animals and parts of animals for the determination of new species of living animals received into the Zoological Gardens; but the necessity of such museums being part of such establishments is very far from being obvious. It is neither more nor less than in the degree of the contiguity of Kew and of the Regent's Park to the British Museum, where the nation had provided, prior to the establishment of both the Botanical and Zoological Gardens the means of determining their living plants and living animals. In the time of the Aitons, father and son, the distance of Kew from London, reckoned by the time and facility of traversing it, was much greater than it now is. Yet the Botanical Department of the British Museum, with its scientific officers, sufficed for all the work of determination of the new and rare species received at Kew during the directorship or curatorship of those estimable and practical horticulturists. The "Hortus Kewensis" of the Aitons was, at the date of its publication, and long after, one of the standard works in botany; and the scientific determinations therein for which Dr. J. D. Hooker affirms the obvious necessity of a second or duplicate national herbarium at Kew, was done by Dryander, Solander, and Robert Brown, the librarians and curators of the Banksian and National Herbaria now in the British Museum. Such works would be equally well done by the present accomplished botanist, the successor of Robert Brown.

The delusion that a museum of natural history must be essential, as juxtaposed, to a garden or menagerie, swayed for a time the direction of the London Zoological Gardens. But these not being maintained by the public purse, but by the subscriptions of private individuals, the real state of the case was sifted, and the delusion recognised.

The Museum of Zoology was abolished; its contents distributed to the proper establishments, where they were wanted, and were truly useful, viz., the anatomical specimens to the Royal College of Surgeons, and the rest to the Zoological Department of the British Museum. The scientific applications and publications of the Zoological Society have in no degree deteriorated or diminished since the determinations and comparisons of their new species have been carried out by means of the National Establishments founded and supported for such work.

Thus, not only is the necessity "of a perfect and complete herbarium at Kew" not obvious, but the contrary. How far such alleged necessity has been universally recognised may be judged by the "Notes on Mr. Russell's Memoranda," above referred to, by J. Jos. Bennett, Esq., F.R.S., Keeper of the Botanical Department (15 January, 1859 [*sic*]), sent in to the Trustees,

* "Return of all communications made by the officers and architect of the British Museum to the Trustees respecting the want of space, &c.," ordered by the House of Commons, 11th March 1859, p. 11.

* *Ibid.* p. 4.

15th January, 1869, and forwarded to the Office of Works.

A Botanical Museum, including a herbarium for the advance of the science, through the naming of existing species and the determination of extinct species of plants, fulfils the aims for which the nation provides and supports it in the degree of the completeness of its collections. In the measure in which a competing museum and herbarium, also maintained at the public cost, approaches, through the interception of State collections of botany, and by outbidding at botanical sales, to the perfection and completeness affirmed to be a necessity at Kew, it detracts from the utility and primal aim of the Metropolitan National Museum.

To give an example of such evil, nullifying completeness by rivalry: the herbaria collected by Banks and Solander, in the circumnavigatory voyages of Cook, and those collected in the late voyages of Flinders, were deposited, with the sanction of the Admiralty, in the Botanical Department of the British Museum.

By and through these herbaria, with the aid of the Banksian Library, subsequently bequeathed with his remaining Natural History Collections by Sir Joseph Banks to the British Museum, Robert Brown was enabled to produce his works on the Botany of Australasia, raising the Science of Plants in a degree second only, if inferior at all, to that effected by the immortal works of Linnæus. On every account, scientific, administrative and economical, collections of dried botany subsequently made by Government officers in Government expeditions, especially those supplementing the illustrations of Australian and New Zealand vegetation, previously arranged for the service of Science in the British Museum, ought to have been located there. But the portion of the Botanical Collections made during the Antarctic Expedition of Sir James C. Ross which has found its way to the British Museum is chiefly the Cryptogamic, or that including the mosses, fungi, and lichens. For the higher organised, or phanerogamic part, by far the larger proportion of the collections, the botanist requiring a comparison of them with the earlier described species from New Zealand and Australia is now compelled to go from the Botanical Department of the British Museum to the Competing Department developed by Dr. Hooker at Kew. Not only so, but since the Antarctic Expedition of Sir James C. Ross, the Royal Gardens at Kew, according to the present Director's evidence, "have been the recipient of almost all the collections made by Government Expeditions." (Evidence before the Scientific Commission. Reply to *Q.* 6658.) That is to say, not merely the specimens of living plants, which would have found at those gardens an appropriate location, but the dried or otherwise preserved specimens of dead plants (herbaria) have been diverted from the Metropolitan Museum. The necessity thus imposed upon the British and foreign botanist to quit the herbarium in London for the herbarium at Kew, arises in no way from the nature of the case, but has been created by the will, and, in my view, the misapplication of opportunities and influence of the present Director of the Royal Gardens at Kew. Thus, in place of that amity and co-operation to a common end of public utility which ought to exist between the establishment for dead plants at the British Museum and that for live plants at Kew, they have been dragged into antagonism. Dr. Hooker, in his reply to *Q.* 6681 of the Scientific Commission, speaks of them as "competing bodies." But the British Museum has had no part in bringing about this unwise and unthrifty and uncalled-for condition. The competition carried on at the public cost, in which the Keeper of the Botanical Department of the British Museum is compelled, by his duty, to bid against rivals for rare and essentially needed herbaria, as far as his proportion of the Annual Parliamentary Grant to the Trustees will go, is solely due to the Director of the Botanical Department under the Board of Works, acting, as I submit, from a mistaken view of his duties and responsibilities.

The main end or drift of Dr. Hooker's evidence before the Scientific Commissioners, now sitting at No. 8, Old Palace Yard, is to impress upon them the necessity of the transfer of the collections of dead plants (the palæontological part or the fossils excepted) in the Botanical Department under the Trustees of the British Museum to the Botanical Department under the Board of Works.

Evidence before the Scientific Commission, "*Q.* 6683. Would you contemplate any separate function for the two Museums, or that they should have common functions.—*A.* With regard to one very important branch of botany, the palæontological, I think it would be best that it should remain in or near London, it being as essential to geologists as to botanists. *Q.* 6684. Besides, therefore, the transference of the collection of fossil botany to South Kensington, is there any other change which you would desire to make in the museum at Kew?—*A.* No; I would still keep Kew as the great scientific working herbarium, to which, as hitherto, all botanists must come, and I think that the herbarium at the British Museum should be named comparatively and consistently with that of Kew. *Q.* 6685. You would contemplate, therefore, that the two establishments ancillary should be under one common head?—*A.* I think that the two herbaria should be re-arranged under one Head, and be brought under one system of management." In other words, the abolition of the Botanical Department in the British Museum is recommended, and its reduction, there, to an appendage of the Department of Palæontology. Also that the Botanical Department to be transferred from London to Kew should be under one Head, that is to say, the Director of the Botanical Department under the Commissioners of Works.

It is contemplated, agreeably with my Report to the Trustees in 1859 ("Return by the Honourable the House of Commons, ordered on the 16th March, 1859"), that the Botanical Department shall take its share in the instruction of school teachers in the elements of natural history, by a free course on the principles and economical applications of botany.

This application of the national collections of dried or dead plants is expressly opposed by Dr. Hooker in his evidence before the Scientific Commissioners, recommending their transfer to Kew. *Q.* 6665. "Has anything yet been done in the way of illustrative conversations or lectures to persons visiting, or to particular or special classes, visiting the Museum?—*A.* Nothing" (the "Museum" is that of the scientific or herbarial establishment at Kew, the subject of the preceding question. *Q.* 6698. "Do you think it would be possible for the officers of the Gardens to combine the functions of giving public lectures together with their present duties?—*A.* I think it would be possible for certain able and active officers to do so, but I think that it would be highly inexpedient to require it of them." The evils here threatened, in my judgment, to science, to the integrity of the British Museum of Natural History, and to its extended uses in aid of national education, compel me, unwillingly, to submit to the consideration of the First Commissioner of Public Works, evidence of what may appear to him, as to others, of the influence of the amount of work now done at Kew, in connection with its Herbaria, upon the works originally contemplated to be done there in connection with the gardens of living plants.

The scientific work of which a herbarium is the instrument has been defined by a great wit and original thinker as the "attaching barbarous binomials to dried foreign weeds." This roughly expresses the net result of the application of a museum of dried plants; it is the proper and authoritatively assigned labour of the Keeper of the Botanical Department under the Trustees of the British Museum. But an estimable naturalist, Gilbert White, has given a better and fitter opinion on the subject: "the objection to (herbarian) botany is, that it exercises the memory without improving the mind or advancing any real knowledge, and where the science is carried no farther than a mere systematic naming and classification, the charge is too true. But the botanist who is desirous of wiping off this aspersion, should be by no means content with a list of names, he should study plants philosophically; should investigate the laws of vegetation; should examine the powers and virtues of efficaceous herbs; should promote their cultivation, and graft the gardener, the planter, and the husbandman upon the physiologist."

To raise the "weed" to the condition of a plant, useful to man's estate, is the work of a Director of a national collection of living plants in adequate gardens and buildings with all appliances for culture, and requisite experiments, liberally provided by the Nation to that end. Most of the plants now of greatest use to man were originally weeds.

Almost yearly are additions made to the list of these inestimable developments and conversions. We look in vain for any evidence of such as represented by new flowers or fruits, raised at Kew.*

* At least since the directorship of the Aitons, in the time of [Thomas Andrew] Knight.

"The Horticultural Society," originated and supported by voluntary contributions, supplies in its degree the absence of the practical applications to that economical end in the Royal Gardens, yet this, surely, is the true and legitimate scientific work of the Director and his staff. The results of competitive exhibitions of new and valuable kinds of fruit, grain, grasses, succulent and other vegetables, flowers and other plants of ornament, are the results of applied physiology, and the prizes are the due reward of science and skill in this department of Botany.

Although no new variety of fruit or flower appears to have been developed at Kew, the Director in his "Report," issued in the present year, states that "During the past year about 10,000 specimens have been added to the herbarium."*

Dr. Hooker assigns as a reason for maintaining a first-rate "herbarium and library" at Kew, "that they are essential to Kew for giving to botanists and gardeners the information daily demanded of us" (*ut supra*, p. 10).

The alleged instances in which reference to an herbarium is essential to supply the information daily demanded by gardeners, lead me respectfully to suggest that official inquiry should be addressed to the leading gardeners who now mainly fulfil the physiological work for which the gardens at Kew were destined. In order, *e.g.*, that the Department of State responsible for such application should know the kind and degree of information and aid which they derive or have derived from the National Establishment.

One of the legitimate functions of the Botanical Establishment under the Commissioners of Works is to endeavour to naturalise rare, useful, and beautiful plants. This endeavour implies time devoted to observation, skill, care, and experience, guided by scientific knowledge of the power and properties of living plants, and their relation to soils.

* * *

On the economical results of adding to the Director's duties those of the head of the Botanical Department under the Trustees of the British Museum, I would finally submit that—

Not only in the way which suggested to Dr. Hooker the term "competing bodies,"† but in relation to the conservation of his acquisitions of dead plants for Kew by success in the competition, is the State made to pay twice over for the same National work.

The Botanical Department of the British Museum consists, besides the herbarium, of a fire-proof museum open to the public, of a collection and models of fruits, of a collection of gums, resins, fibres, and other natural vegetable productions, of large specimens and sections of woods, and other parts, with microscopical preparations, exhibiting the form and structure of plants. Its chief and essential part consists of "the general herbarium," the "British Herbarium" with various other smaller "herbaria of historical interest," also a Departmental Botanical Library in addition to the advantage of the General Library. The staff consists of the Keeper at an annual salary of £500, of a senior assistant at £180, and of a junior assistant at £150. Their time is exclusively given to the duties for which they are paid.

The Royal Gardens at Kew have now had annexed to them a herbarium and a museum, rivalling and analogous to those at the British Museum.

The staff specially attached to this "Annex" includes a keeper having a residence, with two "assistants," at collective annual salaries of £750. Besides a special curator of the museum and an assistant at £315 per annum. The Keeper, Professor Oliver, is also Professor of Botany at University College; one of the assistants is also Lecturer on Botany at a London medical school.

Through this additional establishment for the same end as the Botanical Department of the British Museum, Dr. Hooker has been enabled to publish, or aid in the "publication of 130 volumes on botanical subjects, many of these being accounts of plants collected by Government Expeditions" (detained at Kew) "Monographs published by officers connected with the herbarium" (*i.e.*, the salaried officers holding elsewhere professional chairs), "Colonial floras," and works of that description.

To the extent or proportion in which the Director's time has been diverted from the immediate aims of the Royal Gardens to this foundation of his scientific fame, the proportion of his salary of £800 per annum must also be placed to the credit of the superaddition of the dead plants to "the Botanical Department under the Board of Works," competing with the "Botanical Department under the Trustees of the British Museum."

The only ground which after mature consideration occurs to me for the initiation of such an anomaly, is the want of space, which for about twenty years has affected the reception and convenient arrangement of the indispensible additions, or of such as ought to have been made, to the National Herbarium at the British Museum. This requisite space will be provided in the New Museum of Natural History in course of erection at South Kensington; and the only objection to the transfer of the Herbarium at Kew to the National Natural History Museum in London, will then have ceased to exist. A saving of £500 a year may be estimated to be so gained to the nation, and nothing would be lost to science; on the contrary the director would recover the time for the discharge of his physiological duties at Kew, and the keeper of botany at the British Museum would be better enabled to fulfil his nomenclative and descriptive functions in London.

"Herbaria collected by Government Expeditions for about forty years past,"* which are now hazardously stored at Kew "in an old house, which is not fireproof,"† would be accommodated in a fireproof building. Further, the State, instead of having to provide what Dr. Hooker demands, "a fireproof building,"‡ which signifies a costly museum "at Kew," would avail itself of the museum now in course of erection in London.

(Signed *Richard Owen*,
Superintendent of the Natural History
Department, British Museum.

16 May 1872.

* * *

COPY of TREASURY MINUTE, dated 24th July 1872.

My Lords have under their consideration the Memorandum of the First Commissioner on the rearrangement of Kew Gardens by the Office of Works, and of the changes therein.

This Memorandum embraces three subjects:

1. The manner in which matters connected with the management of Kew Gardens have been conducted, and in doing so, refers to instances in which complaints have been made by the Director of Kew Gardens.

2. The arrangements under which this management ought to be conducted.

3. Suggestions and questions of the First Commissioner as to changes therein, and as to connecting the Kew Gardens with the Kensington Museum, which however the First Commissioner does not propose should be taken into consideration at present.

To the last part of the Memorandum, therefore, my Lords do not propose to refer in the present Minute.

* * *

With regard to the local management at Kew, the First Commissioner's Memorandum divides it, for the purposes of administration, into four branches, Botany, Horticulture, Police, and Works.

* * *

The Botanical Department has been formed by the exertions of Sir W. Hooker, and of his son, Dr. Hooker. It stands high in the estimation of men of science both here and abroad, and both these eminent men are entitled to the gratitude of the country for their services in this department of science.

* * *

No alterations in existing arrangements in the scientific branch of the department should be made without the Director's concurrence.

* * *

COPY "of Dr. Hooker's Reply to Professor Owen's

* This figure appears under the head of "V. Herbarium and Library,' and the Director would hardly report of books as "specimens."

† Evidence before the Scientific Commission."—Answer to Q. No. 6681.

* Dr. Hooker's evidence before the "Scientific Commission."—Reply to Q. 6658.

† *Ibid.*—Reply to Q. 6685.

‡ *Ibid.*—"The collection of dead plants being the most valuable in the world, because of the enormous number of typical specimens which it contains, hence it certainly should be accommodated in a fireproof building."—Reply to Q. 6580.—"Scientific Commission."

Statement, Appendix, No. 3, in the Kew Gardens Return."

REPLY "to Professor Owen's Statement relative to the Botanical Departments respectively under the Trustees of the British Museum and the Commissioners of Works" (*see* Returns to House of Commons, 25th July 1872, entitled "Kew Gardens").

P. 109, par. 4 Professor Owen divides the "aims and applications" of the Royal Gardens of Kew, according to his view of them, under seven heads.

It is sufficient to state that some of these are recognised by the Government, and specified in their instructions under which the Director carried out his duties; but that others, and those of a most comprehensive nature, have no place there, and are not such as pertain to Botanical Gardens elsewhere. Amongst these are the agricultural operations specified by

P. 169, par. 8 Professor Owen, "the application of manures, demonstrations of the fittest species of grasses for particular soils * * * methods of irrigation, subterranean pipe, conveyed liquid manures, and so forth," all of which are being carried out with vigour and success by various agricultural societies and private individuals throughout the country.

To establish such operations at Kew would involve an enormous expenditure, and occupy many acres of ground now devoted to the legitimate purposes of a Botanical garden.

Illustrations of rock-works, garden sculpture, and ornamental waters, also recommended by Professor Owen, appear to be equally out of place.

P. 170, par. 2 Professor Owen is in error in stating that the arrangement of plants in natural groups, with conPar. 3. spicuous labelling, &c., is at Kew "at present limited to the herbaceous grounds;" as he is also in implying that there is no illustration of "geographical distribution," which is in truth carried out to an incomparably greater extent at Kew than in any other garden known to me at home or abroad. Professor Owen cannot have visited the houses devoted to ferns, orchids, succulents, aroids, &c., nor the arboretum, fruticetum, and pinetum, nor observed the arrangement on the shelves of the two great buildings, the palm stove and the temperate house.

Par. 7. The fact that a first-rate herbarium and library must be maintained for the purposes of a botanical garden, and in immediate proximity to it, has not only been uniformly admitted and acted upon by successive

P. 171, par. 1 Governments, but is so universally recognised by naturalists everywhere that I am surprised that Professor Owen should dispute it.

I am sure that were he acquainted with the nature and amount of the duties devolving on this establishment, he would abandon his opinion without hesitation.

P. 171, par. 1 In support of the contrary opinion he refers to that early period in the history of Kew, when its new and rare plants were named at the Banksian herbarium in London. But the naming of a few new and rare plants cultivated at the beginning of the century in a private garden of nine acres, probably at no one time containing more than 4,000 species, is a very different matter from keeping accurately named public collections that occupy 300 acres, and are estimated to contain 20,000 species; and this in an establishment that is annually called upon to name literally thousands of plants from other botanic gardens and nurseries in England and similar institutions abroad. A great deal of the naming, and keeping correctly named, the plants at Kew can be conducted only by skilled botanists visiting the grounds daily. Large classes of plants are now cultivated that must be named in the houses where they grow and many more, the tropical especially, could not be sent to a distance to be named, without serious damage *in transitu*.

To this must be added the necessity of naming and ticketing with copious information the vegetable products of economic interest, in three museum buildings, the illustration of which products by specimens, Profesor Owen admits to be a legitimate object of the Gardens of Kew.

Nor was the naming of the Kew plants carried out in London; as is supposed, there was a large herbarium in constant use at the Royal Gardens at the very period alluded to; the breaking up of which, when it was proposed to give up the Gardens, necessitated the formation of another.

No comparison whatever can be instituted between the needs in these respects of the Royal Gardens at Kew and the Zoological Society's Gardens in the Regent's Park. P. 171, par. 2

The reflection that follow on the conduct of the late and present Directors of Kew Gardens are not suited for official discussion. Pars. 5, 6

Profesor Owen is in error in asserting that the main end or drift "of Dr. Hooker's evidence before the Scientific Commissioners is to impress upon them the necessity of the transfer of the collection of dead plants" from the British Museum to Kew. P. 172, par. 3

My evidence is unequivocally opposed to such a transfer.

Herbaria are not costly establishments, but the least expensive of all natural history collections; and the objects and applications of botany in its largest sense, are now so numerous and so important, as to render a division of the subject necessary; whence the expediency of maintaining a country and a metropolitan department, each with a herbarium, as the most essential, but least expensive of its adjuncts, may readily be demonstrated.

So far from desiring that the British Museum herbarium should come to Kew, I should propose to recruit it from that at Kew, which could be done to its very great advantage.

Professor Owen's approval of the saying of "a great wit and original thinker," that "the net result" of a herbarium is the "attaching barbarous binomials to dried foreign weeds," will not find an echo amongst those conversant with the subject. Had it been otherwise, successive Ministers would hardly have tolerated the existence of the Kew herbarium, or of that at the British Museum either. P. 173, par. 3

The disparaging remarks that follow on the views of his duties held by the late Director, and on his performance of them, are not best dealt with by the counter-assertions of his son; they are best disposed of by certain passages in the Treasury Minute that follows Professor Owen's statements, and by the unanimous verdict of the late Director's countrymen and foreigners everywhere. P. 173, par. 5

The suggestion is offered that an official inquiry should be made of leading gardeners to ascertain "the kind and degree of information and aid which they derive or have derived from the National Establishment." P. 174, par. 2

The answer to this has already been given, in the addresses to the Premier by the Royal Horticultural Society as a body, and separately by its Floral, Fruit, and Scientific Committees; and by the meeting of botanists and horticulturists held in London; and by the concurrent evidence of gardening periodicals throughout this country.

The statement that the Royal Gardens had not fulfilled their function of introducing new, rare, and beautiful plants, is best met by a reference to the pages and illustrations of the "Botanical Magazine;" a work that has issued monthly (and without a month's intermission), from Kew, ever since 1840, edited by the Director, and which is devoted to new, rare, and interesting plants, the larger proportion of which have flowered at Kew. P. 174, par. 3

In the contrast drawn between the herbarium establishments at the British Museum and at Kew, it is stated that the staff of the former consists of three officers, with aggregate salaries of £850, and "that their time is exclusively given to the duties for which they are paid"; whereas the aggregate salaries of the three herbarium officers at Kew is £750, and that one is Professor of Botany in University College, and another a lecturer at a London Medical School. P. 174, par. 11, &c.

I am surprised that Professor Owen should be unaware that one of his own three officers is botanist to the Royal Agricultural Society, and another a lecturer at a London Medical School, and editor of a valuable botanical journal.

Nor does Professor Owen in his comparison take into consideration that the Kew herbarium is open from 8.30 a.m. till 5 p.m. in winter, and 6 p.m. in summer, whereas the British Museum herbarium is open only from 10-4 in winter, and 10-5 in summer, as also that the Kew officers have not only the keep of the largest and most frequented herbarium in the world, but of a very large library, and have the duty of naming all the plants throughout the gardens and museums, together with many other duties that do not fall upon the British Museum officers.

The fact is, that the exigencies of this establishment require that the herbarium should be open during that long period, but the officers are not required to be in attendance, and at their work, for more than seven hours daily throughout the year.

Those seven hours (and to their honour be it said, often many more) are devoted exclusively to the duties of their respective offices.

That the officers both of the British Museum and Kew should be chosen to conduct the very brief professional and other duties which they perform elsewhere (at their own time), is both honourable to themselves, and in many ways advantageous to the establishments with which they are officially connected, always assuming that these vocations do not interfere with their working hours at Kew, and at the British Museum, or with their powers of work during those hours.

P. 1 75, par. 2 The statement that there are at Kew "a special curator of the museum, etc., and an assistant at £315 per annum," is an error.

There is but one curator for the three museums, and his salary is £120, rising to £150, without a house or any other advantage; he has no assistant, and never had one.

P. 75, par. The last of Professor Owen's statements to which I shall allude are the following (which I quote verbatim). "Dr. Hooker has been enabled to publish or aid in the publication of 130 vols. on botanical subjects * * * *."

"To the extent or proportion in which the Director's time has been diverted from the immediate aims of the Royal Gardens to this foundation of his scientific fame, the proportion of his salary of £800 per annum must also be placed to his credit of the superaddition of the dead plants to the Botanical Department under the Board of Works, competing with the Botanical Department under the Trustees of the British Museum."

The first statement in this extract has no foundation in fact; it would ill befit me to notice the insinuation contained in the last.

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

Royal Gardens, Kew, 6 August, 1872.

REMARKS on Dr. HOOKER'S "REPLY" to the "Statement relative to the Botanical Departments respectively under the Trustees of the British Museum and the Commissioners of Works." (Appendix No. III., etc., of Papers relating to Kew Gardens.)

Reply, Q. 6683, Royal Commission on Scientific Instruction &c. One object of my "Statement" is gained by Dr. Hooker's withdrawal of his design to reduce the Botanical Department under the Trustees of the British Museum to an appendage of the Palæontology (Sub-department of Fossils), and by his admission of the expediency of a "Metropolitan Department of Botany."

Further comment on the "Reply" would have been unnecessary had not the recommendation of the mode of supplying the herbarium of such department urged upon the Royal Commission on Scientific Instruction been formally submitted in the Reply to the approval of the Commissioners of the Board of Works, to wit, "to recruit it from that of Kew."

P. 437, Minutes of Evidence, Reply, Q. 6732. P. 2, par. It is important to all concerned to know the meaning of such recommendation. It signifies a continuance of the practice, since Robert Brown's keepership of the Botanical Department of the British Museum, of transferring to the Royal Gardens at Kew all collections of dried plants made by Government expeditions and those purchased with public money voted for the Royal Gardens. At the beginning of the practice some portion of the dried specimens were sent to the British Museum.

Of the botanical collections of the "Antarctic Expedition" of Sir James Ross, for example, the British Museum was "recruited" by the mosses, mushrooms, and lichens. Some duplicate phanerogams were sent in 1847; a smaller number of New Zealand duplicates in 1854, after which the supply ceased. None of the plants described in the fifth and sixth volume of the "Botany of the Antarctic Voyage" [by Dr. Hooker] have been received into the National Herbarium in London.

I will not trespass by multiplying the instances in which botanical science, in so far as its advancement relates to the completeness of the herbarium at the British Museum, has been injuriously affected by the policy and practice of the competing one at Kew. Neither is it necessary to notice the bare and unsupported denials of the conclusions from premises and arguments set forth in my "Statement." But, in reference to those showing that a complete herbarium in London would subserve the functions of a "first-rate herbarium" at Kew, the Directors of the Royal Gardens opposes two reasons which call for notice.

The first is, the "admission and action of successive Governments;" in the second, the Director states Reply, P. 1, par. 5 that since the publication of the "Hortus Kewensis" the gardens of Kew have increased so as "to contain 20,000 species," and that he is "annually called upon to *Ib.* par. 7. name literally thousands of plants from other botanic gardens and nurseries in England and abroad." *Ib.* par. 7. From this statement a non-botanical administrator might conclude that the 20,000 species living and growing in the Royal Gardens had been new or nondescript species when received there. If this be so, it ought to have been stated; if not so, the percentage of the species received into the gardens requiring a continuance of the herbarian comparisons for determination and naming ought to have been stated at least approximately.

The same remark applies to the alleged "thousands" of plants annually sent to Kew to be named.

What is the proportion of such which a competent botanist would recognise? What the number which needed preliminary reference to a "herbarium?"

In a question so grave as the very existence of a Metropolitan museum of botany, statements and arguments bearing thereon ought to be definite and intelligible.

If unknown species of living plants would receive "serious damage in their transit from Kew to London" in order to be named, what must be the amount suffered P 2, par. 1. by "the literally thousands of plants from other botanic gardens" sent to Kew to be named? Under present *Ib.* railway conditions, provincial botanic gardens and nurseries must send their unnamed plants to the herbarium at Kew through London. They would be as accurately named if brought to the herbarium at the British Museum.

The Commissioners of Works, in the correspondence and reports forwarded by the Trustees of the British Museum in 1869, and by the "notes" of the then keeper of their Botanical Department, will find means of testing the statement as to "the universal recognition by naturalists everywhere" of the necessity of maintaining Reply, p 1, par. 5, a "first-class herbarium in immediate proximity to the gardens at Kew."

The eminent botanist, John J. Bennett, F.R.S., V.P.L.S., and his accomplished successor in the keepership of the Botanical Department of the British Museum, have ample and regrettable grounds for knowing that a "first-rate herbarium" at Kew means a "second-rate" one in London, so far as the present Director of the Royal Gardens may have the power or opportunity of raising the one and depressing the other.

They are not the only botanists and naturalists who know the drift of Dr. Hooker's reply to a leading question of the Royal Commissioner, No. 6684. *A.* "I would still keep Kew as the great scientific working herbarium, to which, as hitherto, all botanists must come; and I think that the herbarium at the British Museum should be named comparatively and consistently with that at Kew." "That the two herbaria should be arranged under one Head, and be brought under one system of management."

The covert design of superseding that eminent botanist, Mr. Carruthers, in his present headship, it does not befit me to notice. Minutes of evidence Roy. Com. Sc., p. 436.

That the necessity of a museum of dead plants at Kew, to which "all botanists must come," has "been uniformly admitted and acted upon by successive Governments," is an argument which admits of a conclusion Reply p 1, par. 5 other than that which it is meant to suggest. No doubt a Minister of Public Works receiving such statements as that 20,000 species has to be determined and named, and that "literally thousands of plants from other botanic gardens at home and abroad" were equally without names and specific determinations until supplied therewith through a herbarium at Kew, might accept without further inquiry and act on such averments and resulting recommendations of the Director of the Royal Gardens, to the end of developing the required herbarium there at any cost or detriment to the older national herbarium in the metropolis.

* * *

The advancement of the science of botany by the officers of that department in the British Museum, and

its application to naming the new species of living plants received at Kew was slightly exemplified in my "statement." I have already alluded to Dr. Hooker's disReply, p. 1, par. 7. paraging definition of the work cited. It compels me to trespass on the time of the First Commissioner by other instances of the legitimate application of the national collection of dead plants to the national collection of living plants.

Of the botanical specimens brought home by the circumnavigating expeditions of Cook and his successors to Flinders, the living plants were transferred to the Royal Gardens, the dead ones to the Metropolitan Herbaria.

The naming and description of the new species were done by the Keeper of the herbarium; and the Kew plants duly received the names applied to them by Robert Brown, F.R.S., etc. The majority of the living specimens of Australasian plants in the Royal Gardens bear the names assigned to them in the "Prodromus Floræ Novae Hollandiæ," 8vo., 1810. I trust that no other botanist could now be found who would define, or write of this work, in its relations to Kew Gardens, as 'the naming of a few new and rare plants" cultivated at the beginning of the century in a private garden of Reply, p. 1, par. 7. nine acres." Such definition, however, must also include [The Cruciferæ, with *Cleome*, Leguminosæ, Myrtaceæ, Compositæ, Orchideæ], "Genera et species plantarum e variis familiis, quæ in horto Kewensi coluntur" [in Aiton's Hortus Kewensis, ed. II. 1812-13].

These works by Robert Brown, doing the work of his herbarium in behoof of the living plants at Kew, are of such value in botany, as to have been selected by the Ray Society for republication [with the rest of Brown's memoirs] in one of their volumes for the year 1867.

They were done as metropolitan herbarian work, leaving the officers at Kew free for their legitimate labours and applications of the national collection of living plants.

* * *

[Brown's papers on Salt's plants from Abyssinia, Tuckey's plants from the Congo, Ross's, Parry's, and Scoresby's Arctic plants, Denham and Clapperton's African plants. Stirling's and Sturt's Australian plants; his work on Wallich's Indian collections, and help in Horsfield's "Plantæ javanicæ rariores," are then taken in detail.]

P. 4 I submit that the number of plants now cultivated at Kew, which bear the names assigned to them in this series of works extending over a period of half a century, is not accurately defined as "few," or as "being cultivated at the beginning of the century, in a private garden of nine acres."

The successors of Robert Brown, are fully as willing and as competent to perform the duties of the National Herbarium in the British Museum in relation to the National Botanical Garden at Kew, as was their exemplary predecessor. They have no duties in connection with such collection of living plants to set aside for herbarian work, or to relegate to men of lower grade in science or education.

* * *

P. 5 A vague recommendation from whatever quarter to "maintain the scientific work at Kew," really signifies at the present phase of the competing national herbaria, the suppression of such works, at the British Museum, as are exemplified in the immortal contributions to the science of botany, which I have cited above, and which were continued there from "the beginning of the century" to the year 1852, and until the requisite subjects were diverted to Kew. It signifies that the Director of the Royal Gardens should continue to occupy himself with "herbarian work" in placing the more important scientific observations and experiments truly appropriate to the national collection of living plants . . . the collection of dried plants and parts, should be relegated to, with a return to the practice of locating Government collections of plants in, the British Museum.

* * *

The formation of a private collection has always seemed to me to be incompatible with the duties of a custodian of a public or State collection.

* * *

Of the numerous herbaria added by purchase to the British Museum, we obtained the collection made by Gardner, including 5,476 species of rare Brazilian plants, for £110. The still more numerous and valuable selection from the famous herbarium of Aylmer B. Lambert, Esq., Vice-President of the Linnean Society, was obtained for the sum of £393 19s. This is the largest amount of a single purchase for the National "Hortus siccus," for which the Trustees have sanctioned the application of the Parliamentary grant.

The late Director of the Royal Gardens, who had formed a private herbarium, offered it at a valuation to the Government, but the then "First Commissioner of Works" [Sir Benjamin Hall, 1855-58, afterwards Lord Llanover] declined to recommend the purchase, on the ground that the application of a "hortus siccus" and library to the naming of the new plants received at Kew appeared to have been satisfactorily performed by his predecessors through the "Botanical Department and Library at the British Museum."

* * *

The official sanction given by the Trustees of the British Museum to their keeper of botany—"3. That Mr. Brown have full liberty to assist the superintendent of the Royal Botanical Gardens at Kew, in like manner as during the lifetime of Sir Joseph Banks" (1) Rep. Com. Brit. Mus., 1850, p. 528. —has been continued to his successors; and, if made known to, should have been in the memory of, the Commissioners of Works at every stage of the competing herbarium at those gardens.

P. 7. Every addition to the "Hortus siccus" since established at Kew has been, directly or indirectly, at the cost of the national herbarium at the British Museum —directly, by the diversion of Government collections to Kew; indirectly, by the encouragement to donations of dead plants which the Board of Works have permitted to be accepted and located there.

* * *

The . . . permission to locate this "herbarium" in the residence of the late King of Hanover at Kew, Hanover House, led to such issue.

It was the thin end of the wedge which has since driven away from the State collection of dead plants all the herbaria that ought to have been conveyed thither, and which threatens to split off the botanical department from the rest of the National Museum of Natural History.

To oppose this misfortune to science and to restore the Department of Botany to the consideration and respect which it received from the Government at home, in India, and the Colonies, up to the time of the competition at Kew, I shall pretermit no legitimate opportunity and endeavour. I should be wanting to the departments of Natural History and treasonably indifferent to the deep anxieties of my threatened colleagues of the Botanical Department were I to be found feeble in their defence.

(Signed) Richard Owen,
Superintendent of the Natural History Department.

British Museum, 6th September, 1872.

Note.—In the report [of the sub-committee of the Trustees of the British Museum, cited on page 122, and quoted by the Devonshire Commission, vol. i., page 531, there occurs this statement]:—"Sir William Hooker, Dr. J. D. Hooker, and Dr. Lindley have given reasons in favour of the removal of the collection from the British Museum to Kew, with the view of rendering that establishment more complete." For the exception to this recommendation subsequently allowed by the present Director of Kew, see his answers to Qs. 6683, 6684, p. 436: "Minutes of Evidence before the Royal Commission on Scientific Instruction, etc."

Bibliography, 1823-1891

1. The "Edinburgh Review," No. 76, May, 1823. Art. V. [on official information issued during 1820-22. By Dr. T. S. Traill, from information supplied by W. Swainson], pp. 379-398.

2. Report from the Select Committee on the Condition, Management, and Affairs of the British Museum, together with Minutes of Evidence, Appendix and Index.

House of Commons, 1835, n. 479; 1836, n. 440.

3. Return . . . for Copies or Extracts of any Minutes made by the Trustees of the British Museum since the 20th of July, 1836, with reference to the resolutions passed by the Select Committee of the House during the last Session of Parliament on the subject of the Museum.

House of Commons, 1837. n. 409.

4. Copy of the Report made to the Committee appointed by the Lords of the Treasury in January, 1838, to inquire into the Management, &c., of the Royal Gardens, by Dr. Lindley, Professor of Botany, who, at the request of the Committee, made an actual survey of the Botanical Garden at Kew, in conjunction with Messrs. Paxton and

Wilson, two practical gardeners, in the month of February, 1838.

House of Commons, 1840. n. 292.

5. A Copy "of a Memorial to the First Lord of the Treasury, presented on the 10th day of March, by members of the British Association for the Advancement of Science, and of other Scientific Societies, respecting the management of the British Museum, with the names affixed.

House of Commons, 1847. n. 268.

6. Copy of a Commission for Inquiring into the Constitution and Government of the British Museum.

House of Commons, 1847. n. 674.

7. Report of the Commissioners appointed to inquire into the constitution and government of the British Museum, with Minutes of Evidence. Presented to both Houses of Parliament by Command of Her Majesty.

Command, 1850. n. 1,170.

8. The same: Index to Report and Minutes of Evidence.

9. Copies of all Communications addressed to the Treasury by the Trustees of the British Museum with reference to the report of the Commissioners appointed to inquire into the Constitution and Management of the British Museum.

House of Commons, 1850. n. 425.

10. Copies "of all Communications made by the Officers and Architect of the British Museum to the Trustees, respecting the want of space for exhibiting the collections in that Institution as well as respecting the Enlargement of its Buildings.

"And, of all Minutes of the Trustees, and of all Communications between the Trustees and the Treasury upon the same subject (the whole subsequent to, and in continuation of, Parliamentary Paper, No. 42, of Session 1852-3)."

House of Commons, 1858. n. 379.

11. A "Copy of a Memorial addressed to Her Majesty's Government by the Promoters and Cultivators of Science on the Subject of the proposed Severance from the British Museum of its Natural History Collections, together with the Signatures attached thereto."

House of Commons, 1858. n. 456.

12. The "Quarterly Review," July, 1858, Art. VII. [On the British Museum, Official Papers, 1835-58.]

A short history of the entire collections from Sir Hans Sloane onwards; on page 218 the writer demands that the natural history collections should be separated from the rest, and housed in a building to be erected, preferably at Burlington House, or else at Kensington Gore.

13. "The Natural History Collections in the British Museum." The "Gardeners' Chronicle," 14th August, 1858, pp. 620-621.

By George Bentham, signed with his initials; refers to the "Quarterly Review" (*see* No. 12); notwithstanding the Memorial (No. 11), . . . "an impartial perusal of the above article leads to the conviction that such a step [as the removal of those collections] is now indispensable," and urges the transference of the botanical collections to Kew, "except the Sloane Herbarium."

14. A leading article on the same subject, ib. 28th August, 1858, pp. 651, 652 [by the Editor, Dr. John Lindley].

15. "Public Natural History Collections," ib. 27th November, 1858, p. 861.

Correspondence of Dr. Lindley with the Chancellor of the Exchequer, presenting a memorial recommending the transference of most of the specimens to Kew. This antedates the official record of this correspondence, which is given in No. 19, below.

16. Leading article on the above memorial, ib. 15th January, 1859, pp. 35, 36.

An abstract of the foregoing, presumably by Dr. Lindley; the official paper was issued in March following.

17. Leading article, ib. 16th April, 1859, pp. 335, 336, referring to the same.

18. Leading article, ib. 24th December, 1859, pp. 1035-36.

19. A Copy "of all Communications made by the Officers and Architect of the British Museum to the Trustees, respecting the want of space for exhibiting the Collections in that Institution, as well as respecting the Enlargement of its Buildings."

"And, of all Minutes of the Trustees, and of all Communications between the Trustees and the Treasury upon the same subject (the whole subsequent to, and in continuation of, Parliamentary Paper, No. 379 of Session 1857-8)."

House of Commons, 1859. n. 126.

20. Report from the Select Committee on the British Museum; together with the Proceedings of the Committee, Minutes of Evidence, and Appendix.

House of Commons, 1860. n. 540.

21. Index to the Report, etc.

House of Commons, 1860. n. 540—I.

22. "Botanical Museums." Article in "Nature," iii., 23rd March, 1871; pp. 401-402.

Unsigned article by Mr. George Bentham.

23. Royal Commission on Scientific Instruction and the Advancement of Science. Vol. I.

—First, Supplementary and Second Reports, with Minutes of Evidence and Appendices. Presented to both Houses of Parliament, by Command of Her Majesty, 1872. C. 536.

—Fourth Report, 1874. C. 884.

—Eighth Report, 1875. C. 1298.

—Volume II., 1874. C. 958.

—Volume III. and the General Index to the Evidence to the Analyses of the Evidence, and to the Appendices to the Evidence given in Vols. I-III. 1875. C. 1363.

24. Botanical Museums. "Nature," vi., 3rd October, 1872, p. 449-452. Signed by William Carruthers; a reply to the foregoing.

25. The National Herbarium. "Nature," vii., 12th December, 1872, p. 103.

Referring to the statement that the Banksian Herbarium was used for naming plants at Kew in the time of the Aitons, etc., by William Carruthers, with an appended note by Dr. J. D. Hooker, on the above question, duplicates, etc.

26. Our National Herbarium. "The Garden," 29th March, 1873, p. 248.

Letter from W. Carruthers, enclosing letter which was declined publication by the editor of "Nature." The writer deprecates the Museum being supplied with duplicates from Kew, with possible errors on naming, and without powers of verifying the same.

27. Copies "of Papers relating to changes introduced into the administration of the Office of Works affecting the Direction and Management of the Gardens at Kew," &c.

House of Commons, 1872. No. 335.

28. Copy "of Dr. Hooker's Reply to Professor Owen's Statement, Appendix, No. 3, in the Kew Gardens Return."

House of Commons, 1872. n. 427.

29. Remarks on Dr. Hooker's reply to the statement relative to the Botanical Departments respectively under the Trustees of the British Museum and the Commissioner of Works (Appendix No. III., etc., of papers relating to Kew Gardens), by Richard Owen, dated British Museum, 6th September, 1872.

London: Eyre & Spottiswoode. [1872], fol. 8 pp.

30. An account of the events which preceded Dr. Lindley's Report, 1840; by John Smith.

The "Gardeners' Chronicle," v. (1876) p. 364.

31. Communication relating the offer of the Gardens and their contents to the Royal Horticultural Society, with an account of the consequent negotiations; by George Bentham, at that time honorary secretary of the Society.

The "Gardeners' Chronicle," v. (1876) p. 400.

32. Historical Record of the Royal Botanic Gardens, Kew. "Records," by John Smith, London, 1880, p. v.-xiii.

Subsidiary accounts are also given of the particular collections under their respective sections.

33. Historical Account of (the Royal Gardens) Kew, to 1841. [By Sir William Thiselton-Dyer, K.C.M.G.] In the Kew "Bulletin of Miscellaneous Information," December, 1891, pp. 279-327.

APPENDIX II.

CORRESPONDENCE WITH THE CHIEFS OF FOREIGN HERBARIA.

PAGE

1. Letter addressed by the Secretary of the Botanical Work Committee to certain herbaria abroad - - 161
2. Letter from Dr. Zahlbruckner, dated Wien, 15. Mai, 1900 - - - - - - - - - - 161
3. Letter from the same, dated 26. Mai, 1900, with four enclosures - - - - - - - - - 161
4. Letter from M. F. Crépin, dated Bruxelles, 29 mai 1900 - - - - - - - - - - 164
5. Letter from the same, dated 16 juin 1900 - - - - - - - - - - - - - 164
6. Letter from Dr. Fischer von Waldheim, dated St. Petersburg, 23. Mai. (6. Juni.) 1900 ; with enclosure 164
7. Letter from M. Max. Cornu, dated Paris, 12 juillet 1900 ; with enclosure - - - - - - 165
8. Letter from Dr. A. Engler, dated Berlin, 26. Juli 1900 ; with enclosure - - - - - - 168

APPENDIX II.

Correspondence with the Chiefs of Foreign Herbaria.

No. 1.

Copy of a letter sent to the following European herbaria—namely, Brussels, Monsieur François Crépin, (Director, Jardin Botanique de l'Etat); Berlin, Dr. Adolf Engler, (Director, Kgl. Botanischer Garten und Botanisches Museum, 7, Grunewald Strasse); Paris, Monsieur Maxime Cornu (Director, Jardin des Plantes, 57, Rue Cuvier); St. Petersburg, Dr. Alexander Fischer von Waldheim (Director, Imperial Botanic Garden); and Vienna, Dr. Alexander Zahlbruckner (Leiter, Botanische Abtheilung, k.k. Naturhistorisches Hofmuseum, I., Burgring, Wien).

8, Delahay Street, London, S.W.,
16th May, 1900.

Sir,

A Committee has been appointed by the Lords Commissioners of Her Majesty's Treasury, to enquire into the arrangements under which botanical work is done and collections maintained at the British Museum and at Kew.

It would greatly help the Committee in their investigations if they could be informed of the actual arrangements of the chief European herbaria, and I am therefore directed to ask if you will be so good as to supply the information specified overleaf, for the use of the Committee.

A reply, in French or German, at your earliest convenience, will be highly esteemed and appreciated.

I have the honour to be, Sir,
Your obedient Servant,
(Signed) B. Daydon Jackson,
Secretary.

The information desired by the Committee may be conveniently arranged under the following heads:—

I.

A general statement of the nature and extent of the collections under your charge.

This statement will naturally distinguish between different kinds, general, special, etc., of collections. It will also be desirable to distinguish between

(a) Dried plants;
(b) Other preparations, either
i. Dry, as in bottles or boxes;
ii. In preservative fluid;
iii. Microscope slides;

and to give a rough or approximate estimate of the extent or number of each.

II.

The uses to which the collections are applied.

In this it will be convenient to distinguish between

i. Popular instruction;
ii. Assistance given to students, *i.e.*, educational use;
iii. Assistance to research, given either to home or foreign investigators;
iv. Government requisitions;

special attention being given to the third and fourth sub-headings.

III.

The main several sources from which accessions are derived.

This should indicate in their relative proportions the accessions derived from

i. Purchase.
ii. Exchange.
iii Gift.

IV.

The annual cost of maintaining the collections, distinguishing

i. Administration, as salaries and wages.
ii. Purchases of
(a) Dried plants.
(b) Books and binding.
iii. Special expenditure not falling under either of the preceding categories.

V.

Whether specimens are lent to monographers, and if so, on what conditions.

Replies to the Foregoing.

No. 2.

Botanische Abtheilung des k. k. Naturhistorischen Hofmuseums (k. k. Botanisches Hofcabinet
Wien, I., Burgring.
Wien, den 19/5/1900.

Hochgeehrter Herr!

In Beantwortung Ihrer Zuschrift vom 16. d. M. erlaube ich mir Ihnen mitzutheilen, dass ich gerne bereit bin die gestellten Fragen zu beantworten und dass ich hoffe, mit Ende der nächsten Woche Ihnen ein ausführliches Elaborat senden zu können.

Achtungsvoll Ihr ergebener
(Unterzeichnet) Dr. A. Zahlbruckner.
Leiter der Botanischen Abtheilung des k. k. Naturhist. Hofmuseums.

No. 3.

Wien, den 26/5/1900.

Hochgeehrter Herr!

In der Anlage übersende ich Ihnen die auf unser Institut bezüglichen Auskünfte und bin gerne bereit für den Fall, als Sie noch eingehendere Information wünschen sollten, solche Ihnen zukommen zulassen.

Mit ausgezeichneten Hochachtung,
Ihr ergebener
(Unterzeichnet) Dr. A. Zahlbruckner
Abtheilungsleiter.

[Enclosure No. 1 in No. 3.]

k. k. Naturhistorisches Hofmuseum,
Botanische Abtheilung.

I.

Das Herbarium der botanischen Abtheilung des k. k. Naturhistorischen Museums in Wien (bis zum Jahre 1886 "Botanisches Hofcabinet" betitelt) umfasst:

1. Das Hauptherbar mit 941,215 Spannblättern (bis Ende 1899).
2. Herbar Neilreich mit 13,787 Spannblätter.
3. Diatomaceen-Herbar Grunow's c. 10,000 Nummern.

1. Das Hauptherbar enthält die in der Beilage A. aufgezählten Collectionen. Dasselbe t nach Durand's "Index" geordnet.

2. Das Herbar Neilreich, lau estamentarischer Verfügung selbständig aufgestellt, enthält das gesammte Belegmaterial für die "Flora von Niederoesterreich" Neilreichs.

3. Das Diatomaceen-Herbar Grunow's gliedert sich in
(a) Mikroskopische Präparate;
(b) Zeichnungen;
(c) Trockenmaterial.

Appendix II.

Für jede Art finden sich unter ein und derselben, in einem handschriftlicher Kataloge ersichtlichen Nummer, in jeder Subabtheilung der Collectionen die Belege. Die Sammlung umfasst sammtliche Originalien Grunow's, die von ihm studierten Arten anderer Autoren und das ihm von Fachleuten eingesendete Material.

Ausser diesen Pflanzensammlungen besitzt die botanische Abtheilung des k. k. naturhist. Hofmuseums noch eine grosse Collection von Pflanzenabbildungen in Originalien. Von diesen seien genannt diejenigen von F. Bauer, N. Jacquin, Host, Poeppig, Pohl, Wulfen, Schott, Endlicher, Diesing.

Das im Jahre 1889 der Abtheilung testamentarisch vermachte Herbar Reichenbach's ist mit Ausnahme der circa 30,000 Spannblätter zählenden Orchideencollection dem Hauptherbare eingereiht.

Ausser dem Herbarium besitzt die botanische Abtheilung eine morphologische und carpologische Sammlung (circa 25,000 Nummern), eine Sammlung fixirter Stich- und Plattenculturen pathogener und saprophytischer Mikroorganismen (300 Nummern) und eine Sammlung von mikroskopischen Dauerpräparaten (circa 4,000 Nummern).

Die carpologische, sowie die Hölzersammlung sind bezüglich der Gattungen analog dem Herbare nach Durand's "Index" angeordnet. In der carpologischen Sammlung werden u. a. die Originalien zu Antoine's "Coniferen" aufbewahrt. Die Samen und Früchte sind theils in Schaukästen in entsprechender Montierung aufgestellt, theils als Ladensammlung in Eprouvetten mit Staniolverschluss aufbewahrt. Die Hölzer sind, insoweit sie nicht als Schaustücke zur Ausstellung gelangten, auf gleiche Formate gebracht.

Die Sammlung mikroskopischer Präparate umfasst in erster Linie Diatomaceen (hauptsächlich aus der Collect. Grunow), alle wichtigen Normalsammlungen, Präparate von Ferd. Pfeiffer von Wellheim, A. Heimerl's Ascoboleenpräparate, u. a.

In einem der Säle der botanischen Abtheilung sind die interessanten, sowie die grösseren Objekte der morphologischen Sammlung (etwa 1300 Nummern) zu einer dem grossen Publikum zugänglichen Schausammlung vereinigt. Die Objekte sind theils in Glasschränken (Samen, Früchte, Pilze, Flechten) verwahrt, theils frei den Wänden entlang (Stämme, ganze Pflanzen, etc.) gruppirt. Zur Schau gestellt sind Typen von Algen, Flechten, Pilzen, Samen und Früchten, eine Auswahl von Nutzpflanzen in Herbarexamplaren mit den betreffenden Rohstoffen, forstlich wichtige oder botanisch interessante Hölzer, grössere Objekte (z. B. *Welwitschia*, *Myrmecodia Antoinii*, etc.), Stämme von Baumfarnen, Palmen, Lianen, in Weingeist oder Formalin conservirte Inflorescenzen und Blüthen (namentlich Orchideen und Aroideen), Pilze, Tange und Modelle tropischer Früchte. Nähere Angaben über den Schausaal sind der Beilage C. zu entnehmen.

Die Sammlung fixirter Stich- und Plattenculturen von Mikroorganismen, insbesondere Bacterien, stammt aus dem bacteriologischen Laboratorium von F. Král in Prag.

II.

1. Öffentliche Vorträge werden in unserem Museum nicht abgehalten, wohl aber betheiligen sich die Beamten unseres Institutes lebhaft an den Bestrebungen jener Anstalten und Vereine, welche sich die Verbreitung naturwissenschaftlicher Kenntnisse zur Aufgabe gestellt haben. Zu diesem Zwecke werden unsere Sammlungen, sowie die Bibliothek nicht nur unseren Beamten, sondern auch anderen Männern der Wissenschaft gerne zur Verfügung gestellt. Bei Collectivbesuchen unseres Institutes von Lehranstalten, Vereinen, u. s. f. übernehmen die Beamten die Führung und halten dem jeweiligen Zwecke entsprechend bei dieser Gelegenheit zusammenhängende Vorträge oder erörtern einzelne Fragen.

2. Die Ausbildung der Studirenden erfolgt in Wien in den beiden botanischen Instituten der Universität. Die fortgeschrittenen Studenten, denen bereits ein Thema zur wissenschaftlichen Ausarbeitung gestellt wurde, können auch in unserem Institute arbeiten und erfahren hier jedwege Förderung ihrer Studien. Dasselbe gilt auch für Studirende fremder Universitäten, die zur Vollendung ihrer Arbeiten das bei uns aufbewahrte Material oder seltenere Werke unserer Bibliothek benützen wollen.

3. Einheimischen und fremden Forschern wird von Seite der Leitung der botanischen Abtheilung des grösste Entgegenkommen erwiesen. Es wird ihnen das gesammte Material (Exsiccaten, Früchte, und Samen, Präparate), sowie die Bibliothek und auch Instrumente und optische Hilfsmittel (nach Massgabe des Vorhandenen) zur Verfügung gestellt, mit einem Worte Alles gethan, was zur Bearbeitung einer wissenschaftlichen Studie nötig ist. Auch werden sie von Seite der Beamten mit allen Auskünften, speciell jenen, welche sich auf unsere Sammlungen beziehen, bereitwilligst unterstüzt. Fachleute, welche die Einrichtungen unseres Institutes studiern wollen, werden von einem Beamten geführt; ebenso wird ihnen von der Leitung der Abtheilung Einsicht in die Pläne und Rechnungen der Einrichtungsobjekte gestattet.

4. Von den übrigen Hofinstituten, Staatsämtern und wissenschaftlichen Gesellschaften gestellte Anfragen werden beantwortet, gewünschte Untersuchungen werden durchgeführt und Gutachten abgegeben.

III.

Die Vermehrung der Sammlungen erfolgt:

(a) Durch Kauf. Angekauft werden die wichtigen Exsiccatenwerke, die in den Handel kommen, und ganze Sammlungen von Specialisten. Dabei wird angestrebt, dass innerhalb der jährlich zu diesem Zwecke bewilligten Summe alle Theile der Sammlungen gleichmässig und gleichwerthig vergrössert werden.

(b) Durch Tausch. Als Tauschmaterial dient in erster Linie die unter dem Titel "Kryptogamae exsiccatae" zur Ausgabe gelangende Normalsammlung von Zellkryptogamen, ferner Duplicate exotischer Herbarpflanzen und Sämereien.

(c) Durch Geschenk und Widmungen. Das Verhältniss in welchem die Vermehrung stattfindet nach einem 10-jährigen Durchschnitte pro Jahr

Durch Kauf	6,218	Spannblätter.
Durch Tausch	974	„
Als Geschenk	2,287	„
In Summa	9,479	„

Diese Berechnung ist der normale Zuwachs, da in derselben die zeitweilige Erwerbung grosser Collectionen (z. B., Hb. Reichenbach, Hb. Grunow, Hb. Pittoni, &c.) nicht einbezogen wurde.

Mit Ende des Jahres 1899 zeigte das Herbarium der botanischen Abtheilung des k. k. Naturhistorischen Hofmuseums den folgenden Stand:

Hauptherbarium	941,215	Spannblätter.
Herb. Neilreich	13,787	„
Herb. Grunow	10,000	„
In Summa	965,002	„

Für den Zuwachs an morphologischen Objeckten, Früchten, Samen und Präparaten lässt sich bei der in der Natur der Sache liegenden Ungleichmässigkeit in der Acquisition, keine Durchschnittssumme angeben. Die bereits oben angedeutete Bestrebung der Leitung der botanischen Abtheilung sorgt auch hier für eine äquivalente Vermehrung und für einen systematischen Ausbau.

IV.

Der Beamtenkörper des naturhistorischen Hofmuseums ist derzeit noch in seiner Gesammtheit einem Concretualstatus eingereiht und die Vorrückungen bei einer eventuellen Vacanz erfolgen nach der Anciennität ohne Rücksicht darauf, in welcher der Abtheilungen die Stelle frei wurde. Mithin ist wohl für das ganze naturhistorische Hofmuseum, nicht aber für einzelne Abtheilungen die Summe der Gehälter fixirt. Sie wechselt in den einzelnen Abtheilungen nach den jeweiligen Rangsklassen der zugewiesenen Beamten.

Bewilligt wurde in den letzen Jahren:

	Kr.
Für die Bibliothek	4,000
Acquisitionen für die Sammlungen	2,840
Kanzleierfordnisse	800
Buchbinder	400
Möbel u. Utensilien	500
Sonstige Diensterfordnisse	460
Zusammen	9,000

Dabei ist zu berücksichtigen, dass im Falle der Möglichkeit eine hervorragende Collection zu erwerben, ausnahmsweise auch eine grössere Summe von Seite der vorgesetzten Behörde, S. Maj. Oberstkämmereramt, bewilligt wird.

V.

Aus dem Herbar werden ganze Familien und Gattungen, einzelne Spannblätter nur in besonders zu berücksichtigenden Fällen, auf schriftliches Ansuchen an die Leitung der botanischen Abtheilung an Institute und namhafte Forscher des In- und Auslandes entlehnt. Dasselbe gilt auch von der Bibliothek. Als Norm für die Entlehnung gelten jene Bestimmungen, welch in der im Jahre 1885 erlassenen (als Beilage B. beigefügten), derzeit noch immer gültigen, "provisorischen Vorschrift" enthalten sind.

[Enclosure No. 2 in No. 3.]

(Beilage A.)

Aufzählung der im Herbarium des k. k. Naturhistorischen Hofmuseums enthaltenen Pflanzensammlungen. (Stand; Ende 1899).

[This is a nominal list of the various contributors from all sources of the herbarium in question, and is a portion, pp. 71–78, of the "Die botanischen Anstalten Wiens im Jahre 1894," which was prepared for the 66th meeting of the Deutsche Naturforscher und Aerzte, in September, and published as a Gratisbeilage of the Oesterreichische botanische Zeitschrift at Vienna in that year; to this has been carefully added those additions to the list since that date as set forth under their respective heads as under:—

A. Phanerogamae, 443 as printed, 83 added; total, 526.

B. Cryptogamae vasculares, 10 printed, 9 added; total 19.

Cryptogamae cellulares.

1. Collectiones universales, 15 printed, 11 added; total, 26.
2. Musci frondosi et Hepaticae, 33 printed, 15 added; total, 48.
3. Fungi, 15 printed, 9 added; total, 24.
4. Lichenes, 24 printed, 5 added; total, 29.
5. Algae, 25 printed, added 10; total, 35.

Summarized thus: Phanerogams, 526; added since 1894, 83. Cryptogams, 181; added since 1894, 59.

[Enclosure No. 3 in No. 3.]

(Beilage B.)

Provisorische Vorschrift für die Benützung der Sammlungen des k. k. botanischen Hofcabinetes. (Genehmigt von Sr. kais. und kön. Apostol. Majestät hohem Oberst-hofmeisteramte laut Erlass Z. 2460, dto. 8. Mai 1885.)

Benützung der Sammlungen im allgemeinen.

1. Die Begünstigung, die Sammlungen des k. k. botanischen Hofcabinetes bei ihren Arbeiten benützen zu dürfen, geniessen Botaniker von anerkanntem Rufe, ferner ausnahmsweise auch jüngere Forscher, die zu wissenschaftlichen Untersuchungen befähigt sind.

2. Die Bewilligung zu der oberwähnten Benützung ertheilt der jeweilige Vorstand des k. k. botanischen Hofcabinetes.

3. Die Namen und Adressen derjenigen, welchen die Benützung der Sammlungen des k. k. botanischen Hofcabinetes gestattet ist, werden amtlich vorgemerkt.

4. Wer die Erlaubniss zur wissenschaftlichen Benützung der Sammlungen des k. k. botanischen Hofcabinetes erhalten hat, übernimmt die Verpflichtung, die weiter unten angeführten Benützungsvorschriften in vollem Masse zu berücksichten und sich in jeder Beziehung den Anordnungen der mit der Aufsicht über die Sammlungen betrauten Beamten zu fügen.

Zeit der Benützung.

5. Die Zeit, in welcher die Sammlungen des k. k. botanischen Hofcabinetes benützt werden können, wird von dem Vorstand bestimmt.

Benützung der Pflanzensammlungen in den Amtslocalitäten des k. k. botanischen Hofcabinetes.

6. Wer die Pflanzensammlungen des k. k. botanischen Hofcabinetes zu irgend einem wissenschaftlichen Zwecke benützen darf, erhält von dem Vorstande einen Arbeitsplatz zugewiesen, sowie von einem der mit der Aufsicht über das Herbar betrauten Beamten die gewünschten Pflanzen ausgefolgt.

7. An die Benützung der Pflanzensammlungen des k. k. botanischen Hofcabinetes knüpft sich die Verpflichtung, nicht nur die Ordnung der Pflanzen strenge einzuhalten, sondern auch die grösste Vorsicht bei der Behandlung der getrockneten Pflanzen zu beobachten; namentlich ist das Umdrehen einzelner Spannblätter zu unterlassen.

8. Wer eine grössere Abtheilung des Herbares monographisch bearbeitet, wird ersucht, diese Abtheilung so weit wie möglich kritisch zu revidieren, d. h. die Bestimmungen der Pflanzen zu rectificieren, unbestimmte Arten zu determinieren und das Materiale zu ordnen.

9. Bestimmungen, Correcturen und andere Notizen sind auf eigenen Zetteln den betreffenden Pflanzen beizufügen. Diese Zettel sollen stets den Namen des Revidierenden enthalten.

10. Die Wiedereinreihung der durchgesehenen Pflanzen soll unter der Aufsicht der Musealbeamten oder durch diese selbst vorgenommen werden.

Entlehnung von Pflanzen.

11. Pflanzen können aus den Sammlungen des k. k. botanischen Hofcabinetes nur zu wissenschaftlichen Zwecken entlehnt werden.

12. An Botaniker, welcher ausserhalb der österreichisch-ungarischen Monarchie wohnen, werden Herbarpartien nur im Einverständnisse mit dem Intendanten des k. k. naturhistorischen Hofmuseums ausgeliehen.

13. Das Neilreich'sche Herbar der Flora von Niederösterreich sowie die Normalsammlungen dürfen nicht ausserhalb des Museums benützt werden.

14. An die in Wien oder dessen Vororten domicilierenden Botaniker werden Herbarpartien in der Regel nicht ausgeliehen, da ihnen die Benützung derselben in den Amslocalitäten des k. k. botanischen Hofscabinetes leicht ermöglicht ist.

15. Die Entlehnung von Pflanzen erfolgt nur gegen:

1. Die eigenhändig unterzeichnete Bestätigung des Empfanges der Sammlung,
2. Die Verpflichtung die entlehnten Pflanzen in gutem Zustande zu erhalten,
3. Die genaue Erfüllung der Punkte 8 und 9,
4. Die strenge Einhaltung des Ausleihetermines,
5. Die Vergütung aller Verpackungs-, Transport- und sonstigen Kosten.

16. Der Ausleihetermin wird für kleinere Sammlungen auf höchstens 6 Monate, für grössere Collectionen auf höchstens 1 Jahr festgesetzt, und auf der Empfangsbestätigung vorgemerkt.

17. Eine Verlangerung des Ausleihetermines kann nur ausnahmweise in sehr berücksichtigungswürdigen Fällen von dem Vorstande bewilligt werden.

18. So lange eine ausgeliehene Pflanzensammlung ausständig ist, oder der Empfangsschein des Entlehners in amtlicher Verwahrung erliegt, haftet der Entlehner in jeder Beziehung für die ganze Sammlung und ist für alle Beschädigungen derselben verantwortlich.

Benützung der anderen Sammlungen.

19. Die vorhergehenden auf das Herbar bezüglichen Bestimmungen haben auch für die Benützung der im k. k. botanischen Hofcabinete befindlichen Sammlungen an Hölzern, Früchten, Samen und dergl. Geltung.

Benützung der Bibliothek in den Amtslocalitäten.

20. Die Bibliothek des k. k. botanischen Hofcabinetes ist eine Handbibliothek, welche grösstentheils aus Werken besteht, die zum Ordnen und Bearbeiten des Herbares nothwendig sind; daher können die in ihr befindlichen Werke in der Regel nur in den Amtslocalitäten, und zwar im Bibliotheksaale eingesehen und benützt werden

21. Die Ausgabe und das Einreihen der Werke besorgt die mit der Aufsicht über die Bibliothek betraute Amtsperson.

22. Die benützten Bücher sind der oberwähnten Amtsperson zur Wiedereinreihung zu übergeben.

23. Den im Herbare Arbeitenden ist es gestattet einzelne Bücher auch ausserhalb des Bibliotheksaales auf ihren Arbeitsplätzen zu benützen. Die Titel dieser Werke sind in ein Vormerkbuch einzutragen.

Appendix II.

Entlehnung von Büchern.

24. Die Entlehnung von Büchern aus der Bibliothek des k. k. botanischen Hofcabinetes wird vom Vorstande nur ausnahmsweise gestattet.

25. Die als unentbehrliche Handbücher bezeichneten Werke, ferner voluminöse oder Prachtwerke werden nicht ausgeliehen.

26. Der Ausleihetermin für Bücher beträgt höchstens 1 Monat ; eine Verlängerung ist unstatthaft.

27. Die Entlehnung von Büchern erfolgt nur gegen :—

1. Die eigenhändig unterzeichnete Bestätigung des Empfanges,

2. Die Verpflichtung, die Bücher in gutem Zustande zu erhalten,

3. Die Tragung etwaiger Verpackungs- und Versendungskosten oder anderer Auslagen,

Im Uebrigen gilt auch für das Ausleihen von Büchern die Bestimmung des Punktes 18.

Wien, den 15. Mai 1885.

DER VORSTAND,
des K. K. Botanischen Hofcabinetes.

[Enclosure No. 4 in No. 3].

(Beilage C.)

Consists of pages 364 to 374 inclusive, of the general handbook to the Hofmuseum ; it contains some process blocks of certain botanic specimens on exhibition in the rooms and a plan of the galleries].

No. 4.

Jardin Botanique de l'Etat,
Bruxelles, le 29 mai 1900.

Monsieur,

Il est assez malaisé de répondre d'une façon satisfaisante aux demandes que vous avez faites par votre lettre du 16 mai, et cela parce que depuis deux ans les sections du Jardin sont en pleine réorganisation par suite de la construction des nouveaux locaux et de la restauration d'anciennes salles.

I. Herbiers.

Les herbiers constituent la section la plus importante de l'établissement. Ils comprennent :

1°. Un herbier général composé de 3,300 paquets de phanérogames et 700 paquets de Cryptogames.

2°. Un herbier de la flore européenne composé de 320 paquets.

3°. Un herbier de la flore de Belgique composé de 225 paquets.

4°. Un herbier de la flore du Congo composé de 120 paquets.

Ces herbiers peuvent être consultés par le public dans la salle où ils sont conservés.

Les botanistes livrés a des travaux monographiques peuvent obtenir communication chez eux, dans le pays ou à l'étranger des materiaux de ces divers herbiers necessaires à leurs travaux. Les prêts de plantes se font avec un inventaire detaillé que les emprunteurs doivent renvoyer signé à la direction du Jardin.

II. Collection de Paléontologie Végétale.

Cette collection qui attend un local spécial pour être installé ou classé, comprend environ 6,000 pièces.

III. Collection des Produits Végétaux.

Cette collection comprend environ 10,000 Nos des produits dont la grande majorité est conservée en bocaux.

IV. Collection de Carpologie.

Cette collection formée de graines et de petits fruits comprend environ 2,000 Nos. en bocaux.

V. Collection Forestière.

Cette collection comprend une importante série des bois indigènes et exotiques accompagnés des spécimens de cas pathologiques concernant les arbres, de séries d'insectes nuisibles aux arbres, etc.

Aux collections précédentes déjà installées ou en voie de classement sont attachés les fonctionnaires suivants :

Deux conservateurs, trois aide-naturalistes et un préparateur dont les traitements actuels s'élèvent a la somme de 19,000 francs.

Ce personnel est insuffisant et il devra être augmenté dans un prochain avenir.

Annuellement il est consacré une somme de 2,000 à 5,000 francs a l'entretien et a l'accroissement des collections précédentes ; mais cette somme devrait être du beaucoup augmentée pour qu'elle puisse répondre aux besoins.

Une somme variant de 3,000 à 4,000 francs est consacrée annuellement a l'entretien et a l'accroissement de la bibliothèque.

Je vous prie d'agréer, Monsieur, l'assurance de mes sentiments distingués.

Le Directeur,
(Signé) CRÉPIN.

À Monsieur B. Daydon Jackson, à Londres.

No. 5.

Further information having been sought on matters of detail, the following letter was received in reply :—

Jardin Botanique de l'Etat,
Bruxelles, le 16 juin 1900.

Monsieur,

Voici les renseignements supplémentaires que vous me demandez par votre lettre du 14 courant.

1°. Le contenu de chaque paquet d'herbier est extremement variable selon les genres. Ce contenu varie en feuilles d'herbier de 50 a 100 feuilles, abstraction faite des chemises d'espèces. Dans bien des genres et surtout en Cryptogamie, le nombre des feuilles par paquet peut dépasser de beaucoup 100 et aller jusqu'au 150.

2°. Nos bocaux sont du genre *bottle* fermis hermétiquement par des bouchons en verre. Leurs dimensions sont extremement variables.

Je vous prie d'agréer, Monsieur, l'expression de mes sentiments distingués.

(Signé) CRÉPIN.

À Monsieur B. D. Jackson, à Londres.

No. 6.

Director des Kaiserlichen botanischen
Garten in St. Petersburg.
d. 23. Mai [6. Juni] 1900. No. 162.

Herrn B. D. Jackson, in London.

Sehr geehrter Herr !

Mit Bezug auf Ihr geehrtes Schreiben vom 16 Mai a. s. in welchem Sie um Aufschlüsse über die Einrichtungen unseres Herbariums bitten, erlaube mir beiliegend die gewünschten Antworten zu überreichen.

Mit vorzüglicher Hochachtung,
Ihr ergebener
(Unterzeichnet) A. FISCHER v. WALDHEIM.

[Enclosure in No. 6.]

I.

Das Herbarium des Kaiserlichen Botanischen Gartens in St. Petersburg enthält nur getrocknete Pflanzen ; hingegen das im Garten befindliche botanische Museum die übrigen Sammlungen (siehe weiter unten).

(a). Das Herbarium besteht aus folgenden 5 Haupt-Collectionen :

1. Allgemeines Herbarium.
2. Russisches „
3. Japanisches „
4. Turkestanisches „
5. St. Peterburger „

Diese Collectionen enthalten 5,615 Packete und ausserdem noch 8 Packete in Bücherform und 37 Cartons. Ausser diesen bearbeiteten Grundcollectionen enthält das Herbar noch 1,430 unbearbeitete Packete (brasilianische von Riedel, centralasiatische und andere neuere asiatische). Die Zahl aller Packete übersteigt 7,000, die über 90,000 Arten in mehr als 1½ Millionen Exemplaren getrockneter Pflanzen enthalten.

(b.) Das botanische Museum enthält:

1. Eine carpologische Sammlung aus 27,432 Nummern.
2. Eine dendrologische Sammlung aus 7,271 NNo.
3. Eine paläontologische Collection aus 2,090 NNo.; und
4. Eine Sammlung von Pflanzenproducten aus 2,508 NNo.

N.B. Die Anzahl der in Gläsern, Schachteln, etc., separat aufbewahrten Nummern kann gegenwärtig nicht angegeben werden.

II.

Alle Sammlungen des Herbariums und Museums sind Jedermann, der selbige besichtigen will, zugänglich. Ausserdem werden die Herbarien jederzeit für wissenschaftliche Untersuchungen benutzt, ausser den noch unbearbeiteten, die jedoch für specielle und monographische Arbeiten entweder an Ort und Stelle, mit Genehmigung des Directors des Gartens benutzt werden können, oder versandt werden, wozu noch die Entscheidung des Gartens-Conseils nothwendig ist. Der Empfänger der ihm zugesandten Herbarien verpflichtet sich auf dem Empfangsschein, den er dem Garten retournirt, die Sendung, nach einer im Voraus bestimmten Zeit, in gutem Zustande zurückzusenden.

III.

Die Sammlungen werden durch Ankauf, Tausch, and Geschenke vermehrt.

IV.

Nach dem neuen Etat, welches vom Jahr 1901 in Kraft tritt, sind folgende Angestellte am Herbar:

1 Oberbotaniker mit 2,500 Rubel Gehalt.

1 Oberconservator mit 1,800 Rubel Gehalt.

5 Conservatoren mit 1,200 Rubel Gehalt.

1 Wächter und 1–2 Arbeiter, zusammen 500 R. Alle Angestellten haben Kronswohnung nebst Beheizung.*

Speciell für den Ankauf und Unterhalt des Herbariums sind noch 3,000 Rub. jährlich bestimmt. Für den Unterhalt der Bibliothek, die gegenwärtig aus 28,000 Bänden besteht (Ankauf von Büchern, Einband derselben, etc.), sind 3,000 Rubel jährlich bestimmt. Der Bibliothekar hat 1,500 Rub. Jahresgehalt und Wohnung nebst Beheizung.

Das botanische Museum nebst Laboratorium ist einem Oberbotaniker unterstellt, der ebenfalls 2,500 Rub. Gehalt pro Jahr, nebst Wohnung und Beheizung, bezieht. Das Museum hat 1 Conservator mit 600 Rub. Gehalt, und 1 Wächter mit 180 Rub. Gehalt (beide nebst Wohnung und Beheizung).

Für Ankauf von Gegenständen und zum Unterhalt hat das Museum nebst Laboratorium ausserdem 700 Rubel jährlich zur Verfügung.

St. Petersburg, d. 23. Mai, 1900.

A. Fischer v. Waldheim.

No. 7.

Muséum d'Histoire Naturelle,
Culture. Rue Cuvier,
Paris, le 12 juillet 1900.

Très honoré Monsieur,

J'ai l'honneur de vous addresser le Rapport que vous m'avez fait l'honneur de me demander par votre lettre déjà ancienne; je m'excuse d'avoir autant tardé: malheureusement la periode d'été est la plus chargée. Nous terminons nos leçons et le travail du jardin est extremement chargé. De plus, cette année, l'Exposition universelle nous apporte une besogne supplémentaire et une perte de temps considérables. J'ai du présider un Congrès et en suivre un autre très assidument; les visites des savants étrangers sont fort nombreuses, et nous ne pouvons y soustraire. Cela explique que toute notre correspondance souffre de retards qu'on ne peut regagner. Appendix II.

L'organisation de la Botanique au Muséum n'est pas aussi simple qu'à Kew et au British Muséum à cause de l'enseignment et des laboratoires; j'ai taché de résumer cette organisation. Je vous demande pardon de n'avoir pas mieux réussi et de ne pas l'avoir présentée plus clairement.

Veuillez agréer, très honoré Monsieur, l'expression de mes sentiments les plus devoués.

(Signé) Maxime Cornu,
Professeur-Administrateur au Muséum.

Monsieur B. Daydon Jackson, Secrétaire, 8, Delahay Street, London, S.W.

[Enclosure in No. 7.]

Le Muséum d'Histoire Naturelle est un Établissement où toutes les sciences naturelles sont enseignées côte à côte par 18 Professeurs, tous égaux, sous la direction de l'un d'eux. C'etait autrefois le "Jardin du Roi" qu'on appelle encore "Jardin des Plantes," mais ce nom qui ne désigne qu'une seule des parties, est souvent pris pour désigner l'ensemble. Le Directeur des Jardins n'est pas le Directeur de l'Établissement entier, pas plus que le Directeur de la Ménagerie.

Le Directeur du Jardin n'est pas non plus le chef de la Botanique, il n'en dirige qu'une partie; ce qui est relatif aux plantes vivantes.

La presence de Professeurs multiples fait que les différentes collections relatives à chacun de ces Professeurs se trouvent souvent mélangées dans des bâtiments communs, et que les dépenses de surveillance et d'entretien des collections publiques sont faites à frais communs et qu'il est difficile de répondre, notamment aux questions du titre IV.

Il en est de même pour la Bibliothèque qui est commune a tous les services.

Il me paraît impossible de séparer tout cela d'une façon précise.

Et même, pour ce qui regarde spécialement la Botanique, il est bien difficile de donner des indications particulières car tout est pour ainsi dire mélangé aussi.

Au Muséum d'Histoire Naturelle, les collections botaniques ne sont pas sous la direction d'un seul et unique Professeur.

Il y a trois Professeurs de Botanique occupant des Chaires, libres les uns par rapport aux autres, avec les collections distinctes et un Enseignement (40 Leçons publiques) en relation avec le titre de la Chaire.

Cet Enseignement comporte un certain nombre de leçons pratiques au Laboratoire ayant pour bout de montrer aux Etudiants les faits énoncés dans les cours; les matériaux utilisés dans ces leçons pratiques sont empruntés aux collections vivantes cultivées dans les jardins et les serres et exceptionnellement aux collections sèches.

Les leçons des Professeurs sont suivies par un auditoire libre et auquel on ne demande aucune condition d'admission pour les leçons théoriques ou pratiques du Laboratoire.

Ces leçons constituent une charge assez lourde pour le Professeur et sont la cause que le soin des collections passe au second plan pendant la periode des cours.

Autrefois, au siècle dernier, il y avait des personnes chargées du seul soin des Leçons et d'autres, du seul soin des collections, mais ces derniers dont les fonctions consistaient à montrer et expliquer les collections, furent élevées au titre de Professeur et l'Enseignement de la Botanique se trouva divisé en plusieurs parties.

Lors de la réorganisation du Jardin de Roi en 1792, lequel fut transformé en Muséum d'Histoire Naturelle, l'organisation générale fut fondée sur une égalité et une fraternité entre les diverses services; les collections des uns pouvant et devant servir aux autres, les Professeurs se prêtant une aide mutuelle pour leur enseignement et pour leurs travaux. Chacun d'eux travaillant pour sa part et mettant son œuvre à la disposition de ses collègues.

Les choses n'ont pu demeurer dans une situation si simple.

* Ausserdem sind noch supernumeräre Conservatoren beschäftigt die ein Honorar von 600-800 Rub. jährlich erhalten.

Appendix II.

Les Établissements où il n'y a pas d'Enseignement de la Botanique, ou, dans lesquels cet enseignement n'est pas divisé en sections spéciales, autonomes et ayant des droits égaux, peuvent s'organiser d'une manière bien plus homogène.

Au Muséum, il y a forcément des collections distinctes, l'exiguité ou l'insuffisance des locaux en disjoint souvent les diverses parties.

Les collections d'Étude ne peuvent pas, bien souvent, figurer dans les Galeries publiques et doivent être réservées au Laboratoire du Professeur qui les réunit pour son propre usage durant sa vie.

Les plantes vivantes constituent l'élément fondamental du fonctionnement des Professeurs de Botanique (Leçons du cours à l'Amphitheatre et Leçons pratiques du Laboratoire) ainsi que des recherches scientifiques de toute nature.

Il est donc impossible de les séparer dans l'exposé relatif a la Botanique au Muséum, car elles lui sont indissolublement liées.

Les trois Professeurs de Botanique avec le titre de leurs Chaires sont :—

1°. M. Van Tieghem (Organographie et physiologie végétale) : cette Chaire comprend les Cryptogames et les herbiers correspondants.

Le Professeur s'occupe surtout d'Anatomie végétale ; il a dans son Département la collection des Bois (cette dernière collection n'est pas publique, faute de place).

Les Cryptogames dont l'Herbier était autrefois dans les mêmes salles que les Phanérogames, en ont été séparées a l'exception des Cryptogames vasculaires ; le Professeur ne travaille pas spécialement les Cryptogames, et l'Herbier est confié a une Préparateur, M. Hariot.

Le Professéur fait exécuter pour ses travaux personnels de très nombreuses préparations microscopiques (microscope slides) par un Préparateur attaché a son service ; les préparations sont empruntées soit aux plantes cultivées au Muséum, soit aux échantillons secs de l'Herbier des Phanérogames.

Ces préparations, très souvent coloriées a deux teintes sont au nombre de plusieurs milliers.

Les matériaux d'Études, organes végétatifs ou reproducteurs sont conservés dans l'alcool. Ni les préparations ni les matériaux ne sont exposés dans une Galerie ; mais demeurent dans les locaux du Laboratoire.

La Chaire possède une très belle collection de Champignons moulés qui représente en général les types de l'ouvrage de Bulliard ; ainsi qu'une collection de champignons secs et en alcool ; une partie de cette dernière est exposée dans les galeries publiques de Botanique avec les champignons moulés.

Le budget de cette Chaire est le suivant :

	Fr.	*Fr.*
Gens de service (un garçon)	—	1,400
Frais de Laboratoire	2,750	
Acquisitions	2,700	
Chauffage	500	
Eclairage	200	
		6,150
Deux Préparateurs	2,300	
	2,600	
		4,900
Un assistant	—	4,500
Un Professeur	—	10,000

Il y a en outre pour le Laboratoire d'Enseignement et de recherches un budget spécial, comportant un sous-Directeur du Laboratoire, 3,000 fr.

2°. M. Bureau (Classifications et familles naturelles).

Cette Chaire comprend les plantes Phanérogames et les plantes fossiles avec les collections correspondentes. L'Herbier des Phanérogames et les collections de Paléontologie végétale.

Elle comprend également les collections de fleurs et fruits en alcool et les fruits ou graines a l'état sec (Carpologie) ; tiges et régimes de Palmiers, troncs de fougères, les fruits ou plantes moulés en cire et des tableaux de plantes et fruits ; elle comprend également une collection important de Botanique appliquée, c'est-a-dire, les produits d'utilisation du règne végétale (huiles, fibres textiles, drogues, épices, etc., etc.).

Le Professeur dirige en outre des excursions botaniques dans la campagne qui sont le complément de ses leçons (Herborisations qui ont lieu le Dimanche).

L'Herbier dont le Professeur s'occupe avec vigilance renferme un nombre considerable de paquets (11 mille), et est situé malheureusement très à l'étroit dans les galeries de Botanique. Il est à la disposition de toutes les personnes qui ont des études botaniques à faire ; il renferme des types très importants provenant de voyageurs ou de savants distingués ; il est très liberalement ouvert aux savants de quelque nationalité qu'ils soient ; une salle commune et même des cabinets spéciaux sont à leur disposition.

Les Monographes français ou étrangers peuvent reçevoir communication de parties importantes de l'herbier ; les fragments de rameaux sont remis aux anatomistes, principalement pour les travaux destinés à obtenir le grade de Docteur-ès-sciences.

Les plantes sont disposés en un herbier général, classé d'après le *Genera Plantarum* de Bentham et Hooker.

Les étiquettes de couleur indiquent la patrie des plantes :

Europe	Violet.
Asie	Jaune.
Afrique	Bleu.
Amérique	Vert.
Océanie	Rouge.

Il y avait autrefois des Herbiers spéciaux ; mais M. Bureau les a fondus dans l'Herbier général pour manque de place d'abord et parce que les types de divers monographes doivent y figurer.

Les étiquettes de couleur suppléent en partie a cette séparation des plantes et rendent les plus grands services.

Il existe cependant quelques Herbiers séparés, c'est l'herbier de France et l'herbier des environs de Paris.

Enfin, on a gardé à part certains herbiers historiques très precieux, les Herbiers de Vaillant, Tournefort, Desfontaines, et celui de Lamarck qu'on a pas voulu fondre ; et plusieurs Herbiers locaux non encore suffisament étudiés.

Dans les Cryptogames, l'Herbier Montagne, qui fut donné à condition d'être conservé à part. Il en est de même pour certains *Exsiccata* qui constituent de veritables volumes placés dans une Bibliothèque. Exemple, les exsiccata de Demazières, de Mougeot, Rabenhorst, Massalongo, etc. . . qui sont sous la dépendance de M. le Professeur Van Tieghem.

Les plantes sont attachées a l'aide de bandes de papier gommés qui permettent de les détacher aisément quand il en est besoin.

Un sachet latéral renferme les débris de fleurs et fruits qui sont detachés et peuvent servir pour l'analyse et l'étude.

Une étiquette latérale à en tête du Muséum donne les indications relatives au nom, aux collecteurs, et l'étiquette du collecteur est conservée et collée à côté.

Le format adopté est 35 × 28.

Les plantes sont mises en paquet et pressées par des courroies. Elles sont empoissonées au bichlorure de mercure.

Les collections carpologiques tout exposées dans une galerie publique à proximité de l'Herbier, ainsi que les moulages, les peintures et la collection paléontologique.

Cette dernière renferme quelques préparations microscopiques (microscope slides) obtenues à l'aide de coupes minces pratiquées dans les végétaux silicifiés du Brésil et de France.

Un Assistant, M. Renault, a executé pour des recherches très importantes un nombre considérable de coupes minces sur les fossiles silicifiés d'Autun, tiges et graines. Beaucoup de ces préparations sont exposées dans la galerie publique qui est sous la direction du Professeur de Classification.

L'insuffisance des locaux a necessité le transfert d'une partie importante de la collection carpologique et de toute la collection de Botanique appliquée dans un bâtiment ancien qui n'est pas ouvert au public, mais qui le sera dès que les constructions projetées auront été executées.

Ces differentes collections sont à la disposition des Professeurs de Botanique pour leur enseignement et pour leurs études personnelles.

Le budget de la Chaire est le suivant :

	Fr.	*Fr.*
Gens de service (un garçon)	—	1,400
Laboratoire - - -	5,380	
Acquisitions - - -	2,000	
Chauffage - - - -	700	
Eclairage - - - -	200	
	—	8,280
2 Préparateurs - - -	3,000	
	2,300	
	—	5,300
2 Assistants - - -	à 6,000	
	—	12,000
Un Professeur - - -		10,000

Il y a encore sur le chapitre des hautes études.

Un Préparateur :—

	Fr.
Garçon de Laboratoire adjoint -	600
Préparateur adjoint - - -	100
Préparateur - - - - -	1,500
" - - - - -	2,200
S. Directeur du Laboratoire - -	1,000
Frais de Laboratoire - - -	400

3°. M. Maxime Cornu. (Culture.)

Cette Chaire comprend les collections de plantes vivantes, serres, orangerie, pépinières, jardin d'ornement, école de Botanique, carré officinal, graineterie.

Cette Chaire fournit des matériaux d'étude aux autres Chaires de Botanique du Muséum; elle en fournit également aux autres Chaires en dehors du Museum, et en général à tous ceux qui s'occupent de Botanique.

Le Professeur donne (sur demande écrite) des cartes autorisant soit les études sur place, soit l'obtention de spécimens. Il distribue de cette façon un nombre considérable de plantes correspondant à plus de deux mille autorisations (Botanistes et Artistes de toute nature, industrie, d'art, etc.).

Les graines sont centralisées a la Graineterie et sont échangées avec les Jardins Botaniques ou Etablissements similaires, mais pas in général aux personnes appartenant au commerce ; un catalogue important d'offres est adressé à tous les Jardins Botaniques.

Il n'y a pas de collections exposée publiquement, mais des spécimens sont liberalement distribués à tous les botanistes qui en ont besoin.

Le Professeur a pensé qu'il était intéressant de conserver une partie des graines destinées à être semées dans les différents services (principalement les serres et les pépinières) en vue de contrôler ou d'aider les déterminations spécifiques. Cela est très utile principalement quand les graines sont de provenance directe des pays d'origine et envoyées par des voyageurs.

Les graines sans pouvoir germinatif sont aussi conservées, de même que les parties convenables des graines germées. Avec le temps, cela constitue une collection très utile pour une foule de raisons.

Elle est rangée par provenance et sert à l'Enseignement, mais n'est pas publique.

Enfin on a jugé utile d'établir un herbier de plantes cultivées. Cet herbier est conservée, mais séparément dans les Galeries de l'Herbier et c'est le Professeur de Classification qui en a la garde et l'entretien.

En résumé et pour correspondre plus complètement avec le questionnaire proposé :

I.

Il existe de nombreuses collections botaniques différentes sous la direction de trois Professeurs.

(A.) Plantes Sèches.

L'herbier général de France et des environs de Paris, Herbier des plantes cultivées et autres herbiers. En tout, 11 mille paquets.

L'Herbier des Cryptogames, 49 mille échantillons.

(B.) Autres Préparations. Appendix II.

1. Sèches, en bocaux ou en boîtes, ou à l'état naturel.

Carpologie et drogues, 8 mille spécimens ; Collection de bois, trente mille échantillons ; Botanique appliquée, dix mille (collection non publique) ; fruits moulés et peinture, 300. (Galerie publique) ; Plantes fossiles, bois fossiles, 55 mille échantillons (Galerie publique).

2. En liquide conservateur.

Plantes et fruits en alcool (fruits de la collection carpologique, Galerie non publique. Collection d'étude (non publique, tout à fait privée) ; cela échappe a tout contrôle, il y en a plusieurs milliers.

3. Préparations microscopiques.

A l'usage de l'Enseignment (non publiques) ; Plantes fossiles (Galeries publiques), plusieurs centaines.

II.

Usage de ces collections.

1. Instruction populaire.

Ce sont celles qui sont publiques dans les Galeries de Botanique, tableaux, moulages, fruits secs, plantes fossiles, etc.

2. Facilités données aux Étudiants (Emploi pour l'Enseignement).

Les collections servent a l'Enseignement des trois Professeurs, chacun d'eux montre à l'Amphithéâtre (Leçons publiques théoriques), ou au Laboratoire (Leçons pratiques), les objets dont il a besoin, et qui réintègient les armoires de collections après la leçon.

Il y a une série de tableaux spéciaux et schématiques pour les leçons (fleurs, structures des graminées, fruits, etc.), cinq cents, exécutés pour les cours du Professeur. Il existe pour les leçons orales un herbier spécial, nommé *Herbier du Cours* (trois cents) qui épargne beaucoup de recherches dans l'Herbier général. Enfin, les Étudiants sont parfois conduits dans les Galeries, ou se fait la démonstration en presence des objets qui ne peuvent se transporter aisément.

3. Facultés données aux recherches, soit pour les nationaux, soit pour les étrangers.

Les leçons sont publiques, les laboratoires aussi, et l'on pratique sous ce rapport la plus large hospitalité ; les herbiers aussi bien que les plantes vivantes du Jardin sont à la disposition des étrangers. Le Directeur du Jardin et Serres accorde des autorisations de travailler au milieu des collections, et de reçevoir des spécimens sans s'enquérir de la nationalité avec une parfaite égalité.

On ne demande aucun compte des résultats obtenus.

Aux savants étrangers qui demandent communication d'une plante vivante, on donne en general pleine et entière satisfaction.

4. Demande du Gouvernement.

En general le Gouvernement ne fait que très rarement des demandes officielles, sur tel ou tel point de science théorique et pratique au Muséum d'Histoire Naturelle. Les Ministres se sont parfois adressés au Muséum, mais ils préfèrent un organisme spécial sous leur autorité propre, auquel ils s'adressent directement.

Plusieurs des conseils ainsi constitués renferment des fonctionnaires du Muséum (Instruction publique, Commerce, Agriculture).

III.

Sources différentes auxquelles elles sont empruntées.— Propositions relatives des apports de ces différentes origines.

1. Achat.

Sous cette rubrique il faut faire rentrer des catégories très différentes et très variables, suivant les années, et très difficile à évaluer. Achat aux marchands ou aux collecteurs de plantes ou graines, on doit compter aussi les apports dus aux Voyageurs subventionnés par le Muséum (20 mille fr. par an inscrits au budget pour les voyageurs naturalistes du Muséum), mais ils recoltent des échantillons d'Histoire Naturelle générale, Zoologie, Géologie, et Mineralogie, Anthropologie, etc.

Il y en a qui sont subventionnées par le Ministère de l'Instruction publique, des Colonies ou tout autre, et

Appendix II.

auxquels on remet avant leur départ, une pacotille pour la récolte des objets, plantes ou graines, insectes, etc., de sorte qu'on ne peut considérer leurs apports comme gratuits.

Les voyageurs rapportent le plus souvent, des animaux vivants, ou des peaux des animaux (mammifères, oiseaux, reptiles, etc.) ou bien envoient des spécimens d'Anthropologie, d'Ethnographie, des insectes, des poissons; bien plus rarement des plantes sèches, des fruits, ou des graines.

Cette source d'objets est excessivement variable.

2. Échange.

Des échanges reguliers se font avec tous les principaux Jardins Botaniques et Herbiers, la liste en est bien connue; elle correspond a celle des Etablissements scientifiques (le plus souvent aux Universités) des pays divers.

Il existe aussi des amateurs et des monographes. C'est une source importante pour les plantes vivantes.

Il est très difficile de donner des chiffres sous ce rapport les échanges étant essentiellement variables avec les années; c'est surtout avec les grands Établissements (Kew, Berlin, St. Petersbourg, etc.) qu'ont lieu les plus actifs.

Chaque année il entre à l'Herbier des Phanérogames environ 15 à 17 mille échantillons, sur lesquels les achats proprement dits constituent la plus grande part, presque la moitié.

Les apports des voyageurs sont en général de $\frac{1}{3}$ moindres; Les dons, moitié des précédents; et les échanges $\frac{1}{10}$ environ de l'ensemble. Les plantes fossiles sont aussi $\frac{1}{10}$ de l'ensemble.

Le garçon attache les plantes à l'aide de bandes gommées, chez lui, en dehors des heures de services (9 h. à 5 h.); il en prépare ainsi 22 mille par an, payées 0·05 pièce ($\frac{1}{2}$d.).

L'Herbier des Cryptogames reçoit un assez faible nombre d'entrées.

3. Dons.

Les dons ne sont pas très rares, mais sont d'un importants très variable,—quelques uns sont très importants. On peut citer parmi les dons les plus considerables celui de M. Glaziou qui a donné plus de 15 mille plantes, recueillies et séchées par lui au Brésil, sans que ce don magnifique ait été le moins du monde rémunéré en quoi que ce soit.

Certains particuliers en mourant, lèguent leur Herbier sous certains clauses, parfois sans clause.

Certains voyageurs, des officiers, des marins, des colons, donnent parfois des Herbiers qu'ils ont faits, mais, c'est sauf exception, surtout par la voie des Missions payées par l'état; de certains voyageurs et par les échanges que l'Herbier s'enrichit.

On peut citer les remarquables voyages de MM. Bourgeau, Balansa, Quartin-Dillon, Thollon.

En général les achats priment les dons et les échanges.

IV.

Dépenses annuelle d'entretien des collections suivant les catégories suivantes.

1. Administration, Salaires et Gages.

Ceci est indiqué dans les budgets précédemment indiqués, mais il y a une mélange d'attributions aux collections et à l'Enseignement qu'il est difficile de séparer.

Indiquons cependant que les galeries publiques sont nettoyées (cirer les parquets, frotter les titres, surveiller les visiteurs, garde de nuit par un garçon des galeries variées, Zoologie, Mineralogie, etc.) payé 1,400 fr.

Des surveillants militaires veillent au Jardin, jour et nuit.

Cet ensemble est difficile pour ne pas dire impossible à évaluer pour la Botanique seule.

De même il y a des concierges qui veillent à la securité des Laboratoires (Botanique, Chimie, Mineralogie, Zoologie, situés côte à côte dans des groupements de bâtiments.

2. Achats.

A. Achat de plantes sèches, le livre et reliure.—Comme on l'a vu plus haut, il est impossible d'évaluer par an, les sommes que coutent a l'état l'achat des plantes sèches, parcequ'il intervient des facteurs impossibles à débrouiller les uns des autres.

Il en est de même pour les livres et cela pour deux raisons.

Chacun des Professeurs dans les sommes dont il dispose peut faire les dépenses qu'il juge convenable pour le fonctionnement de sa Chaire. Il peut acheter les livres qu'il juge utiles, s'abonner aux journaux scientifiques. Dans les divers Laboratoires on achète les ouvrages principaux relatifs aux travaux qui s'y exécutent.

Il existe en outre une Bibliothèque commune a toutes les Chaires et qui renferme des livres relatifs a toutes les sciences, les ouvrages anciens, les Revues traitant à la fois de plusieurs sciences, les livres de fonds rares et chers. On y trouve des Revues et des Journaux de Botanique, toutes dépenses qui ne figurent pas dans les budgets des Chaires. La part qui revient a la Bibliothèque est très difficile à évaluer.

Le service de l'herbier des plantes phanérogames consacre 500 à 600 fr. pour les livres par année (achat et reliure).

Abonnement, achat et reliure.

La Bibliothèque du Muséum dépense 16,000 fr. sans compter les traitements des personnes suivantes :—

	Fr.
Bibliothécaire - - - - -	4,500
Bibliothécaire adjoint - - - -	3,000
S.B. adjt. - - - - - -	3,000
Aide Bibliothécaire - - - -	2,300
Garçon - - - - - - -	1,200

Une partie seulement se rapporte à la Botanique.

3. Dépenses spéciales ne rentrant pas dans l'une ou l'autre des catégories précédentes.

Les dépenses sont par exemples les frais necessités par les herborisations publiques (au nombre de 8 ou 10); les courses relatives au transport et à l'envoi des plantes ou à leur reception, échanges avec les correspondants. Les dessins et peintures conservés sous le nom de *vélins*, et qui constituent une [partie] très important se montant à 350 années, et qui comprennent les animaux et les plantes, chaque vélin est payé 150 fr. environ; on en exécute 2 ou 3 par an pour la Botanique.

V.

Envoie-t-on des specimens aux monographes? Si oui, dans quelles conditions?

Oui, cela se fait de la façon la plus libérale; on évite en général d'envoyer les types absolument uniques et c'est le plus souvent pour une periode assez courte, quand les plantes sont d'une rareté excéptionnelle.

Quand il s'agit d'une famille, on l'envoi par portions successives.

Mais, je le répète, on est très large et très libéral sous ce rapport, même pour les simples particuliers.

(Signé) MAXIME CORNU.

No. 8.

Der Director des Königlichen Botanischen Gartens und Museums. J. No. 250.

Grunewald-Strasse, Berlin W. 30,
den 26. Juli 1900.

Auf das geehrte Schreiben v. 16.5.00. erlaube ich mir folgende Mittheilungen zu machen.

I. Bezüglich der Ausdehnung und der Art der Sammlung gebe ich folgenden Notizen:

(*a.*) An getrockneten Pflanzen umfasst unser Museum 22,152 Mappen zu 12 cm. dicke. Einer allgemeinen Schätzung zufolge können für eine solche Mappe 100 Blätter oder Spannbögen (sheets) gerechnet werden, sodass die Gesammtzahl der aufbewahrten Exemplare sich auf mehr als 2 Millionen beläuft.

(*b.*) Von anderen Präparaten, welche ihrer Natur und ihres Umfangs wegen nicht in das Herbar eingeschlossen werden können, bewahrt das Königliche Botanische Museum auf:

1. Trockene Objekte, in Flaschen oder Kästchen;
2. Solche in Alkohol und Formol;

3. Von mikroskopischen Präparaten liegt eine sehr umfangreiche Sammlung vor, welche nicht sowohl die zu wissenschaftlichen Zwecken aufbewahrten Diatomaceen, Algen und Pilzsammlungen umfasst, sondern auch zu anatomischen und pharmacognostischen Untersuchungen angelegt worden ist. Diese Sammlung wird nicht nur von besonders geschulten Botanikern fortwährend ergänzt, in dem sie die schadhaften Präparate verbessern, sondern sie auch fortgesetzt vergrössern.

II. Die Verwendung der Sammlung geschieht in folgender Weise,

1. In dem Botanischen Museum ist eine botanische Schausammlung aufgestellt, welche

(*a.*) Einen Ueberblick über das gesammte botanische System gewährt;

(*b.*) Die hauptsächlichen pflanzengeographischen Gebiete zur Darstellung bringt, und

(*c.*) Die oekonomisch, technisch und medicinisch wichtigen Produkte gewisser Gebiete zusammengestellt vorführt.

Diese Schausammlung ist während des Sommers an 2 Nachmittagen Jedermann zugänglich und wird in umfangreichem Maasse besucht. Ausserdem werden diese Sammlungen zu populären Vorträgen welche in dem Hörsaale des Museums abgehalten werden, benutzt; insonderheit zählen zu diesen letzteren auch botanische Vorlesungen, die jungen, angehenden Kolonialbeamten gehalten werden. Wiederholt sind auch naturwissenschaftlichen Bestrebungen huldigende Vereine unter der Leitung des Directors in dem Museum umhergeführt worden.

2. Dieselbe Sammlung wird auch von den Studenten zur Repetition benutzt, wie denn überhaupt das Museum sowohl wie das Herbarium reichliche Materialien für die Untersuchung an die Studierenden abgiebt. Eine besondere Lehrsammlung, welche theilweise in dem Museum, theilweise in der Universität ihre Ausstellung gefunden hat, ist die wesentlichste Quelle der Demonstrationsmittel für den botanischen und pharmacognostischen Unterricht an der Berliner Universität.

3. Alle botanischen Sammlungen können an Ort und Stelle mit Erlaubniss des Directors benutzt werden. Diese Benutzung ist dauernd eine so umfangreiche, dass sich bei den jetzigen beschränkten Raumverhältnissen ein nicht selten sehr empfindlicher Platzmangel bemerklich macht.

4. Das botanische Museum ist zugleich botanische Centralstelle für die deutschen Kolonien, und es werden zahlreiche von der Regierung eingehende Fragen und Aufträge bearbeitet und zur Erledigung gebracht Ebenso werden auch die häufig wiederholten Anfragen von Seiten Privater aus den Kolonieen und dem Gebiete der Industrie eingehend beantwortet.

III. Die Eingänge für das Königliche Botanische Museum werden erworben.

1. Durch Kauf.

2. Durch Tausch hauptsächlich mittelst der zahlreichen Doubletten brasilianischer, tropisch-afrikanischer und europäischer Pflanzen. Die letzeren sind für aussereuropäische Herbarien immer von einer grossen Bedeutung gewesen.

3. Auf dem Wege des Geschenkes erfährt das Königliche Botanische Museum jedes Jahr einen erheblichen Zuwachs. In erster Linie namhaft sind diejenigen Sammlungen zu machen, welche durch Reisende in unseren Kolonieen zusammengebracht und durch die Beamten des Botanischen Museums bearbeitet werden.

IV. An Gehältern werden jährlich gezahlt:

	M.
1. Für 6 Kustoden - - -	32,100
2. Für 3 Assistanten - - -	4,600
3. Für 2 Unterbeamten (Diener und Präparator) - - - -	2,690
Für sächliche Ausgaben:	
a. Für Heizung und Beleuchtung -	2,400
b. Für Hausbedürfnisse, Reinigung, etc. - - - - - -	1,200
c. Zur Einrichtung uund Erhaltung der Sammlungen - - -	3,930
d. Zur Vermehrung der Sammlungen und der Bibliothek - -	4,800
e. Für Porti etc. - - - -	1,600

Das Königliche Botanische Museum zu Berlin verleiht getrocknete Pflanzen und Museum-Objekte an Personen, deren wissenschaftliche Befähigung zur Benutzung der Objekte erwiesen ist, sofern nicht die im botanischen Museum auszuführenden Arbeiten dadurch benachteiligt werden. Auswärtigen Botanikern darf diese Begünstigung nur mit der Erlaubniss des Kultusministeriums gewährt werden, doch werden soweit das vorhandene Material es gestattet, einzelne Proben von der Direction bereitwilligst abgegeben. Bei dem Verleihen wird die Bedingung gestellt, dass die Versendung und Rücksendung auf Kosten des Entleihers geschieht, dass die Materialien auf das sorgfältigste gesichert werden, und dass jede Veröffentlichung, welche auf Grund der Benutzung des entliehenen Materials geschieht, in einem Exemplar der Bibliothek des Museums übergeben wird. Der Entleiher ist ferner verpflichtet, die Bestimmungen mit eigenhändiger Unterschrift auf besonderem Zettel den Pflanzen beizulegen. 1 Exemplar unserer Bestimmungen für die Benutzung unserer Sammlungen wird beigefügt.

In vorzüglichster Hochachtung,
(Unterzeichnet) A. ENGLER.

Botanical Work Committee,
8, Delahay Street, London, S.W.

[Enclosure in No. 8.]

Bestimmungen für die Benutzung der Sammlungen des Königlichen Botanischen Museums in Berlin.

1. Die Benutzung der Sammlungen des Königlichen Museums ist nur gestattet mit Erlaubnis des Direktors.

2. Zu wissenschaftlichen Zwecken können Teile der Sammlungen auswärts verliehen werden, wenn dieselben im Museum selbst entbehrlich sind, and wenn der Entleiher hinreichende Garantie für gute Behandlung und vollständige, sowie *pünktliche* Rücklieferung bietet. Der vom Empfänger zu unterschreibende Entleihschein ist möglichst umgehend, die Sammlung selbst innerhalb der vorgeschriebenen Frist unter der Adresse: "An die Direction des Kgl. Botanischen Museums in Berlin W. 30. Grunewaldstr. 6/7" zurückzuschicken. Verleihungen in das Ausland hängen von der Genehmigung des vorgesetzten Ministeriums ab.

3. Für diejenigen, welche in den Räumen des botanischen Museums die Sammlungen und Bibliothek benutzen wollen, ist dasselbe vom 1. Oktober bis 31. März von 8–3 Uhr, vom 1. April bis 30. September von 7–3 Uhr geöffnet. Eine Verlängerung der Frist wird von dem Direktor nur ganz ausnahmsweise in besondere motivierten Fällen bewilligt.

4. Den Weisungen der Beamten ist unbedingt Folge zu leisten.

5. Beim Beginn der Arbeit ist Name und Wohnung in das beim Museumsdiener aufliegende Buch einzutragen. Der Arbeitsplatz wird von der Direktion angewiesen.

6. Die Pflanzenpackete werden von einem der Custoden oder Assistenten ausgehändigt; dieser wird auch Auskunft über alle, die Sammlungen und Litteratur betreffenden Fragen erteilen. Es wird aber erwartet, dass die Beamten nur soweit in Anspruch genommen werden, als es für die Benutzung unumgänglich notwendig ist.

7. Das Öffnen der Schränke des Herbariums und der Museumsabteilung ist nur gestattet, wenn eine besondere Erlaubnis der Direktion gewährt worden ist. Die Ordnung und Reihenfolge der Mappen innerhalb der Schränke, sowie der Speciesbogen innerhalb der Mappen, ist auf das strengste einzuhalten. Wenn eine Mappe auf länger als einen Tag dem Herbarium entnommen wird, so muss an deren Stelle ein Hinweis niedergelegt werden.

Eine möglichst sorgfältige Behandlung der Pflanzen wird wegen der Zerbrechlichkeit der Objekte den Benutzern ganz besonders anempfohlen, sowohl beim Öffnen und Schliessen der Mappe (letzteres fest, aber ohne übermässigen Druck), wie auch beim Wenden und Benutzen der einzelnen Bogen. Bei der Entnahme von Blüten zur Analyse, welches nur mit Genehmigung der betreffenden Custoden oder Assistenten geschehen darf, ist möglichst sparsam zu verfahren. Die verwendeten Objekte sind in einer Kapsel an dem Herbarbogen zu befestigen.

9. Verificierungen bez. Bestimmungen sind den ein-

Appendix II.

zelnen Pflanzen, mit Tinte und in deutlicher Handschrift, in folgender Weise hinzuzufügen:

a. Hat die Pflanze bereits eine korrekte Bestimmung, so ist diese durch ein zu der Bestimmung hinzuzuschreibendes teste . . . oder ! . . . zu verificieren, z. B. ! Engl.; teste Urb.

b. Ist die Pflanze ohne Bestimmung, so wird gebeten, den Namen unter Beifügung, eines det. . . . auf das Originaletiquette zu schreiben, wenn hier noch hinreichender Raum vorhanden ist, sonst auf das beigeklebte Museumsetiquette.

c. Ist die Bestimmung falsch oder aus nomenklatorischen Gründen einer Abänderung bedürftig, so ist der richtige Name unter Beifügung eines det. ... auf besonderen kleinen Zetteln, welche im Museum vom Diener bezogen werden können, zu notieren. Dasselbe gilt auch von anderweitigen Bemerkungen, welche die Autoren hinzusetzen wünschen.

d. In keinem Falle dürfen die schon vorhanden Zettel, welche von früheren Bearbeitern beigeklebt sind, bgeändert oder entfernt werden.

10. Bei der Entnahme von Büchern, Zeitschriften oder Sonderdrucken aus der Museumsbibliothek ist an Stelle derselben ein Karton zu legen, welcher den Titel des Buches und den Namen des Entleihers enthält. Jeden Sonnabend sind sämtliche benutzte Bücher an die Museumbibliothek zurückzugeben.

Wer Bücher aus der Königlichen Bibliothek benutzen will, hat bis Montag Mittag einer jeden Woche den ausgefüllten Bibliothekschein dem Museumsdiener zu übergeben; die Bücher werden ihm am darauffolgenden Donnerstag ausgehändigt. Alle diese Bücher dürfen nur in den Räumen des Museums benutzt werden.

11. Wenn die Studien im Museum beendigt sind oder auf mehr als eine Woche unterbrochen werden, so sind sämtliche Bücher und Pflanzenmappen wieder an ihren Platz zu legen und die Arbeitstische aufzuräumen.

12. Das Rauchen in den Räumen des Museums ist untersagt. Laute Unterhaltung ist in Rücksicht auf die übrigen Arbeitenden zu vermeiden.

13. Es wird erwartet, dass ein Exemplar derjenigen Arbeiten, welche unter Benutzung des Museumsmaterials hergestellt worden sind, der Bibliothek des Museums gratis überwiesen wird.

Berlin, den 15. Dezember 1899.

Die Direktion des Königlichen Botanischen Museums.

A. ENGLER, Direktor.

I. URBAN, Unterdirektor.

APPENDIX III.

DOCUMENTS AS SUPPLEMENTARY EVIDENCE.

PAGE

1. Additional observations, received from Mr. E. M. Holmes, 17th and 19th November, 1900 - - 173

2. Memorandum received from Mr. W. Carruthers, 17th November, 1900 - - - - - - - 173

3. Copy of a letter from the Assistant Controller, H.M. Stationery Office, in reply to an enquiry as to the amount annually expended for binding at Kew - - - - - - - - - - - - 173

4. Copy of a letter from Mr. George Simonds Boulger, addressed to the Keeper of Botany, British Museum, and communicated by him, 13th December, 1900. - - - - - - - - - - - - 174

5. List of papers published as the result of work done in the Jodrell Laboratory, Kew, handed in by Sir W. T. Thiselton-Dyer, K.C.M.G., 22nd December, 1900 - - - - - - - - - - 174

6. Copy of a letter addressed by Sir Joseph Hooker, G.C.S.I., to the Secretary of the Botanical Work Committee - 177

7. Statement received from Mr. W. Carruthers, 1st January, 1901 - - - - - - - - - 177

8. Statement received from Mr. G. R. M. Murray, 1st January, 1901 - - - - - - - - 178

9. Additional information furnished by Mr. G. R. M. Murray, 1st January, 1901 - - - - - - 178

10. Copy of a letter addressed by Mr. W. Carruthers to the Secretary of the Botanical Work Committee, 3rd January, 1901, enclosing letter and statement from Mr. E. A. L. Batters - - - - - - 178

11. Copy of a letter addressed by Sir E. Maunde Thompson, K.C.B., Principal Librarian, British Museum, to the Lords Commissioners of Her Majesty's Treasury, dated 12th July, 1899 - - - - - - 179

12. Extract from a letter addressed to the Secretary of the Botanical Work Committee by Sir W. T. Thiselton-Dyer, K.C.M.G., dated 15th January, 1901, enclosing a quotation from M. A. de Candolle's "La Phytographie" - 180

13. Copy of a letter from Sir Edward Maunde Thompson, K.C.B., to the Secretary of the Botanical Work Committee, dated 17th January, 1901 - - - - - - - - - - - - - - 180

14. Extract from a letter addressed by Mr. William Carruthers, F.R.S., to the Secretary of the Botanical Work Committee, dated 24th January, 1901 - - - - - - - - - - - - 180

APPENDIX III.

Documents as Supplementary Evidence.

No. 1.

Additional observations, received from Mr. E. M. Holmes, 17th and 19th November, 1900:—

420. The idea of plant-types in cabinets for public reference would be, in my view, an extension of that which is already done in the English collection of zoological specimens in the room behind Darwin's statue, where specimens can be viewed by visitors by pulling out drawers. Specimens placed on edge, and mounted on card, with a transparent gelatine covering, could easily be arranged in grooved drawers, but that is a detail.

430. Students of pollen or leaves, as a rule, would get more help in a botanical garden than in a herbarium, where leaves cannot be detached without injury.

440, 448. I have seen excellent work in fossil botany done in the Jodrell Laboratory at Kew. Unless a geologist be also a botanist he is hardly likely to study fossil plants critically.

441-443. I misunderstood Lord Avebury's question. The only geological museum that I have visited in London is the one in Jermyn Street, which I believed was the only geological museum properly so called, the collections formerly at Bloomsbury and now at South Kensington being always in my hearing called the Geological Department of the British Museum.

446. My impression is that they were in the Botanical Department when Mr. Carruthers was the Keeper.

450. Since my answers were given to the Committee I took the plant to Kew, and it was there identified by Mr. Burkill, as a luxuriant form of *Sinapis incana*. There was a specimen in the herbarium there which exactly matched my specimen.

451. The collection consisted of Hudson's plants in Forster's collection. Forster appears to have purchased Hudson's plants. Hudson's house was burnt, and the specimen-sheets show traces of fire.

460. No, not usually. I should not expect to find at the British Museum Botanical Department at South Kensington plants that I could not find at Kew, except in special collections that I know to exist in the former. This is so much the case that I have given up going to South Kensington except to see such special plants, or occasionally to compare a British plant when I have other business in that direction. [*Revised and amplified, 19th November*, 1900.]

479. I do not think my objections to uncorrected names on specimens of plants were quite understood. Supposing I wish to identify a seaweed that I believe to be *Sphacelaria cirrhosa*, and I ask to see an authentic specimen of that species, and I am handed a sheet bearing that name on the right-hand corner of the sheet, in writing which I do not know the authoritative value of (for botanists do not always sign their names), and I find on the sheet half a dozen specimens, some of which are evidently different species, how am I to determine which of those is an authentic specimen? And of what use is the sheet to me for the purpose of identifying my plant? As a matter of fact, I found *Sphacelaria scoparioides* on a sheet of *S. cirrhosa* at South Kensington.

The specimens expressing the views of different botanical authorities should, in my opinion, be represented each on a different sheet, and placed in a distinct cover, not on the sheet containing a definite authentic specimen. The object, I think, of a collection of plants is to facilitate study, not to make it more difficult, nor to waste the time of the worker unnecessarily.

482. It is not so much a question of terminology, but a question of well-authenticated specimens; not the change of an old name to a new one, but the identity of two or more specimens on a sheet, and the indication of which of these are rightly named, and which are not, on the sheet itself, as for instance where the same collector has mixed two species together in the same parcel. I am not advocating the erasure of the name given by a botanical authority, but the superscription of the correct name of the plant on a distinctive label, showing what the plant really is.

487, 490. Dr. Dickie's collection contained many type specimens, and is therefore of value. Supposing, however, that he has already made a new genus of a plant which belongs to one already known, the name he has given must be sunk, and the necessary change to another genus should, I think, be indicated on the sheet bearing that type specimen. On one occasion a plant which I sent to him he named *Rhodymenia bifida*, and it would occur in several collections under that name, but I proved to him that it could not be a *Rhodymenia*, but must be a *Nitophyllum*, on account of the tetraspores being of different structure, and I published it as *Nitophyllum thysanorrhizans*. In a case of this kind, I think under *Rhodymenia bifida* there should be on the cover a cross reference to *Nitophyllum thysanorrhizans*, and the plant should be placed in the genus *Nitophyllum*, with the correct name superscribed over the name given by Dr. Dickie.

In the Journal of Botany, for October, 1900, page 377, No. 34, you will find a correction by Mr. Batters of one of Dr. Dickie's specimens at the Botanical Department, South Kensington. Dr. Dickie had labelled it *Schizymenia Dubyi*, but the plant is *Halymenia latifolia*.

No. 2.

Memorandum received on 17th November, from Mr. Carruthers.

In answer to Sir John Kirk's question as to the removal of the Kew collections to the British Museum (No. 581) I said, "It would be impossible to accommodate them in the present room." In saying this I was thinking only of the floor space in the room. Some years ago I had to face the congested state of cabinets in which some natural orders were preserved, and I saw that when the time came to provide additional cabinets the needed space could be secured by erecting a light gallery above the herbarium, and removing as much as was needed of the lath-and-plaster wall which rises from the top of the herbarium to the roof. This additional space, which could be easily increased by carrying the gallery into the public room, would be sufficient, I believe, to accommodate the herbarium cabinets of the Kew collections. The double series of lights—in the walls and in the roof—would prevent loss of light below the galleries. The cost of such a gallery and the necessary alterations would be comparatively small. The removal of the collections need not take place till the alterations have been made, and the removal could then be so managed that the collections would not have to be closed to men of science for more than a few days. When the herbarium was removed from Bloomsbury to the Natural History Museum it was closed for a week only. The thorough incorporation of the two herbaria would be a work of time, but with the present staff of the two herbaria this could be accomplished within a reasonable period. The cabinets from Kew would, so far as needed, be returned as they were emptied, with a suitable herbarium for the use of the Gardens.

(Signed) William Carruthers.

17th November, 1900.

No. 3.

Copy of a letter from the Assistant Controller, H.M. Stationery Office, in reply to an enquiry as to the amount annually expended for binding at Kew.

L 2895/00.

Stationery Office,
20th November, 1900.

Sir,

In reply to your letter dated the 5th instant I am desired by the Controller to inform you that the average

Appendix III.

expenses incurred for this department for bookbinding for Kew Gardens during the past five years has been £53 per annum. This sum has probably been almost entirely on account of binding books for the library.

I am,
Sir,
Your obedient servant,
(Signed) E. P. PLOWMAN,
Assistant Controller.

The Secretary,
Botanical Work Committee.

No. 4.

Copy of a letter from Mr. George Simonds Boulger, addressed to the Keeper of Botany, British Museum, and communicated by him 13th December, 1900.

34, Argyll Mansions, South Kensington, W.
December 8th, 1900.

My dear Murray,

When I first heard that anyone had seriously suggested the abolition of the department of which you are keeper, or the amalgamation of its collections with those at Kew, my feelings can only be described as those of dismay. On carefully thinking the matter over I am forced to the conclusion that such a change would be eminently undesirable, and I think so both as a student and more especially as a teacher. I have made frequent use of the Botanical Department for nearly five-and-twenty years. When, under the guidance of the late Mr. Newbould, I began the study of pre-Linnean botany, I found it of the greatest assistance to my work to be able to have the unique works of the Sloane and Banks libraries brought up from the reading room to the old department at Bloomsbury, where the herbaria of the earlier British botanists and their successors, such as Banks and Edward Forster, could be consulted side by side with their letters and descriptions, published and unpublished. Since the transference of the collections to South Kensington I have not only found the admirable library that has been got together of the very greatest use in itself especially when working at botanical biography; but again and again the presence of a British and a general herbarium in the same apartments have saved an immensity of labour in verifying minute points. As a very busy man, whose time is largely occupied with other purely professional work, I find Cromwell Road most convenient when only part of a morning or an afternoon is available for botanical study, and when, with all existing or probable railroad facilities, a journey to Kew would be out of the question; but, though this last is a matter accidentally resultant from my living in the West End, the convenience of speedy reference afforded by a comprehensive but exclusively botanical library must appeal to everyone who has occasion to work both at Bloomsbury and at South Kensington. When studying one particular group of plants it may certainly be necessary to visit both the collection at Kew and that under your care, as also those at Oxford, Cambridge, and elsewhere, and a specialist may naturally often long for the impossible concentration of all the objects of his study within his reach at one time. This, however, being impossible, I do not think that, with two Metropolitan collections (which have, like most other British institutions, grown up independently and more or less fortuitously, so to speak), and a very limited number of important provincial collections, the English botanist is at all badly off, as compared with a thorough-going student in Germany or France. Such a specialist will generally, with the smallest group, find enough to occupy him for a whole day both at Kensington and at Kew, and will probably no more try to combine the study of the growing plants at the latter place with that of the herbarium specimens than have the many eminent herbarium-botanists who have made Kew their headquarters.

So entirely distinct do I consider a botanical garden to be from a herbarium, that, whilst it is undoubtedly an advantage to have the garden as far from town smoke as possible, and not shut in as are the gardens of Paris, Brussels, Ghent, etc., if any change were desirable—which I very much doubt—it would be better, I think, to bring the Kew Herbarium to some more central situation.

Personally, I find that I often want to identify an exceptional British plant, a casual alien, or an exotic, sent me, generally singly, as editor of "Nature Notes." This may take me an hour at South Kensington, or little more than the time consumed merely in getting to or from Kew.

But the circumstances of any one student are apt to be so peculiar to himself that it is as a teacher that I would emphasise my objection to the change mooted. Here, again, I can speak with five-and-twenty years of somewhat varied experience; but, frankly, it is only since the removal of the collections to Kensington that I have seen them much used, or used them myself for directly educational purposes. I have attended, with the very greatest interest, numerous demonstrations in which the late keeper of the department (Mr. Carruthers) has made use of old and new books, drawings, manuscripts, herbarium and museum specimens, including fossils, to illustrate the history of special groups in a way which would I believe have been impossible elsewhere. Though I constantly, of course, take my students to the small students' garden at Kew, to the houses, herbaceous grounds, arboretum, and economic museums there; for the scientific study of purely structural botany, especially in the winter months, I know of nothing to equal the series in the outer gallery and the index museum in your department. Here I find, without a railway journey or much perambulation of a garden, subject-matter for many instructive demonstrations of physiological as well as morphological topics. I admit that the work and functions of the library and herbarium on the one hand, and of these public exhibition galleries on the other are very distinct; but I should be very sorry to see either of them removed from London. As to the former, I have already written enough. As to the latter, it appears to me that one of the main lessons of the Natural History Museum is the unity of life and its laws; that natural history does not mean zoology or even biology, and that there is—with all its inexhaustible variety—an underlying identity in plant and animal life and structure. This might, of course, still be made manifest to the visitor to the Natural History Museum, if the herbarium were removed; but I do not believe that in such a case the collections illustrating the vegetable sub-kingdom of Nature would or could be adequately maintained by the members of a staff whose main interests lay in zoological studies. You will remember the pregnant dictum of the late director, Sir William Flower, that no museum is ever finished or should ever be treated as if it were so.

When I heard that a Commission was sitting on this question I should have volunteered evidence—mainly as a Metropolitan teacher—but was prevented by temporary illness, until I heard that the Commissioners considered that they had already taken sufficient evidence for their enquiry. As, however, I venture to doubt whether many botanists have had the same opportunities as myself—while knowing something of Kew—of making use of your department as a member of the general public in several different ways, I shall be glad if you have the opportunity, if you will put these views of mine, for what they are worth, before the Commissioners.

Believe me, dear Murray,
Yours sincerely,
(Signed) G. S. BOULGER, F.L.S.,
Professor of Botany, City of London College, Editor of "Nature Notes," etc., etc.

To George Murray, Esq., F.R.S.,
Keeper of the Botanical Department,
Natural History Museum.

No. 5.

LIST OF PAPERS PUBLISHED AS THE RESULT OF WORK DONE IN THE JODRELL LABORATORY.

(Handed in by Sir WILLIAM T. THISELTON-DYER, K.C.M.G., 22nd December, 1900.)

1876.

TYNDALL, Prof. J., F.R.S. Further Researches on the Deportment and Vital Persistence of Putrefactive and Infective Organisms from the Physical point of View. Phil. Trans. Roy. Soc. 167 (1877), pp. 149–206.

1877.

SANDERSON, Prof. J. S. BURDON, F.R.S., and F. J. M. PAGE. On the mechanical effects and on the electrical disturbance consequent on excitation of the Leaf of *Dionaea Muscipula*. Proc. Roy. Soc. 25 (1877), pp. 411–434.

VINES, S. H. On the Digestive Ferment of *Nepenthes*. Journ. Linn. Soc. 15 (1877), pp. 427–431.

1878.

ABBAY, Rev. R. Observations on *Hemileia vastatrix*, the so-called Coffee-leaf Disease. Journ. Linn. Soc. Bot. 17 (1878), pp. 173–184, tt. 13 and 14.

CHURCH, Prof. A. H. A chemical study of vegetable albinism. Journ. Chem. Soc. 35 (1879), pp. 33–41.

SANDERSON, Prof. J. S. BURDON, F.R.S. On the Electromotive Properties of the Leaf of *Dionæa* in the Excited and Unexcited States. Phil. Trans. Roy. Soc. 173 (1882), pp. 1–55.

1879.

CHURCH, Prof. A. H. A chemical study of vegetable albinism. Part. II.—Respiration and Transpiration of Albino-foliage. Journ. Chem. Soc. 37 (1880), pp. 1–6.

WARD, H. MARSHALL. A contribution to our Knowledge of the Embryo-sac in Angiosperms. Journ. Linn. Soc. Bot. 17 (1880), pp. 519—546, tt. 17–24.

1880.

BOWER, F. O. On the germination and histology of the seedling of *Welwitschia mirabilis*. Quart. Journ. Microsc. Sc. N.S. 21 (1881), pp. 15–30.

PFITZER, Prof. E. Beobachtungen ueber Bau und Entwicklung der Orchideen. VIII.—Uebersicht des allgemeinen Aufbaus der Orchideen. Verhandl. d. natur-medizin. Vereins zu Heidelberg. N. F. 2 (1880), pp. 350–364.

1881.

BOWER, F. O. On the further development of *Welwitschia mirabilis*. Quart. Journ. Microsc. Sc. N.S. 21 (1881), pp. 571–594.

1882.

BOWER, F. O. The germination and embryogeny of *Gnetum Gnemon*. Quart. Journ. Microsc. Sc. 22 (1882), pp. 278–98, t. 25.

CROSS, C. F., and E. J. BEVAN. Contributions to the Chemistry of Lignification. II.—On the Oxidation of Cellulose. Journ. Chem. Soc. 43 (1883), pp. 18–23.

1883.

BOWER, F. O. On Plasmolysis and its bearing upon the relations between Cell-wall and Protoplasm. Quart. Journ. Microsc. Sc. N.S. 23 (1883), pp. 151–169.

BOWER, F. O. On the Structure of the Stem of *Rhynchopetalum montanum*, Fresen. Journ. Linn. Soc. Bot. 20 (1884), pp. 440-446, tt. 36–38.

GARDINER, W. On the Continuity of the Protoplasm through the walls of Vegetable Cells. Phil. Trans. Roy. Soc. 174 (1883), pp. 817–863, tt. 68–70.

SCHUNCK, E. Note on the Constitution of Chlorophyll. Proc. Roy. Soc. 36 (1883), pp. 183–185.

1884.

BOWER, F. O. Note on the Gemmae of *Aulacomnion palustre*. Journ. Linn. Soc. Bot. 20 (1884), pp. 465–467, with 4 figs.

BOWER, F. O. Preliminary Note on the Apex of the Leaf in *Osmunda* and *Todea*. Proc. Roy. Soc. 36 (1884), pp. 442, 443.

BOWER, F. O. On the Comparative Morphology of the Leaf in the Vascular Cryptogams and Gymnosperms. Phil. Trans. Roy. Soc. 175 (1885), pp. 565–615, tt. 37–40.

BOWER, F. O. On Apospory in Ferns (with special reference to Mr. Charles T. Druery's Observations). Journ. Linn. Soc. Bot. 21 (1885), pp. 260–268, tt. 11 and 12.

SCHUNCK, E. Supplementary Note on the Constitution of Chlorophyll. Proc. Roy. Soc. 36 (1884), pp. 285, 286.

SCOTT, D. H. On the Laticiferous Tissue of *Manihot Glaziovii* (the Ceara rubber). Quart. Journ. Microsc. Sc. N.S. 24 (1884), pp. 193–203, t. 17.

SCOTT, D. H. Note on the Laticiferous Tissue of *Hevea Spruceana*. Quart. Journ. Microsc. Sc. N.S. 24 (1884), pp. 204–206.

1885.

BOWER, F. O. On the Development and Morphology of *Phylloglossum Drummondii*. Part I.—The Vegetative Organs. Phil. Trans. Roy. Soc. 176 (1885), pp. 665–678, tt. 71–73,

BOWER, F. O. On the Apex of the Root in *Osmunda* and *Todea*. Quart. Journ. Microsc. Sc. N.S. 25 (1885), pp. 75–103, tt. 8 and 9.

SCHUNCK, Dr. E. Contributions to the Chemistry of Chlorophyll. No. I. Proc. Roy. Soc. 39 (1885), pp. 348–361.

SCOTT, D. H. On the Occurrence of Articulated Laticiferous Vessels in *Hevea*. Journ. Linn. Soc. Bot. 21 (1885), pp. 568–573.

1886.

BOWER, F. O. On Apospory and Allied Phenomena. Trans. Linn. Soc. Ser. 2, Bot. 2 (1887), pp. 301–326, tt. 57–59 and 2 figs. in text.

BOWER, F. O. On some Normal and Abnormal Developments of the Oophyte in *Trichomanes*. Annals Bot. 1 (1888), pp. 269–305, tt. 14–16.

LUBBOCK, Sir JOHN, Bart. (afterwards Lord AVEBURY). Phytobiological Observations on the Forms of Seedlings and the Causes to which they are due. Journ. Linn. Soc. Bot. 22 (1886), pp. 341–401, with 134 figs. Part ii. Journ. Linn. Soc. Bot. 24 (1887), pp. 62–87, with figs. 135–176.

SCHUNCK, Dr. E. Contributions to the Chemistry of Chlorophyll. No. II. Proc. Roy. Soc. 42 (1887), pp. 184–188, t. 1.

1887.

BOWER, F. O. On the Pitcher of *Nepenthes*, a study in the Morphology of the Leaf. Annals Bot. 3 (1889), pp. 239–252, t. 16.

BOWER, F. O. On Dr. Macfarlane's Observations on Pitchered Insectivorous Plants. Annals Bot. 4 (1889), pp. 165–168, with a figure in the text.

CALVERT, AGNES, and L. A. BOODLE. On Laticiferous Tissue in the pith of *Manihot Glaziovii*, and on the presence of Nuclei in this Tissue. Annals Bot. 1 (1887), pp. 55–62, t. 5.

CALVERT, AGNES. The Laticiferous Tissue in the Stem of *Hevea brasiliensis*. Annals Bot. 1 (1887), pp. 75–77.

GREGG, W. H. Anomalous Thickening in the Roots of *Cycas Seemanni*, Al. Braun. Annals Bot. 1 (1887), pp. 63–70, t. 6.

JOHNSON, T. The Procarpium and Fruit of *Gracilaria confervoides*. Annals Bot. 1 (1888), pp. 213–222, t. 11.

MASSEE, G. Disease of *Colocasia* in Jamaica, with an Introductory Note by D. Morris. Journ. Linn. Soc. Bot. 24 (1887), pp. 45–49, t. 11, and two figs. in the text.

MASSEE, G. On *Gasterolichenes*, a new type of the group *Lichenes*. Phil. Trans. Roy. Soc. B. 178 (1888), pp. 305–309, t. 25.

MASSEE, G. On causes influencing the direction of growth, and the origin of multicellular plants. Journ. Bot. (1887), pp. 257–267, t. 277.

Appendix III.

OLIVER, F. W. On a point of Biological Interest in the Flowers of *Pleurothallis ornatus*, Rchb. f. Nature, 36 (1887), pp. 303, 304, with 4 figs.

OLIVER, F. W. On the Obliteration of the Sieve-tubes in *Laminarieae*. Annals Bot. 1 (1887), pp. 95–117, tt. 8 and 9.

OLIVER, F. W. Ueber Fortleitung des Reizes bei reizbaren Narben. Vorläufige Mittheilung. Berichte d. Deutschen Bot. Gesellsch. 5 (1887), pp. 162–169, with 2 figs.

OLIVER, F. W. On the Sensitive Labellum of *Masdevallia muscosa*, Rchb.f. Annals Bot. 1 (1888), pp. 237–252, t. 12.

SCOTT, D. H. On Nuclei in *Oscillaria* and *Tolypothrix*. Journ. Linn. Soc. Bot. 24 (1887), pp. 188–192, t. 5.

SCOTT, D. H., and H. WAGER. On the Floating Roots of *Sesbania aculeata*, Pers. Annals Bot. 1 (1888), pp. 307–314, t. 17.

1888.

COOKE, M. C., and G. MASSEE. A new Development of *Ephelis*. Annals Bot. 3 (1889), pp. 33–40, t. 4.

JOHNSON, T. *Arceuthobium Oxycedri*. Annals Bot. 2 (1888), pp. 137–160, t. 10*a*.

MASSEE, G. A Monograph of the Genus *Calostoma*, Drov. (Mitremyce, *Nees*). Annals Bot. 2 (1888), pp. 25–45, t. 3.

MASSEE, G. On the Presence of Sexual Organs in *Aecidium*. Annals Bot. 2 (1888), pp. 47–54, t. 4*a*.

OLIVER, F. W. On the Structure, Development, and Affinities of *Trapella*, Oliv.—a new Genus of *Pedalineae*. Annals Bot. 2 (1888), pp. 75–115, tt. 5–9 and a fig. in text.

OLIVER, F. W. On a new Form of *Trapella sinensis*. Annals Bot. 3 (1889), p. 134.

SCHUNCK, Dr. E. Contributions to the Chemistry of Chlorophyll. No. III. Proc. Roy. Soc. 44 (1888), pp. 448–454, with 2 figs. in text.

1889.

BOWER, F. O. The Comparative examination of the meristems of Ferns, as a Phylogenetic Study. Annals Bot. 3 (1889), pp. 305–392, tt. 20–24.

MASSEE, G. Life History of a Stipitate Fresh-water Alga. Journ. Linn. Soc. Bot. 27 (1891), pp. 457–462, t. 12.

OLIVER, F. W. The Weather-Plant—*Abrus precatorius*, Linn. Kew Bull. (1890), pp. 6–25.

SCOTT, D. H. Distribution of Laticiferous Tissue in the Leaf. Annals Bot. 3 (1889), pp. 445–446.

1890.

MASSEE, G. New Fungi from Madagascar. Journ. of Bot. (1891), pp. 1, 2, t. 300.

OLIVER, F. W. *Sarcodes sanguinea*, Torr. Annals Bot. 4 (1890), pp. 303–326, with plates 17–21.

OLIVER, F. W. On the Floral Biology of *Episcia maculata*. Brit. Assoc. Reports (1890), pp. 869, 870.

1891.

MASSEE, G. Vanilla Disease. Kew Bull. (1892), pp. 111–120.

1892.

MASSEE, G. *Heterosporium asperatum*, Mass.—a parasitic fungus. Journ. Roy. Microsc. Soc. (1892), pp. 572–584, t. 8.

SCOTT, D. H., and G. BREBNER. On the Secondary Tissues in Certain Monocotyledons. Annals Bot. 7. (1893), pp. 21–62, tt. 3–5.

1893.

DE WEVRE, A. Contribution à l'étude des Mucorinées avec essai d'une Monographie de ces Champignons. Grevillea 22 (1893), pp. 1-8 and 69–79.

DE WEVRE, A. Recherches sur le Cubèbe et sur les Piperacées qui peuvent s'y trouver. Ann. Soc. Sc. Méd. Brux. 3.

GREEN, J. R. Researches on the Germination of the Pollen-grain, and the nutrition of the pollen-tube. Phil. Trans. Roy. Soc. B. 184 (1894), pp. 385–409.

MASSEE, G. On *Trichosphaeria Sacchari*, Mass.—a fungus causing a disease of the Sugar-cane. Annals Bot. 7 (1893), pp. 515–532, t. 27.

SCOTT, Dr. D. H., and E. SARGANT. On the Pitchers of *Dischidia Rafflesiana* (Wall). Annals Bot. 7 (1893), pp. 243–269, tt. 11 and 12.

WILLIAMSON, Prof. W. C., F.R.S., and Dr. D. H. SCOTT. Further observations on the organisation of the Fossil plants of the Coal-Measures. Part I. *Calamites*, *Calamostachys*, and *Sphenophyllum*. Phil. Trans. Roy. Soc. B. 185 (1895), pp. 863–959, tt. 72–86.

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BREBNER, G. On the Mucilage Canals of the *Marattiaceae*. Journ. Linn. Soc. 30 (1895), pp. 444–451 t. 37.

GIBSON, R. J. HARVEY. Contribution towards a Knowledge of the Anatomy of the Genus *Selaginella*, Spr. Annals Bot. 8 (1894), pp. 133–206, tt. 9–12.

MASSEE, G. Note on the Disease of Cabbages and allied plants known as "Finger and Toe," etc. Proc. Roy. Soc. 57 (1895), pp. 330–332.

WILLIAMSON, Prof. W. C., F.R.S., and Dr. D. H. SCOTT, F.R.S. The Root of *Lyginodendron Oldhamium*, Will. Proc. Roy. Soc. 56 (1894), p. 128.

WILLIAMSON, Prof. W. C., F.R.S., and Dr. D. H. SCOTT, F.R.S. Further observations on the organisation of the Fossil Plants of the Coal-Measures. Part II. The roots of *Calamites*. Phil. Trans. Roy. Soc. B. 186 (1895), pp. 683–701, tt. 15–17.

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MASSEE, G. The "Spot" Disease of Orchids. Annals Bot. 9 (1895), pp. 421–429, t. 25.

MASSEE, G. Root Diseases caused by Fungi. Kew Bull. (1896), pp. 1–3, with plate.

SARGANT, ETHEL. Some Details of the First Nuclear Division in the Pollen Mother-Cells of *Lilium Martagon*, L. Journ. Roy. Microsc. Soc. (1895), pp. 283–287, with figs. 42–51.

WILLIAMSON, Prof. W. C., F.R.S., and Dr. D. H. SCOTT, F.R.S. Further Observations on the organisation of the Fossil Plants of the Coal-Measures. Part III. *Lyginodendron* and *Heterangium*. Phil. Trans. Roy. Soc. B. 186 (1896), pp. 703–779, tt. 18–29.

1896.

BREBNER, G. On the Prothallus and Embryo of *Danaea simplicifolia*, Rudge. Annals Bot. 10 (1896), pp. 107–122, t. 9.

GREEN, J. R. On the Action of Light on Diastase and its Biological Significance. Phil. Trans. Roy. Soc. B. 188 (1897), pp. 167–190.

GWYNNE-VAUGHAN, D. T. A new case of Polystely in Dicotyledons. Annals Bot. 10 (1896), pp. 289–291.

GYWNNE-VAUGHAN, D. T. On some points in the Morphology and Anatomy of the *Nymphaeaceae*. Trans. Linn. Soc. Ser. 2, Bot. 5 (1897), pp. 287–299, tt. 21 and 22.

LANG, W. H. Preliminary Statement on the Development of Sporangia upon Fern Prothalli. Proc. Roy. Soc. 60 (1897), pp. 250–260.

MASSEE, G A Lily-bulb Disease—*Rhizopus necans*, Mass. Kew Bull. (1897), pp. 87–90, with plate.

WORSDELL, W. C. The Anatomy of the Stem of *Macrozamia*, compared with that of other genera of *Cycadeae*. Annals Bot. 10 (1896), pp. 601–620, tt. 27 and 28.

WORSDELL, W. C. On the Development of the Ovule of *Christisonia*, a genus of the *Orobanchaceae*. Journ. Linn. Soc. Bot. 31 (1897), pp. 576–584, tt. 21 and 22.

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BROWN, H. T., F.R.S., and F. ESCOMBE. Note on the Influence of very Low Temperatures on the Germinative Power of Seeds. Proc. Roy. Soc. 62 (1897), pp. 160–165.

BROWN, H. T., F.R.S., and F. ESCOMBE. On the Depletion of the Endosperm of *Hordeum vulgare* during Germination. Proc. Roy. Soc. 63 (1898), pp. 3–25, t. 1.

GWYNNE-VAUGHAN, D. T. On Polystely in the Genus *Primula*. Annals Bot. 11 (1897), pp. 307–325, t. 14.

LANG, W. H. Studies in the Development and Morphology of Cycadean Sporangia. I.—The Microsporangia of *Stangeria paradoxa*. Annals Bot. 11 (1897), pp. 421–438, t. 22.

MASSEE, G. Slime-Flux. Kew Bull. (1897), p. 423.

SCOTT, Dr. D. H., F.R.S. On the Structure and Affinities of Fossil Plants from the Palæozoic Rocks. On *Cheirostrobus*, a new type of Fossil Cone from the Lower Carboniferous Strata (Calciferous Sandstone Series). Phil. Trans. Roy. Soc. B. 189 (1897), pp. 1–34, tt. 1–6.

SCOTT, Dr. D. H., F.R.S. On two new instances of Spinous Roots. Annals Bot. 11 (1897), pp. 327–332, tt. 15 and 16.

SCOTT, Dr. D. H., F.R.S. The Anatomical characters presented by the peduncle of Cycadaceae. Annals Bot. 11 (1897), pp. 399–419, tt. 20 and 21.

SCOTT, Dr. D. H., F.R.S. On the Structure and Affinities of Fossil Plants from the Palæozoic rocks. II.—On *Spencerites*, a new genus of Lycopodiaceous Cones from the Coal Measures, founded on the *Lepidodendron Spenceri* of Williamson. Phil. Trans. Roy. Soc. B. 189 (1898), pp 83–106, tt. 12-15.

WORSDELL, W. C. On "Transfusion-Tissue," its Origin and Function in the Leaves of Gymnospermous plants. Trans. Linn. Soc. Ser. 2, Bot. 5 (1897), pp. 301-319, tt. 23–26.

1898.

LANG, W. H. On Apogamy and the Development of Sporangia upon Fern-Prothalli. Phil. Trans. Roy. Soc. B. 190 (1898), pp. 187–238, tt. 7–11.

MASSEE, G. Tea-blights. Kew Bull. (1898), pp. 105–112, with plate.

MASSEE, G. Gummosis of *Prunus japonica*, Thunb. Kew Bull. (1898), pp. 321–326, with plate.

SALMON, E. S. On the Genus *Fissidens*. Annals Bot. 13 (1899), pp. 103–130, tt. 5–7.

SCOTT, Dr. D. H, F.R.S. On *Medullosa anglica*: a new representative of the *Cycadofilices*. Phil. Trans. Roy. Soc. B. 191 (1899), pp. 81–126, tt. 5–13.

WORSDELL, W. C. The Comparative Anatomy of Certain Genera of the *Cycadaceae*. Journ. Linn. Soc. Bot. 33 (1898), pp. 437–457, t. 20.

WORSDELL, W. C. The Vascular Structure of the Sporophylls of the *Cycadaceae*. Annals Bot. 12 (1898), pp. 203–241, tt. 17 and 18.

1899.

BOODLE, L. A. On some points in the Anatomy of the *Ophioglosseae*. Annals Bot. 13 (1899), pp. 377–394, t. 20.

BOODLE, L. A. Stem-Structure in *Schizaeaceae*, *Gleicheniaceae* and *Hymenophyllaceae*. Annals Bot. 13 (1899), pp. 624, 625.

HILL, T. G. The Structure and Development of *Triglochin maritimum*, L. Annals Bot. 14 (1900), pp. 83–107, tt. 6 and 7.

MASSEE, G. Cacao-Disease in Trinidad. Kew Bull. (1899), pp. 3–5, with a plate.

SCOTT, Dr. D. H, F.R.S. On the Primary Wood of Certain Araucarioxylons. Annals Bot. 13 (1899), pp. 615–619.

WORSDELL, W. C. The Comparative Anatomy of Certain Species of *Encephalartos*, Lehm. Trans. Linn. Soc Ser. 2, Bot. 5 (1900), pp. 445–459, t. 43.

WORSDELL, W. C. Observations on the Vascular System of the Female "Flowers" of *Coniferae*. Annals Bot. 13 (1899), pp. 527–548, t. 27.

WORSDELL, W. C. The Anatomical Structure of *Bowenia spectabilis*, Hook. Annals Bot. 14 (1900), pp. 159–160.

1900.

BOODLE, L. A. On the Structure of the Stem in two Species of *Lycopodium*. Annals Bot. 14 (1900), pp. 315–317.

BOODLE, L. A. I.—On the Anatomy of the *Hymenophyllaceae*. Annals Bot. 14 (1900), pp. 455–96, tt. 25–27.

BROWN, H. T., F.R.S., and F. ESCOMBE. Static Diffusion of Gases and Liquids in relation to the Assimilation of Carbon and Translocation in Plants. Phil. Trans. Roy. Soc. B. 193 (1900), pp. 223–292.

SCOTT, Dr. D. H., F.R.S. Note on the Occurrence of a Seed-like Fructification in Certain Palæozoic Lycopods. Proc. Roy. Soc. 67 (1900), pp. 306–309.

SCOTT, Dr. D. H., F.R.S., and T. G. HILL. The Structure of *Isoetes Hystrix*. Annals Bot. 14 (1900), pp. 413–454, tt. 23 and 24, and 2 figs. in text.

WORSDELL, W. C. The Vascular Structure of the ovule of *Cephalotaxus*. Annals Bot. 14 (1900), pp. 317, 318.

No. 6.

Copy of a letter addressed by Sir Joseph Hooker, G.C.S.I., to the Secretary of the Botanical Work Committee.

The Camp, Sunningdale,

December 21st, 1900.

Sir,

Referring to your letter of the 19th December, enquiring if I have any desire to modify the evidence given by me before the Duke of Devonshire's Committee on botanical work carried on at the Natural History Museum and the Royal Gardens, Kew, I have to inform you that after a careful perusal of the evidence I see no reason for modifying it.

I am, sir,

Your obedient servant,

(Signed) Jos. D. HOOKER.

B. Daydon Jackson, Esq., F.L.S.

No. 7.

Statement received from Mr. Carruthers, 1st January, 1901.

Having seen the evidence given by Mr. Holmes, I request permission to submit the following statement regarding matters stated there which happened while I was Keeper of the Department of Botany.

Mr. Holmes (Q. 377) complains that access to the herbarium of the British Museum is less easy than it should be. I was compelled somewhat to curtail Mr. Holmes's liberty under these circumstances. As he had the charge of a herbarium at the Pharmaceutical Society he was treated as if he knew how to use a herbarium. He was allowed to consult it directly; to take out the plants he wished to examine, and to replace them when he had finished. The assistants complained to me of the condition in which he left the specimens, that they were placed in the herbarium sometimes with the plants

Appendix III.

facing each other, and put together in so untidy a manner that the safety of the specimens was seriously endangered when replacing them in the cabinet. I examined the specimens after his next visit and found the complaint justified. I thereupon instructed my assistants that while continuing to Mr. Holmes full access to the herbarium, the specimens he wished to see must be given to him, and, when he was done with them, restored to their place by an officer of the department. This step was taken solely for the proper preservation of the collections entrusted to my charge.

Mr. Holmes says (Q. 411), "Some years ago a gentleman had occasion to make enquiry, and he found a collection there that had been lost sight of, a very interesting collection indeed." (Q. 451) "It was looked at by a friend of mine, and I am afraid I cannot tell you the name (of the collection) offhand." And when asked to ascertain it and put it in his evidence he said (Q. 452), "I will; it was my friend Mr. Batters who saw it." In the supplementary observations under (Q. 451) Mr. Holmes says, "The collection consisted of Hudson's plants in Forster's collection; Forster appears to have purchased Hudson's plants. Hudson's house was burnt, and the specimen sheets show traces of fire."

May I, in the first place, point out that in regard to the serious charge (Q. 411) made by Mr. Holmes, it was not till he was questioned by Lord Avebury (Q. 451, 452) that he was compelled to admit that his statement was second-hand, and that he did not even know what collection he was referring to. In the supplementary observations prepared at his leisure some days afterwards he gives, under Q. 451, an incorrect account of the collection, as will be apparent from the following narrative.

Twenty-four years ago I purchased for the Museum the cryptogamic collections of James Dickson (a famous cryptogamic botanist, and one of the founders of the Linnean Society) from his daughter, Mrs. Hickey. There were included in the purchase some twenty Algæ or thereabout, named in writing which I did not recognise, but without localities, though obviously British. These specimens were done up in a sheet of writing paper, on the outside of which was written "Hudson," or "Mr. Hudson." If they had been named by William Hudson, author of the "Flora Anglica," they would be important, as he was the first to introduce the Linnæan binominal nomenclature to Britain. In the hope that the writing might be identified the small parcel was placed in a herbarium cabinet at the end of the Algæ. As specimens these Algæ were worthless, their value entirely depended on their connection with William Hudson. Some time after this it appeared to me desirable, on account of the many additions to the algal flora of Britain since Harvey's time, to have a catalogue of the British Algæ prepared for publication by the Trustees of the British Museum. I had a conversation with Mr. E. A. L. Batters, F.L.S., whose extensive and critical knowledge of the British Algæ pointed him out to me as the most suitable person to undertake such a work. He agreed to entertain my proposal and began the critical examination of the materials in the Museum for this purpose. Among other specimens I showed him the carefully preserved parcel with the name of Hudson inscribed on it, and pointed out what might be its value. Mr. Batters has a thorough appreciation of the great value of such old historical specimens, and after going into the evidence we concluded that the writing was William Hudson's, and after being labelled they found their places in the herbarium.

After Mr. Holmes heard that Mr. Batters was undertaking the preparation of a catalogue of British Algæ he came to the Museum and complained to me because I had negotiated with Mr. Batters without taking him into consideration. He urged some preposterous reasons why I ought to have taken this step. It was far from agreeable to him to hear that in my judgment Mr. Batters was the best man for the work, and he could not conceal his annoyance at what I had done.

There is abundant material for animadversion in the evidence of Mr. Holmes, but I will trouble the Committee with only one other matter. In answer to Q. 485 he says, "I have on one occasion spoken to Mr. Carruthers about the matter, and asked him if he would like me to write in pencil what I considered the proper names to be, and he said 'Yes,' but subsequently the collection came under other hands, and I found there was an objection to my doing so." The liberty to write on the sheets was withdrawn by myself a considerable time before I left the Museum, because I found that Mr. Holmes in his "off-hand" way had written names which were not correct, and so instead of helping to clear up confusion he was adding to any confusion that may have existed.

(Signed) WILLIAM CARRUTHERS.

Norwood, 21st December, 1900.

No. 8.

Statement received from Mr. Murray, 1st January, 1901.

Having seen the evidence given by Mr. Holmes and the replies to it by Mr. Carruthers, I desire to add two statements.

In his answer to Q. 407 Mr. Holmes says:—"I went there" (British Museum) "the other day to find out a plant I gathered near Guildford, but they could not recognise it at the British Museum. It was a *Sinapis*." Mr. E. G. Baker informs me that the specimen was not in fruit, and it is unnecessary to remind botanists of the impossibility of determining a *Sinapis* in such a state. That it was subsequently matched (not determined) at Kew was fortunate, but the incident calls for no further explanation or comment.

In his answers to Q. 485-492 Mr. Holmes refers to the condition of the Dickie collection of Algæ. It would be absurd to suppose that anyone's collection of plants contained no wrong determinations, and no doubt there were, and still are, such in the Dickie collection. Mr. Holmes at one time freely wrote what he believed to be corrections of the names given by Professor Dickie and others, but I, and other workers so frequently found his supposed corrections to be themselves wrong that I requested him to stop a practice to which we invite all competent botanists. We take, so far as we can, every determination on its merits, and it appears to have surprised Mr. Holmes that we have frequently preferred Professor Dickie's authority to his own.

(Signed) GEORGE MURRAY,
December 28th, 1900.

No. 9.

Additional information furnished by Mr. Murray, 1st January, 1901.

Herbarium, British Museum:

Approximate number of sheets:

Phanerogams	592,000
Cryptogams	88,000
Approximate Total	680,000

Number of cabinets in the British and General Herbaria, including cryptogams, each cabinet having eight trays	1,560
1,560 cabinets × 8 = trays	12,480

The number of cabinets moved from Bloomsbury was 509; ascertained from the old pattern in use until the removal.

A specimen means everything belonging to one label, in every case—whether it be one or two plants—or in the case of diatoms, *e.g.*, one or two millions or more.

No. 10.

Copy of a letter addressed by Mr. William Carruthers, F.R.S., to the Secretary, Botanical Work Committee.

14, Vermont Road, Norwood,
3rd January, 1901.

Dear Mr. Jackson,—I asked, by letter, Mr. Batters if he would be so good as send me a statement as to what he said to Mr. Holmes about the Hudson Algæ, which he found in the Museum. He has sent me the enclosed statement.

I did not imagine that the declaration of Mr. Holmes referred to the herbarium of Edward Forster, jun., for that formed part of the herbarium of British Algæ. I supposed he referred to the few plants which were not placed in the herbarium, and which were obtained with the Dickson collections.

I trust you will be able to place Mr. Batters's statement before the Committee.

I am, faithfully yours,
(Signed) WM. CARRUTHERS.

(Enclosure No. 1 in No. 10.)

Copy of a letter from Mr. Edward Arthur Lionel Batters, LL.B., F.L.S., to Mr. Carruthers, F.R.S.

The Laurels, Wormley, Herts,
January 2nd, 1901.

Dear Mr. Carruthers,—Thank you for your letter, which I should have answered yesterday, but I wished first to see what Mr. Holmes had said. Mr. Murray kindly let me see a copy of Mr. Holmes's evidence. It is most extraordinary! I have made out a short statement of the facts as I remember them, which you should receive with this. In haste to catch post, wishing you a very happy and prosperous new year.

Yours very sincerely,
(Signed) EDW. A. BATTERS.

(Enclosure No. 2 in No. 10.)

(Statement on the part of Mr. E. A. L. Batters.)

When collecting material for my contemplated monograph of the British marine Algæ, I was surprised to find that three contradictory statements as to the whereabouts of W. Hudson's herbarium had been published.

1. In 1801, only eight years after Hudson's death, Mr. Stackhouse speaks of "Mr. Lambert's specimens, the remains of the late Mr. Hudson's collection" (Nereis Britannica, p. 86).

2. A year later Mr. Dawson Turner, when speaking of "W. Hudson, the learned author of the Flora Anglica," says, "The relics of his herbarium, now in the possession of my friend, Mr. E. Forster, jun." (Turner, Synopsis of the British Fuci, 1803, p. 42); and again on page 375, "There are specimens of it (*Fucus clavellosus*) also among the relics of Mr. Hudson's collection, in the possession of Mr. E. Forster, jun." That the remains of Hudson's herbarium were in the possession of E. Forster is further confirmed by a statement in "English Botany," where *Ulva rubra* is said "to be figured from an authentic specimen of Hudson's species, lent by Mr. E. Forster (E. Bot. pl. 1627, August 1806).

3. On the other hand, Messrs. Trimen and Dyer, in their "Flora of Middlesex," p. 392, say, "Hudson died in 1793, and left his herbarium to the Apothecaries' Society."

I searched the collections mentioned, and found that the Hudsonian specimens in Herb. Lambert (in Herb. Hooker at Kew) were, like those in the herbaria of Rev. Hugh Davies, Sir J. Frankland, and others, evidently only specimens presented by Hudson to the various gentlemen in whose collections they are found. Those in Ed. Forster's herbarium however, appear to be the remains of Hudson's own herbarium, rescued from the "disastrous fire at his house," some of the specimens showing evident marks of fire. The sheets on which they are mounted are marked in Forster's handwriting "Hudson's sale," either on the bottom left-hand corner or on the back. It is quite incorrect to say that I asserted that this or any other of the older collections in the British Museum had been lost sight of by the officials in whose keeping they were. Throughout my examination of the old collections at the Museum, I received the greatest assistance from Mr. W. Carruthers and the other officials, and I well remember many occasions on which Mr. Carruthers spent several consecutive hours examining with me old collections of Algæ like those of Buddle, Uvedale, Petiver, Pulteney, etc. Mr. Carruthers showed me a small package of Algæ which had formed part of either the Rev. Hugh Davies' or Pulteney's herbarium, and asked me to examine them. I did so, and found among them a few, I do not think more than half a dozen, specimens, which I could identify as having been named by Wm. Hudson; these were at once marked and incorporated in the herbarium by Mr. Carruthers's orders.

In reference to a request for information as to Hudson's herbarium, I told Mr. Holmes in substance what I have above stated. It is possible I may have said in the course of conversation that I had "discovered" Hudson's type of this or that species in Herb. Edw. Forster, but, so far as I am concerned, there is no foundation whatever for saying that the few specimens (they can hardly be called a collection), saved from the fire at Hudson's house had been lost sight of by the officials of the British Museum. As I have already stated, the sheets had been marked by Forster, before they were acquired by the Museum, and were consequently easily identified. I did not even have occasion to ask any of the officials for information. All I required to know, was marked clearly on the specimens themselves.

No. 11.

British Museum,
12th July, 1899.

My Lords,—In reply to Sir Francis Mowatt's letter of the 21st April (6681/99), communicating, for the consideration of the Trustees of the British Museum, copy of a minute of your Lordships' Board respecting the relations between the botanical work carried on at the Natural History Museum and that carried on at the Royal Botanic Gardens, Kew, I am directed by the Trustees to inform your Lordships that they have carefully considered the subject, and desire to submit the following remarks:—

Having thoroughly enquired into the question of the possible saving that would be effected by the amalgamation of the Botanical Department in the British Museum and the herbarium at Kew, they are of opinion that the resultant economy would be but small.

A large part of the annual grant appropriated to the department is expended in the salaries of the higher officers whose scientific work would, presumably, in any case be continued; nor is it to be anticipated that the cost of publications would be diminished.

It is presumed that the typical collection of British plants, the Index Museum, and a general typical collection would still have to be kept up in the Natural History Museum.

At the utmost, under the most favourable economic conditions, the Trustees doubt if a saving of more than a few hundred pounds would be effected by the suggested amalgamation.

The Trustees further submit that the absence of any botanical collection in London would certainly be a great loss to botanists and botanical science. Without taking account of numerous casual inquirers, about seven hundred botanical students make use of the collection in Cromwell Road during the year; and without a Botanical Department the Natural History Museum would be incomplete, particularly in relation to geology, palæontology, and entomology.

It appears that the duplication of work carried on in the two establishments is but small, there being constant and friendly communication between the officers.

The Trustees would therefore recommend the maintenance of exiting arrangements, and they are doubtful whether any advantage would result from the appointment of the proposed Committee.

I have the honour to be,
My Lords,
Your Lordships' most obedient humble servant,
(Signed) E. MAUNDE THOMPSON.

The Right Honourable
The Lords Commissioners of
Her Majesty's Treasury

Appendix III.

No. 12.

Extract from a letter addressed to the Secretary of the Committee by Sir William T. Thiselton-Dyer, Director, Royal Botanic Gardens, Kew, dated 15th January, 1901.

" . . . It seems to me that De Candolle's statement is a very important testimony as to the character and value of the Kew Herbarium up to 1880. If it had occurred to me I should have introduced it into my Memorandum. I think the attention of the Committee should be drawn to it, and it should be added to the printed evidence. . . ."

The following is the paragraph in question:—

"Kew (Jardin Royal de).—Pour les deux herbiers, celui de Sir W. et Sir Jos. Hooker et celui de M. Bentham, qui ont formé la base de l'immense herbier actuel, il n'existait pas de catalogues ou registres d'entrée. J'ai relevé sur l'époque antérieure à 1856 beaucoup de détails tirés de Lasègue, Mus. Deless. p. 325, A. Gray, Amer. Journ. 1840, de lettres de M. Bentham, de Sir Joseph Hooker, et autres sources occasionelles. À dater de 1856, *les Reports* ont donné des informations de plus en plus précises sur l'accroisement de l'herbier, qui doit être le plus riche de tous en espèces différentes et en espèces rares, décrites par les auteurs. J'espère avoir indiqué à peu près tous les herbiers de botanistes connus qui s'y trouvent incorporés, mais un grand nombre de collections de voyageurs y sont aussi, sans qu'il m'ait été possible de les passer en revue pour en extraire celles dont il aurait convenu de parler ici. Ce sont souvent des collections uniques, de voyageurs anglais, et celles-la sont indiquées dans les ouvrages redigés à Kew. Quant aux autres collections de plants numerotées, on se trompera rarement si l'on part de l'idée qu'elles y sont, même lorsque mes documents ne m'ont pas permis de les signaler."

A. De Candolle, "La Phytographie," p. 385.

No. 13.

Copy of a letter from the Principal Librarian, British Museum, to the Secretary of the Botanical Work Committee, dated 17th January, 1901.

British Museum,
17th January, 1901.

Sir,

In reply to your letter of the 11th inst., I am directed by the Trustees of the British Museum to acquaint you, for the information of the Botanical Work Committee, that nothing has occurred to move them to make any addition to, or alteration in, the statements contained in their letter addressed to the Lords Commissioners of Her Majesty's Treasury on the 12th July, 1899.

I am, sir,
Your most obedient servant,
(Signed) E. MAUNDE THOMPSON.

The Secretary, Botanical Work Committee.

No. 14.

Extract from a letter addressed to the Secretary by Mr. William Carruthers, F.R.S.:—

14, Vermont Road, Upper Norwood.
24th January, 1901.

Dear Mr. Jackson,

My first work as an Assistant of the Botanical Department in the autumn of 1859 was to incorporate in a single series the British plants of Edward Forster, of Sowerby, containing the types used in "English Botany," and of some small collections. This may be considered the foundation of the present British herbarium, though the collections then incorporated had been kept by themselves in a separate press.

* * * * * *

I am, faithfully yours,
(Signed) W. CARRUTHERS.

INDEX TO THE MINUTES OF EVIDENCE AND THE APPENDICES.

The numbers refer to the Questions unless preceded by p. for page.

Acanthaceæ of Africa, *Clarke*, 302.

Access to collections, *Masters*, 673, 674.

Accessibility of the two establishments, relative, *Clarke*, 332; *Dyer*, 1282, 1341; *Groves*, 350-353; *King*, 272-274, 294; —to a non-resident in London, *Elwes*, 1054.

Accessions to herbaria, Berlin, p. 169; —British Museum, *Masters*, 729; *Murray*, 61-67; —Brussels, p. 164; —Kew, *Dyer*, p. 74; —Paris, p. 167; —St. Petersburg, p. 165; —Vienna, p. 162; —to library at Kew, *Dyer*, p. 98.

Accommodation at Cromwell Road insufficient for united herbaria, *Carruthers*, 581, 583; completion of building would afford room, 582, 584; ready means of accommodation, p. 173; sufficient for some years, *Murray*, p. 4.

Accumulation, of plants at the British Museum, *Ball*. p. 132; —the rule there, but not at Kew, *Dyer*, p. 97; *Murray*, 64-73, p. 4.

Academies, publications in general library, *Murray*, p. 4.

Addenda, *Dyer*, p. 99-102.

Adequate, term as applied to Kew, *Elwes*, 1027.

Administration at Kew, the Director subordinate to the First Commissioner of Works, *Dyer*, 1312-1315; relation to Office of Works, *Dyer*, p. 78; would require change on amalgamation there, *Hiern*, 977-980.

Admiralty, correspondence as to collections, *Dyer*, p. 86; expenses of collections consigned to Kew, p. 113.

Admission to the Herbarium, *Dyer*, p. 98.

Advantages, of amalgamation not justified if expensive, *Masters*, 658; of gluing specimens, *Dyer*, p. 94; of two collections, *Masters*, 667, 668, 670.

Advice to botanic stations, *Dyer*, p. 76; —forthcoming from both establishments, *Murray*, 163.

Africa, colonial work at Kew, *Murray*, 164; —botanic stations, *Dyer*, p. 79; Congo herbarium at Brussels, p. 164; work in two herbaria, *Dyer*, 1355-1356; —East, collections, *Dyer*, p. 85; —South, flora, *Dyer*, p. 64, 65; —Tropical, flora, by Oliver, *Dyer*, p. 65; how it might be worked, *Fawcett*, 546, 549.

African Acanthaceæ, *Clarke*, 302; —plant-collections, at the British Museum, *Hiern*, 950; —in some instances larger than those at Kew, *Murray*, 74, 75; —not studied by witness, *Hanbury*, 515.

Agriculture, Board of, arrangement as to botanic and zoologic matters, *Lankester*, 1186-1192; technical botanic work, *Dyer*, 1309, p. 65.

Agriculture, Indian, *Dyer*, p. 77, 78; West Indian, Commissioner appointed, *Dyer*, p. 76.

Aiton, William, p. 112; collectors during his term of office, 141; his "Hortus Kewensis" drawn up by Solander, Dryander and Brown, p. 112.

Aiton, William Townsend, correspondence with Sir J. Banks, *Dyer*, p. 84; —with Dr. Lindley, p. 112; Director-General of the Royal Gardens, p. 112; editor of the "Hortus Kewensis," Ed. 2, p. 112; not responsible for names attached to plants, p. 112; records of Kew destroyed by him, *Dyer*, p. 102; resigned in 1840, p. 113; to receive Bauer's drawings, *Dyer*, p. 101, 102.

Algæ, arrangement, *Murray*, p. 4; collections at Berlin, p. 169; —Vienna, p. 162; —erroneously named by Dr. Dickie, *Holmes*, 487-490.

Aloë, cannot be shown in herbaria, *Holmes*, 402.

Alterations in naming Algæ needed at the British Museum, *Holmes*, 479, 481, 484-489.

Amalgamation of the two herbaria, anywhere, desirable, *Clarke*, 304, 337; at the British Museum, desirable, *Groves*, 342-343; *Hiern*, 954-956, 958; at Kew, desirable, *Elwes*, 1009-1012, 1014; *Hemsley*, 1211; *King*, 210, 235; by cabinets, *King*, 212, 214, 215, 235; *Masters*, 642, 643; *Murray*, 153; —not practicable, *Dyer*, 1342, 1343; by collection or contiguity, *Dyer*, 1287, 1342, 1343; *King*, 211, 214, 236-240; by incorporation of sheets, *King*, 238; cost, large, *Lankester*, 1164, 1165; *Murray*, 88-92, 96-107; counterbalanced, *Carruthers*, 576; dangers of, *Murray*, 83; fittings required, *Murray*, 89-91; labour required, *Murray*, 93; preponderating advantages, *Seward*, 920, 921; small economy resulting, p. 179; *Murray*, 88-94; time required, *Clarke*, 328; *Elwes*, 1040, 1041; would assist botanists, *Carruthers*, 570.

Amateurs, majority of papers in Linnean Society's Transactions, by, *Carruthers*, p. 137; should have a herbarium in London, *Carruthers*, 126, 127.

Ambrosia, as a "type" of Compositæ, *Holmes*, 421.

America, expeditions to collect issuing from, *Dyer*, 1294, p. 85.

American botanists and Kew, *Dyer*, p. 82; their opinion of the fire risks there, *Dyer*, p. 96; plants not studied by witness, *Hanbury*, 515.

Anatomic investigations, collections not sufficiently utilised, *Dyer*, p. 64; —in Jodrell Laboratory, *Dyer*, p. 95.

Anatomy of palæozoic plants, *Seward*, 895.

Animal remains more used in stratigraphic geology than plants, *Murray*, 86.

Annotations in Banksian Library referring to the herbarium, *Carruthers*, p. 135.

Antarctic collections of "Erebus" and "Terror," *Dyer*, p. 85-87.

Antoine, Franz, the types of his "Coniferen" at Vienna, p. 162.

Anthropology, not represented at Cromwell Road, *Lankester*, 1151, 1166.

Apologies extorted from British Museum officials, *Dyer*, p. 57.

Appendices in Kew Bulletin, *Dyer*, p. 81.

Application for additional space ignored, *Dyer*, p. 98.

Applied Botany, see *Economic Botany*.

Arboretum hand list, *Dyer*, p. 58.

Argyll, late Duke of, in Geological Department, *Woodward*, 1066.

Aroid inflorescences at Vienna, p. 162.

Aroids, best studied in a living state, *Elwes*, 1022.

Arrangements at Kew preferable, *Masters*, 637, 665; of herbaria, *Dyer*, p. 95; *Murray*, 33, 34, p. 4; good at both institutions, *King*, 275, 276; of museums, *Dyer*, p. 58; suggested by the Devonshire Commission, p. 141.

Arrears of cryptogams, none, *Murray*, 67; —of phanerogams, *Murray*, 64-66.

Artists, regulations for, *Dyer*, p. 64.

Ascension, flora, *Dyer*, p. 65.

Assistant Librarians, their grade, p. 111.

Assistants, in herbarium, *Dyer*, p. 59; work assigned, *Murray*, 140.

Attacks by British Museum Officials on Kew, *Dyer*, p. 57.

Attendance of Visitors, *Murray*, p. 3.

Auckland Island collection, *Dyer*, p. 86.

Auckland, Lord, consignment of plants from Kew, p. 113.

Australia, flora, *Dyer*, p. 65; representative herbarium to be at the British Museum, *King*, 223, 290; types in the British Museum, not Kew, *Murray*, 160, 162.

Australian collections at the British Museum, *Dyer*, 1275; no large accession from, now received at Kew. *Dyer*, p. 74.

Authentic specimens not equal to types, *Fawcett*, 536.

Avebury, The Right Hon. John, 1st Baron; see *Lubbock*.

Ayrton, The Right Hon. Acton Smee, memorandum on Kew, p. 151; mentioned, *Dyer*, p. 57.

B.

Babington, Prof. Charles Cardale, estimate of the British flora, p. 137.

Backing of sheets in Kew Herbarium, not practicable, *Helmsley*, 1222, 1223.

Bacteria, preserved, at Vienna, p. 162.

Baillon, Prof. Henri Ernest, visits to the British Museum, *Carruthers*, p. 134.

Baker, E. G., at Kew, *Dyer*, p. 65; mentioned, *Murray*, p. 178.

Baker, J. G., at Kew, *Dyer*, p. 65; flora of Mauritius, *Dyer*, p. 65; herbarium arrangement, *Murray*, p. 4.

Balansa, B., plants in Paris, p. 168.

Balfour, Dr. I. B., at Kew, p. 65.

Ball, John, accumulation of plants at the British Museum, p. 132; botany, has paid much attention to it, p. 131; collections should be sent in the first place to Kew, p. 132; Colonies would benefit by plants distributed, p. 132; evidence, 1871, p. 131; —correction of same, p. 143; —reply to, *Carruthers*, p. 145; fossils might remain at the British Museum, p. 132; gift to Kew, *Dyer*, p. 74; Kew, duplicates available, p. 131; —perfection of its arrangements, p. 131; —richest and most valuable collection in the world, p. 131; —should receive the British Museum collections, p. 131; letters explaining his evidence, p. 143; national botanic collection, views on, p. 131; reply to evidence, *Carruthers*, p. 145.

Banks, Right Hon. Sir Joseph, Bart., codicils to his will, *Dyer*, p. 100-102; correspondence with W. T. Aiton, and the Treasury, *Dyer*, p. 84-85; his influence on Kew, p. 112, 125; his library and herbarium the centre of botanic activity, p. 111; *Murray*, p. 3; his fossils, *Murray*, p. 3; his manuscripts, p. 116; opinion of Bauer as a draughtsman, *Dyer*, p. 98; plants from Kew, p. 141; *Hemsley*, 1220, 1225, 1226; cf. *Dyer*, p. 101; —those in the Botanical Department, British Museum, cited, 1868, p. 126; scientific adviser to George III., p. 111; seeds and dried plants, *Hemsley*, 1220, 1225, 1226.

Banksian herbarium, amalgamation proposed in 1858, *Dyer*, p. 57; history, *Dyer*, p. 100-102; *Hemsley*, 1209; *Murray*, p. 3; its value, *Dyer*, 1305; merged in the general herbarium, *Murray*, 42.

Banksian library, intimate connection with the herbarium, *Carruthers*, p. 135; insured for £7,300, p. 127; retained at Bloomsbury, *Murray*, 176; should be transferred to the Botanical Department, p. 126; —probable effect on the Printed Book Department, p. 127; views of the collector during its formation, p. 127.

Barter, C., his Niger collections, *Dyer*, p. 85.

Barrow, Sir John, letter, *Dyer*, p. 86.

Bateman, James, garden at Biddulph Grange, p. 152.

Bather, F., work on fossil crinoids, mentioned, *Woodward*, 1083.

Batters, Edward Arthur Lionel, at Kew, *Dyer*, p. 66; correction of misnamed Algæ, *Holmes*, p. 173; letter, p. 179; on plants at the British Museum, p. 179; statement in correction of some of Mr. Holmes's evidence, p. 179.

Bauer, F., drawings at Vienna, p. 162.

Bauer, Ferdinand, drawings made during Flinders's voyage, p. 116.

Bauer, Francis, annuity from Sir J. Banks, *Dyer*, p. 98, 100-101; p. 125; drawings, p. 116; —bequeathed, *Dyer*, p. 101; Sir J. D. Hooker's letter about them, p. 101, 102.

Beddome, Col. R. H., at Kew, *Dyer*, p. 65.

Belgium, Brussels herbarium, p. 164.

Bennett, Arthur, at Kew, *Dyer*, p. 66.

Bennett, John Joseph, appointed keeper, 1858, p. 122; assistant, p. 112; assistant keeper, p. 115, 117; Brown's herbarium housed at the British Museum, his property, *Carruthers*, p. 133; cost of Department, between £900 and £1,000 annually, p. 124, 125; description of the collections, p. 124; difference between them and those at Kew, p. 124; disadvantages of removal, p. 124; evidence, 1858, p. 119; ditto, 1860, p. 124; —cited, *Owen*, p. 152; gardeners visit the collections, p. 125; library, a new one required after removal, p. 125; —costly on account of illustrated books, p. 125; mercantile men as enquirers, p. 125; on Dryander's catalogue, p. 117; notes on G. Russell's memorandum, p. 126; probable diminution of visitors if removed, p. 125; reasons against removal, p. 125; store-room only required, p. 124; structure of plants exhibited, p. 125; students prefer dried plants to living, p. 125; visitors would probably diminish on removal, p. 125; weavers cultivate flowers, p. 125; workmen, few as visitors, p. 125.

Bennettites Gibsonianus, specimens at Kew, *Scott*, 1135.

Bentham, George, article in the "Gardeners' Chronicle," 1858, on removal of British Museum collections, p. 122; —in "Nature," p. 134, 135, 136; Australia, flora of, *Dyer*, p. 65; Banksian herbarium wanted for Kew, p. 120; botanic gardens, not utilised by him, p. 120; —cited, *Carruthers*, p. 135, *Owen*, p. 152; British flora, estimated extent, p. 137; desirable to keep a herbarium at the British Museum, p. 120; —cited, *Carruthers*, p. 134; duplicates at the British Museum, p. 120; evidence, 1858, p. 120; —cited, *Carruthers*, 1871, p. 130, 134; —paper in support, p. 142; exclusive use of dried material, *Carruthers*, 613, 614; flora, British, estimated extent, p. 137; gifts to Kew, *Dyer*, 1290; p. 74; herbarium given to Kew, p. 120; —referred to, p. 138, 139; —essential requisites, p. 130; —cited, p. 139; —required for the work of the gardens, p. 140; —specimens of dried plants exclusively used by him, p. 120; —cited, *Carruthers*, p. 135; *Owen*, p. 152; Hongkong flora, *Dyer*, p, 65; Leguminosæ examined only in the dried state, p. 120; —cited, *Carruthers*, p. 135, *Owen*, p. 152; letter on Kew, *Dyer*, p. 102; library presented with his herbarium, *Dyer*, p. 98; p. 120; living plants need not be near herbaria, p. 120; reasons for gifts to Kew, p. 120; Sloane herbaria might be left at the British Museum, p. 120; — cited, *Carruthers*, p. 134; statement, p. 142; —disputed, *Carruthers*, p. 136; views as to Kew and the British Museum, p. 130; — controverted, *Carruthers*, 578.

Bentham, G., and Sir J. D. Hooker, their "Genera plantarum," elaborated at Kew, *Dyer*, p. 76; fossils ignored therein, *Carruthers*, 136; herbaria arranged in accordance therewith; —British Museum, *Murray*, p. 4; —Kew, *Dyer*, p. 95; Paris, p. 166.

Bequests, accessions to Kew, *Dyer*, p. 74; contain duplicates, *Murray*, 126.

Berkeley, Rev. M. J., herbarium at Kew, *Dyer*, p. 74; its value, *Dyer*, 1305; types of Erysphaceæ, *Dyer*, p. 98; —of Myxomycetes lent, *Dyer*, p. 93.

Berlin, collections utilised, *Dyer*, 1281; herbarium at, *Brown*, p. 117; information requested, p. 161; —reply, forwarding the same, p. 168; no duplicate collections, *Carruthers*, p. 135; removal from town, *Clarke*, 333; set of palms for, *Dyer*, p. 83; visited by witness, *Clarke*, 335; worth imitation, *Murray*, 152.

Bermuda flora, *Dyer*, p. 65.

Bernard, Sir Charles, mentioned, *Dyer*, 1303.

Bescherelle, E., moss herbarium, declined by Kew, *Dyer*, p. 87; —reasons, *Dyer*, 1296, 1305, 1331; mentioned, *Murray*, 67.

Bibliography, 1823-91, p. 157, 158; of Kew work, *Dyer*, p. 65; of research in Jodrell Laboratory, p. 174-177.

Binding, at the British Museum, *Murray*, 97, p. 3; —a small item, *Murray*, 97; at Kew, annual cost, p. 173, 174; borne on the vote for the Stationery Office, *Dyer*, p. 87. (See also *Libraries*.)

Biological series, in which geology will disappear, *Woodward*, 1068.

Birkbeck Institution, students visit the Botanical Department, *Murray*, p. 3; and the Geological Department, *Woodward*, 1097.

Blackened sheets, due to poison, *Dyer*, p. 94.

Bloomsbury, Banksian library retained there, *Murray*, 176; removal from, *Murray*, p. 3.

Board of Agriculture, technical botanic work undertaken, *Dyer*, 1309, p. 65; *Lankester*, 1188;—zoologic work, *Lankester*, 1186-1188.

Board of Control suggested for Kew, *Dyer*, p. 99.

Boiling, examination by, *Dyer*, p. 95; *Murray*, p. 4.

Boodle, L. A., at Kew, *Dyer*, p. 65.

Books purchased, British Museum, *Murray*, 97, p. 3; —Kew, *Dyer*, p. 87, 99; saving on amalgamation would be small, *Murray*, 102, 103; books and journals at Cromwell Road, absent from Kew, *Hiern*, 961, 962.

Booksellers employed, *Murray*, p. 4.

Borrowed, term defined, *Woodward*, 1082, 1083; collections, *Dyer*, 1344.

Boswell, J. T. I., herbarium formed by, *Hanbury*, 497.

Botanic assistance chiefly from outside workers, *Woodward*, 1079; duplicate books should be left, *Woodward*, 1076; gardens in the colonies, suggestions for, *Dyer*, p. 74, 75; excursions, Kew, *Dyer*, p. 62; —Paris, p. 166; —their cost, p. 166; headquarters of the Empire at Kew, *Dyer*, p. 64; investigation, fossil plants at Kew for, *Scott*, 1117, 1120; library at the British Museum, *Murray*, 180; —incorporated in the general library catalogue, *Woodward*, 1076; —one of the finest existing, *Woodward*, 1076; sequence observed at the British Museum, *Masters*, 666; staff consulted by palaeontologists rather than the herbarium, *Murray*, 108, 109; stations, *Dyer*, p. 76, 79; —in Africa, *Dyer*, p. 82; survey of the Empire, *Dyer*, p. 64, 98; value of fossils predominates over geologic value, *Seward*, 875, 876.

Botanical Department, British Museum, p. 111; see also evidence of *Bennett, J. J.*, *Brown, R.*, *Carruthers, W.*, *Murray, G. R. M.*, ; relations to Kew, *Dyer*, p. p. 57; transference of fossil plants to Geological Department, *Woodward*, 1063.

"Botanical Magazine," *Dyer*, p. 98.

Botanist, competent, in critical genera wanted, *Hanbury*, 509; would be required at the British Museum after transference, *King*, 280.

Botanists, American, on the fire risks at Kew, *Dyer*, p. 96; English, prefer a London establishment, *Carruthers*, 577; foreign, are indifferent to locality, *Carruthers*, 577; only students of fossil plants, *Lankester*, 1146; portraits at Kew, *Dyer*, p. 58; visiting Kew, *Dyer*, p. 65; who have used the Geological Department, *Woodward*, 1066; who cannot get to Kew, *Murray*, 113, 114; would regret amalgamation out of London, *Groves*, 347; work at fossil plants, *Woodward*, 1065.

Botany, from a horticultural standpoint, *Elwes*, 1017; in the Index Museum, *Lankester*, 1183; instruction, *Murray*, 6-21; lectures to garden staff, *Dyer*, p. 59, 60; less claim than other subjects for recognition, *Lankester*, 1151; less studied by witness than entomology or ornithology, *Elwes*, 1017; no other science has duplicate collections, *Carruthers*, 586, 589; systematic, largely based on the pre-Linnean herbaria, *Murray*, p. 3; —Kew the only place in the world for its proper study, *Elwes*, 1008.

Bourgeau, Eugène, collections at Kew, *Dyer*, p. 85; —mentioned, *Hemsley*, 1257; —at Paris, p. 168.

Boulger, Mr. George Simonds, letter deprecating removal of botanic collections, p. 174.

Bovell, Mr., investigation of sugar-cane disease at Kew, *Dyer*, p. 67.

Bower, Professor F. O., at Kew, *Dyer*, p. 65; at the Laboratory, *Dyer*, p. 66; palaeobotany, *Murray*, 53; use of Geological Department, *Seward*, 910; *Woodward*, 1066.

Brabourne, Right Hon. Edward Huguessen Knatchbull-Huguessen, 1st Baron, papers mentioned, p. 101.

Braithwaite, Dr. R., at Kew, *Dyer*, p. 65.

Brandis, Sir Dietrich, at Kew, *Dyer*, p. 65; his Forest Flora of India, *Dyer*, p. 76, 98; labours on forestry, *Dyer*, p. 77.

Briquet, Dr. J., at Kew, *Dyer*, p. 66.

British Association for the Advancement of Science, Memorial, 1847, p. 113.

British botanists at the British Museum, *Carruthers*, 611, 612; —at Kew, *Dyer*, p. 65, 66; their types chiefly in British Museum, *Murray*, 37; botany, *Groves*, 345; coal-plants at Jermyn Street, *Woodward*, 1097; collections at the British Museum not perfect, *Groves*, 365, 366; Colonial floras, *Dyer*, p. 64.

British Columbia expedition, collections, *Dyer*, p. 85.

British Flora, estimates of its extent, p. 137.

British Herbarium, Cromwell Road, of British specimens only, *Murray*, p. 2, 4, Q. 46, 83; —sufficient for casual botanists, *Masters*, 699; —not known to witness, *Elwes*, 1013; —should remain, *King*, 226, 289-291; —transfer to Kew, *Lankester*, 1162; —with pre-Linnean collections should be left in Museum, *Masters*, 647, 654, 655.

British India, flora, *Dyer*, p. 65, 76.

British Isles, geology not entirely represented at Jermyn Street, *Woodward*, 1169.

British Museum, academies, their publications in the general library, *Murray*, p. 4; accessibility, relative, *Clarke*, 320, 321, 331; *Elwes*, 1055; *Groves*, 348-355; *King*, 273, 274; accessions, *Murray*, p. 3, Q. 61, 62; accommodation insufficient for united herbaria, *Carruthers*, 581, 583;—additional space readily arranged, *Carruthers*, 582, 584; p. 173; accumulation the dominant idea, *Dyer*, 1286; accumulations, *Ball*, p. 132; *Murray*, p. 4; —accessible to enquirers, *Murray*, p. 4; —rapidly being reduced, *Murray*, p. 4; acquaintance with herbarium only partial, *Ball*, p. 131; additions to each establishment, *Murray*, 156; administration, change on amalgamation, *Hiern*, 977-980; Admiralty, collections sent to, *Richards*, p. 147; —correspondence as to collections wanting at the British Museum, *Dyer*, p. 85, 86; advantages of separate collections, *Bennett*, p. 127; *Carruthers*, p. 133; *Masters*, 667, 670, 681; —offered as educational, *Farmer*, 779-781, 827; advice to botanists, casual, *Murray*, 162; Africa, collections sometimes predominate over those at Kew, *Murray*, 74, 75; —West, collections from, *Hiern*, 950; Agriculture, Board of, advised in matters of zoology, *Lankester*, 1186-1192; algæ, present and future arrangements, *Murray*, p. 4; recourse to collections, *Farmer*, 775, 783, 808; amalgamation, conditioned by expense, *Hiern*, 968, 969; *Masters*, 657, 689; —costly, if involving building, *Lankester*, 1164, 1165; —counterbalanced, *Carruthers*, 576; —dangers of, *Murray*, 113, 115; —desirable, *Clarke*, 304-308; *Elwes*, 1008-1012; *Hemsley*, 1211-1213; *King*, 210; —methods—by cabinets, *Clarke*, 337; *King*, 212, 214, 215, 236, 238, 239; *Masters*, 642, 643; ——not possible, *Dyer*, 1342, 1343; —by contiguity, *King*, 211, 214, 236, 239; —by collocation, *Dyer*, 1287, 1342, 1343; —by sheets, *Clarke*, 337; *King*, 236, 238; —saving, *Murray*, 88, 91, 92, 95, 98-107, 111; —time requisite, *Clarke*, 328, cf. 311; *Elwes*, 1040, 1041; —useful to workers, *Dyer*, 1281, 1283, 1284; *Carruthers*, 570; *Elwes*, 1014, 1052; amateurs, herbarium for, p. 126; —importance of museum collections to, *Masters*, 673; anthropology not represented, *Lankester*, 1151, 1166; applied botany, collections not used for, *Murray*, 6, 29; arrangement, authorities followed, *Murray*, p. 4; —good, *King*, 276; —less advantageous than at Kew, *Masters*, 636, 637, 671, 672; —of specimens by the staff, *Murray*, 33, 34; —suggested geographic arrangement by the Devonshire Commission, p. 141; —British Museum and Kew, *Carruthers*, p. 137, 140; *Hooker*, p. 129, 140; *Owen*, p. 140, 154; arrears in laying in, *Murray*, 64—66; Assistant-Librarians, their position, p. 111; assistants, distribution of work, *Murray*, 140; attacked by "Edinburgh Review," in 1823, p. 111; attacks by officials on Kew, *Dyer*, p. 57; attendance of visitors, 1875, *Murray*, p. 4; —1899, *Murray*, p. 3; —return 1881-9, *Murray* p. 3; Australia, herbarium, *King*, 223; —rich collections from, *Murray*, 160, 162; authenticity of specimens should be vouched for, *Holmes*, 475, p. 173; Baker, J. G., Vascular Cryptogams arranged after *Murray*, p. 4; balances, unexpended, formerly paid into Treasury, *Woodward*, 1090; —present arrangement, *Woodward*, 1092; Banks, Right Hon. Sir J., codicils, *Dyer*, p. 100-101; —fossils, *Murray*, p. 4; —his herbarium, *Murray*, p. 3; p. 111;—his library, p. 111; Banksian Department acquired, p. 112;

British Museum, &c.—*continued.*
—herbarium, *Dyer*, p. 101-102; —Kew lacks possession, *Dyer*, 1274; —known to witness, *Dyer*, 1345; —not kept separate, *Murray*, 42; —offshoot of Kew, *Dyer*, 1299, p. 102; —specimens desirable for Kew, *Hemsley*, 1225; —value, *Dyer*, 1306; Barter, C., plants collected by, absent, *Dyer*, p. 85; Bauer's drawings, p. 116; *Dyer*, p. 101, 102; Bennett, J. J., assistant, p. 112; —Keeper, p. 122; —evidence, 1835, p. 117; —1858, p. 119; —1860, p. 124; —notes, 1869, p. 126; Bentham, G., views, 1871, p. 130; bequests, duplicates resulting from, *Murray*, 126; Berlin, an example, *Murray*, 152; Bescherelle collection, acquired, *Dyer*, p. 87, Q. 1296, 1305, 1331; —alluded to, *Murray*, 67; binding, allowance for, *Murray*, p. 3; —possible saving on amalgamation, *Murray*, 103; Birkbeck Institution, students as visitors, *Murray*, p. 3; Bloomsbury, removal from, *Murray*, p. 3; books, in Botanical Department, *Clarke*, 334; —possible saving on amalgamation, *Murray*, 102, 103; —recent botany only, *Woodward*, 1093, 1094; —wanting at Kew, *Clarke*, 310, 319, 334; *Hiern*, 962; —in general library, *Clarke*, 334; books and binding, *Murray*, p. 3; books and journals, *Hiern*, 961; booksellers employed, *Murray*, p. 4; borrowing from other departments, *Woodward*, 1082, 1083, 1086; —of balances, *Woodward*, 1090; botanic collections, *Masters*, 621, 623; —arrangement, *Masters*, 665, 688; —inferior to Kew, *Masters*, 636, 637; —criticised in 1823, p. 111; —exhibition should be retained, *Seward*, 930, 931: —much consulted by witness, *Hanbury*, 499; —never used for teaching purposes by witness, *Holmes*, 468; —used for old collections, *Masters*, 624; —also for plants not at Kew, *Masters*, 630, 633, 695; —worked five years in the collections, *Hiern*, 947; Botanical Department, enlargement suggested, *Carruthers*, p. 173; —growth since removal, *Dyer*, 1299, 1345; —library confined to recent botany, *Woodward*, 1094; —staff rather than collections used by palaeontologists, *Murray*, 108, 109; —public also, *Murray*, p. 2; —to whom subordinate, *Dyer*, p. 57; —under George III., p. 111; botanist, competent, would always be needed, *King*, 280; —limitations, *King*, 281; botanists, attending, *Carruthers*, 611, 612; —relative accessibility, *Carruthers*, 577; botany shown in Central Hall, *Lankester*, 1183; Boulger, Mr. G. S., on collections exhibited, p. 174; Bourgeau, E., plants wanting, *Dyer*, p. 85; British botanists visiting, *Carruthers*, 611, 612; British herbarium, *Murray*, p. 2; —date of formation, *Carruthers*, p. 180; —enough for casual botanic visitors, *Masters*, 699, 700; —most excellent, *Hanbury*, 506; —not a perfect collection, *Groves*, 365, 366; —should be left, *King*, 289, 290, 291; should be transferred, *Lankester*, 1160-1162; unknown to witness, *Elwes*, 1013; British plants alone insufficient, *Groves*, 362-364; —easier studied than at Kew, *Hanbury*, 500, 502; —removal deprecated, *Hanbury*, 504, 505; British specimens only in British herbarium, *Murray*, 46, 83; —shown in public room, *Carruthers*, 604; Brown, R., evidence, p. 111-115; —fossils, *Murray*, p. 4; —herbarium, *Carruthers*, p. 133; *Murray*, p. 3; —on "Erebus" and "Terror" collections, *Dyer*, p. 86; building at Cromwell Road not complete, *Carruthers*, 582, 584; —at Kew, *Dyer*, 1329; —Burlington House as a site for a museum, p. 122; cabinets, incorporation by, *Clarke*, 337; *Hemsley*, 215; *King*, 212, 214; *Masters*, 642; —larger than those at Kew, *Murray*, 90; —number, *Murray*, p. 178; —with moveable trays, *Murray*, p. 4; Campbell Island plants wanting, *Dyer*, p. 85; camphor used as a preventative to insect damage, *Murray*, p. 4; carpological collection, *Murray*, 56-58; *Carruthers*, Mr. W., evidence, 1871, p. 133-138; 1900, 564-619; p. 173, 177-179; —keeper, 24 years, *Carruthers*, 564; catalogues, official, *Murray*, p. 3, 4; —cost of printing, *Murray*, p. 3; —published by the Trustees, *Seward*, 940; —specimens enumerated should be left, *Scott*, 1124; —written by witness, *Seward*, 892, 939; Central Hall exhibition, *Lankester*, 1154, 1183; "Challenger" collection claims, *Dyer*, p. 85; change undesirable if to an inflammable structure, *King*, 244; Characeæ studied, *Groves*, 344, 345, 357; collection lost sight of, *Holmes*, 451; ——controverted, *Carruthers*, p. 177-180; —of fossil plants very large, *Scott*, 1108; —of timbers poor, *Dyer*, p. 82; collections, botanic, acquired by competition, *Elwes*, 1031; —not on personal knowledge, *Elwes*, 1032; —by purchase, *Dyer*, 1291, 1295; —claims against Kew, *Dyer*, p. 85; —deprived by Kew, *Dyer*, p. 85; —difference between

British Museum, &c.—*continued.*
them and those at Kew, *Bennett*, p. 126; —disposal a personal question, *Murray*, p. 3; less important than those at Kew, *Masters*, 718, 719; —London situation preferable, *Murray*, 113, 114; —might be brought under one system, *Hooker*, p. 129; — —history of, p. 114-117; — —cited, p. 138; —might be left in part, *Scott*, 1136, 1137; —not as available as they should be, *Ball*, p. 131; —set from Kew, *Dyer*, 1358; —some packets not opened since the time of Banks, *Ball*, 132; — —statement challenged, *Carruthers*, p. 143, 145; — —subsequently modified, *Ball*, p. 143; — suggestions as to transference, *Ball*, p. 132; —teaching collections, *Murray*, p. 3; —transference of the whole to Kew, *Ball*, p. 132; —used, reasons given, *Farmer*, 769; *Groves*, 339-341; —wanting at Kew, *Hiern*, 950; collectors, for Banks, were Kew men, *Hemsley*, 1220; —plants not named by them, *Murray*, 152; —previously instructed, *Murray*, p. 3; —show preference for Kew, *Elwes*, 1024; collocation the only possible way of union, *Dyer*, 1342, 1343; Colonial work might be done, *Hiern*, 984, 997; Colonies, herbarium might be arranged according to, *King*, 223, 290; —predominance of Kew due to economic questions, *Murray*, 164; Committee, Select, 1835, p. 111; comparison, facilities for, *Murray*, 84; —of Kew collections, *Carruthers*, p. 135; competition with Kew, *Dyer*, 1595, 1346-1352; —desirable, *Murray*, 156; —insignificant, *Dyer*, 1296; *Hemsley*, 1260; —non-existent, *Murray*, 128; —not disadvantageous, *Farmer*, 848-852; —should be obviated, *Masters*, 727, 728; complete collection desirable, *Masters*, 723; —endeavours to make it so, *Masters*, 725; consultation by Kew, *Hiern*, 984; —little likelihood, *Hiern*, 985; correlation of the Banksian herbarium and library, *Carruthers*, p. 138; correspondence on want of space, p. 113; —with Colonial and foreign botanists, *Murray*, p. 3; Cosson, Ernest St. Charles, letter on herbarium, p. 145; cost of fittings considerable, *Murray*, 89; —of herbarium, 1871-72, p. 137; —would not be lessened by transference, *Murray*, p. 127; Cotton, Sir Robert Bruce, manuscripts, p. 111; Cottonian collections, p. 111; Crombie, Rev. J. M. lichens named by, *Holmes*, 486; cryptogamic collections, *Murray*, p. 3; —badly named, *Holmes*, 473, 477. p. 173; —compared with those at Kew, *Dyer*, 1305; —increase, *Murray*, p. 3, Q. 117, 118; —no arrears of unarranged, *Murray*, 67; —not able to state comparative value, *Masters*, 726; —reconstruction of herbarium, *Murray*, p. 3; —should be transferred to Kew, *Holmes*, 476; —should not be separated from phanerogams, *Groves*, 354-357; —visitors, reason for diminution, *Murray*, p. 3; —world wide, *Murray*, 162; Cunningham, R. O., plants wanting, *Dyer*, p. 85; Cycads, size of sheets for, *Murray*, p. 4; *Delesseria* confused in herbarium, *Holmes*, 489; Departments, at foundation, p. 111; —libraries, *Murray*, 177-181; Devonshire Commission, recommendations not practicable, *Murray*, 167-175; —report, p. 127-149; De Toni, algæ arranged according to, *Murray*, p. 4; Dickie, Dr. G., algæ misnamed by, *Holmes*, 477, 478, p. 173; cf. 178, 179; differences from Kew herbarium, *Clarke*, 302; *Carruthers*, p. 137; diaries of officers, *Murray*, p. 2; dilettanti, herbarium important for, *Masters*, 673; disadvantage of two collections, p. 123; —not serious, *Farmer*, 848-855; disappearance of collections, *Ball*, p. 132; Holmes, 411, 451, cf. p. 178; —controverted, *Carruthers*, p. 177-179; distribution of duplicates, *Murray*, 144; division of phanerogams from cryptogams would be a mutilation, *Murray*, 197; drawings, large collection, *Murray*, p. 4; Dulau and Co., as booksellers, *Murray*, p. 4; duplicates, a few sent to Royal College of Science, *Farmer*, 810; —ascertained proportions, *Carruthers*, p. 136; —distribution, *Murray*, 144; —elimination on union, *Murray*, 154, 155; —how should be disposed of, *King*, 259; —in bequests and purchases, *Murray*, 126; —might be sent from Kew, *Hooker*, p. 129; —should be got rid of, *Hemsley*, 1230, 1246, 1258; duplicate-room, for storing, *Murray*, 68; dust, a great nuisance, *Hooker*, p. 129; —not found injurious, *Carruthers*, 616; —plans for its exclusion, *Hooker*, p. 129; duties of officers, *Murray*, p. 2; Dyer, Sir W. T. Thiselton, letter on collections, p. 87; economic botany, left to Kew, *Holmes*, 462; *Murray*, 29, 164, 165; —collections not required, *Bentham*, p. 131; —colonial questions referred to Kew, *Hiern*, 998; "Edinburgh Review,"

British Museum, &c.—*continued.*
attack, p. 111; edification its function, *Lankester*, 1152, 1153; education not its work, *Lankester*, 1152, 1170, 1185; educational collections, fluid specimens not essential, *Farmer*, 834; —expansion desirable, *Farmer*, 780, 842; — —supply required from a garden, *Farmer*, 835; —herbarium should be left, *Masters*, 651-653, 656; —if reduced to that would be retrogressive, *Farmer*, 846, 847; —series, largest and best in Europe, *Murray*, 149; —use of collections, *Farmer*, 774-789, 790-799, 827, 859; *Murray*, p. 2, 3; Q. 6-17, 149-151; effects of transference to Kew, *Lankester*, 1138; —from Kew, *Lankester*, 1151; emulation a possible advantage, *King*, 234; English plants should be left, *King*, 290, 291; enlargement deprecated, *Masters*, 729; —proposed, *Carruthers*, 582-584, p. 173; enquiry, 1868-69, p. 126; —referred to, *Carruthers*, p. 134; *Owen*, p. 152; "Erebus" and and "Terror" collections, *Dyer*, p. 85, 86; errors in naming, *Carruthers*, p. 178; *Hanbury*, 512; *Holmes*, 473, 474, p. 173; European herbarium, *King*, 225; —required for British plants, *Groves*, 364; *Hanbury*, 517; examination by boiling, *Murray*, p. 4; exchange of specimens, *Murray*, p. 3, Q. 63; exhibition in public gallery, *Elwes*, 1034; should be kept up, *Elwes*, 1033; —in Geological Department, *Woodward*, 1095; expansion, not practicable, 1858, p. 123; —room for, *Murray*, 110; —teaching collections desirable, *Farmer*, 780, 842-844; expenditure on amalgamation, *Murray*, 95-107; expense not justified for amalgamation, *Masters*, 658, 680, 681, 689; —not worth consideration, *King*, 213, 232; —removal probably not great, *Elwes*, 1030; external characters in fossil plants, *Scott*, 1128; facilities for examination of specimens, *Carruthers*, p. 135; —study of fossils, *Seward*, 924; —work in herbarium, *Murray*, 79, 80; Fawcett, W., assistant for five years, 524; ferns, arrangement, *Murray*, p. 4; —essential to consult collection, *Seward*, 920; —size of sheets for, *Murray*, p. 4; Ferro's pre-Linnean herbarium transferred from Kew, *Murray*, p. 3; fire, precautions against, *Murray*, 98; —security by separation, p. 137; fire-proof building requisite, *King*, 752; —collections housed in, *Murray*, p. 4; fire-risk, appliances, *Hiern*, 959, 970; —drawback to amalgamation, *Carruthers*, 571, 576; —small, at Cromwell Road, *Hiern*, 959; Flower Sir W. H., fossils transferred under, *Murray*, p. 4; —Index Museum, *Lankester*, 1154; —relations with Kew, *Dyer*, p. 87; Forbes, H. O., New Guinea collections, *Dyer*, p. 87; foreigners, London most convenient for, *Clarke*, 331; Forster, E., collection of plants lost sight of, *Holmes*, 411, 451, 452, p. 173; —controverted, *Carruthers*, p. 177-179; fossil plants, collection exceedingly good, *Seward*, 871; —believed to be in the Botanical Department, *Holmes*, p. 173; —best kept with recent plants, *Farmer*, 797-799; *Seward*, 877; —could not be named from a reference herbarium, *Carruthers*, 578, 605; essential feature in a complete collection, *Carruthers*, 573, 574; —in Botanical Department, once, *Holmes*, p. 173; —transferred, *Murray*, 47-50, p. 4; *Woodward*, 1063; —fewer than were in Geological Department, *Seward*, 878; *Woodward*, 1063; —in the Geological Department, *Seward*, 878; *Woodward*, 1063, 1064, 1081-1086; — —transfer unconditional, *Woodward*, 1084; —present state of collection, *Seward*, 881; —specimens not readily found, *Seward*, 923; —less used by geologists than formerly, *Murray*, 60, 85; —probable reasons, *Murray*, 85; —little studied by witness, *Hiern*, 989; —methods of research, *Carruthers*, 610; —might be left, *Lankester*, 1183; *Masters*, 749; —named by comparison with recent forms, *Farmer*, 802; —need a herbarium of types, *Carruthers*, 618, 619; —not arranged for stratigraphic work, *Lankester*, 1178, 1194, 1195; —only place where they are kept, *Carruthers*, 573; —opinion relied on, *Hiern*, 973-976; —publications required for their study, *Murray*, 94; —resulting from Government expeditions, p. 141; —sent from Kew, *Dyer*, 1358; —should be shown, *Seward*, 942-945; ; —should be transferred to Kew, *Holmes*, 439, 440; *Seward*, 878, 880; —should be with recent plants, *Seward*, 877; —transferred to Geological Department, *Murray*, 47-50, p. 4; *Woodward*, 1063, 1064, 1081-1086; —specimens studied by Dr. Scott, *Lankester*, 1181, 1182; —usually have only external characters, *Carruthers*, 618, 619; foundation in 1753, p. 111; fruits, how kept, *Murray*, p. 4; Q. 56-58; fungi, arrangement, *Murray*, p. 4; furniture and fittings, *Murray*, 88-94, p. 3; galleries, term explained, *Murray*, 78; genera, arrangement, *Murray*, p. 4; general herbarium should be retained, *Hanbury*, 517; general library at Cromwell Road, *Murray*, 94; geographical arrangement confined to species, *Murray*, p. 4; —herbarium suggested, *Hanbury*, 507; —sequence not followed, *Masters*, 666, 685; Geological Department, alluded to, *Holmes*, 444; —fossil plants transferred to, *Murray*, 48-50, p. 4; *Woodward*, 1063, 1064, 1081-1086; —more animal remains than botanic, *Lankester*, 1176; —no geologic work done there, *Lankester*, 1177; —not aware that fossil plants are now there, *Holmes*, 445; —palaeontology in, *Lankester*, 1142, 1143, 1147; —vegetable fossils under Keeper of Botany, *Murray*, p. 4; —controverted, *Woodward*, 1064, 1084-1086; geologists and fossil plants, *Murray*, 59; —proposed herbarium for, p. 126; George II., presentation of the Royal Library, in 1757, p. 111; George III., condition of Botanical Department under, p. 111; gift, accessions by, 1891-99, *Murray*, p. 3; glue, not used, *Murray*, p. 4; Godman, F. D., St. Vincent collections, *Dyer*, p. 87; Government collections of dried plants not now sent, *Murray*, 172-173; —Devonshire Commission, recommendations carried out, *Murray*, 173, 174; —fossil plants sent, p. 141; —expedition claims, *Dyer*, p. 85; —first set reserved for, p. 141; —requisitions rare, *Murray*, p. 3; —sets sent thither by the Admiralty, *Richards*, p. 147; groups of plants geographically arranged, *Murray*, p. 4; —not better than at Kew, *Masters*, 721; guides to collections, *Murray*, p. 3, 4; gum used as an adhesive, *Murray*, p. 4; hepatics, arrangement, *Murray*, p. 4; herbaria which should be retained, *King*, 223-228; herbarium, accessibility, *Farmer*, 821, 822, 824; —accessions, *Murray*, p. 3; —arrangement and plants, p. 133; —assistants, p. 133; —Banks's plants all laid in, p. 133; —believed to be equal to Kew, p. 133; —British plants should be transferred, *Lankester*, 1162; —Brown's plants only lodged there, p. 133; —consists of more than dried plants, *Carruthers*, 609; —consulted to compensate for own small collection, *Farmer*, 817, 820; —described, *Carruthers*, p. 133; —duplicates, their acquisition discouraged, p. 133; —for fossil plant study needless, *Lankester*, 1167, 1168; —for students, *Carruthers*, 604; —general, should be retained, *King*, 243, 244; —Hooker's views on, p. 128; —incorporated during 1891-99, *Murray*, p. 3; —insufficient for cultivators, *Elwes*, 1026; —large, but does not obviate visits to Kew, *Seward*, 903, 904; —less consulted by palaeontologists than the staff, *Murray*, 108; —might be transferred to Kew, *Seward*, 883, 930; —necessary so long as fossil plants are in the Museum, *Carruthers*, 588; —not consulted by witness, *Elwes*, 1006, 1029; —not open to the public, p. 133; —not required, save for fossils, *Elwes*, 1015; —nothing there not found at Kew, *Elwes*, 1006, 1050; —old types in it, *Dyer*, 1274, 1275, 1277; —plants from Banks all incorporated, p. 133; —popularisation recommended, *King*, 266, 268, 278, 279; — —but accuracy in naming essential, *King*, 278; —removal, a calamity, *Carruthers*, 616, 618; —represents a different view than Kew, *Carruthers*, 573; —rules of admission, p. 133; —should be kept, but not enlarged, *Masters*, 729; —should remain as at present, *Carruthers*, 566; —Sloane herbaria, and their indexing, p. 111; —smaller than Kew, *Hemsley*, 1222, 1227; cf. 1232, 1233; —somnolent once, *Murray*, 156; —staff, p. 133; —stronger than Kew in some parts, *Murray*, 158; —students, p. 133; —herbarium for, *Carruthers*, 604; —unarranged collections, p. 133; —use with regard to fossils, *Seward*, 910-915; —vegetable productions in Sloane collections, p. 133; —visited after Kew, *King*, 207; *Masters*, 694-698; historic herbaria should be with recent plants, *Clarke*, 308; —and be remounted, *Clarke*, 322; —should be transferred to Kew, *King*, 231; historic investigations, *Murray*, 41; Hooker, Sir J. D., fossil plants, p. 4; —letter to the Admiralty as to the Trustees, *Dyer*, p. 86, 87; Hooker, Sir W. J., and J. G. Baker, their "Synopsis filicum," *Murray*, p. 4; horticultural names obtained, *Masters*, 739, 740, 756-758, 760-762; Hudson's plants lost sight of, *Holmes*, 452, p. 173; —controverted, *Batters*, p. 179; *Carruthers*, p. 177-179; identified, plants always, before incorporation, *Murray*, 124; identification, visitors for, *Murray*, 18, 26; identity of certain collections, *Hemsley*, 1246, 1256; inconvenience of visit-

British Museum, &c.—*continued.*
ing Kew, *Groves*, 348; incorporation, 1753, p. 111; incorporation of herbaria desirable, *Hiern*, 956; —at Cromwell Road, *Hiern*, 957; —more accessible than Kew, *Hiern*, 958; —nearer Linnean herbarium, *Hiern*, 958, 959; —with the geologic and zoologic collections, *Hiern*, 958; —by cabinets only a temporary measure, *Hiern*, 994; —by sheets impossible, *Hemsley*, 1215; —in the Kew collections would involve immense labour, *Murray*, 93; —of specimens, *Murray*, p. 3; —continuous process, *Murray*, p. 4; instruction of collectors, *Murray*, p. 3; —of the public, botanic collection needed for, *Hooker*, p. 128; —no part of the Museum work, *Lankester*, 1152, 1170, 1185; independent position, *Dyer*, p. 57; Index Museum in the Central Hall, *Lankester*, 1154, 1183; —its history, *Murray*, 132, 137, 143; India, plants from, *King*, 223, 290, 292; —fewer than at Kew, *Murray*, 74, 77, 157, 161; Jaeger, A., and Sauerbeck, arrangement of mosses, *Murray*, p. 4; Jones, J. W., letters claiming collections, *Dyer*, p. 85, 86; journals and books, *Hiern*, 961; —wanting at Kew, *Hiern*, 962; Keeper of Botany, duties, *Murray*, p. 2; —formerly termed Under-Librarian, p. 112; —of the Banksian collections, 1835, p. 112; —should be a geologist also, *Bentham*, p. 130; Kensington Gore as a site, p. 122; Kew as a competing body, *Hooker*, p. 127; —advantages of cessation of rivalry, *Hooker*, p. 127; —collections consulted by British Museum staff, *Murray*, 119, 120; —richer than British Museum, *Masters*, 626-633, 662-664, 683; —separate functions desirable, *Hooker*, p. 128, 140; —transference would involve closer connection, *Seward*, 937; —visits to British Museum from, essential, *Hiern*, 949; —visits to Kew necessary if herbarium is transferred, to name fossils, *Farmer*, 800; Kirk, Sir J., his plants absent, *Dyer*, p. 85; laboratory, methods employed, *Murray*, p. 4; —used for cryptogams, *Murray*, 145, 146; —well equipped, *Murray*, p. 4; laxity of officials not complained of, *Masters*, 663; lectures by officers not desirable, *Hooker*, p. 129; Librarian, Principal, p. 111; library at Bloomsbury, *Murray*, 176; —at Cromwell Road, *Murray*, p. 3, 4, Q. 176, 177, 178; —consulted, *Clarke*, 310, 319, 334; *Farmer*, 805; —equally accessible as that at Kew, *Farmer*, 807; —less so, *Masters*, 676-679; —excellent for study, *Seward*, 924; —extent, *Murray*, p. 4; —grant for, *Murray*, 93; —Kew compared, *Carruthers*, p. 127, 135; —most valuable, *Groves*, 362; —stop accessions on union, *Masters*, 690, 691; Library, Old Royal, p. 111; lichens named by Crombie, *Holmes*, 486; —rearrangement, *Murray*, p. 4; Lister, Mr. A., myxomycetes added by, *Dyer*, p. 94; —arranged by, *Murray*, p. 4; —Guide to British Species, p. 3; loan of specimens not permitted, *Murray*, p. 4; London, best position for herbaria, *Groves*, 342, 343, 346; —British Museum unique, *Murray*, 141; —botanists would regret transference, *Hanbury*, 511; —residents might prefer amalgamation at Cromwell Road, *King*, 272; Lyall, Dr., his plants absent, *Dyer*, p. 85; maintenance urged, *Hanbury*, 504, 505; Mann, G., plants absent, *Dyer*, p. 85; manuscripts in Department of Botany, *Murray*, p. 2; Manuscripts and Medals, Department of, p. 111; Maskelyne, Nevil Story, evidence, p. 126; material unarranged, probably vast, *Dyer*, 1330; Meller, Dr., plants absent, *Dyer*, p. 85; memorial, 1847, p. 113; —1858, against removal, p. 117; microscopes in Botanical Department, *Murray*, 80; *Seward*, 924; —not in Geological Department, *Seward*, 924; —preparations, *Murray*, p. 2, Q. 148; —provided for workers, *Murray*, 80; Miers, J., on the herbarium, p. 145; mineral collection, *Lankester*, 1154; models exhibited, *Murray*, 138, 139, 149; monographers must consult the collections, *Murray*, 36; monographs the basis of arrangement, *Masters*, 720; *Murray*, p. 4; —should be prepared at, *Fawcett*, 532, 538; —used for arranging collections, *Masters*, 720; Montague House, original site, p. 111; morphological collections, *Carruthers*, 590-601; *Masters*, 705; *Murray*, 132-137, 143, 151; —much used, *Masters*, 706-708; —very useful, *Masters*, 711-713; —work in laboratory, *Murray*, 146, 147; mosses, arrangement, *Murray*, p. 4.; museum at Kew, a model, *Bentham*, p. 143; Murray, Mr. G. R. M., evidence, 1-198; —statement, p. 2-4, p. 178; mycetozoa (myxomycetes), arrangement, *Murray*, p. 4; —guide, *Murray*, 35; —gift from A. Lister, *Dyer*, p. 84; naming, erroneous, in herbarium, *Hanbury*, 512; *Holmes*, 473, 477-492, p. 173; —remarks on same, *Carruthers*, p. 177-179; national herbarium should be at Kew, *Hooker*, p. 126; —denied, *Bennett*, p. 127; Natural and Artificial Productions Department, p. 111; natural history collections should be kept as a whole, *Bennett*, p. 127; —subject not adequately represented on the Board of Trustees, 1847, p. 113; —the Department criticised in 1823, p. 111; new plants and naming, *Hiern*, 989, 999; *Masters*, 729; New Zealand collections, *Dyer*, p. 86; oecological collections, *Murray*, 132-137, 143; offshoot of Kew, *Dyer*, p. 85; old collections, *Hemsley*, 1207; origin of collections, p. 111; Owen, Professor R., on Kew and the British Museum, 151-154, 156-157; —his changed views as to transference, p. 126; Oxford and Mortimer, Robert Harley, Earl of, see *Harley*; palaeobotanists consult botanic staff, *Murray*, 108; —working in museum, *Murray*, 53; palaeobotany, no special member of staff for, *Seward*, 422; *Woodward*, 1079, 1080; palaeontological department a striking success, *Dyer*, 1366; palaeontology at, *Hooker*, p. 129; —recent plants for comparison should be supplied from Kew, *Hooker*, p. 129; palms, special size and paper for, *Murray*, p. 4; Paris herbarium, not an example for imitation, *Murray*, 156, 198; patrolment a safeguard, *Murray*, 98; patronage of Kew and the British Museum compared, p. 129; pedagogic instruction not its aim, *Lankester*, 1152, 1170, 1185; phanerogams, fossil forms there studied, *Seward*, 915; —not better represented than at Kew, *Masters*, 722; plants there, absent from Kew, unknown to witness, *Elwes*, 1051; —collections deprived by Kew, *Dyer*, p. 85; —set to be reserved for, *Dyer*, 1358; —divided equally by, *Fawcett*, 562; poison not used, *Murray*, p. 4; popular exhibition, *Lankester*, 1170, 1172; —should be retained, *Elwes*, 1034; *King*, 221-223, 263-266, 268; —instruction, *Murray*, 6-17; — —not the aim of the exhibition, *Lankester*, 1152, 1170, 1185; post-Linnean collections fused, *Murray*, 43, 44; pre-Linnean collections, *Murray*, 40, 41; —mentioned, *Hemsley*, 1208; —systematic botany largely founded on them, *Murray*, p. 3; —should be transferred to Kew, *King*, 231; —with British herbarium should be retained, *Masters*, 648, 654, 655; preparing allowance, *Murray*, p. 3; present arrangement not bad for science, *Masters*, 730-732, 734, 737; preservative fluids, specimens in, *Murray*, p. 3; Principal Librarian, origin and term, p. 111; Printed Book Department, p. 111; —views as to Banksian Library, p. 125, 127; *Murray*, 176; printing allowance for catalogues, *Murray*, p. 3; professors not permitted to lecture in the Herbarium Gallery, *Murray*, 188-191; public collections for teaching purposes, *Murray*, p. 3; —valuable, and should be extended, *King*, 263-266, 268; —exhibition should be retained, *Elwes*, 1034; —galleries should be left, *King*, 221-223; publication, *Murray*, p. 3; purchases, *Murray*, p. 3, Q. 63; —borrowing from other departments, *Woodward*, 1090; —sum allowed, *Murray*, p. 3; Purdie, W., plants absent, *Dyer*, p. 85; pure botany, collections used for, *Murray*, 6; rarely visited by witness, *Holmes*, 460; recommendations of Devonshire Commission, p. 141; reconstruction of cryptogamic herbarium, *Murray*, p. 3; reduction of arrears in laying in, *Murray*, 69-73; reference herbarium, *King*, 217-219; —from its imperfections might mislead, *Seward*, 899, 900; —might be returned to Kew, *Hiern*, 964; —need not be kept, *Lankester*, 1158; —should be complete, *Seward*, 919; —should be kept, *Seward*, 883, 886-890; —types might be excluded, *Seward*, 888, 889; —unsatisfactory, *Carruthers*, 617; —views on, *Seward*, 919, 920; —would not suffice, *Carruthers*, 578, 617; —would probably suffice, *Farmer*, 783, 790; references received from Kew for verification, *Carruthers*, p. 135; removal from Bloomsbury, *Murray*, p. 3; —from Cromwell Road would be calamitous, *Carruthers*, 616, 618; representative botanic collection might be retained, *Scott*, 1121; —essential that something should be left, *Scott*, 1122; Report, Devonshire Commission, p. 127-149; —Select Committee of the House of Commons, 1835, p. 111; —1860, p. 124; requisitions rarely made by Government, *Murray*, p. 3; research, assistance to, *Murray*, 82; —by staff, *Murray*, 121-123; —essential to vigour of collections, *Farmer*, 845, 865, 866; —herbarium should be transferred, *King*, 279; *Lankester*, 1170; —students, accessibility an advantage, *Masters*, 674; —use, *Murray*, 6, 18-28; reserve of specimens, *King*, 283; *Seward*,

British Museum, &c.- *continued.*
933-936 ; —from Kew, *Elwes*, 1035-1038 ; —of teaching material, *Farmer*, 863, 864 ; Ridley, H. N., Fernando Noronha collections, *Dyer*, p. 87 ; rivalry, not a stimulus to work, *Masters*, 659, 660, 661 ; —with Kew, *Murray*, 156 ; — —beneficial, *Fawcett*, 529, 530 ; — —not productive of undue expense, *Fawcett*, 537, 563 ; *Hemsley*, 1255 ; Royal College of Science, mutual relations, *Murray*, 182-187, 193, 195, 196 ; —students consult collections, *Murray*, p. 3 ; Royal Commission, 1847-50, p. 113 ; —1871-75, p. 127-149 ; Royal Veterinary College, students from, *Murray*, p. 3 ; Saccardo, P. A., arrangement of fungi, *Murray*, p. 4 ; St. Vincent collections, *Dyer*, p. 87 ; salaries and wages, *Murray*, p. 3 ; saving by amalgamation, *Murray*, 88, 91, 92, 96, 98-107, 111 ; Schomburgk, Sir Richard, plants absent, *Dyer*, p. 85 ; sea weeds, facilities for their study, *Farmer*, 775, 783, 808 ; Select Committee of the House of Commons, 1835, p. 111 ; —1860, p. 124 ; selection of plants for Kew, *Hiern*, 963, 964 ; semi-incorporation would end in absolute incorporation, *Murray*, 153 ; sheets, sizes used, *Murray*, p. 4 ; —could not be cut down, *Hemsley*, 1215, 1219 ; *Hiern*, 972 ; shelves in cabinets, moveable trays, *Murray*, p. 4 ; Sinai Survey Exploration, plants absent, *Dyer*, p. 85 ; size of sheets in herbarium, *Murray*, p. 4 ; —a bar to incorporation, *Hemsley*, 1215 ; *Hiern*, 971, 972 ; *King*, 212 ; *Masters*, 669 ; —could not be cut down, *Hemsley*, 1215, 1219 ; *Hiern*, 972 ; —difference not known to witness, *Holmes*, 393 ; slip-catalogue of book-titles, *Murray*, p. 4 ; Sloane, Sir Hans, collections, *Murray*, p. 2, 3 ; —not damaged by soot or dust, *Carruthers*, 616 ; —foundation of the Museum, p. 111 ; —fruits, *Murray*, p. 2 ; —herbaria, p. 111 ; —should be retained, *Bentham*, p. 120 ; — —cited, *Carruthers*, p. 124 ; —their incorporation in the general herbarium undesirable, *Murray*, p. 3 ; soot and dust not found injurious, *Carruthers*, 616 ; Sowerby, J., models of fungi, and guide book, *Murray*, p. 3 ; space acquired by removal, *Lankester*, 1138 ; —for future growth, *Carruthers*, p. 173 ; *Murray*, p. 4 ; speciality in two collections possibly advantageous, *Farmer*, 853-862 ; species in geographic arrangement, *Murray*, p. 4 ; —mixed on sheets, *Holmes*, 473, 477-492 ; specimens, amount for purchases, *Murray*, p. 3 ; —cannot be allowed out of the Museum, *Carruthers*, p. 135 ; *Clarke*, 302 ; *Murray*, p. 4 ; *Seward*, 877 ; —often better than those at Kew, *Clarke*, 315 ; —possibly nine-tenths are duplicated at Kew, *Elwes*, 1030 ; —transfer for examination costly, *Bennett*, p. 127 ; *Sphacelaria* species mixed on sheets, *Holmes*, p. 173 ; staff, consulted by Kew, *Murray*, 119, 120 ; —educational functions, *Murray*, p. 3, Q. 30-32 ; —specimens arranged for, *Murray*, 33, 34 ; Standing Committee of the Trustees, *Dyer*, p. 86 ; statement in reply to interrogatories, *Murray*, p. 2-4 ; Stephani, F., arrangement of hepaticæ, *Murray*, p. 4 ; stratigraphic geology not greatly employed in arrangement, *Woodward*, 1103 ; —not represented, *Lankester*, 1151, 1166, 1193 ; strictures on the Museum, 1823, p. 111 ; structural characters of fossil plants not much studied, *Scott*, 1129 ; —magnificent collection, *Scott*, 1130 ; students, herbarium for, *Murray*, 130, 131 ; —no provision for, *Lankester*, 1152, 1157, 1171 ; —preparing for B.Sc. examination, *Holmes*, 468 ; —provision for, *Carruthers*, 602-604 ; *Woodward*, 1095, 1096 ; —regulations for, *Murray*, 129 ; —use of collections, *Murray*, p. 2, 3 ; study-series, term defined, *Murray*, 125 ; subsidiary collections, *Murray*, p. 4 ; summary of previous inquiries, p. 111-157 ; —of Hooker's views, p. 130 ; Switzerland, herbarium of, *King*, 225, 226, 228, 230 ; "Synopsis filicum" and "Synopsis hepaticarum" used in arrangement, *Murray*, p. 4 ; systematic botany largely based on pre-Linnean collections, *Murray*, p. 3 ; table-space insufficient, *King*, 255 ; Tasmanian collections, *Dyer*, p. 86 ; teaching collections, *Murray*, p. 3 ; temporary assistance, *Murray*, 4, 5, 51, 52 ; *Woodward*, 1079 ; teratology, attractive, *Masters*, 716, 717 ; —not represented, *Masters*, 714 ; —should be, *Masters*, 715 ; timbers, a poor collection, *Dyer*, p. 82 ; Toynbee Hall, students from, *Murray*, p. 3 ; tracts in departmental library, *Murray*, p. 4 ; tradition as to collections, *Dyer*, 1286 ; transactions, in general library, *Murray*, p. 4 ; transference of collections to Kew, deprecated, *Fawcett*, 528 ; —would not help Kew, *Dyer*, 1279, 1288, 1289 ; —fossil plants, special suggestions, *Scott*, 1114-1118 ; —might be done, provided a good collection were retained, *Hanbury*, 520, 521 ; —recommended, *King*, 210, 220 ; —Trustees formerly not unwilling, *Dyer*, p. 56 ; —would be costly, *Bennett*, p. 127 ; —transference to British Museum from Kew, *Carruthers*, 576-578, p. 138, 173 ; *Hiern*, 957-959, 963, 964 ; travellers bring living and dried plants, *Elwes*, 1024, 1042 ; —instructed how to collect, *Murray*, p. 3 ; Trustees, catalogues published with their sanction, *Seward*, 940 ; —deprecate the present Committee, p. 179, 180 ; —employment on African collections, *Hiern*, 950-953 ; —exchanges need their sanction, *Murray*, 68, 144 ; —guide to mycetozoa issued by, *Murray*, 35 ; —nothing resembling the Board, at Kew, *Hooker*, p. 128 ; —would not be advantageous, *Hooker*, p. 128 ; —publications by, *Murray*, 35, 87 ; —Standing Committee of, *Dyer*, p. 86 ; —temporary assistance, *Murray*, 4, 5 ; *Woodward*, 1079 ; —transference of fossil plants not yet sanctioned by, *Murray*, 47 ; —willingness to transfer collections, *Dyer*, p. 56 ; types at, *Murray*, 36-39, 116 ; —more than at Kew as regards cryptogams, *Murray*, 116 ; —if removed would discourage the keeper, *Fawcett*, 535 ; —might be transferred, provided an authentic series were left, *Hanbury*, 507, 508 ; —of early collectors, *Hemsley*, 1213 ; rarely referred to by students, *Farmer*, 785-787 ; unarranged collections, probably vast, *Dyer*, 1330 ; cf. *Murray*, 64-73, p. 4 ; —should be overhauled at Kew, *Hooker*, p. 126 ; Under-Librarian, term explained, p. 111 ; changed to keeper, p. 112 ; unincorporated plants, *Murray*, 64-66, 69-73 ; union of herbaria advantageous, *Hiern*, 1000 ; —at Kew, rather than not at all, *Hiern*, 1002, 1003 ;—preferably at Cromwell Road, *Hiern*, 1001 ; unique specimens should be at Kew, *Masters*, 729 ; unity of collections important, *Seward*, 928, 929 ; —not of any practical value, *Masters*, 692 ; University College students, *Murray*, p. 3 ; unmounted specimens, their number, *Murray*, p. 4 ; unnamed collections should be sent to Kew, *Ball*, 132 ; vascular cryptogams, arrangement, *Murray*, p. 4 ; vegetable kingdom, might be ilustrated in cases, *Lankester*, 1158,1159 ; —productions in Sloane collections, p. 111 ; ; visitors to the Department of Botany, *Carruthers*, p. 133 ; *Murray*, p. 3, Q. 21-28 ; —diminution during rearrangement of cryptogamic herbarium, *Murray*, p. 3 ; visits from Kew, *Hemsley*, 1206, 1209 ; volumes in departmental library, *Murray*, p. 4 ; waste of time consequent on two establishments, *King*, 207 ; Wealden plant catalogue, *Murray*, 87 ; West African plants, *Hiern*, 950 ; Wilford, C., plants absent, *Dyer*, p. 85 ; William III., MSS. presented, p. 111 ; Williamson collection, *Scott*, 1108, 1109 ; —bought by arrangement between two departments, *Woodward*, 1090, 1091 ; —of palæozoic plants, *Seward*, 924 ; Wood, Dr. C. B., plants absent, *Dyer*, p. 85 ; woods, adjacent to dried plants, *Murray*, p. 3 ; —number of specimens, *Murray*, p. 2 ; work accomplished and in prospect, *Hiern*, 981, 982 ; —possibly hampered by removal, *Hiern*, 947 ; world-wide collection of fossil plants, *Woodward*, 1100 ; worthless specimens should be discarded, *Elwes*, 1014 ; zoological arrangement of fossils, *Woodward*, 1103 ; Zoological Department adversely criticised in 1823 ; p. 111 ; zoology and geology would not suffer by the removal of the botanic collections, *Lankester*, 1139-1142. (See also *Bennett, J. J.*, *Brown, R.*, *Carruthers, W.*, and *Murray, G. R. M.*)

British Mycetozoa, guide book, *Murray*, 35.

Britton, N. L., aid as to books, *Dyer*, p. 99.

Bromfield, Dr. William Arnold, Books given to Kew, p. 119.

Brokers' produce, *Dyer*, p. 61.

Brown, Nicholas Edward, lectures to gardening staff, *Dyer*, p. 60.

Brown, Robert, administration imperfect, *Ball*, p. 131 ; admission to Banksian department, p. 115 ; annuity from Sir J. Banks, p. 100, 111, 112 ; appointment, p. 111, 112, 114 ; —details of pay and leave, p. 116 ; assistance, p. 115 ; assistant, one only, p. 112 ; attendant, none for several years, p. 115 ; augmentation of collections, p. 112, 114 ; Banks's bequest, *Dyer*, p. 100 ; —terms of, p. 112 ; —annuity to Brown, p. 111, 112 ; —collections acquired by the British Museum, p. 112 ; —left to Brown for life, p. 112 ; —library now merged in the Printed Book Department, p. 112 ; —Trustees negotiated fearing loss by fire, p. 112 ; —use and enjoyment by Brown, p. 112 ; books of reference in department defective.

Brown, Robert—*continued.*
p. 112; botanic gardens, p. 115; —useless without a good library attached, p. 115; Botanic Society at Regent's Park, p. 115; change in keepership, p. 116; charge of entire botanic collections about to be given, p. 112; collections made during Flinders's voyage, laid in, *Bennett*, p. 119; —of fossil woods, by express condition to be kept at the British Museum, *Bennett*, p. 125; —transferred to Geological Department, *Murray*, p. 4, 47; *Woodward*, 1053, 1084; —the Trustees' sanction not yet obtained, *Murray*, 48-50; "Erebus" and "Terror" collections, *Dyer*, p. 86; fossil plants, *Bennett*, p. 125; —transferred to Gealogical Department, *Murray*, p. 4; Q. 47; —sanction of Trustees not yet obtained for this, *Murray*, 48-50; herbarium, only lodged at the Museum, *Carruthers*, p. 133; —now merged in general herbarium, *Murray*, p. 3, 42; collections, unarranged, p. 115; copperplates prepared by Sir J. Banks, p. 116; department came to the Museum with himself, p. 112, 114; drawings by Bauer in the Botanical Department, 4,660 in number, p. 116; duties enumerated, p. 112, 115; "Edinburgh Review" statement overcharged, p. 112; evidence, 1835, p. 112; —1850, p. 114; —portion read to the Trustees, p. 118; exhibition of vegetable products, p. 114; extent of herbarium, p. 115; foreign herbaria and botanic gardens, p. 117; grants for purchases, p. 115; herbarium, its extent, p. 115; increase of collections by purchase, £100 annually allowed, p. 112; librarian formerly to Sir J. Banks, and the Linnean Society, p. 115; library, Banksian, his use of, p. 115; in the Botanical Department, p. 112, 115; —sum allowed for its increase, p. 115; Linnean herbarium mentioned, p. 112; manuscripts in the department, p. 116; objections to the Trustees' scheme, p. 116; opinion as to botanic gardens, p. 115; —read to the Trustees of the British Museum, p. 118; plants annotated by him must always be kept, *Dyer*, 1305; *Murray*, 154; plea for fixity of tenure for his successor, p. 112; public admitted to Banks's collection solely by favour of the librarian, p. 112; proposed change in conditions of keepership, p. 116; removal to Kew opposed, p. 115; salary without apartments, p. 112; seeds and seed-vessels, collection, p. 114; services to Kew, *Dyer*, p. 85; Sloane herbaria in good condition, p. 112, 115; Trustees' scheme deprecated, p. 116; unarranged collections, p. 115; work on types, *Dyer*, 1305; under-librarian and keeper of the Banksian collections, p. 112; —afterwards keeper of the botanical collections, p. 114; cf. p. 138; views as to the study of botany, *Carruthers*, p. 135; wish that his collection should remain at the British Museum, p. 119.

Brussels, State herbarium, p. 164; —application for information, p. 161; —reply to the same, p. 164.

Buckland, Dean William, his work on fossil plants at the British Museum, p. 121.

Buddle, Rev. Adam, herbarium mentioned, p. 179.

Buildings at Kew crowded, *Dyer*, p. 97; —more required, *King*, 241.

Buitenzorg, Kew excels it as to palms, *Dyer*, p. 83.

Bulletin, Kew, account of, *Dyer*, p. 78-81.

Bullard, P., wax models of fungi, the types of his "Herbier de la France," p. 166.

Bureau, Edouard, Professor of Classification at Paris, p. 166.

Burkill, I. H., identification of a *Sinapis*, *Holmes*, p. 173.

Burrows, Capt. G., Congo plants, *Holmes*, 457.

Burt, Dr. E. A., at Kew, *Dyer*, p. 66.

Business men who study botany not numerous, *Groves*, 358, 359.

Busts of botanists at Kew, *Dyer*, p. 58.

C

Cabinets at British Museum, *Murray*, 178, p. 4; —large size, *Murray*, 90; —at Kew, *Dyer*, p. 58, 95; —new required, *Clarke*, 313, 324, 325; —on amalgamation should be kept, *Hemsley*, 1215, 1218, 1224.

Cacao in Africa, *Dyer*, p. 76.

Cacti, impossible to show in herbaria, *Holmes*, 402; —to be systematically studied in herbaria, *Carruthers*, 615.

Cactus wanted, not in herbarium, but in the living collection, *Holmes*, 458.

Calcutta Botanical Gardens, fireproof building, *King*, 246-252.

Cameroons, collections from, *Dyer*, p. 85.

Campbell Island collection, *Dyer*, p. 86.

Campbell, His Grace George Douglas Glassell, 8th Duke of Argyll, in Geological Department, *Woodward*, 1066.

Campbell, R., collection, *Dyer*, p. 85.

Camphor used as a preservative, *Murray*, p. 4.

Candolle, A. L. P. P. de, extract relating to Kew, p. 180.

Cape flora, in progress at Kew, *Dyer*, p. 65; *Murray*, 97.

Capsules, in herbarium, *Dyer*, p. 94; —Paris, p. 166.

Carboniferous fossils, transference to the Geological Department, *Woodward*, 1083.

Carey, John, North American herbarium, *Dyer*, p. 95.

Carpentaria, collections, *Dyer*, p. 85.

Carpological collections, British Museum, *Murray*, 56-58; Brussels, p. 164; Kew, *Dyer*, p. 94; Paris, p. 166; St. Petersburg, p. 165; Vienna, p. 162.

Carruthers, Mr. William, F.R.S., accommodation at Cromwell Road insufficient for the united herbaria, 581, 583; —means of providing the same, 582, 584, p. 173; advantages of amalgamation counterbalanced, 576; amalgamation would assist botanists, 570; Bentham, G., dried plants only used by him, 613, 614; —his views controverted, 578; botanists, English, prefer a London establishment, 577; —foreign, visit Cromwell Road and Kew indifferently, 577; botany the only science possessing two State-supported collections in or near London, 586, 587; British herbarium, date of establishment, p. 180; British Museum, British botanists visiting, 611, 612; —building incomplete, on completion could house the united herbaria, 582, 584; —herbarium consists of dried plants, woods, fruits, etc., 609; — —required so long as the fossil plants remain, 583; —herbarium, for students exhibited, 604; —keeper of botany, 24 years, 564; —only place where fossil and recent plants can be studied together, 573; —public exhibition of British plants, 604; —students' herbarium, 604; business men debarred from visiting Kew, 577; Cacti need to be systematically studied in a herbarium, 615; comparison of herbaria at Cromwell Road and Kew, p. 135; complete herbarium non-existent, 569; correspondence with J. Ball, p. 143; —with Secretary of the Committee, p. 173, 177, 178, 180; Devonshire Commission, evidence before, p. 133-138; —still holds good, 565; Dickson, J., collection, p. 178; duplicate collections possibly peculiar to botany, 586, 587; Edinburgh herbarium, a State-supported duplicate of the British Museum or Kew, 586; English botanists prefer a London establishment, 577; evidence, 1871, p. 133-138; —still adhered to, 565; —1900, 564-619; exhibition in the Central Hall, Cromwell Road, arranged by Keeper of Botany, who has no control of the funds, 591-593, 597, 598; —of morphology, constructed by him, 590, 596; —much consulted, 595; —very valuable, 594; experience, *Bentham*, p. 143; facilities for study at Cromwell Road, p. 135; fire, danger from, the great drawback to any amalgamation, 571, 576; foreigners visit both establishments indifferently, 577; fossil plants, collection formed by, *Murray*, p. 4; —transferred to the Geological Department, *Murray*, 47; —could not be named from a mere reference herbarium, 578, 605; —require a herbarium of types, 618, 619; —should be studied with recent plants, p. 136; —those in possession of the Geological Society, p. 137; —they form an essential part of a collection of plants, 573, 574; —usually possess external characters only, 606; fruits, woods, stems, form part of the herbarium, 609; gallery suggested to house the Kew collections, p. 173; herbaria of both establishments should remain as at present, 566; herbarium, arranged plants form 19-20ths, p. 133; —assistants, p. 133; Banks's plants all laid in, p. 133; —believed to equal that at Kew, p. 133; —Brown's plants only housed there, p. 133; —described, p. 133; —duplicates discouraged, p. 133; —incorporation with Kew herbarium desirable, *Hooker*, p. 128; —and thence supplied, *Hooker*, p. 128; —statement denied, p. 134; —independence desirable, p. 140; —no complete one existent, 569; not open to the public, p. 133; —plants from Banks all laid in, p. 133; —rules of admission, p. 133; —staff, 1871,

Carruthers, Mr. William, F.R.S.—continued.
p. 133; —students, p. 133; —unarranged collections, p. 133; — —cited, p. 143; —vegetable productions in the Sloane collection, p. 133; Holmes, Mr. E. M., charges against management, p. 173; — —reply to, p. 177-178; *Batters*, p. 179; *Murray*, p. 178; Hooker, Sir J. D., views controverted, 578; Hooker, Sir W. J., dried material only used for descriptions of ferns, 613, 614; Hudson, W., plants collected by, p. 173, 178, 179; injury by removal and separation from Banks's books, p. 115; Kew, and British Museum represent different views, 573; —ferns in cultivation not used in descriptions by Sir W. J. Hooker, 613; —views on the establishment, 568; letter from Sir W. T. Thiselton-Dyer, p. 87; letters to supplement evidence, p. 173, 177-180; library at the British Museum, superior to that at Kew, p. 135; mesozoic plants determined from external characters, 606; morphological exhibition at Cromwell Road laid down by him, 590; —not intended as a teaching collection, 599-601; palæontology, herbarium required for structure as well as leaf-form, 607, 608; —methods of research, 610; —needs a better collection for naming than for naming living plants, 580; palæozoic plants determined from external characters, 606; paper handed in, p. 135; plants studied by him, returned to the Geological Department, *Woodward*, 1063; reference herbarium as proposed, would not suit the British Museum, 578; —would always be unsatisfactory, 617; references from Kew for verification, p. 135; removal of herbarium, from Bloomsbury, when closed, p. 173; —from the fossil plants would be calamitous, 616, 618; reply, to Mr. Ball's evidence, p. 145; —to Mr. Holmes's evidence, p. 177-179; requisites of a national herbarium, p. 137; Royal College of Science, its collections would not be the same as those of the British Museum, 599; —its museum would be for the students only, not the public, 602; Sloane collection not injured by soot or dust, 616; Smith, John, his statement that living ferns were not used by Sir W. J. Hooker in descriptions, 613; societies' publications at the British Museum, p. 135; soot not injurious to the collections, 616; space in gallery, suggested plan, p. 173; specimens borrowed by, *Woodward*, 1082; — —returned, *Woodward*, 1086; —cannot be sent away, p. 135; stems, woods, and fruits form part of the herbarium, 609; students, herbarium for, 604; —other provision for them in the public galleries, 602, 603; systematic botany founded on dried plants, 613; taxpayers, who maintain the collections can more easily consult them in London than elsewhere, 616; tertiary plants determined by external characters, 606; types not needed in a herbarium for naming living plants, 579; use of Geological Department, by, *Woodward*, 1066; views on proposed transfer, p. 133; visitors to the Botanical Department, p. 133; willing to have correct names to plants added, *Holmes*, 486; —comment on this statement, p. 178; woods, etc., form part of the herbarium, 609.

Casa Laiglesia, Marquis de, letter, *Dyer*, p. 82.

Cases in the Museum at Kew, *Dyer*, p. 58.

Castagne, specimens at Kew from his herbarium, *Dyer*, p. 98.

Catalogue of the departmental library, incorporated in the general catalogue, *Woodward*, 1076; —of the Kew Library, printed, *Dyer*, p. 98; —additional entries published in the "Kew Bulletin," *Dyer*, p. 99.

Catalogues drawn up for the Museum, *Seward*, 939; —official, *Murray*, p. 3, 4; —referred to, *Woodward*, 1079; —would remain at present cost, on amalgamation, *Murray*, 105.

Central Hall, Cromwell Road, series of teeth shown, *Lankester*, 1152.

Ceylon plant list, *Dyer*, p. 64.

"Challenger," H.M.S., collection, *Dyer*, p. 85; —reports, *Dyer*, p. 65.

Change in organisation at Kew required on amalgamation there, *Hiern*, 977-980.

Characeæ of the world, *Groves*, 345, 347.

Chemistry and physics, lectures, *Dyer*, p. 59, 60.

China, collections from, Henry's, *Dyer*, 1294; —Wilford's, *Dyer*, p. 85.

Chinese flora, inconvenience of its form, *Holmes*, 470, 471.

Church, Prof. A. H., at Kew, *Dyer*, p. 65.

Cilician Taurus, a supposititious expedition to, *Dyer*, 1294.

Cinchona cultivation in India, *Dyer*, p. 76; —in Java, *Dyer*, p. 64; —introduction into India, *Dyer*, p. 64.

City brokers, communications with, *Dyer*, p. 66.

Clarke, Charles Baron, F.R.S., Acanthaceæ of South Africa, how studied, 302; accessibility of the British Museum and Kew, 331-332; African species of Acanthaceæ, how studied, 302; amalgamation at either establishment desirable, 302-308; —by cabinets, the second best plan, 337; —by sheets, 302; — on the larger-sized sheets, 302, 311-312, 322-323; — requiring from 3 to 5 years, 328; at Kew, *Dyer*, p. 65; British Museum, departmental library good, 324; cabinets at Kew require renewal, 313, 324-325; collection, *Dyer*, p. 76; duplicates should not be hastily discarded, 307, 314-317; dust-tight cabinets required at Kew, 324, 325*; evidence, 297-337; expense should not be considered, 309; galleries for botanical use, their advantages over rooms, 309; his methods of work, *Murray*, 161; herbarium essential to Kew, 329, 330; —Kew, dust-tight cabinets should be supplied throughout, 324, 325*; —herbarium essential, 329, 330; —journals and similar publications wanting at Kew, 310; libraries used by him when the Kew Library is deficient, 334; —those belonging to the two establishments should be consolidated, 309, 319; London most central for foreigners, 331; monograph of Cyperaceæ, *Dyer*, p. 98; numbers, as used by collectors, 314; pre-Linnean collections should be in the general amalgamated herbarium, 307, 308, 322; reference herbarium might remain in London, 307; specimens not allowed out of collections, inconvenience of that regulation, 302; suggestion that he should state the relative richness of British Museum and Kew herbaria, *Elwes*, 1051; trustee for the sale of a collection, *Elwes*, 1032.

Classed catalogue begun on Dryander's plan, p. 117.

Clubs, naturalists', attention given to, *Murray*, 6; — staff at Kew, *Dyer*, p. 62-63.

Coal plants at the Geological Department, *Woodward*, 1097; —at Jermyn Street, *Woodward*, 1101.

Codicils to the will of Sir Joseph Banks, *Dyer*, p. 100-101.

Collection.—At Berlin, p. 168-169; at the British Museum, how obtained, p. 111; —first set of plants should go to Kew, *Ball*, p. 132; —made on board vessels of the Royal Navy, p. 147; —see also *Bennett, J. J.*, *Brown, R.*, *Carruthers, W.*, *Murray, G. R. M.*; at Brussels, p. 164; at Kew, how acquired, *Dyer*, p. 83; —sent for determination, *Dyer*, p. 94; —shared between the two establishments, *Fawcett*, 557, 562; —subsidiary, deprecated, *Dyer*, p. 95; —their object, *Dyer*, p. 58; —worked out there, *Dyer*, p. 65; —see also *Hooker, Sir W. J.*, and *Hooker, Sir J. D.*; at Paris, p. 165-168; at St. Petersburg, p. 164-165; at Vienna, p. 161-163; — their disposal chiefly a personal question, *Murray*, p. 3.

Collectors, previously instructed, *Murray*, p. 3; their terms, *Hemsley*, 1260, 1261.

Collett, Sir Henry, at Kew, *Dyer*, p. 65; —on Simla flora, *Dyer*, p. 98.

Collins and Leather, Messrs., their report on Indian agriculture, *Dyer*, p. 78.

Collocation of the two herbaria, *Dyer*, 1343; —the only feasible method of union, *Dyer*, 1287.

Colonial, botanic gardens, former relations, p. 113; suggested regulations, *Dyer*, p. 74-75; —botany at Kew, *Dyer*, p. 65; —consultation with the British Museum, *Hiern*, 984; — —little likely to occur, *Hiern*, 985; —delay in correspondence, *Hiern*, 986; —economic questions should be referred to Kew, *Hiern*, 998; —establishments, *Dyer*, p. 74; —floras in hand, *Dyer*, p. 98; — —types at Kew, *Hemsley*, 1262; —if transferred, could be done at the British Museum, *Hiern*, 997; —naming and research on new plants, *Hiern*, 987; —need not be interfered with, *Hiern*, 983; —plants in Paris, p. 168; — —not studied by witness, *Hanbury*, 515; —questions referred to Kew, *Murray*, 164; —work, *Hiern*, 981-986; — —appreciated abroad, *Dyer*, p. 67.

Colonial Office, appreciation of Kew, *Dyer*, p. 81-82; —relations, *Dyer*, p. 64; —representation before the Committee, *Dyer*, 1300.

Colonial Office List, 1318-1320; —recognition of Kew in, *Dyer*, p. 56; —statement, *Dyer*, p. 83.

Colonies, botanic needs of, *Dyer*, p. 57; —Kew work dependent on the herbarium, *Dyer*, 1308; —plants from, at Berlin, p. 169; —Paris, p. 168; —representative herbaria should be at the British Museum, *King*, 223, 290; —students, p. 169.

Commission, Royal, 1847-50, p. 113-117; —1871-75 (Devonshire Commission), p. 127-149.

Commissioner of Agriculture for the West Indies appointed, *Dyer*, p. 76.

Committee, Departmental, 1883, nothing done, *Dyer*, p. 57; —[1900-1901] deprecated by the Trustees of the British Museum, p. 179; —of enquiry into the condition of Kew Gardens, 1838, p. 112; —Select, Report, 1835, p. 111; —1860, p. 124.

Commons, see HOUSE OF COMMONS.

Comparison, at two establishments, difficult, *Clarke*, 302; —proximity important, *Murray*, 84.

Competent botanist, need for, after union, *King*, 280.

Competition between the British Museum and Kew, not severe, *Murray*, 128; —hypothetical, *Dyer*, 1346-1353; —injury resulting from, *Elwes*, 1031, 1032; —insignificant, *Dyer*, 1295, 1296; *Hemsley*, 1254-1256; —not disadvantageous, *Fawcett*, 848-855; —undesirable, *Masters*, 727, 728.

Complaints as regards two herbaria, *Clarke*, 331.

Complete collection should be aimed at, *Masters*, 723, 724, 734, 735.

Compositæ, many types in the order, *Holmes*, 421.

Concentration ideally desirable, *Dyer*, 1283, 1284, 1304, 1307.

Cone, R. Brown's famous specimen, *Murray*, 53.

Congo, herbarium, at Brussels, p. 164; —plants from, *Holmes*, 457.

Coniferæ, at Kew, Handlist, *Dyer*, p. 58; —in Museum, *Dyer*, p. 94; —rich collection, *Masters*, 683.

Constitution of Kew, *Dyer*, p. 78.

Continental herbaria must be visited by botanists, *Fawcett*, 544.

Convenience for fossil botany at the British Museum, *Seward*, 924, 927.

Cook, Lieut. James, plants collected on his voyages, at the British Museum, p. 116, 126; *Hemsley*, 1209; —wanting at Kew, *Dyer*, 1274.

Cooke, Dr. M. C., types of Erysiphaceæ at Kew, *Dyer*, p. 98.

Cooke, Dr. T., at Kew, *Dyer*, p. 65; —on Bombay flora, *Dyer*, p. 98.

Cooper's Hill, small collection of timber, *Dyer*, p. 82; —students from, *Dyer*, p. 64.

Cornu, Professor Maxime, at Kew, *Dyer*, p. 66; report on the Paris collections, p. 165-168.

Correlation of the Banksian herbarium and library, *Carruthers*, p. 135.

Correspondence, its extent, *Dyer*, p. 67; *Murray*, p. 3.

Corrosive sublimate as a poison, at Kew, *Dyer*, p. 67; —at Paris, p. 166.

Cosson, Ernest St. Charles, letter on the British Museum collections, p. 145; —visits in 1871, p. 134.

Cost of Botanical Department, 1868, *Bennett*, p. 127; —1871, *Carruthers*, p. 137; —1900, *Murray*, p. 3.

Cotton, Sir Robert Bruce, manuscripts in the British Museum (Cottonian MSS.), p. 111.

Crag mollusca, Searles-Wood collection, 1083.

Crinoids, recent and fossil in Museum, *Woodward*, 1083.

Crombie, Rev. J. M., lichens named by him; *Holmes*, 486; —mentioned, *Holmes*, 475.

Cromwell Road, timbers, *Dyer*, p. 82; —see also BRITISH MUSEUM.

Cross-references in herbarium desirable, *Holmes*, 479.

Crown, Kew formerly a private garden of the, p. 113.

Cryptogams, at Paris, p. 166; —imperfectly represented at Kew, *Murray*, 117, 118; —in museums, at Kew, *Dyer*, p. 94; —increased at the British Museum, *Murray*, 117, 118, p. 3; —not worked as by witness, *Hiern*, 989; *King*, 261, 262; —observations on collections, *Dyer*, 1305; —sets issued, *Murray*, 62; —should be with phanerogams, *Groves*, 354-357; *Murray*, 197; —unknown value of the two collections, *Masters*, 722; —vascular, collections at Kew, *Dyer*, p. 64; —work on fossil, *Seward*, 891, 912.

Cultivators, go to Kew for names, *Elwes*, 1048; —hardly to the British Museum, *Elwes*, 1048.

Cultures, professor of, at Paris, p. 167; —started at Kew, *Dyer*, p. 64.

Cunningham, R., work on Kew herbarium under W. T. Aiton, p. 141.

Cunningham, R. O., collections made by, *Dyer*, p. 85; —his advice as to their disposal, *Richards*, p. 148.

Curator of Kew, *Dyer*, p. 59.

Curators of botanic gardens from Kew, *Dyer*, p. 64; —of stations, *Dyer*, p. 76.

Cut plants supplied to art school, *Dyer*, p. 64.

Cycads, special size of sheets for, *Murray*, p. 4; —fossil, *Buckland*, p. 121; —work on, *Seward*, 891.

D

Darwin, Charles Robert, letter from, p. 122; —cited, *Carruthers*, p. 122, 134; —re Index Kewensis, *Dyer*, p. 76.

Davies, Rev. Hugh, herbarium mentioned, *Batters*, p. 179.

Decades Kewenses, *Dyer*, p. 79.

Deficiencies in Kew library not noticed, *Elwes*, 1019.

Delesseria, two species confused in the British Museum herbarium, *Holmes*, 489.

Departments of the British Museum when incorporated, p. 111.

Derby, Right Hon. Edward Henry, 15th Earl of, letter addressed to, by G. Bentham, *Dyer*, p. 102.

Deprecation of removal of the natural history departments, p. 117.

Desfontaines, Joseph René, his herbarium in Paris, p. 166.

De Toni, G. B., arrangement of Algæ, *Murray*, p. 4.

Devonian sharks, *Woodward*, 1103.

Devonshire Commission, evidence, p. 127-149; —recommendations cited, *Dyer*, 1358-1365; — —a compromise, *Dyer*, p. 57; —not fully workable, *Murray*, 167-175.

De Vries, H., at Kew, *Dyer*, p. 66.

Diagrams for lectures, in Paris, p. 167.

Diaries of officers, *Murray*, p. 2.

Diatomaceæ, at Berlin, p. 169; Vienna, p. 162.

Dickie, Dr. George, an authority on Algæ, *Holmes*, 483; errors in names given by him, *Holmes*, 477, 485, 487-490, p. 173; — —names not verified, *Holmes*, 477; — —remarks on these statements, *Murray*, p. 178.

Dicotyledons, at Kew, handlist, *Dyer*, p. 58; —in museum, *Dyer*, p. 58, 94; —fossil forms not studied by witness, *Seward*, 891.

Diesing, —., his drawings at Vienna, p. 162.

Difficulty of comparison of specimens in the two establishments, *Clarke*, 302.

Directeur, limitation of the term, p. 165.

Director, British Museum (Natural History), has charge of the Index Museum, *Murray*, 133-135; —of Royal Botanic Gardens, Kew, *Dyer*, 1264.

Disadvantages of competition not great, *Farmer*, 848-855.

Diseases investigated at Kew, *Dyer*, p. 66, 67, Q. 1310.

Dismemberment by transference of fossil plants to Kew, *Woodward*, 1060.

Distance of Kew not prohibitive, *Masters*, 673, 674, 724.

Distribution of duplicates, *Dyer*, 1331-1334; *Murray*, 144; —of seeds, *Dyer*, p. 64.

Division of fossil plants suggested, *Scott*, 1116.

Donations, accessions due to, at Berlin, p. 169; —British Museum, *Murray*, p. 2; —Kew, *Dyer*, p. 74; —Paris, p. 168; —St. Petersburg, p. 165; —Vienna, p. 162.

Drake del Castillo, at Kew, *Dyer*, p. 66.

Drawings, at the British Museum, p. 116 ; *Murray*, p. 4 ; —at Kew, *Dyer*, p. 58, 98 ; —at Paris, 166, 167 ; — —Vélins du Muséum, p. 168 ; —at Vienna, p. 162.

Dried plants less useful than living, *Elwes*, 1017.

Druce, G. C., at Kew, *Dyer*, p. 66.

Dryander, Jonas, classed catalogue of Banks's library, p. 115, 117 ; —a supplement in MS., p. 115 ; —his share in Aiton's "Hortus Kewensis," p. 112.

Drugs, collection at Paris, p. 166 ; —in the "Kew Bulletin," *Dyer*, p. 81 ; —questions on, referred to Kew, *Murray*, 29.

Dublin, types in, *Murray*, 37.

Dulau and Co., as booksellers, *Murray*, p. 4.

Duncannon, Viscount, afterwards 4th Earl of Bessborough, Board of Trustees suggested for Kew, *Dyer*, p. 57, 99.

Duplicates, —assumed proportions at the British Museum, p. 137 ; —botanic books, *Dyer*, p. 98 ; — —should be retained at Cromwell Road, *Woodward*, 1076 ; —definition, *Clarke*, 314 ; *Elwes*, 1040 ; *Murray*, 154 ; —distribution, *Dyer*, p. 66 ; Qs. 1332, 1333 ; *Holmes*, 375 ; *Murray*, 144 ; —elimination of, *Hemsley*, 1215, 1230, 1246, 1247, 1257, 1258 ; *Murray*, 154 ; —from the British Museum, *Dyer*, 1331 ; *Farmer*, 810-813 ; — —from Kew, *Farmer*, 864 ; —museum duplicates, *Dyer*, p. 97 ; —libraries, *Murray*, 176-181 ; —not to be discarded, *Clarke*, 307, 314-317 ; possibly nine-tenths of the British Museum collections compared with Kew, *Elwes*, 1030 ; —rarely occur in purchased collections, *Murray*, 126 ; —room, stored for exchange, *Murray*, 68, 71.

Duplication of collections, perhaps only in botany, *Carruthers*, 586, 587 ; —of specimens, *King*, 258 ; — —gradual weeding out, *King*, 259.

Durand, Théophile, his "Index generum" used as the basis of arrangement at Vienna, p. 162.

Dust at British Museum not found injurious, *Carruthers*, 616.

Dust-tight cabinets needed at Kew, *Clarke*, 324-325*.

Duties, and functions of Kew never formally defined, *Dyer*, p. 57 ; —of officers at the British Museum, *Murray*, p. 2.

Dyer, Sir William Turner Thiselton-, K.C.M.G., F.R.S., accessibility of Kew, 1282, 1341 ; accessions, p. 74 ; —mainly by correspondence, 1291 ; accumulation discouraged, 1286 ; —of collections, p. 58 ; accumulation and preservation at the British Museum, p. 97 ; activity centres in the Herbarium, 1267, 1308 ; addenda to statement, p. 99-103 ; additions to the library, "Kew Bulletin," p. 99 ; administration, 1311-1315 ; —the First Commissioner and Kew, p. 78 ; Admiralty correspondence concerning collections, p. 85, 86 ; African floras, 1354-1356, p. 65 ; Agriculture, Board of, botanic work undertaken, p. 65 ; —herbarium requisite for, 1309, 1310 ; —Commercial, p. 76 ; —Indian, p. 77, 78 ; Aiton, W. T., Bauer's drawings, p. 101 ; —correspondence with Sir J. Banks, p. 84 ; —records destroyed by, p. 102 ; amalgamation advantageous for research, 1283, 1284, 1288-1290, 1304, 1307 ; —by cabinets not possible, 1342 ; —objections to, 1286 ; American botanists, their opinion of fire risk, p. 96 ; —herbarium, Carey's, p. 95 ; —visitors, p. 82 ; annexe to Museum No. III. applied for, p. 98 ; appendices to "Kew Bulletin," p. 81 ; appreciation by Government of economic work, p. 81, 82 ; arrangement of herbarium, p. 95 ; arboretum, p. 63 ; —hand list of, p. 58 ; articles, special, in "Kew Bulletin," p. 80 ; artists, regulations for, p. 64 ; Australia, early types at the British Museum, 1275 ; —flora by G. Bentham, p. 65 ; Ayrton, Rt. Hon. A. S., proposal negatived, p. 57 ; Baker, J. G., lectures, p. 60 ; Ball, J., herbarium, p. 74 ; Banks, Sir J., Codicils, p. 100-101 ; —relations with Kew, p. 83-85 ; Banksian herbarium, p. 101-192 ; —contains the plants of Cook's Voyages, 1274 ; —origin and disposal of, p. 85 ; —personal knowledge of, 1299, 1304, 1306, 1345 ; Bauer, F., bequest to, p. 100, 101 ; — drawings, p. 98, 101, 102 ; Bentham, G., herbarium, presented, p. 74, 98 ; —letter to the Earl of Derby, p. 102-103 ; —offered the Directorship, p. 102 ; Bentham, G., and Sir J. D. Hooker, Genera plantarum, p. 76 ; —herbarium arranged according to, p. 95 ; bequest, accessions by, p. 74 ; Bermuda flora, p. 65 ; Berkeley, Rev. M. J., in Berkeley's herbarium, p. 98 ; catalogue of library, p. 98 ; —additions, p. 99 ; Ceylon flora, by G. H. K. Thwaites and Sir J. D. Hooker, p. 64 ; "Challenger" collections, p. 65, 85 ; chemistry lectures, p. 60 ; China collections by Dr. Henry, 1294 ; *Cinchona*, at Kew, p. 64, 72 ; Clarke, C. B., his Indian collections, p. 76 ; clubs of gardening staff, p. 63 ; coinage, Banks's papers on, p. 101 ; coffee at Kew, p. 72 ; collections, acquisition, p. 83 ; —object, p. 58 ; —travellers', 1293 ; collectors, for Kew in the time of Banks, p. 84 ; —subscriptions to, 1294 ; collocation the only practicable mode of union, 1287 ; —defined, 1342, 1343 ; Colonial botanic stations, p. 76, 79 ; —staff, p. 83 ; —floras, p. 64, 98 ; —organisation at Kew to aid, 1316 ; Colonial Office and Kew, p. 64, 70 ; —its beginnings, p. 83 ; —list, quasi-recognition on, p. 56, 1318-1320 ; —no authority to speak in its name, 1300, 1302 ; —recognition of Kew, p. 56, 1318-1320 ; commercial correspondence, p. 66 ; Committee, decision invited, p. 57 ; competition with British Museum, 1295 ; —insignificant, 1296 ; —not advantageous, 1346, 1347 ; concentration of material advantageous, 1283, 1284, 1304, 1307, 1351 ; coniferæ in Museums, p. 58, 94 ; —hand list of, p. 58 ; constitution for Kew not laid down, p. 57 ; Cooke and Peck's Erysiphaceæ at Kew, p. 98 ; correspondence, amount, p. 67 ; —between Aiton and Banks, p. 84 ; —foreign, etc., p. 101 ; —on trade products, p. 66 ; correspondents the main source of accessions, 1291 ; cost of housing the two herbaria relatively, 1329 ; Colonies, posts filled by Kew men, p. 68 ; cryptogams at the British Museum, p. 1305 ; cultural aspect of Kew, p. 64 ; cultures in laboratory, p. 95 ; curator, his duties, p. 59 ; curators of botanic gardens, from Kew, p. 64 ; Darwin, C. R., at cost of compiling "Index Kewensis," p. 76 ; Decades Kewenses, in "Kew Bulletin," p. 79 ; determinations, generic, p. 94, 1369 ; Devonshire Commission, recommendations cited, p. 57 ; —some unworkable, p. 97 ; 1357, 1358 ; Dicotyledons in museums, p. 58, 94 ; —hand list of, p. 58 ; Director, since 1885, 1264 ; —edits publications, p. 98 ; —foreign publications for library, p. 99 ; diseases of plants, in "Kew Bulletin," p. 80 ; disestablishment of Kew would result from removal of herbarium, 1271, 1272 ; dispute with British Museum, p. 87 ; drawings, collection of, p. 58, 98 ; —from plants at Kew, by Bauer, p. 100, 101, ; dried plants, accessions, p. 87 ; drugs

Dyer, Sir William Turner Thiselton-, K.C.M.G., F.R.S. —*continued.*
in "Kew Bulletin," p. 81; Duncannon, Viscount, and others, letter to the Treasury, p. 99; duplicates, distribution difficulties, 1237, 1332, 1334; —from museums, p. 97; East India Company's herbarium, p. 74, 76; economic aspects of Kew, p. 64; —botany, herbarium as its centre, 1270; —list of plants supplying products, 60-62, 69; education, horticultural, 1267; Egyptian tombs, specimens from, p. 94; enquiry, its nature hardly realised, 1256; enseignement, 60-64, 69; "Erebus" and "Terror" collections, p. 85-87; Erysiphaceæ, monograph, p. 98; evidence, 1264-1373, p. 55-108; —its limitations, 1300, 1302, 1303, 1321-1323; exchanges, accessions from, p. 74; —notes of Milhe-Poutingon, p. 70; —of publications, p. 99; expeditions, collections from, 1294; p. 83; —sent to Kew, p. 55; extension of herbarium collections not indefinite, p. 74; extract from letter, citing A.L.P.P. de Candolle, p. 180; facility of access, 1282, 1341; fern herbarium, its value, 1305; ferns, hand list of, p. 58; fibre-plants, in "Kew Bulletin," p. 80; —Government requisitions, p. 64; figures in library, p. 58; fire precautions, p. 95-97; floras, in "Kew Bulletin," p. 79; —plan of colonial, with list, p. 64; food-grains in "Kew Bulletin," p. 81; Foreign Office, relations with Kew, p. 64; forestry in Kew museums, p. 82, 83; fossil plants, development from matrix, 1368; —few and special at Kew, p. 94; —fresh material for comparison, 1366; —room to accommodate them, 1366; —sent to the British Museum, 1358, 1359, 1360; —their want not felt, 1360; France, report on Kew for the Government, p. 67-74; —study of Kew, p. 74; fruit trade in "Kew Bulletin," p. 79; functions of the Royal Botanic Gardens, 1267; —report of Milhe-Poutingon, p. 71-74; fungi, value of Berkeley herbarium, 1305; fungus-cultures in laboratory, p. 95; Gamopetalae of Arboretum, hand list, p. 58; garden library, p. 58, 59; gardeners, instruction for, 59, 60; gardening staff, school for, p. 59; Gay, J., herbarium, p. 74; genera, arrangement of species when large, p. 95; Genera plantarum, herbarium arranged according to, p. 76; geographical botany, lectures, p. 60, 69; —divisions for herbarium arrangement, p. 95; gift, accessions by, p. 74; Glaziou, A., plants from, p. 82; gluing of specimens, reasons assigned, p. 94; Government estimation of economical work at Kew, p. 81; —expeditions, p. 65; —no assistance in physiological botany, 1364; —offices in regard to economic questions, p. 64; —posts filled by Kew men p. 64; grant, annual, for herbarium and museums, p. 58; guides to museums, p. 58; gymnosperms in museums, p. 58, 94; hand lists of collections, p. 58; Hariot, P., statement as to Leveillé's herbarium, p. 98; Harris, Dr. J. K., lectures, p. 60; herbaceous plants, hand list to, p. 58; herbarium, Brown's transfer of one, formerly at Kew, to the British Museum, p. 85; —building, p. 75; —Candolle's testimony, p. 180; —centre of activity, 1257; —collections elaborated, p. 82; —contents, p. 58; —difference of British Museum, 1274; —keeper and staff, duties of, p. 58, 59; —Milhe-Poutingon's report, p. 68; —Shaw's report as to risk of fire and appliances, p. 96; herbarium and library, functions, p. 64; herbarium and museums, vote, p. 74; historic value of British Museum herbarium, 1277, 1306; Hongkong flora, p. 65; Hooker, Sir J. D., Bauer's drawings, p. 101; —collection of fossils, p. 95; —correspondence with the British Museum, p. 86, 87; —editor of "Botanical Magazine," p. 98; —Indian collection, p. 76; Hooker, Sir W. J., his library, p. 98; —on Colonial floras, p. 64; horticultural press, p. 59; horticulture, herbarium a centre, 1270; —in "Kew Bulletin," p. 80; housing insufficient, 1297, 1298; —of two establishments, and relative cost, 1329; Hutchins, D. E., on museums, p. 82, 83; Ibbetson, Hon. W. D. C. J., on Indian agriculture, p. 77, 78; Icones plantarum, issue, etc., p. 98; identification of plants, p. 64; indefinite extension not desired, p. 74; Index Kewensis, p. 63, 76; India, connections with Kew, p. 76; —posts filled by Kew men, p. 64; India Office, p. 64; —assistant in herbarium, p. 59, 65; —no authority to speak on behalf of, 1300-1303; India and Colonies, floras, p. 98; —help from Kew, 1316; indiarubber plants, p. 64; Indian agriculture, p. 77, 78; —flora, all important collections at Kew, 1273, 1277; instruction at Kew, Milhe-Poutingon's report, p. 69; instructions as to own evidence, 1300, 1302, 1303, 1321-1323; interrogatories, p. 55, 56; —reply, p. 58-103; investigations in

Dyer, Sir William Turner Thiselton-, K.C.M.G., F.R.S —*continued.*
Jodrell Laboratory, p. 95; —list of papers resulting, p. 174-177; iron or steel for cabinets, p. 95; Isaac, A., introduction of an enquirer, p. 74; isolation of herbarium, p. 97; Jodrell, T. J. Phillips, Laboratory, p. 75; Jodrell Laboratory, duties of hon. keeper and staff, p. 59; —list of papers of work done, p. 174-177; —private munificence, its origin, 1362-1364; Jones, J. W., correspondence, p. 86; keeper, four, answering to that term, p. 58-59; —curator, p. 59; —herbarium and library, with staff, p. 58; —Jodrell Laboratory (Hon.), and staff, p. 59; —museums and north gallery, and staff, p. 59; Kew, a convenient abbreviation, p. 58; —board suggested for, p. 57; —directorship offered to G. Bentham, etc., p. 102-103; —short list of staff, p. 83; "Kew Bulletin," p. 67; —exchanges, p. 99; —Stationery Office, p. 67; —summary of ten years, p. 78-81; Kew Gardeners' Mutual Improvement Society, p. 62; Kew Guild, p. 63; King, Sir G., plants sent, p. 82; —on Indian agriculture, p. 78; Kirk, Sir J., rubber trade in East Africa, p. 76; Knatchbull, Sir E., charge of Banks's papers, p. 101; laboratory, 1362-1365; —bibliography, p. 174-177; —built by private munificence, p. 75; —investigations, p. 95; —Milhe-Poutingon on, p. 69; —regulations, p. 66; —school of science at, p. 66; work done in, p. 174-177; lectures to gardeners, p. 59, 60; letter, covering reply to interrogatories, p. 56-57; —regarding Candolle's testimony, p. 180; Leveillé, J. H., specimens, p. 98; libraries, Milhe-Poutingon on, p. 69; library, contents and extent, p. 58, 98; lichens, saxicolous, how kept, p. 94; lightning, precautions against, p. 96; Lincoln papers belonging to Banks, p. 101; Lindley, Dr. J., orchid type collection, p. 95; —report on Kew mentioned, p. 99; Linnean Society, Wallich's collection belonging to, 1339; Lister, A., types lent to, p. 94; living collections, p. 58, 59, 83; —arranged according to cultural requirements, p. 95; loan of specimens unsatisfactory, p. 94; Loher, Dr. A., Philippine herbarium, p. 82; London School Board, supplied, p. 64; Lyons, student from, p. 74; Maiden, J. H., letter, p. 74; maps in museums, p. 58; Mauritius and Seychelles flora, p. 65; memorandum put in, 1263; Ménissier, A., account of Kew, p. 60-64; microscope slides, no collection, p. 58; Milhe-Poutingon, A., report to French Government, p. 67-74; Mint and coinage papers of Banks, p. 101; miscellaneous notes in Kew Bulletin, p. 81; models in museums, p. 58; Maloney, Sir C. A., rubber trade, p. 76; Monocotyledons, arboretum, hand list, p. 58; —in museums, p. 58, 94; —tender, hand list, p. 58; monographers, consult many herbaria, 1275; —specimens not lent to, p. 93; Morris, Dr. D., director of botanic stations, p. 76; —West Indies Commission, p. 73; museums, p. 58, 94; —additions, p. 75; —an adjunct to the herbarium, p. 66; —appreciation of, p. 82; —arrangement, geographic and taxonomic, p. 95; —keeper, duties and staff, p. 59; —Milhe-Poutingon on, p. 69; —pressure in, p. 97, 98; — —annexe applied for, p. 98; —specimens, in dispute, 1312; Myxomycetes, types lent to A. Lister, p. 94; naming plants, for the public, p. 64; New York, museum buildings mentioned, p. 96; New Zealand, flora, p. 65; North Gallery, p. 58, 75; North, Miss Marianne, notice of, p. 58; notice as to use of herbarium, p. 94; objections to amalgamation, 1286; Office of Works, nature of enquiry hardly realised, 1266; official publication of researches not desirable, 1373; oils, plants yielding, Government requisitions, p. 64; orchids, hand-list, p. 58; —in "Kew Bulletin," p. 79; —Lindley's type collection, p. 95; organisation, sufficient at present, 1316; outfit supplied to travellers, 1293; Owen, Sir R., views as to Kew, p. 57; Oxford University Press, and Index Kewensis, p. 76; Pacific, types from the, at the British Museum, 1275; palæontological department, 1366; palæontology, best at South Kensington, 1361; —study by Dr. Scott, p. 95; palæozoic plants, p. 95; papers resulting from work in the Jodrell Laboratory, p. 174-177; Pará rubber plants at Kew, 64; Paris collections, desirable, 1283, 1338; Peck, C. H. Erysiphaceæ at Kew, p. 98; periodicals, how acquired, p. 99; Philippine Islands flora, p. 82; Phillips, J., bequest by Sir J. Banks, p. 100; photographs in museums, p. 58; physiological botany, provision due to private munificence, 1364, 1365; Pierre, L., visits to Kew, p. 82; plant diseases in "Kew Bulletin," p. 80; plants yielding fibre and rubber,

Dyer, Sir William Turner Thiselton-, K.C.M.G., F.R.S. —*continued.*
in "Kew Bulletin," p. 80; poison employed as preservative, p. 94; Poisson, J., study of Kew methods, p. 74; Polypetalæ, Arboretum hand-list under revision, p. 58; popular instruction, none direct, p. 59; —with recreation, 1267; portraits of botanists, p. 58; portfolios of drawings, p. 58; precautions against fire and lightning, p. 95, 96; Preece, Sir W., lightning conductor fixed, p. 96; printing, insufficient, 1324-1328; prints and drawings, p. 98; publication of researches by staff, 1372, 1373; publications, p. 98; —Milhe-Poutington on, p. 69; purchases, p. 87; —not the main source of accession, 1291; —of books, p. 87, 99; —of plants, p. 87; questions transmitted by First Commissioner, p. 55, 56; —reply, p. 58-103; redundancy inevitable, in geographic arrangement, p. 95; regulations, for botanic establishments abroad, p. 75; —for herbarium, p. 65, 94; relations between British Museum and Kew, p. 57; —Office of Works and Kew, p. 78; removal of herbarium would be disastrous, 1271, 1272; reply to interrogatories, p. 58-103; research, advantages of amalgamation to, 1283, 1284, 1288-1290; —at Kew, p. 64, Q. 1267, 1270; —herbarium an instrument for, p. 97, 98; —permitted to staff, 1370; Ripon, Marquess of, on regulations for botanic stations, p. 74, 75; —on colonial produce, p. 76; Roberge, specimens in Berkeley's Herbarium, p. 98; Royal Botanic Gardens, Kew, abbreviated into "Kew," p. 58; —summary of functions, 1267; Royal College of Science, use of Jodrell Laboratory, p. 66; Royal Geographical Society, technical instruction arranged, p. 66; —use of its library, p. 98; Royal School of Art, supplied, p. 64; Royal Society, library used, p. 98; —papers read before, p. 101; rubber plants, Government requisitions, p. 64; —in "Kew Bulletin," p. 80; —trade in Africa, p. 76; Rusby, H. H., on fire risks at Kew, p. 97; Salmon, E. S., monograph of Erysiphaceæ, p. 98; salaries, lower scale than British Museum, p. 59; salary, none to Keeper of Jodrell Laboratory, 1364; Schweinitz, L. de, specimens from his herbarium, p. 98; science, Director free in matters of, p. 78, Q. 1312-1314; scientific work, Kew independent of the First Commissioner, p. 78; seeds, distribution, p. 64; Shaw, Sir E. M., report as to fire risks, p. 96; Shaw-Lefevre, Right Hon. G. J., reasons for non-interference, p. 57; sheets in herbarium, numbers, p. 58; —sizes, p. 95; shelves in cabinets, fixed, p. 95; shrubs, hand list, p. 58; societies, reunions, amongst garden staff, p. 62, 63; Somerville, Professor W., on Indian Agriculture, p. 78; South Africa, flora, by Harvey and others, p. 64, 65; South Kensington, instructions as to evidence, 1300; space in herbarium insufficient, 1297, 1298; —urgently required, p. 97; special articles in "Kew Bulletin," p. 80; specialists employed, p. 94; specialisation, dangers of, 1367; species in large genera, arrangement, p. 95; specimens, not lent, p. 93; —number, p. 58; —poisoned, p. 94; —term defined, p. 58; staff, p. 83; —detailed list, p. 88-93; —gardening, p. 59; —Milhe-Poutingon on, p. 70; —visits to British Museum, 1281, 1282; statement in answer to interrogatories, p. 58-103; Stationery Office, alleged neglect, 1324-1328; —"Kew Bulletin," p. 67; —vote for books, p. 99; steel or iron for cabinets, p. 95; Stephani, F., return of specimens, p. 93; students, garden for, p. 64; —regulations, p. 64; subscriptions to collectors, 1294; subsidiary collections, p. 95; sugar-cane, disease investigated, p. 67; —seedling raised, p. 64; superintendents of botanic gardens abroad; —instructions, p. 75; —supplied from Kew, p. 64; systematic botany, lectures, p. 60; taxonomic arrangement, p. 95; Taylor, Sir J., on fire risks, p. 96, 97; tea, grown at Kew, p. 73; technique for palaeontology, 1368; temperate house, completion, p. 75; teratological collection discarded, *Masters*, 743; timbers in museum, p. 58, 94; —arrangement, p. 95; Todmorden School Board, gifts to, p. 66; training at Kew, results, p. 64; travellers, accessions from, p. 74; —instructed in collecting, 1292, 1293; trays, no advantages over shelves, p. 95; Treasury, the, letter as to additional buildings, p. 97; — —removal of herbarium, p. 97; —Minute of 24 July, 1872, nearest to constitution for Kew, p. 57; — —19 April, 1899; — —cited, p. 56; —want of space, 1298; trees and shrubs, hand list, p. 58; Tropical Africa, flora, p. 65; Trustees of the British Museum and Kew, p. 85-87; —their independent position, p. 57; types lent to Mr. A. Lister, p. 94; Underwood, Professor L. M., on Kew fire risks, p. 96; undigested material on amalgamation would impede, 1286, 1330, 1331; unmounted material small, p. 94; University of London, its use of the Jodrell Laboratory, p. 66; verification of names, p. 64; Vidal y Soler, Don S., his work at Kew, p. 82; visitors, number, p. 59; visits to the Herbarium in 1899, p. 65; Voelcker, Dr. A., report on Indian agriculture, p. 77; volumes in library, p. 58; Wallich, N., his collection mentioned, 1339; water supply, in case of fire, p. 96, 97; Watson, H. C., his British herbarium, p. 95; Watt, Dr. G., Dictionary of Economic Products, p. 76; weeding collections, 1287, 1343; Welby, Lord, quoted, p. 57; West Indies, Commission on Agricuture, p. 73; —flora, by H. R. A. Grisebach, p. 65;—Dr. D. Morris appointed, p. 76; Williamson collection studied by Dr. D. H. Scott, p. 95; —refusal to purchase, *Woodward*, 1068; wood specimens now shown, p. 58; Woods, Forests, etc., Commissioners' letter to the Treasury, p. 99; work accomplished during last 25 years, p. 76.

E.

East India Company, collections at Kew, p. 74, 76.

Economic, botany, at Kew, *Hemsley*, 1204; —at the British Museum not required, *Bentham*, p. 130; —conspectus of, *Dyer*, p. 61, 62; —instruction on, *Dyer*, p. 66; —lectures on, *Dyer*, p. 59, 60; museum of, p. 123; —plants cultivated, *Dyer*, p. 64; —products at Berlin, p. 169; — —Brussels, p. 164; — —Paris, p. 166, 167; — —St. Petersburg, p. 165; — —Vienna, p. 162; —of India, Watt's "Dictionary," *Dyer*, p. 76; —questions referred to Kew, *Murray*, 29, 164; —specimens in Kew Museum, *Dyer*, p. 58; —work appreciated abroad, *Dyer*, p. 67.

Economy in administration, *Bennett*, p. 127; —on amalgamation, probably small, p. 179.

Eden, Right Hon. George, Earl Auckland, plants from Kew, p. 113.

Edification, the true function of the British Museum, *Lankester*, 1152, 1153.

Edinburgh, collections in, *Murray*, 194; —herbarium should be kept up to date, *Fawcett*, 542; — —State-supported, *Carruthers*, 586; —suggested as a place for amalgamation, *Clarke*, 305; —Museum, Brown's bequest, p. 125; —types at, *Murray*, 37.

Education no function of the British Museum, *Lankester*, 1152, 1155-1157, 1170, 1185.

Educational herbarium at the Royal College of Science, *Farmer*, 771; —should be added to, *Holmes*, 387, 397; — —and arranged systematically, *Holmes*, 405; — —much wanted, *Holmes*, 389; —help, *Murray*, 150, 151; —side of the British Museum, *Masters*, 651-653, 656; —use of the British Museum, *Farmer*, 774-787, 790-799, 805, 808, 821-825, 827, 847; *Murray*, p. 2, 3; —use of foreign collections, Berlin, p. 169; —Paris, p. 165-167; —Vienna, p. 162.

Egyptian tombs, specimens from, *Dyer*, p. 94.

Elementary collection insufficient for the British Museum, *Woodward*, 1073, 1074, 1098.

Elder, Dempster and Co., Messrs., on botanic stations, *Dyer*, p. 82.

Elliot, G. F. S., collection divided between Kew and the British Museum, *Murray*, 129.

Elwes, Henry John, F.R.S., accessibility of Kew from his own standpoint, 1055; amalgamation of the two herbaria at Kew desirable, 1003, 1009; —would require several years to effect, 1040, 1041; aroids better studied living than in herbaria, 1022; botany, less studied by him than entomology or ornithology, 1017; —studied purely from a horticultural standpoint, 1017; —systematic botany can only be properly studied at Kew, the only place in the world, 1008; British Museum, British herbarium unknown to him, 1013; —duplicates in collection possibly the same as at Kew, 1030; —herbarium not consulted by him, 1006, 1007, 1029, 1050; — —would not satisfy cultivators, 1026; —horticulturists do not visit it for names, 1048, 1049; —library should be transferred to Kew, 1044, 1045; — —books not wanted should be sold, 1046; — —no loss would accrue, 1046; —old specimens probably worthless, 1014; —public collections might be retained, 1011, 1034; —reference herbarium not needed, 1014; —reserve of specimens for galleries not required, 1035; — — Kew could supply them, 1035-1037; specimens are probably old and worthless, 1014; —travellers' col-

Elwes, Henry John, F.R.S.—*continued.*
lections of living plants go to Kew, not the same inducement for British Museum, 1042; —union with Kew, 1010, 1012, 1014; Clarke, Mr. C. B., sale of the herbarium of a deceased naturalist, 1031; —should be consulted as to the relative riches of British Museum and Kew, 1051; collections in public galleries to be left at the British Museum, 1011, 1034; —two, cause a loss of time and additional trouble, 1008, 1052, 1053; collectors are attracted by Kew, 1024, 1042; competition injurious, 1024; —declines to specify cases, 1031, 1032; dried plants only used by him in default of living ones, 1018; duplicates, definition of, 1040; —those in the British Museum possibly the same as the Kew specimens, 1030; entomology more studied by witness than botany, 1017; expense of amalgamation likely to be great, 1030; educational collection of botany in London desirable, 1033; evidence, 1004-1058; fire regulations at Kew, 1058; fireproof, new building should be, 1058; fossil plants may require a herbarium, but cannot see its necessity, 1015; geologists may wish to compare recent plants with fossil, 1016; garden work needed for the herbarium at Kew, 1022; herbarium, accommodation at Kew possibly adequate, 1057; —complete herbarium at the British Museum would not satisfy cultivators, 1026; —needed for garden work, 1022; —price enhanced by competition, 1031; —small herbarium is of very little use, 1025; horticulturists need living plants for comparison, 1027, 1029; —visit Kew, 1048, 1049; — —but not the British Museum, 1048; Kew, accessibility of, 1055; —admirably managed, 1019, 1029; —amalgamation desirable, 1008, 1009; — — would require several years to effect, 1040, 1041; —duplicates at the British Museum, 1030; —herbarium exclusively consulted by him, 1006, 1029, 1050; —horticulturists visit it exclusively, 1048, 1049; —library admirable, 1019; — —should have all needed books from the British Museum Departmental Library, 1044-1046; — —never found wanting by him, 1020; —reserve of specimens could be supplied from, 1035-1037; —systematic botany can only be properly studied at, 1008; —travellers send their collections thither, 1042; —types should be there, 1024, 1051; —unique among public herbaria, 1005; library at British Museum should be transferred to Kew, 1044, 1045; — —books not wanted to be sold, 1046; —at Kew, admirable, 1019; — —never found wanting by him, 1020; *Lilium*, monographed by him, 1004; living plants preferable to dried for his own purposes, 1018; London, an educational collection of botany in, desirable, 1033; monocotyledons best studied living, 1008, 1022; old specimens at the British Museum probably worthless, 1014; orchids better studied in the living state, 1022; ornithology more studied by him than botany, 1017; palms should be studied living, 1022; public collections at the British Museum might be left untouched, 1011, 1034; reference herbarium not needed at the British Museum, 1014; reserve of specimens for public galleries not required, 1035; —could be supplied from Kew, 1035-1037; — —closer relations needed, 1037, 1038; specimens at the British Museum, old, probably worthless, 1014; systematic botany can only be properly studied at Kew, 1008; travellers bring their collections of living plants to Kew, rather than to the British Museum, 1042; trees, better studied living than in the herbarium, 1022; two collections cause trouble and loss of time, 1008, 1052, 1053; types at the British Museum, Mr. Clarke should be asked about them, 1051; — —should be at Kew, 1024; —definition of the term, 1025; union of herbaria advocated, 1010, 1012, 1014; zoology, no necessary connection with botany, 1016.

Empire, botanic survey of, *Dyer*, p. 64.

Emulation may be useful, *King*, 234.

Endlicher, S. L., drawings by, p. 162; —his "Genera plantarum" includes fossil plants, *Carruthers*, p. 136.

Engler, Dr. Adolf, his methods worth copying, *Murray*, 152; —report on Berlin collections, p. 168-169.

English Botany, types in the British Herbarium, *Carruthers*, p. 180; —fungi, Sowerby's models, p. 114, 115; — —guide to the same, *Murray*, p. 3.

Epacridaceæ, usually unknown to students, *Holmes*, 418.

Enquiries, summary of previous, p. 111-158.

Enquiry, 1858, p. 118-122; —1860, p. 124-126; —1868-1860, p. 126-127; —1871-75, p. 127-149; —1872, p. 149-157.

"Erebus" and "Terror" collections, *Dyer*, p. 85, 86.

Errors in names in the British Museum, *Hanbury*, 512; —by Dr. Dickie, *Holmes*, 487-490, p. 173.

Erysiphaceæ of Kew Herbarium, *Dyer*, p. 98.

Esher, Right Hon. Viscount, attitude to museums, *Dyer*, 1312.

Estimate of relative sizes of the two herbaria, *Hemsley*, 1222, 1227, cf. 1232-1237.

Etheridge, R., work in the Geological Department, *Woodward*, 1066.

Ettingshausen, Baron C. von, his use of the Geological Department, *Woodward*, 1066.

Euphorbias, cannot be shown in herbaria, *Holmes*, 402.

Europe, representative collection should be at the British Museum, *King*, 225.

European, application to the chiefs of foreign herbaria, p. 161; —replies, p. 161-170; —herbaria visited, *Clarke*, 335; —reports from, Berlin, p. 168-170; —Brussels, p. 164; —Paris, p. 165-168; —St. Petersburg, p. 164-165; —Vienna, p. 161-164; —herbarium formerly owned by Boswell, *Hanbury*, 497; —plants needed for comparison with British, *Groves*, 345, 346; —studies of witness confined to them, *Hanbury*, 515.

Evidence laid before previous Enquiries. (See *Enquiries.*)

Examination by boiling, *Dyer*, p. 94; *Murray*, p. 4.

Exchanges, accessions by, at Berlin, p. 169; —at the British Museum, *Murray*, p. 3; —at Kew, *Dyer*, p. 74; — —library, *Dyer*, p. 99; — —seeds, *Dyer*, p. 64; —at St. Petersburg, p. 165; —at Vienna, p. 162.

Excursions, botanic, from Kew, *Dyer*, p. 59; —from Paris, p. 166, 168.

Exhibition, compared with others in Europe, *Murray*, 149; —in the botanical department, p. 114; —in the galleries, *Murray*, 12-14; —in the Geological Department, *Woodward*, 1095; —of species in the public galleries, *Seward*, 933-936; —should be left at Cromwell Road, *King*, 221, 222.

Expansion since 1880 of the British Museum, *Dyer*, 1290, 1345; —room for, *Murray*, 110.

Expeditions, Government, plants sent to Kew, *Dyer*, p. 65 (see also *Owen, Prof. R.*, *Richards, Adm.*, *Ross, Sir J. C.*, p. 154); —results, *Dyer*, 1358.

Expense, if herbarium is retained in London, *Bennett*, p. 127; —of transference to Kew, *Hiern*, 966; *Masters*, 657, 680, 658; —its cost not great, *Elwes*, 1030; —not to be considered, *Clarke*, 307; *King*, 232, 233, 245, 246; —scientific results would not justify large outlay, *Hiern*, 969; *Masters*, 657, 680, 658.

Expenses, annual, at Berlin, p. 169; —at the British Museum, *Murray*, p. 3; —at Brussels, p. 164; —at Kew, *Dyer*, p. 90-93; —at Paris, p. 166-168; —at St. Petersburg, p. 165; —at Vienna, p. 162.

Expert in critical genera wanted, *Hanbury*, 509, 512.

Experts in palaeontology at the British Museum, *Dyer*, 1366.

Exsicata in book form, p. 166.

Extension of buildings at Kew urgent, *Dyer*, 1297, 1298, p. 97, 98.

External characters of fossil plants, *Seward*, 896; —plants displaying them should be left at Cromwell Road, *Scott*, 1116, 1124.

F

Facilities, for study, at Berlin, p. 169; —at the British Museum, *Masters*, 671; *Murray*, 79, 80; — —fossil botany, *Seward*, 924, 927; —at Brussels, p. 164; —at Kew, *Dyer*, p. 64; *Masters*, 671; —at Paris, p. 165-167; —at St. Petersburg, p. 165; —at Vienna, p. 162; —of access, *Clarke*, 332; *Dyer*, 1282, 1341; *Groves*, 350, 353; *Elwes*, 1054; *King*, 272-274, 294; *Lankester*, 1174.

Falconer, Dr. Hugh, Banksian and other collections known to him, p. 121; —should be kept at the British Museum, p. 121; botanic gardens, their scope, p. 120; collections should exist in London, p. 121; —cited, p. 134, 137; dust and soot injurious to specimens, p. 121; evidence, 120; —cited,

Falconer, Dr. Hugh—*continued.*
Carruthers, p. 134; —herbarium, general scope, p. 121; Kew, collections at, p. 121; library an essential adjunct, p. 121; superintendent of Saharunpore and Calcutta botanic gardens, p. 120.

Fashionable studies, *Murray*, 86.

Farlow, Prof. W. G., at Kew, *Dyer*, p. 66.

Farmer, Prof. John Bretland, F.R.S., accessibility of establishments, 769, 818, 832; —of their botanic libraries, equal, 807; advantages of the educational facilities at the British Museum, 779, 780; alluded to, *Lankester*, 1173; British Museum, collections used, 819, 820; —educational value of, 859; —enlargement desirable, 780, 781, 791, 793; —facilities, 775, 777, 778; ——not destructive of research, 865 866; —competition with Kew confined to acquisition of types, 861; —consultation easy, 853-857; —duplicates from, 810; ——no general system of distribution, 811; ——supply cannot be depended on, 812, 813; —herbarium, nearer than Kew for him, 769; ——does not greatly differ from Kew, 852, 853; —library, 805; ——easily accessible, 807; —reference herbarium would suffice for teaching purposes, 783, 790; —seaweeds, how examined at the British Museum by students, 775, 782, 808, 809, 822; —teaching collection and its expansion, 842-844; —visits of students, 819, 820; Chelsea physic garden used by him, 802; colonial work at Kew, 859; competition between the British Museum and Kew not very severe, except as regards types, 861; complete collections aimed at by both establishments, 848-851; cryptogams, how examined, 808, 809, 822; division of function between Kew and the British Museum possible, 859; duplicates at British Museum, cannot depend on the supply, 812, 813; —no general system of distribution, 811; —to Royal College of Science, 810; —storage at and distribution from Kew possible, 863, 864; educational exhibition at British Museum should be enlarged, 780, 781, 791, 793; —sources of enlargement, 792, 795; —facilities, 775, 777, 778; —herbarium at Royal College of Science, 771, 772; —views on, 814-818; —value of British Museum collections, 859; ——if confined to that purpose would be retrogressive, 846; ——not destructive to research, 865, 866; evidence, 763-866; fluid, specimens so mounted, wanted at the British Museum, 834, 835; fossil plants not much studied by him, 796; —comparison with recent forms, 801; —should be in one series with recent plants, and not remote, 797, 799; herbarium, at Royal College of Science, chiefly European, 771; —that of the British Museum nearer than Kew, 769; Kew, educational facilities at, 775; —frequently used, 766, 767; —need of reference to herbarium, 782, 788, 789; ——no difficulty in consulting either collection, 853-857; —not unlike British Museum in certain respects, 852, 853; both establishments visited with students, 819, 820; library at British Museum, 805; —at Kew, 806; —no difference in accessibility, 807; —Royal College of Science library, 804; microscope preparations, how far permanent, 838; —not advisable to keep a large number, 839; morphological collection at Royal College of Science, 828, 829, 831; —the possibility of overlapping the British Museum similar collections, 830, 833; museum, if without research, is lifeless, 845; overlapping collections, 830, 833; reference herbarium at the British Museum would suffice for teaching purposes, 783, 790; research essential in every living collection, 845; Royal College of Science, botany taught by him, 763; —educational herbarium at, 771, 772; —rooms badly lighted for his purposes, 833; Royal Botanic Gardens, Regent's Park, hardly used by him, 803; seaweeds, how examined at the British Museum, 808, 809, 822; —special use, 775, 782; students', *Murray*, 185, 189, 193; —herbarium for, at the Royal College of Science, 770, 816; supply of fresh material from gardens, 836; —large stock collection not wanted, 837; teaching appliances at Royal College of Science, 770; —collection there, 826; —at British Museum, how it should be expanded, 842-844; teratological collection at the Royal College of Surgeons, 840; —reported, but not seen by him, 841; type-specimens, the only form of competition between British Museum and Kew, 861; —rarely wanted by students, 785-786.

Fawcett, William, B.Sc., F.L.S., Africa, flora of the tropical portion, preferably worked at the British Museum, 546; —method suggested, 549; authentic specimens not equal to types, 536; Berlin, reasons for sending Jamaica plants thither, 559; British Museum, assistant during five years, 524; —general scientific herbarium should be there, 534; —new plants shared between it and Kew, 562; —tropical Africa flora preferably prepared there, 546; ——suggested method, 549; collections for the two establishments are not the same, 540; —personal regard often a factor, 541; colonial floras, should be specially worked at Kew, 532, 538; —work the strong point of Kew, 527, 534, 550; compulsory allocation of collections not desirable, 557, 558; Continental herbaria have to be visited by monographers, 544; division of collections practicable, 557, 562; Edinburgh herbarium should be kept up to date, 542; evidence, 523-563; expense caused by rivalry of the two establishments not come under his notice, 563; Glasgow herbarium should be kept abreast of the time, 542; herbarium, general scientific, should be at the British Museum, 534; Hooker, Sir J. D., his "Flora of British India" requires revision in parts, 531; Hooker, Sir W. J., his pupils sent him collections, 541; Jamaica orchids, his special work, 531; —plants sent to Berlin, reasons given, 559; Kew, collections known to him, 526; —colonial floras should be prepared there, 532, 536; ——work the strong point of Kew, 527, 534, 550; —new plants, shared, 562; loss of time in working at two establishments, small, 531, 552-554; monographs should be prepared at the British Museum, 532, 538; monographers must visit Continental herbaria, 544; Oxford herbarium should be kept abreast of progress, 542, 544; reference collection at the British Museum, would not suffice, 529; rivalry beneficial, 529, 530;— not causing much extra expense, 537; transference of British Museum herbarium to Kew, deprecated, 528; time lost in using two establishments very small, 531, 552-554; types, authentic specimens not equal to, 536; —if removed would much discourage the keeper, 535.

Fedtschenko, Mme., and her son, at Kew, *Dyer*, p. 66.

Fern herbarium at Kew, its value, *Dyer*, 1305.

Fern-stems at Paris, p. 168; —at Vienna, p. 162.

Fernando Noronha, plants, *Dyer*, p. 87.

Fernando Po, collections, *Dyer*, p. 85.

Ferns, at the British Museum, *Murray*, p. 4; —at Kew, collection known, *Seward*, 869; —hand list of, *Dyer*, p. 58; —fossil, studied, *Stewart*, 912; —*Salisburia* leaves mistaken for, *Woodward*, 1087.

Ferro, pre-Linnean herbarium, *Murray*, p. 3.

Fibre plants, in "Kew Bulletin," *Dyer*, p. 80.

Fibres, vegetable, at Paris, p. 166.

Field clubs visiting the British Museum, *Murray*, 6.

Fielding, Henry Barron, herbarium wanted for the British Museum, p. 115.

Figures and drawings at Kew, *Dyer*, p. 58, 98.

Fire, danger on amalgamation, *Murray*, 98, 113, 115; —regulations at Kew, *Dyer*, p. 95, 96; *Elwes*, 1057; *Hemsley*, 1239, 1240, 1248-1251; —risks at Kew, *Dyer*, p. 95, 96; *Hemsley*, 1239, 1240, 1248-1251; *Hiern*, 959; *King*, 244, 284-288; ——a great objection to amalgamation, *Carruthers*, 571, 576; ——better appliances for extinguishing in London, *Hiern*, 959, 970; ——present duplication a safeguard, *Carruthers*, p. 140.

Fireproof buildings, British Museum secure, *King*, 252; *Murray*, p. 4; —essential for the security of the Kew herbarium, *King*, 244, 284-288; —most important, *Holmes*, 417; —possible at Kew, *Hiern*, 960.

Fischer von Waldheim, Dr. Alexander, report on the St. Petersburg herbarium, p. 164-165.

Flax, differently arranged at Kew and South Kensington, *Hooker*, p. 127; —cited, p. 140.

Flinders, Capt. M., drawings made during his voyage, p. 116.

Flora, British, estimates of its extent, p. 137; ——sometimes studied exclusively, *Elwes*, 1013; —of British India, *Dyer*, p. 76; ——specimens marked as types, *Holmes*, 384; ——worked at Kew, *Clarke*, 327.

Floras, in "Kew Bulletin," *Dyer*, p. 79; —in preparation, *Dyer*, p. 98; —of Colonies, *Dyer*, p. 64; —those issued from Kew, p. 149; —types at Kew, *Hemsley*, 1262.

Flower, Sir W. H., action in disagreement between the two establishments, *Dyer*, p. 87; —his views on the Geological Department, *Woodward*, 1068; —on fossil plants transferred from the Botanical Department, *Murray*, 47-49, p. 4; — —controverted, *Woodward*, 1063, 1064, 1081; —on the Index Museum, *Lankester*, 1183; *Murray*, 133; —popular instruction encouraged by, *Murray*, 11, 12; — teeth arranged for exhibition by, *Lankester*, 1152.

Flowers, preserved, at Vienna, p. 162.

Fluid mounted specimens, *Farmer*, 834.

Food-grains, in "Kew Bulletin," *Dyer*, p. 81.

Forbes, H. O., New Guinea plants, *Dyer*, p. 87.

Foreign botanists at Kew, *Dyer*, p. 64.

Foreign Office and Kew, *Dyer*, p. 64.

Forest officers for India, *Dyer*, p. 77; —products, at Brussels, p. 164. (See also *Timbers*, *Woods*.)

Forestry, in India, *Dyer*, p. 77; —represented at Kew, *Dyer*, p. 82-83; —students, *Dyer*, p. 64.

Formalin, objects preserved in, at Berlin, p. 168; —at Vienna, p. 162.

Forsyth Major, C. I., collection in the Geological Department, *Woodward*, 1066.

Forster, Edward, his collection the basis of the British herbarium at Cromwell Road, *Carruthers*, p. 180; —Hudson's plants, supposed to be missing from, *Holmes*, p. 173; — —alluded to, *Holmes*, 451; — — controverted, *Batters*, p. 179; *Carruthers*, p. 178.

Foslie, Dr. M., at Kew, *Dyer*, p. 66.

Fossil botany, at Kew, *Holmes*, p. 173; —in the Geological Department, British Museum, *Woodward*, 1062; —special attention paid to, *Seward*, 868.

Fossil plants, at the British Museum, p. 127; *Woodward*, 1062; — —Brown's bequest, with conditions, p. 125; — —should be transferred to Kew, *Holmes*, 439, 493; — —should be with recent plants at Kew, *Seward*, 877, 882, 885; — —should be retained, *Ball*, p. 132; *Bennett*, p. 125; *Masters*, 747-755; *Lankester*, 1180; *Russell*, p. 126; —at Brussels, p. 164; —at Kew, few, p. 119; *Dyer*, p. 94. 95; *Seward*, 870; — —transferred to British Museum, *Dyer*, p. 95; Q. 1358, 1360; — —not wanted, *Dyer*, 1361; — —might be accommodated, *Dyer*, 1366; —at Paris, p. 166, 167; — —slides there, p. 166; —at St. Petersburg, p. 165; —botanists the chief students, *Woodward*, 1065-1067; —collection at the British Museum, *Woodward*, 1062; — —exceedingly good, *Seward*, 871; — —only place, *Carruthers*, 573; — —rich collection, *Lankester*, 1145; —essential in a plant collection, *Carruthers*, 573, 574; — for geological purposes, *Holmes*, 447, cf. p. 173; —herbarium, reference herbarium for, *Bentham*, p. 130; *Elwes*, 1015; — —insufficient, *Carruthers*, 578, 605; — —but need a complete herbarium of types, *Carruthers*, 580, 618, 619; —methods of research, *Carruthers*, 610; *Dyer*, 1368; —might be more extensively displayed, *Seward*, 942-945; —proportion in Geological Department small, *Lankester*, 1142, 1144, 1176; —should be concentrated, *Lankester*, 1179; —stratigraphic geology requires them, *Lankester*, 1195, 1196; —studied by botanists, *Hiern*, 975, 976; *Seward*, 910; *Woodward*, 1065-1067; — —with recent plants, *Carruthers*, p. 136; —transferred from Botanical Department, *Murray*, 47-50; p. 4; *Woodward*, 1063, 1064, 1081; — —from Kew, *Dyer*, p. 95; Q. 1358, 1360, 1361; —usually possess only external characters, *Carruthers*, 610.

Foster, Sir Michael, adjudicator of S. Elliot collection, *Murray*, 129.

Foundation of the British Museum in 1753, p. 111.

France, herbarium of, at Paris, p. 166, 167; —official report on Kew, *Dyer*, p. 67-74.

Frankland, Sir J., herbarium mentioned, *Batters*, p. 179.

Fruit trade, in "Kew Bulletin," *Dyer*, p. 79.

Fruits and Seeds, collection at Berlin, p. 169; —at the British Museum, *Murray*, 56, p. 2, 3; — —its arrangement, *Murray*, 57, 58; —at Kew, *Dyer*, p. 94; — —unarranged specimens, *Holmes*, 430; —at Paris, p. 166, 167; — —models in wax, p. 167; —at St. Petersburg, p. 165; —at Vienna, p. 162; —models, at Vienna, p. 162; —no complete collection in existence, *Holmes*, 430.

Functions of Kew never defined, *Dyer*, p. 57.

Fungi, models, at the British Museum, *Murray*, p. 3; —Paris, also in spirit, p. 166.

Furniture and fittings, *Murray*, p. 3; no reduction of cost by amalgamation, *Murray*, 88-92, 106.

G.

Gaboon collection, *Dyer*, p. 85.

Galleries, exhibition in, explained, *Murray*, 78; —suggested for herbarium purposes, *Clarke*, 307.

Galton, Capt. Douglas Strutt, disadvantages of separation, p. 148; evidence, p. 148.

Gamble, James Sykes, at Kew, *Dyer*, p. 65.

Gamopetalæ of Kew Arboretum, hand list, *Dyer*, p. 58.

Garden library at Kew, *Dyer*, p. 58, 59; —plants not wanted for comparison, *Groves*, 367-369; —staff of Kew, *Dyer*, p. 59, 90-93.

"Gardeners' Chronicle," editor of, *Masters*, 620.

Gardens, Colonial botanic, suggested regulations for, *Dyer*, p. 75.

Gardner, J. S., work in Geological Department, *Woodward*, 1066.

Gaudin, C. T., of Lausanne, work on plants of the oolitic shale, *Woodward*, 1087.

Gay, Jacques, herbarium at Kew, *Dyer*, p. 74; p. 149.

Genera, arranged according to monographs, *Murray*, p. 4; large, arranged geographically, *Dyer*, p. 95; types if marked, should be publicly exhibited, *Holmes*, 421-428.

"Genera plantarum," *Dyer*, p. 76.

General herbarium at the British Museum, includes all post-Linnean collections, *Murray*, 45, p. 2; —stated to be inferior to Kew, *Hooker*, p. 126; — —not admitted, *Bennett*, p. 126; —Library at Cromwell Road, *Murray*, 179, 181.

Generic determination, *Dyer*, 1369, p. 94.

Geneva herbaria visited, *Clarke*, 335.

Geographic arrangement suggested by Devonshire Commission, *Dyer*, 1357, p. 97; —at Kew, *Holmes*, 409; *Masters*, 666; —confined to species, *Murray*, p. 4; —not employed at the British Museum, *Masters*, 685, 687; —recommended, p. 123, p. 141; *King*, 226, 243; —when complete, is useless to students, *Holmes*, 410.

Geographical botany, lectures, *Dyer*, p. 59, 60; —progress at Kew, *Murray*, 170; —divisions for genera, *Dyer*, p. 95.

Geologic age, fossils used to ascertain, *Seward*, 875; *Woodward*, 1102; —investigation at the British Museum, *Scott*, 1118, 1120; —specimens should remain in London, *Hooker*, p. 126. See also *Fossil Plants*.

Geological Department, British Museum, account of, *Woodward*, 1059-1103; —history, *Woodward*, 1061, 1063; —possesses all the fossil plants, *Seward*, 872; —transference from Botanical Department, *Murray*, Q. 47-50, p. 4; *Seward*, 879-881; *Woodward*, 1063, 1064, 1081; specimens now in, *Seward*, 881; —their number, *Woodward*, 1063, 1064; visits of officers to Botanical Department, *Hiern*, 989; would not suffer if transferred to Kew, *Lankester*, 1139, 1142, 1177.

Geological Museum, fossils in, *Holmes*, 441; —mistake explained, *Holmes*, p. 173.

Geological Society of London, fossil plants possessed by, *Carruthers*, p. 189; —supposed to possess a collection of fossil plants, *Holmes*, 442.

Geologists, cannot be distinguished from botanists, as to fossil plants, *Woodward*, 1055; —herbarium suggested for their use, *Bentham*, p. 130; *Hooker*, p. 126; — —repudiated as useless, *Carruthers*, 578, 605; — —their needs, *Carruthers*, 580, 618, 619; —scarcely use the Botanical Department, *Woodward*, 1076; —use fossil plants less now than formerly, *Murray*, 59, 60, 86; —who have used the Department, *Woodward*, 1066.

Geology, as a science, may disappear, *Woodward*, 1068; —its wants in recent forms, *Woodward*, 1077, 1078.

George III., old Royal library presented, p. 111.

George III., condition of the Botanical Department, British Museum, during his reign, p. 111.

Germany, expeditions sent out by, *Dyer*, 1294.

Gift, accessions by, Berlin, p. 169 ; —British Museum, p. 3 ; —Kew, *Dyer*, p. 74 ; — —library, *Dyer*, p. 99 ; —Paris, p. 168 ; St. Petersburg, p. 165 ; —Vienna, p. 162.

Gingko, fossil leaves resembling those of that genus, *Woodward*, 1087.

Glasgow herbarium should be kept up to date, *Fawcett*, 542.

Glaziou, A., large gifts to Paris, p. 168.

Gluing of specimens, *Dyer*, p. 94; not done, *Murray*, p. 4.

Godefroy-Lebeuf, at Kew, *Dyer*, p. 66.

Godman, F. D., St. Vincent collections his property, *Dyer*, p. 87.

Gold Coast rubber trade, *Dyer*, p. 76.

Government, collections sent to Kew, *Dyer*, p. 65 ; *Murray*, 173, p. 126 ; — —have enriched Kew *Masters*, 662 ; — —fossil plants sent to British Museum, *Murray*, 172, p. 141 ; control of British Museum apparently wanting, *Dyer*, p. 57 ; —enquiries ; see *House of Commons, Royal Commissions* ; —expeditions, collections allotted, *Richards*, p. 147 ; — —fossils sent to British Museum, p. 146 ; — —plants sent to Kew, p. 126 ; — —should be sent thither to be worked out, p. 126, 141 ; — —with a set for the British Museum, p. 141 ; —no assistance given for physiological botany, *Dyer*, 1362-1365 ; —offices, their relations with Kew, *Dyer*, p. 64 ; —requisitions, seldom made, *Cornu*, p. 167 ; *Murray*, p. 3.

Graineterie at Paris, *Cornu*, p. 167.

Grant, special, for Hooker collections, *Dyer*, p. 98.

Gray, Dr. J. E., transference of Searles-Wood collection to Geological Department, *Woodward*, 1083.

Great Britain, geology shown at Jermyn Street, *Lankester*, 1169.

Greenwich, comparison with Kew, *Dyer*, 1273.

Grisebach, H. R. A., his West Indian flora, *Dyer*, p. 65.

Groups under geographic arrangement, *Murray*, p. 4.

Groves, Henry, at Kew, *Dyer*, p. 65.

Groves, James, F.L.S., accessibility of both establishments compared, 350-353 ; amalgamation desirable if in London, not otherwise, 342 ; botanists would regret removal of herbarium from London, 346 ; British collection of plants at the British Museum not a perfect one, 365, 366 ; —plants should be studied in relation to European plants, 345, 361 ; British Museum, accessibility, 350-353 ; —amalgamation of Kew collections in London, desirable, 342 ; —herbarium chiefly used by him, 338 ; — —more useful to him than Kew, 340, 341 ; library in Botanical Department most useful, 362 ; —pre-Linnean collections rarely used by him, 345, 346 ; Characeæ, study of, 345 ; Continental plants required for comparison with British, 362, 363 ; —should be a complete European herbarium, 364 ; Cryptogams should remain with the Phanerogams, 354-357 ; evidence, 337*-370 ; European plants for comparison with British, 362-364 ; Kew herbarium used when the British Museum is not available, 339 ; —inconvenient of access, 347,351 ; —living plants not used by witness, 369 ; library at British Museum most useful, 362 ; living plants not required in proximity to a herbarium, 367, 368 ; London the preferable locality for the union of the two herbaria, 345, 346 ; pre-Linnean herbaria rarely used by him, 344.

Grunow, A., collection of Diatoms at Vienna, p. 161, 162.

Guides, British Museum, *Murray*, p. 3 ; —Kew, *Dyer*, p. 58.

Guildford *Sinapis* identified at Kew, *Holmes*, p. 173 ; *Murray*, p. 178.

Gum, new, from Zanzibar, *Dyer*, p. 66 ; —used as an adhesive, *Murray*, p. 4.

Gunn, R. C. Tasmanian collections, *Dyer*, p. 86.

Gymnosperms at Kew, known to witness, *Seward*, 869 ; —in Museum, *Dyer*, p. 94 ; —work on, *Seward*, 891.

H.

Halymenia Latifolia misnamed by Dr. Dickie, *Holmes*, p. 173.

Hamilton, Lord George, mentioned, *Dyer*, 1300, 1303.

Hammersmith, botanist living at, *Carruthers*, p. 134 ; *Waterhouse*, p. 124 ; —identified as being probably John Miers, *Panizzi*, p. 125.

Hanbury, Frederick Janson, F.L.S., African and American plants not studied by him, 515 ; botanist skilled in critical genera wanted, 509, 512 ; British Museum, deprecated transference to Kew, 508 ; —the herbarium of British plants most excellent, and not equalled at Kew, 506 ; Colonial plants not studied by him, 515 ; critical genera, State botanist required for, 509, 512 ; —plants now examined as a favour by specialists, 511 ; errors in names in British herbarium at the British Museum, 512 ; evidence, 495-522 ; European plants studied in connection with British plants, 515, 518 ; general herbarium should be retained at the British Museum, 517 ; herbaria in his own possession, 498 ; *Hieracium*, has a critical knowledge of the British forms of that genus, 497 ; Indian plants not studied by him, 515 ; Kew, deprecates transference of British Museum collections to, 504-508 ; —British Herbarium at Cromwell Road, unequalled at Kew, 506 ; —less accessible than the British Museum, 504 ; —little help obtainable from it for local botanists, 500 ; —little visited by him, 499 ; — —reasons, 500 ; types might be transferred to Kew, if authentic specimens left at British Museum, 507, 508, 520, 521.

Hanbury, Right Hon. R. W., extension at Kew, *Dyer*, p. 97.

Hand lists of Kew collections, *Dyer*, p. 58.

Hanover, King of, his house at Kew now appropriated to the herbarium, p. 141.

Hariot, Paul, in charge of cryptogams in Paris, p. 166 ; —on Leveillé's herbarium, *Dyer*, p. 98.

Harleian collections, p. 111.

Harley, Robert, afterwards Earl of Oxford and Mortimer, his manuscripts, p. 111.

Harris, Dr. J. H., lectures at Kew, *Dyer*, p. 60.

Harvey, Dr. W. H., work on South African flora, *Dyer*, p. 64.

Hawley, Sir H., an executor of Banks's will, *Dyer*, p. 101.

Heer, Oswald, collection of both fossil and recent fruits required, p. 122.

Heimerl, Anton, Ascoboleenpräparate, p. 162.

Hemsley, William Botting, F.R.S., activity in the herbarium, 1203 ; additional room urgently required, 1221, 1241 ; advantageous to amalgamate, 1211, 1213, 1220 ; amalgamation at Kew desirable, 1211, 1213 ; backing the sheets of specimens impracticable, 1222 ; Banks, Sir Joseph, dried plants acquired by, 1225 ; Banksian herbarium, 1209, 1213 ; —its growth, 1220 ; boiling specimens, means for, 1248 ; botanic research, herbarium used for, 1202 ; British Museum, known to him by personal visits, 1206 ; —its old collections, 1207 ; —one-third only as large as Kew, 1222, 1227 ; cf. 1232-1238 ; buildings at Kew needed, 1243, 1245 ; cabinets, amalgamation by, 1218, 1224 ; —differences in size, 1215, 1216, 1231 ; collections at the British Museum, and at Kew, many the same, 1246, 1247 ; —purchased, 1252-1256 ; collectors for Banks were Kew men, 1220 ; —terms, 1260, 1261, 1263 ; colonial collections, reasons for being sent to Kew, 1262 ; competition as to purchased collections, 1253-1255 ; —insignificant, 1255 ; Cook's voyages, specimens in herbarium, 1209 ; cultivated plants, names verified, 1202 ; cutting down of British Museum sheets deprecated, 1215, 1216, 1219 ; cycads need a large size of paper, 1231 ; determination, plants sent for, 1202 ; disadvantages of amalgamation not obvious, 1214 ; dried plants sent to Banks, 1220, 1225 ; duplicates, of numbered collections, 1257, 1258 ; —should be eliminated, 1215, 1224, 1230, 1245, 1247, 1258 ; evidence, 1197-1263 ; extension of herbarium at Kew needed, 1243, 1245 ; fire-proof, the herbarium not so, 1239 ; fire-risk and precautions, 1240, 1248-1251 ; fires, none in herbarium building, 1248 ; floras, drawn up by, *Dyer*, p. 65 ; —types at Kew, 1263 ; fruits belonging to the Banksian collections not at Kew, 1225 ; functions of the herbarium, 1202 ; garden plants, names verified, 1202 ; Hanover House, library begun at, 1225 ; herbarium, functions, 1202 ; —growing, 1228, 1229 ; —known to him for forty years, 1199-1200 ; —now isolated, 1240, 1249 ; —overcrowded, 1221, 1241 ; —want of space detrimental,

Hemsley, William Botting, F.R.S.—*continued.*
1244; historical collections, should be kept in their present state, 1230; incorporation prevented by different sizes of sheets, 1215, 1217-1219; increase of collections, annual percentage not known, 1263; Indian flora, reasons of collections being sent to Kew, 1262; keeper of herbarium for two years past, 1197, 1198; Kew Herbarium, three times the size of the British Museum, 1222, 1227; cf. 1232-1233; museums, not under his charge, 1242; names of plants verified in the herbarium, 1202; new buildings requisite, 1243, 1245; numbered collections, duplicates in, 1257, 1258; old collections at the British Museum, 1207, 1209; over-crowded state of the herbarium, 1221, 1241; percentage of increase in collections not known, 1263; pre-Linnean collections mentioned, 1208; purchase of collections, 1252-1256; reduction by elimination of duplicates, 1247, 1258; research, herbarium used for, 1202; risk of fire, and precautions, 1240, 1248-1251; seeds sent to Kew, 1220, 1226; sheets, difference in size, 1215, 1224; sets distributed, 1261; sizes of paper at Kew, 1231; specimens, as understood, 1234-1236; —of Banksian collections not at Kew, 1225; spirit-lamp, its place in the herbarium, 1248; travellers, the most valuable collectors, 1261; types at Kew, 1263; uses of the herbarium, 1201; visits to both herbaria, 1210, 1212.

Henfrey, Prof. Arthur, evidence, p. 120; ——cited, *Carruthers*, p. 134, 137; —living at Turnham Green, p. 125.

Henry, Dr. A., Chinese collections, *Dyer*, 1294.

Hepaticae, lent, *Dyer*, p. 93; rearrangement of, *Murray*, p. 4.

Herbaceous plants, hand list, *Dyer*, p. 58.

Herbaria, article in "Encyclopædia Britannica," *Holmes*, 388, 415, 416; —combined, old and new, *Clarke*, 307; —European, application for information on, p. 161; — —replies, p. 161-170; —left by will, *Cornu*, p. 168; —of cultivated plants, at Paris, p. 167; —possessed by F. J. Hanbury, 497; — travellers', *Cornu*, p. 168.

Herbarium, at Berlin, p. 168-170; —at the British Museum, *Brown*, p. 112, 114; *Carruthers*, p. 136; Q. 568-619, p. 173, 180; *Murray*, p. 1-13; —at Brussels, p. 164; —at Kew, *Dyer*, p. 58, 82, 94-99; — —accommodation probably adequate, *Elwes*, 1057; cf. *Dyer*, 1297, 1298; *Hemsley*, 1244, 1245; *King*, 241, 242; — —essential for its present work, *Clarke*, 329, 330; *Dyer*, 1316, 1317; *King*, 216, 170, 271, 294; — —extension desirable, *Dyer*, p. 98; — —urgent, *King*, 241, 242; —at Paris, p. 166-168; —at St. Petersburg, p. 164-165; —at South Kensington Royal College of Science, *Farmer*, 771; —at Vienna, p. 161-163; —for fossil botany essential, *Carruthers*, 588; *Murray*, 54; *Seward*, 907; — —needless, *Lankester*, 1167, 1168; —functions, *Dyer*, p. 64; —importance of, *Seward*, 906, 907; —instrument of research, *Dyer*, p. 97; *Murray*, 129; —leaves cannot be detached without injury, *Holmes*, p. 173; —material worked up, *Dyer*, p. 82; —not consisting of dried plants only, *Carruthers*, 609; —regulations, *Dyer*, p. 65; —requisites for, *Bentham*, p. 130; —Sloane, p. 111; — —alleged neglect and present condition, *Brown*, p. 112, 114; *Carruthers*, p. 136; —transference, and change in function, *Seward*, 908; —use by palaeontologists, *Murray*, 53; —vote for, *Dyer*, p. 74.

"Herbier du Cours," lecture herbarium at Paris, p. 167.

Hieracium, British forms known to witness, *Hanbury*, 497; —critical botanist for the genus wanted, *Hanbury*, 509.

Hiern, William Philip, F.L.S., administration after transference, 979*, 983; African plants, collection at the British Museum, 950; amalgamation desirable, 954-958; — —a great advantage, 1000; — —preferably at Cromwell Road, 957, 1001; — —reasons, 978-979*; —more accessible, 958; —nearer the Linnean Herbarium, 958; —risk of fire less, 959, 970; —to take place at Kew, rather than present plan, 1002, 1003; appliances for extinguishing fire at British Museum and Kew, 959, 961; at Kew, working, *Dyer*, p. 65; British Museum, its collections not represented at Kew, 948; —reference to, 949; —witness worked five years in herbarium, 947; books at Cromwell Road, 961; —those wanting at Kew, 962; change in administration requisite on transference, 977; collection, geological, should be in the same building, 959, 988; Colonial questions might be referred to the British Museum, if Kew collections were transferred there, 997; —if economic, referred to Kew, 998; —if of names, referred to wherever the main collection exists, 999; —work done at Kew important, and need not be interfered with, 983, 984; consultation between British Museum and Kew, 984; —not likely to arise, 985, 986; Cryptogams on the border line approaching animals, 988, 990; —not much in his work, 991; evidence, 946-1003; expense of transference would be large, 967; —if great might be incommensurate with the advantages, 968, 969; fire, appliances for extinguishing, better in town than elsewhere, 959; —risk small at Cromwell Road, 959, 970; fireproof building at Kew possible, 960; fossil botany requires an intimate knowledge of recent plants, 973; —has done but little work in it, 988; —would rely upon the opinion expressed by Mr. Carruthers, 975, 976; geological collections should be in the same building as the recent plants, 959, 988; incorporation desirable, 954-958; —more modes than one are practicable, 992; — —if by cabinets, it would be only a temporary expedient, 994; journals at Cromwell Road, 961; —which are wanting at Kew, 962; Kew, first went thither on account of its reputation, 949; —has worked in its herbarium 8½ years, 947; Linnean herbarium must be consulted, 958; monographer's intimate knowledge an aid in the study of fossil plants, 973; naming of plants when new, 987; organisation must be changed, if the collections are transferred to Kew, reasons, 977; reference herbarium for Kew, 964, 965; recent plants, the larger the collection the better for the study of fossil plants, 973; secondary herbarium for Kew, 964, 965; —sufficient for its requirements, 966; selection of plants from Kew for the British Museum, 963; size of sheets, the difference an important one, 971, 972; —impossible to cut down the British Museum sheets, 972; time of staff occupied in the removal from Bloomsbury to Cromwell Road, 995; —might account for diminution of original work, 996; transactions and journals at Cromwell Road, 961; —those wanting at Kew, 962; transference of Kew to British Museum, there would be little need of consultation, 935; —to Kew, would be an improvement on the present conditions, 977; Trustees, employment by, 950, 953; union of herbaria, see *amalgamation*; water at Kew available in case of fire, 961; West Africa, plants collected from, in British Museum, 950; work done at the British Museum small in the past, 928; —likely to equal Kew in the future, 928; —time was consumed in the removal from Bloomsbury, 995, 996.

Hind, Dr. W., work in Geological Department, *Woodward*, 1066.

Hinde, Dr. G. J., visitor to the Geological Department, *Woodward*, 1066.

Historic collections, *Murray*, 41; —should be transferred to Kew, *Clarke*, 307; *King*, 231; *Masters*, 675; —but kept as now, *Hemsley*, 1230.

Hochreutiner, Dr. G., at Kew, *Dyer*, p. 66.

Holland, J. H., at Kew, *Dyer*, p. 65.

Holmes, Mr. Edward Morell, F.L.S., access to British Museum herbarium, reasons for restriction, *Carruthers*, p. 177-178; advantages of proximity of living plants with herbarium, 459; Algæ of "Challenger" expedition misnamed, 473; —by Dr. Dickie, p. 173; —comments on, p. 177-178; —views on a list of the British species, *Carruthers*, p. 178; alteration in naming, 481; amalgamation at Kew desirable, 379; —by cabinets, unless the British Museum sheets are cut down, 394, 395; —by selecting all specimens wanting at Kew, 387; —its convenience would justify any expense, 413; —residue would serve as a reference herbarium, 388, 389; authenticated specimens wanted, p. 173; authenticity should be vouched for by experts, 475; Batters, Mr., his correction of Dr. Dickie's naming, p. 173; Bloomsbury, collections consulted when there, 373; botany studied by witness professionally, 373; British algæ, views on a list of the species, *Carruthers*, p. 178; British Museum, amalgamation at Kew desirable, 379; — —by incorporation of specimens, 387; — —residue for herbarium at Royal College of Science, 388; — —specimens required for Kew to be selected, 388; — —few study the collections exhibited, 399; — —less complete collections than at Kew, 375; — —instance of one collection lost to sight, 412; (reply, *Carruthers*, p. 178, 179); — —rarely consulted by

Holmes, Mr. Edward Morell, F.L.S.—*continued.*
witness, 375; — —special collections compel visits, 375, 376; — —used by witness while at Bloomsbury, 375; —competition of Kew has not acted as a stimulant, 414; —fossil plants believed to be in the Botanical Department, p. 173; —fruits common in commerce should be in the collections, 435; —main collections should be transferred to Kew, 431; — —residual duplicates should be left, 435; — —or else provided by Kew, 437, 455; —old collections not known as being in the Museum, 412; —plants, few which are not representated at Kew, p. 173; —pre-Linnean collections should be transferred, 411, 412; — —some already there, 411; —rarely possesses plants absent from Kew, p. 173; —*Sphacelaria*, species mixed in herbarium, p. 173; —*Sinapis incana*, not identified by officers, 407; p. 173; —to be made an offshoot of Kew, 433; —treatment less civil than at Kew, 377, 378; cf. *Carruthers*, p. 177, 178; —use made of collections, 373; —works issued compared with those from Kew, 414; Burkill, I. H., plant identified by, p. 173; Burrows, Capt. G., plant collected by, 457; Carruthers, Mr. W., fossil plants under his care, p. 173; —permission given to alter names, 485; cf., p. 177, 178; charges controverted, *Carruthers*, p. 177, 178; *Murray*, p. 178; Chinese flora, inconvenient as issued, 470, 471; City (of London) should possess a commercial collection, 464; collections lost sight of, p. 173; cf. 178, 179; competition between the two establishments not beneficial, 414; criticism of names in herbarium, 483-492; cf. p. 173, 178, 179; cross-references in herbarium desirable, p. 173; Cryptogams studied as a hobby, 373; —badly named in the British Museum, 473; — —less so at Kew, 474; —should be transferred, 476; Curator of the Museum of the Pharmaceutical Society, 371; Dickie, Dr. G., errors made by him in naming Algæ, 477, p. 173; — in his lifetime the highest British algological authority, 488; drugs, studied by witness, 457; duplicates should be amalgamated, sheet by sheet, 392; —excluded, 391; economic botany chiefly studied by witness, 457; —represented at Kew, 461; experts should verify all names before incorporation, 475; evidence, 371-494, p. 173; —comments on, *Batters*, p. 179; *Carruthers*, p. 177, 178; *Murray*, p. 178; fire-proof, condition of herbarium buildings important, 417; Forster, E., plants in his collection lost sight of, 451; p. 173; cf. p. 178, 179; fossil plants believed to be in the Botanical Department, p. 173; —no critical knowledge of, 494; —not studied by witness, 400; —should be separate from the recent plants, 445; —should be transferred, 439, 440; —work done in Jodrell Laboratory, p. 173; fruits, duplicates for British Museum, 431; —main collection should be transferred, 431; —no complete collection in existence, 430; —one good specimen of each sufficient for teaching, 432; —unknown forms in commerce, 436; "Gardener's Chronicle," plants named in, 403; generic types, views on, 422-428; geographic arrangement at Kew, 409; Geological Department, British Museum alluded to, 444, p. 173; —not aware of the fossil plants there, 446; —should have a series of fossil plants, 494; Geological Museum (*i.e.*, Museum of Practical Geology), Jermyn Street, supposed to possess fossil plants, 441-444; —explained, p. 173; Geological Society of London, supposed collection of fossil plants, 443; geology, not an expert in, 494; —outside the usual work of students, 401; Gepp, Mr. A., Key collection of mosses prepared by, 486; *Halymenia latifolia*, Dr. Dickie's error in naming, 487-490, p. 173; herbaria, arrangement of, 469; —leaves cannot be well studied in, p. 176; —paper on, mentioned, 414-416; Hudson, W., plants lost to sight, 411, 451, 452, p. 178, 179; identification, amateurs supply insufficient material for, 408; —erroneous, 473-492; —of plants yielding economic products, 462; Jodrell Laboratory, fossil botany at, p. 173; Kew, accessibility compared with British Museum, 454; —algae of "Challenger" expedition incorrectly named, 473; —amalgamation desirable at, 379, 402; — —by incorporation, 387; — —residue for the Royal College of Science or British Museum, 389; — —sheet incorporation preferable, 392; — —or by cabinets when sheets could not be cut down, 394, 395; —collections richer than those at Cromwell Road, 375, p. 173; — —used by witness, 374, 376; — —wanting specimens, 376; —competition not required as a stimulus, 414; —correction of names in herbarium, 484; cryptogamic collection better named than the British Museum, 473; — —main collection should be at Kew, 476; —economic botany should be given up to Kew, 461, 465; —fruits at British Museum should be transferred, 430; — —duplicates, provision for, 433, 444; — —should be chief for economic botany, 434; — —unnamed specimens, 430; —fossil plants, p. 173; — —should be transferred to, 439, 448; —herbarium arranged geographically, 409; — —if completely so would puzzle students, 410; — —used by him, 374, 462; —identification in future exclusively done there, 407; —living plants facilitate research, 402, 404; —more civil treatment and ready help than elsewhere, 377, 378; —names correctly given, 407; —nearly all the plants there which are at the British Museum, 460, p. 173; —preferable place for amalgamation, 402; —pre-Linnean collections should be transferred, 411,412; — —some already there,411; —*Sinapis* identified, 407, 449, p. 173; —use made of collections, 373; —visited as easily as the British Museum, 454; —works published at the two establishments compared, 413; labelling, views on, p. 173; leaves best studied in gardens, p. 173; lichens named by Rev. J. M. Crombie, 486; London, commercial collection required in, 464; Merrifield, Mrs., mentioned, 485; mosses, key collection, 486; Museum of the Pharmaceutical Society, partly botanical, 372; — —witness is Curator, 371; names, erroneous, p. 173; naming plants in herbaria, 481-492; —should be done by officials, 408; national herbarium should be at Kew, 408; natural orders studied by students, 418; *Nitophyllum* misnamed, p. 173; objections to uncorrected errors in naming, p. 173; phanerogams studied professionally by witness, p. 173; "Pharmaceutical Journal," plants named by for the public, 408; plant-types for popular use, p. 173; pollen best studied in gardens, p. 173; popular use of types, p. 173; pre-Linnean collections should be transferred to Kew, 411, 412; —some already there, 411; reasons for restricting access, *Carruthers*, p. 177; reference collection defined, 418; —herbarium should be systematically arranged, 405; —might be arranged geographically, 409; research results should be published by the nation, 469; *Rhodymenia*, error in naming, 487-490, p. 173; Royal College of Science, as a teaching establishment, 429; *Schizymenia* misnamed, p. 173; *Sinapis* matched at Kew, p. 173; South Kensington collections not much visited by witness, 373; species more than one on the same sheet, 473, 484-489, p. 173; specimens mixed at the British Museum, p. 173; *Sphacelaria* species mixed in the herbarium, p. 173; students of pollen or leaves, their requirements, 398; —teaching collection, conditions for consultation, 398; teaching, views on, 467, 478; types of natural orders, 418-422, 426; —continued to genera, 423; —required for popular use, p. 173; unaware of the different sized sheets at the two establishments, 393; uncorrected names in specimens, p. 173; views on catalogue of British Algæ, *Carruthers*, p. 178; Westminster Medical School, formerly taught botany at, 467.

Hongkong flora, *Dyer*, p. 65.

Hooker, Sir Joseph Dalton, at Kew, *Dyer*, p. 65; anxiety as to fire, *Dyer*, p. 95; botanic collections at Kew before the time of Sir W. J. Hooker, p. 141; British flora, estimated extent, p. 137; career of, p. 150; collection of fossils transferred, *Murray*, 47; *Woodward*, 1063, 1084; correspondence with the Admiralty, *Dyer*, p. 86; —with the British Museum, *Dyer*, p. 85-87; evidence, 1858, p. 119; — —cited, *Carruthers*, p. 133, 135, 137; *Owen*, p. 153; —1871, p. 127-130; — —cited, *Carruthers*, p. 133; facilities at Kew for scientific work, p. 119; flora, British, estimate of its extent, p. 137; fossil plants collected by, *Dyer*, p. 94; —transferred, *Murray*, 47, p. 4; *Woodward*, 1063, 1084; gift of Gay's herbarium, p. 150; *Dyer*, p. 76; herbarium at Kew requisite for garden purposes, p. 119; —cited, *Carruthers*, p. 133, 135, 137; his Indian collections, *Dyer*, p. 76; letter, adhering to his former evidence, p. 177; —on Bauer's drawings, *Dyer*, p. 101; memorandum as to collections, *Dyer*, p. 87; motion concerning, in the House of Lords, *Dyer*, p. 102; Museums at Kew, p. 127; —cited, p. 139; New Zealand flora, *Dyer*, p. 65; plants annotated by, their value, *Murray*, 154; Rendle's help given to, on grasses, *Murray*, 119; statement as to purchase of Hookerian herbarium, p. 142; suggestion to Devonshire Commission, *Dyer*, 1357; views combated, *Carruthers*, 578. (See also *Kew.*)

Hooker, Sir William Jackson, advantages of transferring British Museum collections, p. 118; —cited,

Hooker, Sir William Jackson—*continued.*
p. 134, 136; —difficulties alleged, *Bennett*, p. 124; appointed director, p. 113; *Dyer*, p. 57; career of, p. 149; collections, p. 113; difficulties in uniting the two herbaria, *Bennett*, p. 124; evidence, 1858, p. 118; —cited, p. 134, 136; floras of British colonies, *Dyer*, p. 64; herbarium, its size and value, p. 119, 139; —memorial as to its purchase, p. 116, 142; library, *Dyer*, p. 98; living collections not used for descriptions, *Carruthers*, 613, 614; pupils sent collections to him, *Fawcett*, 541; residence at Kew, p. 113; Sloane herbaria, their historic value, p. 118; transference of British Museum collections would be advantageous, p. 118. (See also *Kew.*)

Hooker, Sir W. J., and J. G. Baker, Synopsis filicum, *Murray*, p. 4.

Hope, C. W. W., at Kew, *Dyer*, p. 65.

Horrell, E. C., at Kew, *Dyer*, p. 66.

Hortus Kewensis, its authorship, p. 112; *Carruthers*, p. 137.

Horticultural botany, *Elwes*, 1004.

Horticulture, in "Kew Bulletin," *Dyer*, p. 80.

Horticulturists, dissatisfied with the British Museum collections, *Elwes*, 1026; their preference for Kew, *Masters*, 624, 631-633, 701-703, 738; their use of the British Museum, *Masters*, 756-762.

Host, N. T., drawings at Vienna, p. 162.

Housing at Kew wholly inadequate, *Dyer*, 1297, 1298.

Hudson, W., plants lost sight of, *Holmes*, p. 173; —correction, p. 178, 179.

Hutchins, D. E., at Kew, *Dyer*, p. 65; on forest produce, *Dyer*, p. 83.

Huxley, Professor Thomas Henry, fossils should be with recent forms, p. 124; Government collections sent to, *Richards*, p. 148; proposal to bring both herbaria into definite relations so as to avoid duplication, p. 134.

I.

Ibbetson, Hon. William Denzil Charles Jelf, on Indian Agriculture, *Dyer*, p. 77-78.

"Icones plantarum," *Dyer*, p. 98.

Identification, always precedes laying in, *Murray*, 124; —of plants, *Dyer*, p. 64; *Murray*, 18-20;— problems only to be solved at Kew, *Holmes*, 407.

Imperfect books not bought, *Dyer*, p. 99; —herbarium might be misleading, *Seward*, 899, 900.

Imperial Institute, large and fine collection of forest products, *Dyer*, p. 82.

Importers of drugs, referred to Kew, *Murray*, 29.

Increase of Kew collections, percentage not known, *Hemsley*, 1263.

Incorporation at Kew, by cabinets a temporary expedient, *Hiern*, 994; —by selection, *Holmes*, 384; —British Museum, p. 111; —desirable, *Holmes*, 384; *King*, 205, 210, 212; *Masters*, 635, 642-646; impossible, *Hemsley*, 1215, 1217, 1219, 1224; three methods, *Hiern*, 993; *Masters*, 642; —of specimens, *Murray*, 2, 3.

"Index Kewensis," *Dyer*, p. 76.

Index Museum, *Lankester*, 1183; *Murray*, 133-137.

India, agriculture, *Dyer*, p. 77-78; —botanic needs of, *Dyer*, p. 57; —botanists on flora of, *Dyer*, p. 65; —Dictionary of Economic Products, *Dyer*, p. 76; flora, *Dyer*, p. 65; — —Rendle's assistance as to the grasses, *Murray*, 119; — —smaller floras in hand, *Dyer*, p. 98; — —worked at Kew, *Clarke*, 327; —forest flora, by Brandis, *Dyer*, p. 76; —forest officers, *Dyer*, p. 77; —Kew, richer collections than at the British Museum, *King*, 209; *Murray*, 74, 77, 157-161; —no large accessions now, *Dyer*, p. 74; —plants not studied by witness, *Hanbury*, 515; —relations with Kew, *Dyer*, p. 76; —representative herbarium should be at the British Museum, *King*, 223, 290, 292; single consignment and plants in Aiton's time, p. 113; —types at Kew, *Hemsley*, 1262; *Murray*, 159.

India Museum, collections from, *Dyer*, p. 75.

India Office, assistant in herbarium paid by, *Dyer*, p. 59, 65; —relations with Kew, p. 64; —representation before the Committee, *Dyer*, 1300-1303.

India-rubber plants cultivated at Kew, *Dyer*, p. 64; —in Africa, *Dyer*, p. 76.

Inflorescences of palms at Vienna, p. 162.

Injury, by duplication, *Elwes*, 1052, 1052: —to science by removal of herbarium from the Banksian library, *Carruthers*, p. 135.

Inspector-General of Agriculture for India, *Dyer*, p. 77, 78.

Instruction of collectors, *Dyer*, 1292, 1293, p. 66; *Murray*, p. 3; popular, no function of the British Museum, *Lankester*, 1152, 1155-1157, 1170, 1185; —not direct, at Kew, *Dyer*, p. 59.

Interchanging visits of staffs, *Dyer*, 1281, 1282; *Murray*, 113, 119, 120.

Interest of geologists in fossil plants, *Murray*, 86, 87.

Iron cabinets, possible in future, *Dyer*, p. 95.

Isaac, C., letter regarding Kew organisation, *Dyer*, p. 79.

Isolation of herbarium, *Dyer*, p. 97; *Hemsley*, 1240, 1249, 1250.

J.

Jackson, Benjamin Daydon, at Kew, *Dyer*, p. 65; —(Secretary of Committee), correspondence, p. 161-170, 173-174, 177-180; summary of previous inquiries, p. 109-158.

Jackson, John Reader, lectures, *Dyer*, p. 60.

Jamaica, collections, *Fawcett*, 559, 562.

Jacquin, Nicolaus Joseph, Baron von, drawings at Vienna, p. 162.

Jaeger, A., and Sauerbeck, mosses arranged after, *Murray*, p. 4.

Japan, collections, *Dyer*, p. 85; special herbarium at St. Petersburg, p. 164.

Jardin des Plantes, Paris, professors of botany, *Brown*, p. 117; —report on, *Cornu*, p. 165-168; —statement, *Lockyer*, p. 147.

Jardin du Roi, now styled "Jardin des Plantes," *Cornu*, p. 165.

Jermyn Street Museum, *Owen*, p. 126; —collections sent to, *Richards*, p. 148; —fossils believed to be there, *Holmes*, 441; —stratigraphic geology partially shown at, *Lankester*, 1169; *Woodward*, 1065.

Jodrell Laboratory, fossil botany, *Holmes*, p. 173; —fossil plants there, few, *Seward*, 870; —keeper without salary, *Dyer*, 1364; —study of fossils there, *Lankester*, 1181.

Jodrell, T. J. Phillips, laboratory erected and equipped by, *Dyer*, p. 75.

Johnson, W. H., at Kew, *Dyer*, p. 65.

Jones, Prof. T. Rupert, work in Geological Department, *Woodward*, 1066.

Jones, J. Winter, correspondence as to collections, *Dyer*, p. 86.

Journals and books at Cromwell Road not at Kew, *Hiern*, 961, 962.

Judd, Prof. J. W., his students visit the Geological Department, *Woodward*, 1096.

Jurassic plants of Yorkshire, *Seward*, 939; studied, *Seward*, 891.

K.

Keeper, four officials who correspond to that term, *Dyer*, p. 58; (Honorary) of the Jodrell Laboratory, *Dyer*, p. 59, Q. 1364; —of botany, British Museum, duties, *Murray*, p. 2; —should have geological qualifications, *Bentham*, p. 131; —of the herbarium and library, *Dyer*, p. 58; —of the museums, *Dyer*, p. 59.

Kensington, exhibition there compared with the British Museum, *Bennett*, p. 124.

"Kew," an abbreviation for "Royal Botanic Gardens, Kew," *Dyer*, p. 58.

Kew, Royal Botanic Gardens, accessibility, *Dyer*, 1282, 1341; *King*, 274; —relative, *Clarke*, 331-353; *Elwes*, 1055; *Groves*, 350-353; accessions, *Dyer*, p. 65; —how obtained, *Dyer*, 1292-1294, p. 74; —space required for, *Dyer*, p. 97; accumulation, not desired, *Dyer*, 1285; —of unmounted material, *Dyer*,

Kew, Royal Botanic Gardens—*continued.*
p. 94; activity in herbarium, *Hemsley*, 1205; addenda to Director's Reply, p. 99-103; additions to library, *Dyer*, p. 99; administration, alteration needed on union, *Hiern*, 977-980; —departmental committee proposed in 1883, *Dyer*, p. 57; Admiralty, cost of collections borne by, p. 113; —collections transmitted by, *Richards*, p. 147; admission, special, *Dyer*, p. 64; advance of botanic study, the object of the collections, *Dyer*, p. 58; advantage of, as a botanic centre, p. 122; —concentration, *Dyer*, 1283, 1284, 1288, 1290, 1304; —of gluing down specimens, *Dyer*, p. 94; —of transference of British Museum herbarium to, *King*, 273; African, botanic stations, *Dyer*, p. 76; —botany, partly predominant in certain areas, *Murray*, 74, 75; —floras, both establishments at work on, *Dyer*, 1354-1356; —tropical floras, method of working, *Fawcett*, 546, 549; Agriculture, Board of, arrangement with, *Dyer*, 1309; p. 65; *Lankester*, 1188, 1190; —Commissioner, for West Indies, *Dyer*, p. 76, 83; —in India, *Dyer*, p. 77-78; Alton, W. T., collections under, p. 141; —correspondence with Banks, *Dyer*, p. 84; —Director of Royal Gardens, p. 112; —documents destroyed by, *Dyer*, p. 102; —"Hortus Kewensis," p. 112; Allemand, A., visit to Kew on colonisation matters, *Dyer*, p. 74; amalgamation, *Lankester*, 1163, 1138; —advantageous, *Clarke*, 304; *Hemsley*, 1211, 1213; *Hiern*, 954; *Seward*, 920; — —costly, *Murray*, 89-107; —at British Museum, desirable, *Groves*, 342, 343; *Hiern*, 954; —at Kew, desirable, *Elwes*, 1008, 1009, 1012, 1014, 1015; *King*, 205, 210, 220; *Masters*, 635-644; — —a luxury, *Dyer*, 1307; — —by cabinets or sheets, *Clarke*, 311, 337; *King*, 214, 215, 235-240; *Masters*, 642-646; *Murray*, 153; —time required, *Clarke*, 328; *Elwes*, 1041; —by contiguity or collocation, *Dyer*, 1287, 1342, 1343; *King*, 236-243; —would not assist Kew, *Dyer*, 1279, 1288, 1289, 1305, 1330 and therefore deprecated, 1286-1290; — would oblige the British Museum to name the fossil plants there, *Farmer*, 800; —would save in the library, *Dyer*, 1329; America, communications with, p. 128; American botanists at Kew, *Dyer*, p. 81; — herbarium, Carey's, *Dyer*, p. 95; anatomical investigation, *Dyer*, p. 95; Appendices in "Kew Bulletin," *Dyer*, p. 80; appointments compared with the British Museum, p. 129; Arboretum, hand list of, *Dyer*, p. 58; arrangement of herbarium, *Dyer*, p. 95; —better than at the British Museum, *Masters*, 635, 637, 665, 671; —good, *King*, 275, 276; —perfection of, *Ball*, p. 131; —recommended by the Devonshire Commission, p. 141; —species as far as genera, *Dyer*, p. 94; arrangement of Museums, *Dyer*, p. 58; artists, access to drawings, *Dyer*, p. 98; — admission, *Dyer*, p. 64; —collections used by, *Dyer*, p. 58; attraction by reputation, *Hiern*, 949; Auckland, Lord, consignment of plants to, p. 113; Australian collection, should be in London, *Hooker*, p. 128; —products, *Dyer*, p. 74; —types in the British Museum absent from Kew, *Murray*, 160, 162; autonomy or fusion, *Dyer*, 1357; Ayrton, Rt. Hon. A. S., Memorandum, p. 151; Banks, Rt. Hon. Sir J., Bart., codicils, *Dyer*, p. 85; —connection with Kew, p. 112; *Bennett*, p. 125; —correspondence, *Dyer*, p. 84-85; —drawings by Bauer, *Bennett*, p. 116; *Dyer*, p. 98; Banksian collections not at Kew, *Dyer*, 1274; *Hemsley*, 1225, 1226; —collections, were sent from Kew, *Hemsley*, 1220; —Herbarium, memorandum on, *Dyer*, p. 100-102; — —not at Kew, *Dyer*, 1274; *Hemsley*, 1225, 1226; —remarks on, *Dyer*, 1299, 1345; —should be transferred, *Bentham*, p. 121; —value, *Dyer*, 1306; Barbadoes, Commissioner of Agriculture at, *Dyer*, p. 83; Bauer, F., bequest to, *Dyer*, p. 100, 101; —his drawings, *Bennett*, p. 116; *Dyer*, p. 98; Bennett, J. J., reply to Memorandum, 1869, p. 126; Bentham, G., gifts, *Dyer*, 1290; —letter to Lord Derby, p. 102; —library presented, *Dyer*, p. 98; — —its extent, *Dyer*, p. 102; —offered Directorship, p. 102; —views, 1871, p. 130; Bentham and Hooker's "Genera" the basis of the herbarium arrangement, *Dyer*, p. 95; bequests, large accessions by, *Dyer*, p. 74; Berlin, referred to occasionally, *Dyer*, 1281; Berkeley, Rev. M. J., his herbarium at Kew, *Dyer*, 1305, p. 74; —its value, *Dyer*, 1305; —types of myxomycetes lent, *Dyer*, p. 94; Bescherelle collection of mosses, purchase declined, *Dyer*, p. 87; —reasons, *Dyer*, 1296, 1305; —typical case, *Dyer*, 1331; bibliography of Kew work mentioned, *Dyer*, p. 65; binding, cost of, p. 174; —without limit, *Dyer*, p. 98; blackening of herbarium sheets, *Dyer*, p. 94; Board of Agriculture, botanic work done for, *Dyer*, 1309, p. 65; Board of Trustees recommended in 1839, p. 99; Board of Trade Returns on tickets, p. 128; Board of Visitors suggested, *Hooker*, p. 120; boiling, arrangements for, *Dyer*, p. 95; books bought, *Dyer*, p. 87, 99; —lost at binders, *Dyer*, p. 98; —present arrangements, *Dyer*, p. 99; —Stationery Office vote for, *Dyer*, p. 99; —wanting, *Hiern*, 961, 962; borrowed specimens, *Dyer*, 1344, p. 93, 94; botanic collectors to His Majesty, p. 141; —excursions of staff, *Dyer*, p. 59, 60; —gardens, suggestions for Colonial, *Dyer*, p. 75; —institutions in Colonies, *Dyer*, p. 83; —stations, in Africa furnished, *Dyer*, p. 76; — —in "Kew Bulletin," *Dyer*, p. 78; — survey of the Empire, *Dyer*, p. 64; Botanical Department, British Museum, *Dyer*, p. 57; "Botanical Magazine," *Dyer*, p. 98; botanists, portraits at Kew, *Dyer*, p. 58; —visiting the herbarium, *Dyer*, p. 65; —working at Kew, *Dyer*, p. 98; botany, Devonshire Commission recommendations impracticable, *Dyer*, p. 97; —elementary, for garden staff, *Dyer*, p. 59; —foreign, p. 128; —in its most comprehensive sense the object of Kew, *Dyer*, p. 58; —kinds at Kew, *Dyer*, 1267; —systematic, the only place in the world where it can be properly studied, *Elwes*, 1008; Brabourne papers mentioned, *Dyer*, p. 101; Britain, visitors for the botany of, *Dyer*, p. 66; British botanists visiting the herbarium, *Dyer*, p. 65, 66; —herbarium, Watson's, *Dyer*, p. 95; — —practically wanting, *Hanbury*, 506; British Museum, Botanical Department, and Kew, *Dyer*, p. 57; —a competing body, *Hooker*, p. 127; —collections believed to be equal to those at Kew, *Carruthers*, p. 133; —could be brought under one system and control, p. 129; —demands for collections, *Dyer*, p. 85-87; —duplicate volumes presented by the Trustees, *Dyer*, p. 98; —herbarium consulted by witness, *Elwes*, 1006, 1007; — —if transferred to Kew would be stopped in growth, *Dyer*, 1343; — —stronger than Kew in parts, *Murray*, 158; —not taken into account, *Dyer*, 1278, 1330; —offshoot of Kew, *Dyer*, 1299, p. 102; —plants not at Kew, *Elwes*, 1851; —should be transferred to Kew, *Hooker*, p. 118; —should be subordinate to Kew, *Hooker*, p. 128, 140, and under one head, p. 128; —should have separate functions, *Hooker*, p. 128, 140; —transference deprecated, *Dyer*, 1286-1290; —visited last by monographers, *Masters*, 633; Brown, R., in Banks's codicils, *Dyer*, p. 100, 101; building not large enough, *Masters*, 641; —to receive British Museum collections, *Dyer*, 1343; Buitenzorg exceeded in the number of palms cultivated, *Dyer*, p. 83; "Bulletin," its origin, *Dyer*, p. 78-81; business men debarred from visiting, *Carruthers*, 577; busts of botanists, *Dyer*, p. 58; cabinets, *Dyer*, p. 95; —new, wanted, *Clarke*, 313, 324, 325, 325*; —number, *Dyer*, p. 58; —retained from British Museum, *Hemsley*, 1215, 1224; —smaller than those at the British Museum, *Murray*, 90, 91; Calcutta, specimens borrowed from, *Dyer*, 1344; candidates, qualifications required, *Dyer*, p. 59; caoutchouc, *Dyer*, p. 73; carpological specimens in museums, *Dyer*, p. 94; capsules, employment of, *Dyer*, p. 94; cases in museums, *Dyer*, p. 58; catalogue of library, printed, *Dyer*, p. 98; — —additions, *Dyer*, p. 99; Ceylon, relations with Kew, *Dyer*, p. 83; "Challenger" collections worked out, *Dyer*, p. 65; changes in administration needful on union, *Hiern*, 977-980; chemistry lectures, *Dyer*, p. 59, 60; China, Henry's collections, *Dyer*, 1294; Cinchona enterprise, *Dyer*, p. 64, 72; City (of London), technical information from, *Dyer*, p. 66; clubs at Kew, *Dyer*, p. 62, 63; coffee, information afforded, p. 128; —report on, *Dyer*, p. 72; collections, at the British Museum absent from Kew, *Hiern*, 950; —claimed by the British Museum, *Dyer*, p. 85-87; —desired from, *Dyer*, p. 87; —determined by specialists, *Dyer*, p. 94; —Government expeditions, Devonshire Commission recommendations, *Dyer*, p. 57; —gravitate to Kew, *Dyer*, p. 83; —incorporation into one series, *Dyer*, p. 95; —objects of, *Dyer*, p. 58; —richer than those of the British Museum, *Ball*, p. 131; *Masters*, 626, 627, 629-630, 662-664, 718, 719; — —known to, *Fawcett*, 526; *Scott*, 1105; — —partially, *Seward*, 869; — —used by, *Farmer*, 766, 767; — —requisite to consult British Museum collections, *Murray*, 39; —when purchased, *Hemsley*, 1252, 1254-1256; —worked up at Kew, *Dyer*, p. 65; collectors, seeds raised, p. 112; —sets, views on, *Ball*, p. 132; —terms, *Hemsley*, 1260-1262; —will always be attracted,

Kew, Royal Botanic Gardens—*continued.*
Elwes, 1024, 1042; collocation the only possible method of amalgamation, *Dyer*, 1287, 1342, 1343; Colonial aspect, *Dyer*, p. 71-73; —botanic gardens, relations, *Dyer*, p. 83; — —suggestions, *Dyer*, p. 75; —establishments, supplied from Kew, *Dyer*, p. 74; exchanges, p. 113; —floras, *Dyer*, p. 83; — —drawn up at Kew, p. 127; —in preparation, *Dyer*, p. 98; — —plants at Kew, *Hemsley*, 1262; — —workers on, *Dyer*, p. 65; —work, most important, *Hiern*, 983-987, 993; — —impossible without the present herbarium, *Dyer*, 1308; — —investigated by the French Government, *Dyer*, 67-74; — —speciality of Kew, *Fawcett*, 527, 534, 550; Colonial Office, advice given, *Dyer*, p. 73, 76; —floras started by Sir W. J. Hooker, *Dyer*, p. 64; —help asked, *Dyer*, p. 81; —List, reference to Kew, *Dyer*, 1317, 1320, p. 56, 83; —referred to, *Dyer*, 1300-1302; Colonies, botanic institutions essential, *Dyer*, p. 57; —economic botany for, *Dyer*, 1267; —floras of, *Dyer*, p. 64; —predominance of Kew as regards them, *Murray*, 164; —relations with, p. 128; commercial enquiries at Kew, *Dyer*, p. 58; — —from Lyons, *Dyer*, p. 74; —plants, *Dyer*, p. 64; Commissioners of Woods, Forests, etc., on Kew, p. 99; Committee of Enquiry, 1838, p. 112; —1858, p. 118-122; —1860, p. 124-126; —1900-1901, its origin, *Dyer*, 56; comparison of herbaria, *Bennett*, p. 126; *Carruthers*, p. 137; *Hemsley*, 1222, 1227; *Hooker*, p. 126; —of specimens, *Clarke*, 302, 303; *Dyer*, 1344; competition, *Dyer*, 1295; *Hooker*, p. 127; *Murray*, 128, 156; —deprecated, *Masters*, 727, 728; —injurious, on hearsay, *Elwes*, 1031, 1032; —insignificant, *Dyer*, 1296; —not desirable, *Dyer*, 1346-1352; —not disadvantageous, *Farmer*, 848-855; —not serious, *Hemsley*, 1255; completion aimed at, *Masters*, 723-726, 734, 735; concentration desirable, *Lankester*, 1163; —discussed for forty years, *Dyer*, p. 56; —impossible of attainment, *Dyer*, 1281; Coniferae, hand list, *Dyer*, p. 58; —in museums, *Dyer*, p. 58, 94; constitution never defined, *Dyer*, p. 57; consultation if necessary, *Hiern*, 984, 985; continental contributions, *Hooker*, p. 127; Cook's voyages, plants not at Kew, *Dyer*, 1274; *Hemsley*, 1209; Copenhagen, specimens borrowed from, *Dyer*, 1344; correspondence, *Dyer*, p. 67; cost of maintenance not diminished by union, *Bennett*, p. 127; Cromwell Road, collections occasionally consulted, *Dyer*, 1281; crowded state of the herbarium, *Hemsley*, 1241; Crown, Kew formerly in possession, p. 113; Cryptogams, comparison of the two collections, *Dyer*, 1305; *Murray*, 117, 162; —imperfectly represented at, *Murray*, 117; —in the museums, *Dyer*, p. 94; —not known to witness, *Masters*, 722; —predominance of British Museum, *Murray*, 162; —should be with phanerogams, *Groves*, 354-357; —vascular, collection of living specimens unrivalled, *Dyer*, p. 64; cultures, *Dyer*, p. 95; —new, *Dyer*, p. 64; Cunningham, R., charge of herbarium, p. 141; Curator, functions, *Dyer*, p. 59; curators for tropical stations trained at Kew, *Dyer*, p. 64, 76; curriculum for garden staff, *Dyer*, p. 60-62; cultural capabilities of plants studied, *Dyer*, p. 58; cut plants supplied to Royal School of Art, *Dyer*, p. 64; danger in amalgamation, *Murray*, 98; Darwin, C.R., cost of compiling "Index Kewensis" borne by his family, *Dyer*, p. 76; —letter on the Hookerian herbarium, p. 122; "Decades Kewenses," *Dyer*, p. 78; deficiencies in library not noticed, *Elwes*, 1019; definition of duties never officially made, *Dyer*, 1312; demonstrations to garden staff, p. 129; deprecation of transference, *Hanbury*, 504-508; Derby, Earl of, letter to, from G. Bentham, on the gift of his herbarium and library, p. 102; Devonshire Commission, recommendations hardly workable, *Murray*, 167-175; —report quoted, *Dyer*, p. 57, 97; Dicotyledons, in museums, *Dyer*, p. 58, 94; —tender, hand list of, *Dyer*, p. 58; difference between the two establishments, *Bennett*, p. 126; *Carruthers*, p. 137; *Dyer*, 1274; *Hooker*, p. 126; difficulty of amalgamation, *Dyer*, 1286; —of consulting two herbaria, *Clarke*, 302; Director, Sir W. T. Thiselton-Dyer, appointed in 1885, *Dyer*, 1204; —Sir J. D. Hooker, his career, p. 150; —Sir W. J. Hooker appointed, p. 150; —reply to memorandum from Office of Works, p. 128; Director's Office, accommodation required, *Dyer*, p. 97; disestablishment would result from removal of the herbarium, *Dyer*, 1271; distance from London no hindrance, *Masters*, 673; division of collections might be made, *Fawcett*, 557, 562; documents destroyed by Aiton, *Dyer*, p. 102; drawings of plants, *Dyer*, p. 58, 98; —made by Bauer, *Bennett*, p. 116; *Dyer*, p. 98; dried plants sent to Banks, *Hemsley*, 1220; drugs, in "Kew Bulletin," *Dyer*, p. 80; duplicates, *Ball*, p. 131; *Hooker*, p. 128; —applications for, *Hooker*, p. 128; —defined, *Murray*, 154, 155; —difficulty in disposal, *Dyer*, 1332-1334; —distribution of, *Dyer*, p. 66; *Hooker*, p. 128; —elimination on union, *Hemsley*, 1215, 1230, 1246, 1247, 1257, 1258; — —gradual process, *King*, 259; not easy to get, *Farmer*, 864; —not known to witness, *Elwes*, 1039, 1040; —practice regarding, *Murray*, 127; —views on, *Clarke*, 314-317; dust, no trouble at Kew, *Hooker*, p. 129; —obviated by grass and trees, p. 129; dust-proof cabinets required, *Dyer*, p. 95; duties of the staff, p. 129; *Dyer*, p. 58-59; Dyer, Sir W. T. Thiselton-, director since 1885, *Dyer*, 1264; —letter to Secretary, p. 56-57; —memorandum on Kew, p. 58-103; East India Company's gifts, *Dyer*, p. 74; economic botany, *Dyer*, 1267; —as regards the garden staff, *Dyer*, p. 66; —predominant, *Murray*, 164, 165; —products, p. 128; economic plants, enquiries, *Dyer*, p. 64; —supplied from Kew, *Dyer*, p. 64; —questions referred from British Museum, *Murray*, 29; —specimens in museums, *Dyer*, p. 58; —use of herbarium, *Hemsley*, 1202; educational facilities, *Farmer*, 774; —work at Kew, *Dyer*, p. 59; effect of rivalry, *Murray*, 156; Egyptian tombs, specimens from *Dyer*, p. 94; Empire, economic botany for, *Dyer*, 1267; employment, limit of time, *Dyer*, p. 59; emulation, advantages of, *King*, 234; Enquiries, previous, summary, p. 109-158; Enquiry, 1835, p. 111-112; —1847-50, p. 113-117; —1858, p. 118-122; —1860, p. 124-126; —1868-69, p. 126-127; —1871-74, p. 127-149; —1872, p. 149-157; Erysiphaceæ, in collections, *Dyer*, p. 98; estimates, annual, *Dyer*, p. 87; evidence, instructions regarding his own, *Dyer*, 1300-1303, 1321-1323; exchange of periodicals, *Dyer*, p. 99; —of seeds, *Dyer*, p. 64; exchanges with foreign establishments, p. 128; exhibition of vegetable products at the two establishments, *Bennett*, p. 124; *Bentham*, p. 143; expeditions, Government, methods of dealing with, *Dyer*, 1358, p. 57, 65; —private, plants from, *Dyer*, 1244; expense of transfer, considerable, *Hiern*, 967, 968; *Masters*, 657, 658, 680, 689; — —not great, *Elwes*, 1031; — —not justified, *Hiern*, 969; *Masters*, 658, 680; — —should not be considered, *King*, 213, 232, 233; — —the bar to amalgamation, *Masters*, 657, 689; —would not be diminished on union, *Bennett*, p. 127; extension needed, *Dyer*, 1298; extent of the establishment, p. 139; facilities of access, *Dyer*, 1282, 1341; *Lankester*, 1175; fern herbarium, its value, *Dyer*, 1305; ferns, hand list of, *Dyer*, p. 58; —in cultivation not used in descriptions, *Carruthers*, 613; fibre-plants, *Dyer*, p. 64; —in "Kew Bulletin," p. 80; figures of plants, *Dyer*, p. 58, 98; fire appliances, *Dyer*, p. 96; —danger from, *Murray*, 98; —precautions, *Dyer*, p. 95; *Hemsley*, 1239, 1240, 1248—1252; —risk, *Dyer*, p. 95—97; *King*, 244, 284-288; —strict regulations, *Elwes*, 1058; fireproof building much required, *Hooker*, p. 128; —possible, *Hiern*, 960; —time required, *Dyer*, p. 96, 97; fires not permitted in Herbarium, *Hemsley*, 1248; fittings, cost on transference, *Murray*, 89; flaxes, differently arranged at Kew and South Kensington Museums, p. 127; —cited p. 140; flora of India, distributed duplicates, *Dyer*, 1334; floras, colonial, *Dyer*, p. 83, 98; —basis of work on, *Dyer*, p. 64-65; —in "Kew Bulletin," *Dyer*, p. 78; flowers preserved in capsules, *Dyer*, p. 94; food grains, in "Kew Bulletin," *Dyer*, p. 80; foreign botanists as visitors, p. 128; *Dyer*, p. 66; —herbaria, duplicates sent to, p. 129; Foreign Office, help acknowledged, *Dyer*, p. 80; forestry students, *Dyer*, p. 64; fossil plants, accidental or presented, *Scott*, 1132-1135; —change of, p. 129; —could be accommodated, *Dyer*, 1306, —few, *Dyer*, 1360, 1361, p. 94, *Scott*, 1106, 1131-1135; *Seward*, 870; —herbarium not wanted for their study, *Lankester*, 1142, 1167, 1181; — —required, *Seward*, 916; —living plants wanted for comparison, *Seward*, 884, 885; —need not be removed, *Lankester*, 1183, 1196; —not a speciality, *Thomson*, p. 132; —recent plants required for comparison, *Masters*, 748-755; *Seward*, 884, 885; —should be with recent plants, *Lankester*, 1146; *Masters*, 748-755; *Seward*, 877; —should not be transferred, p. 126, 127; —studied by Dr. Scott, *Lankester*, 1181, 1182; —transference recommended, *Seward*, 885; — —partial transfer suggested, *Scott*, 1114, 1119, 1120; fragments preserved in capsules, *Dyer*, p. 94; France, Colonial Ministry report on Kew Colonial activities, *Dyer*, p. 67-74; fruits, preserved

Kew, Royal Botanic Gardens—*continued.*
in capsules, *Dyer*, p. 94; —used to compare with fossils, *Phillips*, p. 122; fruit trade, in "Kew Bulletin," *Dyer*, p. 78; functions of herbarium, *Hemsley*, 1201-1204; fungus cultures, *Dyer*, p. 95; fusion, suggested, *Dyer*, 1367; Gamopetalæ of Arboretum, *Dyer*, p. 58; Galton, Captain D. S., his views, p. 148; garden, an essential to any herbarium, *Elwes*, 1022; —library, *Dyer*, p. 58; — —when open, *Dyer*, p. 59; —use of herbarium, *Hemsley*, 1202; gardening staff, *Dyer*, p. 59; gardens, plants from not used by witness, *Groves*, 368, 369; —used educationally, *Farmer*, 775, 789; Gay, J., herbarium presented by Sir J. D. Hooker, p. 74; genera, large, arranged geographically, *Dyer*, p. 95; "Genera plantarum," described, *Dyer*, p. 76; —arrangement followed, *Dyer*, p. 95; generic determination, *Dyer*, 1369, p. 94; George III. and Kew, *Dyer*, p. 101; geographic arrangement in herbarium, *Dyer*, p. 95; *King*, 230; *Masters*, 666, 684; — —of living collections, *Dyer*, p. 95; — —of timbers; *Dyer*, p. 58; —botany, recommendations of Devonshire Commission, *Dyer*, 1357, p. 97; —distribution of plants, *Dyer*, p. 58; gift, accessions by, *Dyer*, p. 74; Glaziou, A., his plants sent to Kew, *Dyer*, p. 82; gluing down of specimens essential, *Dyer*, p. 94; Government enquiries, *Dyer*, p. 64; —expeditions, collections sent to, *Dyer*, p. 65; *Murray*, 173; —how shared, *Dyer*, 1358; —plants from, p. 126, 139, 153; — —formerly sent to the British Museum, p. 153; — —presented to Sir W. J. Hooker, p. 142; — —sent from the Admiralty, *Richards*, p. 147; —difficulty in getting funds for science, *Dyer*, 1307; —not responsible for Jodrell Laboratory, *Dyer*, 1361—1365; — —grant for library catalogue, *Dyer*, p. 98; —for purchases, *Dyer*, 1291; guides to museums, *Dyer*, p. 58; gum, correspondence on a commercial sample, *Dyer*, p. 66; gymnosperms in museum, *Dyer*, p. 58, 94; hand lists, *Dyer*, p. 58, 59; Henry, Dr. A., Chinese collections, *Dyer*, 1294; hepaticæ lent, *Dyer*, p. 93; herbaceous plants, hand list, *Dyer*, p. 58; herbarium, p. 119, 149; —accommodation probably adequate, *Elwes*, 1057; —arrangement, *Dyer*, p. 81, 95; —asserted superiority, *Hooker*, p. 126; — —controverted, *Bennett*, p. 126; —at Kew, transferred by Brown's order, *Dyer*, p. 85; —built up by correspondence, *Dyer*, 1291; —centre of all activities, *Dyer*, 1269, 1270; —compared with the British Museum, *Hemsley*, 1222, 1227; cf., 1232-1237; —daily used for naming plants, *Dyer*, p. 58; —crammed, *King*, 241, 242; —crowded, *Hemsley*, 1241; —essential to a garden, *Elwes*, 1022; —foreign botanists, preference shown by, *Dyer*, p. 81; —functions, *Dyer*, p. 64-66; —indispensable, *Dyer*, 1271, 1272; —introduced exotic plants, *Dyer*, p. 102; —known to witness for forty years, *Hemsley*, 1200; —less convenient than British Museum, *Groves*, 340, 341, 344; —little recent knowledge of, *Elwes*, 1057; —material, *Dyer*, 1366; — —worked up, *Dyer*, p. 81; —might acquire part of British Museum herbarium, *Elwes*, 1029; — —of everything useful, *Elwes*, 1052; — —possibly one-tenth, the rest duplicates, *Elwes*, 1030; —most valuable for research, *Clarke*, 327, 329, 330; —must be kept adequate, *Elwes*, 1027; —needed for the gardens, p. 140; — —cited, *Owen*, p. 152, 154; —not complete, *King*, 282; —not fireproof, p. 128; *Dyer*, p. 95-97; —not used for pupils, *Farmer*, 775-819; —number of specimens, *Dyer*, p. 58; —reasons for working there, *Elwes*, 1006; —regulations, *Dyer*, p. 65, 94; —report on, *Dyer*, p. 68; —requisites for, *King*, 216, 270, 294; —research an object, *Dyer*, p. 98; —retained, *Hiern*, 964-966; —sheets and sizes, *Dyer*, p. 95; —should remain as at present, *Carruthers*, 566, 576; —space for new buildings, *Dyer*, p. 98; —study of certain plants in, impracticable, *Elwes*, 1022; —used for plants wanting at Cromwell Road, *Groves*, 339; —uses of, *Hemsley*, 1201-1204; why described at length, *Dyer*, p. 56; Herbarium, Banksian memorandum on, *Dyer*, p. 100-102; Herbarium building used as a library, *Hooker*, p. 129; historic botany, few study it, *Masters*, 650; —herbaria, if any, not known to witness, *Masters*, 675; — —should be transferred from British Museum, *King*, 231; history of, *Dyer*, p. 67; Hooker, Sir J. D., career, p. 150; —collection of fossil plants, *Dyer*, p. 94, 95; —on letter from G. Bentham, p. 102; —on Bauer's drawings, p. 101; Hooker, Sir W. J., appointed director, p. 113; —career, p. 149; —herbarium, p. 113, 142, 149; — —purchase, p. 132, 142; —library bought for Kew, p. 98, 141, 142; horticultural press, *Dyer*, p. 59; —school at Kew, *Dyer*, p. 59; horticulture, *Masters*, 624; —in "Kew Bulletin," *Dyer*, p. 80; horticulturists, access to drawings, *Dyer*, p. 98; —collections, *Dyer*, p. 58; —plants named, *Masters*, 701-703; 756-762; —reasons for preference, *Elwes*, 1028, 1048; "Hortus Kewensis" and authorship, p. 112; hose, fire, *Dyer*, p. 96; housing insufficient, *Dyer*, 1297, 1298; Hutchins, D. C., on forest products, *Dyer*, p. 82, 83; hydrants in Herbarium, *Dyer*, p. 90; Ibbetson, Hon. W. D. C. J., on Indian agriculture, *Dyer*, p. 77; "Icones plantarum," *Dyer*, p. 98; imperfect collection would be disastrous, *King*, 294; —copies not bought for library, *Dyer*, p. 99; Imperial work, *Dyer*, p. 56; incompleteness, term deprecated, *Dyer*, 1276, 1277; inconvenient of access, *Groves*, 348; incorporation, by cabinets, *Masters*, 642, 643; —by sheets, impossible, *Hemsley*, 1217, 1224; increase, annual amount unknown, *Hemsley*, 1263; "Index Kewensis" described, *Dyer*, p. 76; India, botanic assistance essential, *Dyer*, p. 57; —botanists engaged on its flora, *Dyer*, p. 65; —Cinchona, *Dyer*, p. 76; —collections, *Hemsley*, 1262; —communications with, *Hooker*, p. 128; —consignment of plants to, p. 113; —economic botany, *Dyer*, 1267; India Office, advice to, *Dyer*, p. 77; —assistant paid by, *Dyer*, p. 59, 65; —not represented officially, *Dyer*, 1300-1303; Indian collections admittedly larger than those of the British Museum, *Murray*, 74, 77, 157, 161; — —best collection, *King*, 207; —exhibition, supply from, *Dyer*, p. 74; —floras in preparation, *Dyer*, p. 98; —types at the British Museum wanting at Kew, *Murray*, 159; indiarubber, *Dyer*, p. 73; —plants yielding, *Dyer*, p. 64; industrial application of plants, *Dyer*, p. 58; —museum, p. 127; inflammability of Herbarium building, *Dyer*, p. 96; *King*, 244, 284-288; insignificant amount of competition, *Hemsley*, 1255; instruction, popular, *Dyer*, 1267; p. 58, 59; —rarely asked for, p. 127; instructional collection preferably in London, p. 128; instructions as to own evidence, *Dyer*, 1300-1303, 1321-1323; interrogatories addressed to the Director, p. 55, 56; investigation, anatomic, *Dyer*, p. 95; iron for cabinets, *Dyer*, p. 95; isolation of Herbarium buildings, *Dyer*, p. 97; *Hemsley*, 1240, 1249, 1250; Jamaica, relations with, *Dyer*, p. 83; Jodrell Laboratory, access, *Dyer*, p. 66; —dimensions, *Dyer*, p. 75; —due to private munificence, *Dyer*, 1361-1365; —fossil botany at, *Holmes*, p. 173; —list of papers emanating from, p. 174-177; —report on, *Dyer*, p. 69; journals and books wanting, *Clarke*, 310; *Hiern*, 961, 962; journalists, reasons for applying to Kew for names, *Masters*, 762; keeper, four officials with function of, *Dyer*, p. 58; —of herbarium and library, *Dyer*, p. 58; — —staff, p. 58, 59; —of Jodrell Laboratory, *Dyer*, p. 59; —of museums, *Dyer*, p. 59; —service as, *Hemsley*, 1197-1200; "Kew," an abbreviation, *Dyer*, p. 58; "Kew Bulletin," *Dyer*, p. 65, 78-81, 98; —appendices, p. 78-81; —information for, *Dyer*, p. 67; —origin, etc., *Dyer*, p. 78-81; —supplied from correspondence, *Dyer*, p. 67; King, Sir G., on Indian agriculture, *Dyer*, p. 77; —visits to Kew, *Dyer*, p. 82; Kirk, Sir J., establishment of rubber trade, *Dyer*, p. 76; laboratory, accommodation needed, *King*, 286, 296; see also Jodrell Laboratory; Lagos, rubber trade, *Dyer*, p. 96; Lambert's plants at, p. 179; leaf forms for fossil study, *Dyer*, 1366; lectures, *Dyer*, p. 59, 60; —not public, *Hooker*, p. 127, 128; —to young gardeners, *Hooker*, p. 129; *Owen*, p. 153; library, *Hooker*, p. 119, 128; —accessibility, *Farmer*, 807; *Masters*, 676-679; —admirable, *Elwes*, 1019; —consulted by witness, *Farmer*, 806; —deficiencies, *Clarke*, 310, 334; *Hiern*, 961, 962; — —not noticed, *Elwes*, 1020; —extent, *Dyer*, p. 58, 97; —generally sufficient, *Clarke*, 310; —inferiority, *Bennett*, p. 126; *Carruthers*, 135; —needs strengthening, *Clarke*, 319; —previous to 1841, p. 141; —printed catalogue, *Dyer*, p. 98; —report on, *Dyer*, p. 69; —research purposes, *Dyer*, p. 98; —should have its requirements supplied, *Elwes*, 1044, 1045; lichens, saxicolous, *Dyer*, p. 94; lightning conductor fixed, *Dyer*, p. 96; light better than at the British Museum, *Masters*, 671; lights not permitted, *Hemsley*, 1248; Lindley, Dr. J., orchid herbarium, *Dyer*, p. 95; —report, p. 99, 112; Linnean herbarium should be at Kew, *King*, 231; Linnean Society, collections desirable, *Dyer*, 1339; —monographs published by, *Hooker*, p. 127; Lister, Mr. A., types lent to, *Dyer*, p. 94; literature emanating from, p. 64, 65, 127,

Kew, Royal Botanic Gardens—*continued.*
150; —Jodrell Laboratory, p. 174-177; living collections, *Dyer*, p. 58, 59; —plants advantageous for comparison with fossil, *Scott*, 1123; —requisite for study, *Elwes*, 1022; — —arrangement according to cultural requirements, *Dyer*, p. 95; loan of specimens, *Dyer*, p. 93; *Hooker*, p. 128; Loher, Dr., herbarium, *Dyer*, p. 81; London botanists would regret transference, *Hanbury*, 511; Lord Steward's department and Kew, p. 113; loss of time in visiting, *Farmer*, 818; Madagascar supplies now stopped, *Dyer*, 1352; Maiden, J. H., letter, *Dyer*, p. 74; manufactured articles chiefly at South Kensington, *Hooker*, p. 127; maps in museum, *Dyer*, p. 58; Maskelyne, N. S., on Kew as a scientific resort, p. 126; material on amalgamation, *Dyer*, 1286, 1330; Malayan collections, *King*, 207; medallions of botanists, *Dyer*, p. 58; memorial, 1873, *Dyer*, 1357; p. 97, 146-147; memorandum, *Dyer*, p. 58-103; —on Kew previous to 1841, p. 141; Ménissier, A., report on work in the gardens, *Dyer*, p. 60-64; microscope slides, no collection, *Dyer*, p. 58; Milhe-Poutingon, A., report on Kew, *Dyer*, p. 67-74; models in the museum, *Dyer*, p. 58; Moloney, Sir C. A., rubber trade of West Africa, *Dyer*, p. 76; monocotyledons in arboretum, *Dyer*, p. 58; —in museums, *Dyer*, p. 58, 94; —tender, hand list of, *Dyer*, p. 58; monographers require all available material, *Dyer*, 1275; monographs drawn up at Kew, *Hooker*, p. 127, 128; Morris, Dr. D., appointed Commissioner of Agriculture, West Indies, *Dyer*, p. 76; museums, p. 119; —cited, 139, 149; *Dyer*, p. 58, 59; *Owen*, p. 153; —arrangements, *Dyer*, p. 58; *Hooker*, p. 127; —contents, *Dyer*, p. 94; —example for the British Museum, *Bentham*, p. 143; —extension needed, *Dyer*, p. 75; —functions, *Dyer*, p. 66; *Hooker*, p. 127, 128; —library, *Dyer*, p. 58; —not fireproof, *Dyer*, p. 95-97; —objections at Office of Works, *Dyer*, 1312; —probably unique, *Dyer*, p. 82; —report on, *Dyer*, p. 69; —space required, *Dyer*, p. 97, 98; —use and function, *Hooker*, p. 127, 128; —views, Capt. Galton's, p. 148; mycologic research, *Dyer*, p. 66; myxomycetes, types lent, *Dyer*, p. 94; names, attached to plants not vouched for by Aiton, p. 112; —verified in herbarium, *Hemsley*, 1202; naming plants, *Dyer*, p. 64; national herbarium should be at Kew, *Hooker*, p. 126; —statement denied, *Bennett*, p. 126; natural orders, partly followed, *Masters*, 684; naturalists' societies, *Hooker*, p. 128; necessary reference, *Seward*, 903, 904, 916; need of a collection, *Murray*, 194; new plants sent to, *Fawcett*, 562; *Masters*, 729; —should be sent to, *King*, 271; New South Wales, consignment of plants to, p. 113; nomenclature, *Dyer*, p. 58; North Gallery, *Dyer*, p. 58; —when built, *Dyer*, p. 75; notice as to use of collections, *Dyer*, p. 94; number of plants in cultivation, p. 139; numbered collections, *Hemsley*, 1257; object of collections, *Dyer*, p. 58; Office of Works, at Kew, *Dyer*, 1311-1315; official information tendered, *Dyer*, 1266, 1303, 1321; oils and plants yielding oils, *Dyer*, p. 64; orchids, hand-list, *Dyer*, p. 58; —in "Kew Bulletin," *Dyer*, p. 78; organisation sufficient, *Dyer*, 1316, 1317; organism as a whole, *Dyer*, 1272; origin and history, *Dyer*, p. 67; Owen, Prof. R., transference of collections, p. 126, 151-154, 156-157; palaeobotany, views on, *Dyer*, 1367; palaeontologic collection should be in London, *Hooker*, p. 128; —department, its success, *Dyer*, 1366; palaeontology, studied by Dr. Scott, *Dyer*, p. 95; palaeozoic fossils need fresh material for comparison, *Dyer*, 1366; palms, rich collection, *Dyer*, p. 83; paper blackened by action of poison, *Dyer*, p. 94; Pará rubber, *Dyer*, p. 64; Paris, borrowed specimens from, *Dyer*, 1344; —Madagascar collections now a monopoly, *Dyer*, 1352; —referred to occasionally, *Dyer*, 1281; —would be convenient to possess collections, *Dyer*, 1283, 1338; patrolment wanting, *Murray*, 98; patronage at two establishments compared, *Hooker*, p. 129; phanerogams and conifers, richer than at British Museum, *Masters*, 683, 722; Philippine Island collections, *Dyer*, p. 81; photographs in museums, *Dyer*, p. 58; physiological botany, means for study due to private munificence, *Dyer*, 1362-1365; percentage of annual increase unknown, *Hemsley*, 1263; periodicals, sources of supply, *Dyer*, p. 99; pictures of botanists, *Dyer*, p. 58; Pierre, M. L., visits to Kew, *Dyer*, p. 82; pilfering, gluing down a preventative, *Dyer*, p. 94; plant diseases, in "Kew Bulletin," *Dyer*, p. 80; plant names verified, *Hemsley*, 1202; plants, from gardens, not used by witness, *Groves*, 368, 369; —purchased, *Dyer*, p. 67; —studied in every aspect, *Dyer*, p. 58; poisoning of specimens, *Dyer*, 94; Poisson, M., museums studied for the French Government, *Dyer*, p. 74; Polypetalæ of arboretum, hand-list, *Dyer*, p. 58; popular instruction, *Dyer*, 1267, p. 58, 59; portfolios of drawings, *Dyer*, p. 58; portraits in museums, *Dyer*, p. 58; precautions against fire, *Dyer*, p. 95-97; *Hemsley*, 1239, 1240, 1248-1252; Preece, Sir W., lightning conductor fixed, *Dyer*, p. 96; pre-Linnean herbaria should be transferred, *King*, 231; present arrangements satisfactory, *Masters*, 680, 681, 731, 733, 737; prints and drawings, *Dyer*, p. 98; properties of plants studied, *Dyer*, p. 58; protectorates, work done for, *Dyer*, 1308; public lectures not desirable, *Hooker*, p. 129; publication of researches, *Dyer*, 1372; —an official record deprecated, *Dyer*, 1373; publications, *Dyer*,, p. 69, 98; *Hooker*, p. 127, 150; —relations with the Stationery Office, *Dyer*, 1324-1328, p. 67; purchase of collections, *Hemsley*, 1252; —of plants, *Dyer*, p. 74, 87; —of periodicals, *Dyer*, p. 99; purchases, difference between the two establishments, *Dyer*, p. 97; quasi-official recognition, by Colonial Office, *Dyer*, 1319, 1320, p. 56; records destroyed by Aiton, *Dyer*, p. 102; redundancy not large, *Dyer*, p. 95; reference herbarium, explained, *King*, 217-219; —might suffice to name living plants, *Carruthers*, 578; references for verification brought from, *Carruthers*, p. 135; refusal to buy Williamson collections, *Woodward*, 1068; regulations for use of herbarium and library, *Dyer*, p. 65, 94; —for superintendents of colonial botanic gardens, *Dyer*, p. 75; relations with the British Museum, *Dyer*, p. 57; —the Office of Works, *Dyer*, 1312; remounting collections needed on amalgamation, *Clarke*, 311, 322; replies to questions, p. 56-103; report of Devonshire Commission, p. 141; —Treasury Committee, 1838, p. 112; — —referred to, 138, 139; responsibility for all supplies to the British Museum recommended, *Hooker*, p. 129; research, by the staff, *Dyer*, 1369; —herbarium an instrument for, *Dyer*, 1267, p. 97; *Hemsley*, 1203, 1204; *King*, 277; *Masters*, 624, 625; --material for, *Dyer*, p. 64; --should be done at Kew, *Lankester*, 1170; researches, left to the staff to publish; *Dyer*, 1373; reserve of specimens might be supplied to the British Museum, *Elwes*, 1035-1038; *Farmer*, 863; *King*, 283; resources, ample, *Dyer*, 1280, 1347-1351; restriction of accessions, *Dyer*, p. 74; revision of museums, *Dyer*, p. 97; Ripon, Marquess of, on Colonial work of Kew, p. 73, 76; rivalry with the British Museum, beneficial, *Fawcett*, 529, 530; --not causing undue expense, *Fawcett*, 537, 563; —not stimulating, *Masters*, 659, 660; Royal Botanic Gardens, Kew, abbreviation employed, *Dyer*, p. 58; Royal Gardens, Kew, title deprecated, *Dyer*, 1267, 1268; Royal Geographical Society, instruction given to travellers, *Dyer*, p. 66; —library, recourse had to, *Dyer*, p. 98; Royal School of Art, cut plants supplied, *Dyer*, p. 64; Royal Society, recourse to its library, *Dyer*, p. 98; rubber plants, *Dyer*, p. 64; —in cultivation, *Dyer*, p. 81; —in "Kew Bulletin," *Dyer*, p. 80; —trade in Africa, *Dyer*, 76; rupture of relations with the British Museum, *Dyer*, p. 87; Rusby, Dr. H. H., on Kew fire risks, *Dyer*, p. 97; —visits to Kew, *Dyer*, p. 82; Russell, G., on transference of collections, p. 126; salaries, *Hooker*, p. 127, 141; —lower than at the British Museum, *Dyer*, p. 59; Salmon, E. S., work on Erysiphaceæ, *Dyer*, p. 98; saving on amalgamation, *Murray*, 93, 96-107; saxicolous Lichens, *Dyer*, p. 94; science, difficulty in obtaining funds for, *Dyer*, 1307; Science School in the Laboratory, *Dyer*, p. 66; scientific work, *Dyer*, 1313; *Hooker*, p. 127; School Board for London, specimens supplied, *Dyer*, p. 64; schools, duplicates sent to, *Dyer*, p. 66; seeds, annual distribution, *Dyer*, p. 64; —in Banks's time, *Hemsley*; 1220, 1226; selection of plants for the British Museum, *Hiern*, 963, 964; Shaw, Sir E. M., report on fire risks, *Dyer*, p. 96; Shaw-Lefevre, Right Hon. G. J., opinion on responsibility at the British Museum, *Dyer*, p. 95; sheet-iron for cabinets, *Dyer*, p. 95; sheets, herbarium, *Dyer*, p. 58; —sizes, *Dyer*, p. 95; smaller than at the British Museum, *Hemsley*, 1215; *Hiern*, 971; —of drawings, *Dyer*, p. 58; shelves in cabinets, fixed, *Dyer*, p. 95; shrubs and trees, hand list, *Dyer*, p. 58; *Sinapis* identified, *Holmes*, p. 173; size of sheets, a bar to incorporation, *Hemsley*, 1216, 1217, 1219; *Hiern*, 971, 972; *King* 212; *Masters*,

Kew, Royal Botanic Gardens—*continued.*
644; sizes of sheets, *Dyer*, p. 95; *Hemsley*, 1231; —British Museum sheets could not be reduced, *Hemsley*, 1215, *Hiern*, 972; slides, for microscope, no collection, *Dyer*, p. 58; Smith, J., foreman, p. 112; Smith, J. D., visits to Kew, *Dyer*, p. 82; Somerville, Prof. W., on Indian Agriculture, *Dyer*, p. 77; South Kensington (Victoria and Albert) Museum, *Hooker*, p. 127; space insufficient, *Dyer*, 1297, 1298, p. 97; special articles in "Kew Bulletin," *Dyer*, p. 80; specialisation, as suggested, impracticable, *Dyer*, 1357, p. 97; specialists, outside, *Dyer*, p. 94; speciality would be advantageous, *Farmer*, 858-862; species, arrangement in large genera, geographic, *Dyer*, p. 95; specimen, defined, *Dyer*, p. 58; *Hemsley*, 1234-1236; specimens, in museums, *Dyer*, p. 58; —not allowed out, *Clarke*, 302; —preparation, and boiling, *Dyer*, p. 95; —rarely lent, *Dyer*, p. 93; —transference would be costly, *Hooker*, p. 127; spices, information given in museums, *Hooker*, p. 128; staff, p. 141; —mentioned, p. 140; —entire, *Dyer*, p. 87-93; —principal members, *Dyer*, p. 83; —reciprocal visits, *Murray*, 119, 120; —research by, *Dyer*, 1369-1373; stamping books, unsightly, *Dyer*, p. 99; statement concerning the establishment, p. 58-103; Stationery Office, binding, *Dyer*, p. 98, 99; cf. p. 173; —publications, *Dyer*, 1324-1328, p. 67; steel for cabinets, *Dyer*, p. 95; Straits Settlements and Kew, *Dyer*, p. 83; structure of plants studied, *Dyer*, p. 58; students, admission, *Dyer*, p. 64; —garden for, *Dyer*, p. 64; — —used, *Farmer*, 775; subsidiary collections avoided, *Dyer*, p. 95; sugar, information given in museums, *Hooker*, p. 128; sugar-cane, disease investigated, *Dyer*, p. 67; —seedling raised, *Dyer*, p. 64; suggestions for Colonial botanic gardens, *Dyer*, p. 75; sulphurous acid found in herbarium paper, *Dyer*, p. 98; summary as to relations with the British Museum, *Hooker*, p. 129, 130, 145; superintendents abroad, trained at Kew, *Dyer*, p. 64; supply of periodicals, *Dyer*, p. 99; Surveyor of Office of Works, *Dyer*, 1313; swede, disease in, *Dyer*, 1310; systematic botany, arrangements for, *Hooker*, p. 141; —only place possible for its study, *Elwes*, 1008; —recommendation of the Devonshire Commission, *Dyer*, 1357, p. 97; table space inadequate, *King*, 253, 256, 257; table cases in museums, *Dyer*, p. 58; taxonomic relations of plants studied, *Dyer*, p. 58; Taylor, Sir J., report on herbarium building, *Dyer*, p. 96; tea, report on, *Dyer*, p. 73; technical information from City brokers, *Dyer*, p. 66; technique of fossils, *Dyer*, 1366, 1368; Temperate House, completion, *Dyer*, p. 75; teratological collection, its history, *Masters*, 741-743; tickets, information on, *Hooker*, p. 127; time lost in visiting, *Farmer*, 818; timbers, arrangement, *Dyer*, p. 82; —in Museum, *Dyer*, p. 58, 94; Todmorden School Board, duplicates sent to, *Dyer*, p. 66; transference of British Museum collections, costly, *Bennett*, p.127; *Masters*, 657; —deprecated, *Dyer*, 1286-1290; —desirable, *Lankester*, 1138, 1163; —if effected, would alter relations of the two establishments, *Seward*, 937; —proposed in 1858, *Dyer*, p. 56; —would not assist, *Dyer*, 1279, 1330; —of fossil plants deprecated, *Woodward*, 1068; — — reasons not overpowering, *Scott*, 1136, 1137; —to British Museum impossible, *Elwes*, 1021-1023; — —suggested, *Carruthers*, p. 137, 173; — —would necessitate costly building, *Lankester*, 1151, 1164, 1165; travel, books of, in library, *Dyer*, p. 98; travellers, accessions from, *Dyer*, 1292-1294; —show preference for Kew, *Elwes*, 1024, 1042; trays, moveable, not employed, *Dyer*, p. 95; Treasury, cost of collections, p. 113; —Committee, 1838, p. 112; — —mentioned, p. 139; —extension refused, *Dyer*, 1298, p. 97; — Minute, 24th July, 1872, the nearest to a constitution, *Dyer*, 1311, 1312, p. 57, 78; — —its effects, *Dyer*, p. 78; —19th April, 1899, *Dyer*, p. 56; —new buildings, *Dyer*, p. 97; —no intention of moving Kew herbarium, *Dyer*, p. 97; —relations with Sir J. Banks, *Dyer*, p. 84; tree-fern stems supplied when duplicates, *Hooker*, p. 120; trees and shrubs, hand list, *Dyer*, p. 58; tropical Africa, suggestions for its flora, *Fawcett*, 546, 549; Trustees of the British Museum, duplicates presented by, *Dyer*, p. 98; —none at Kew, *Hooker*, p. 128; —their peculiar position, *Dyer*, p. 57; types, American, at Kew, *Dyer*, p. 96, 97; —at the British Museum absent from Kew, *Murray*, 77; — —more cryptogams, fewer phanerogams, *Murray*, 116; —at Kew, *Hemsley*, 1262; —might be transferred on certain conditions, *Hanbury*, 507, 520, 521; —needed at Kew, *Elwes*, 1024; *King*, 294; —of descriptions, p. 128; —specimens presented by Glaziou, *Dyer*, p. 4; —term defined, *Dyer*, 1277;

Kew, Royal Botanic Gardens—*continued.*
unarranged British Museum collections should be named at Kew, *Hooker*, p. 126; Underwood, Prof. L. M., on fire risks at Kew, *Dyer*, p. 96; undigested material would result from union, *Dyer*, 1286, 1330; unique plants should be at Kew, *Masters*, 729; unmounted material, small, *Dyer*, p. 94; — —not available for consultation, *Dyer*, p. 94; unnamed plants quickly dealt with, *Ball*, p. 152; University of London examination in Jodrell Laboratory, *Dyer*, p. 66; vascular cryptogams, living collection unrivalled, *Dyer*, p. 64; Vidal y Soler, Don, collections worked up at Kew, *Dyer*, p. 81; views on, *Carruthers*, 568; visitors, annual number, *Dyer*, p. 59; — —to herbarium, *Dyer*, p. 65; —Board of, suggested, *Hooker*, p. 128; visits to the British Museum, *Hemsley*, 1210, 1212; wall-cases in museums, *Dyer*, p. 58; Wallich collection desirable, *Dyer*, 1339; want of space detrimental, *Hemsley*, 1244; water supply in case of fire, *Dyer*, p. 96, 97; *Hiern*, 961; Watson, H. C., British herbarium, *Dyer*, p. 95; weeding out, tedious, *Dyer*, 1237; Williamson collection of fossil plants, examined by Dr. Scott, *Dyer*, p. 95; —refusal to buy, *Woodward*, 1068; wood-pulp paper blackened, *Dyer*, p. 94; woods in museums, p. 58; work accomplished, *Dyer*, p. 76; *Hooker*, p. 118; —at Kew, more than at the British Museum, *Hiern*, 981, 982; — —may be equalised in future, *Hiern*, 982; —time spent by witness, *Hiern*, 947.

Kidston, R., catalogue of Carboniferous plants, *Woodward*, 1079; —employed by the Trustees, *Woodward*, 1079; —work in Geological Department, *Woodward*, 1066.

King, Sir George, F.R.S., accessibility of both establishments, 272-274; accessions at large, 242; amalgamation at Kew desirable, 204, 205, 219, 266; — —by cabinets, 240; —by contiguous buildings, 215, 236-238; —by sheets, complete incorporation, 236, 239; arrangement in both herbaria good, 275, 276; —at Kew, *Dyer*, p. 65; Australia, separate herbarium of its flora, at the British Museum, 223, 290; Botanical Survey of India, Director of, 199; botanist, competent, must be left in charge of the British Museum collections, 283; British collections should be left at the British Museum, 221, 289, 291; British Museum, amalgamation with Kew desirable, 204, 205, 219, 266; — —by cabinets, 240; — —by contiguous buildings, 215, 236, 238; — —complete incorporation by sheets, 236, 238; —arrangement good, 275, 276; —Australian herbarium should be kept as a separate flora, 223, 290; —botanist in charge of collections must be competent, 283; —British herbarium should be retained, 221, 289, 291; —colonies should be represented by separate herbaria, 223, 290; —duplicates on amalgamation to be gradually discarded, 259; — —supply of same from Kew, 271; —Europe, its flora should be shown in a separate herbarium, 225; —exhibition to be left at Cromwell Road, 221-223, 263-266; —facilities which should be afforded to the public, 223, 237; —fire, collections presumably safe from, 244; —fireproof building essential before amalgamation, 244; —geographical arrangement proposed, 225, 226, 243; —herbarium according to colonies, 223; — —British collection to remain, 221; — —general collection to be transferred to Kew, 210; —historic herbaria also to be sent to Kew, 231; —palæontologists should have provision made for them, 257; —pre-Linnean collections should be transferred, 231; —reference herbarium might be supplied from Kew, 271; — —to be accurately named, 278, 279; —reserve of specimens sent from Kew, 223; —Switzerland, representative herbarium, 225, 226; — —in natural orders, 230; — —would not be costly, 228; —size of sheets a hindrance to complete incorporation, 212; —systematic arrangement in the united herbarium, 230; —table-space inadequate, 255; —types should all be transferred to Kew, 231, 294; buildings at Kew inadequate, 242; —to be made fireproof, or amalgamation should not take place, 244; Calcutta Botanic Gardens, 199; —herbarium building is fireproof, 246-252; change undesirable except to a fireproof building, 244; Cinchona in India, *Dyer*, p. 76; collections at Kew, their richness, 246; colonies, separate herbaria suggested at British Museum, 223, 290; complete herbarium non-existent, 282; Cryptogams not studied by him, 261, 262; duplicates, difficulty of determining, 259; —gradual elimination recommended, 259; —supply

King, Sir George, F.R.S.—*continued.*
from Kew, 271; emulation conceivably advantageous, 234; Europe, representative herbarium should be kept at the British Museum, 225; evidence, 199-296; exhibition for the public should be retained at Cromwell Road, 221-223, 263-266; expense of amalgamation should not be considered, 213, 232, 233; facilities recommended for public use of museum collections, 223, 237; fire, British Museum collections probably secure from, 244; —Kew collections most unsafe, 244; — —dangerous condition, 284-288; fireproof building at Calcutta Herbarium, and its cost, 246, 252; —essential before transfer of museum collections, 244; flora of the Straits Settlements, *Dyer*, p. 98; geographical arrangement suggested, 225-226, 243; herbarium according to colonies, 223; —main collection to be at Kew, 210; —needed for gardens, 294; — —inclusive of types, 294; historic herbaria to be sent to Kew, 231; incorporation by cabinets preferred, 211, 212, 214, 215, 236; India, agriculture in, *Dyer*, p. 78; —representative herbarium to be at Cromwell Road, 223, 290, 292; Kew, amalgamation at, desirable, 204, 205, 219, 266; — —by cabinets, 240; — —by contiguous buildings, 215, 236-238; — —complete incorporation of sheets, 236, 238; —arrangement good, 275, 276; —duplicates to be gradually discarded, 259; — —supply to British Museum, 271; —fire, risk of, 244, 284-288; —fireproof building imperative before any amalgamation, 244; —herbarium to be sent from British Museum, 210; —inadequacy of present buildings, 242; —laboratory arrangements needed in herbarium, 296; —Linnean herbarium might be acquired by, 231; —new plants should be dealt with at Kew, 271; —pre-Linnean herbaria to be sent to Kew, 231; —reference herbarium, 217, 219; —research herbarium, 277, 281; —reserve of specimens, 223; —size of sheets a hindrance to incorporation, 212; —space at Kew inadequate, 253, 257; —table-space inadequate, 253, 255; —types needed, 218, 231, 294; laboratory arrangements required at Kew, 296; Linnean herbarium might be acquired for Kew, 231; new plants should be sent at first to Kew, 271; palæontologists, arrangements for, 257; phanerogams, remarks exclusively apply to, 260; pre-Linnean herbaria should be at Kew, 231; public exhibition should be left at Cromwell Road, 221-223, 263-266; reference herbarium at the British Museum, should be accurately named, 278, 279; —at Kew, 217, 219; research herbarium, 277, 281; reserve of specimens for British Museum from Kew, 223; rivalry may be advantageous, 234; Royal College of Science, herbarium for, arranged geographically, 243, 269; sheets, difference in size, a hindrance to incorporation, 212; space at Kew inadequate, 253, 257; Straits Settlements flora, *Dyer*, p. 98; Switzerland, a representative herbarium of, should be at the British Museum, 225, 226; —in natural orders, 230; —would not be costly, 228; systematic arrangement in the united herbarium, 230; table-space at both establishments inadequate, 253, 255, 257; types needed at Kew, 218, 294; —the whole should be there, 231.

Kirk, Sir John, at Kew, *Dyer*, p. 65; collections made by, *Dyer*, p. 85; originator of the East Coast rubber trade, *Dyer*, p. 76.

Knatchbull, Sir E., named in Banks's will, p. 101.

Knatchbull-Hugessen, E., afterwards 1st Baron Brabourne, Banksian papers (see BRABOURNE).

König, Charles, evidence as to the position of R. Brown in the British Museum, p. 111; —his "Icones fossilium sectiles" contains many fossil plants, *Woodward*, 1061; —keeper of the Geological Department, 1815-51, *Woodward*, 1061; —under-librarian of natural history, p. 111.

Král, F., preparations of bacteria at Vienna, p. 162.

L.

Labelling, in the British Museum, *Murray*, 12; —in the Kew Museums, *Hooker*, p. 128; —views on, *Holmes*, p. 173.

Labels not popularised, *Woodward*, 1097.

Laboratory, at the British Museum, *Murray*, p. 4; — —cryptogamic preparations, *Murray*, 145, 146; — —morphologic and systematic botany in, *Murray*, 146, 147; —at Kew, how used, *Dyer*, p. 66; — —rea-

Laboratory—*continued.*
St. Petersburg, p. 165; —requirements wanting at herbarium, *King*, 286, 296; see also KEW, Jodrell Laboratory.

Lagos, rubber trade at, *Dyer*, p. 76.

Lamarck, J. B. M., Chevalier de, his herbarium at Paris, p. 166.

Lambert, A. B., specimens collected by W. Hudson in his herbarium, *Batters*, p. 179.

Lange, Dr. J. E., at Kew, *Dyer*, p. 66.

Lankester, Professor Edwin Ray, F.R.S., advantages of botanical and zoological collections under one roof, very small, 1140; Agriculture, Board of, arrangement as to zoological questions, 1186-1192; with Kew for botany, 1188, 1190; —removal of botanical collections would not interfere, 1190, 1192; amalgamation, involving building would be costly, 1164, 1165; —reasons for, 1166; anthropology, its claims greater than botany, 1151, 1166; biologic arrangement of fossils in Geological Department, 1148; botanic collections, none should be retained at the British Museum, 1157, 1162; —not used by students, 1156, 1171; —should be transferred to Kew, 1150; botanists the only students of fossil plants, 1146; botany, claims of other branches stronger, 1151; keeper of the Department and the Index Museum, 1183; British herbarium should not be retained, 1162; Central Hall Index Museum, 1183; collections if transferred from Kew would entail additional building, 1138, 1151; —if to Kew, would give additional space, 1138; "edification" the purpose of the Museum, 1152, 1153; education, no part of the functions of the Museum, 1152, 1157, 1170, 1185; evidence, 1138-1196; exhibition, public, means of, 1174, 1184; facility of access to Kew, 1175; Flower, Sir W. H., Index Museum, 1183; —series of teeth shown, 1155; fossil plants do not need a large herbarium of recent plants, 1142; —might be transferred, 1146, 1178; —not regarded as geological, 1196; —required for stratigraphic purposes, 1195; —should be with living plants, 1178; —should not be kept apart, 1146; general herbarium, its transference would not injure other Departments, 1139, 1141; geologic specimens, their quality, 1178; Geological Department essentially palæontological, 1142, 1143; —fossil plants not treated geologically, 1148; palæo-zoologic arrangement, 1177; —would not suffer by transference of the botany, 1139; geology, stratigraphic, its claims, 1151, 1166; herbarium of recent plants needless for study of fossil plants, 1142, 1167, 1180; —should be with living plants, 1178; Index Museum, in Central Hall, 1183; instruction no function of the Museum collections, 1152, 1157, 1170, 1185; Kew the botanic centre, collections should be concentrated there, 1163, 1170, 1181; living plants should be associated with herbarium and fossil specimens, 1178; minerals, an important collection, 1154; Museum of Practical Geology, stratigraphic collection confined to Britain specimens, 1169; opinion, personal, throughout the evidence, 1152; palæo-botany, forms a small proportion in the collections in the Geological Department, 1142, 1144, 1176; —a valuable collection, 1145; palæontologic collections part of the zoologic, but housed in the Geological Department, 1147, 1148; palæontologist as a type of investigator, 1146; palæo-zoologic department of the British Museum, 1142; pedagogic instruction not the purpose of the British Museum, 1152, 1170; personal opinion only in his evidence, 1152; popular exhibition at Cromwell Road, 1170; public, the function of the British Museum in relation to, 1152, 1174; recent forms should be associated with fossil, 1149; research material should be transferred to Kew, 1170; Royal College of Science should have its teaching museums, 1173; space would be vacated by transfer of the botanical collections, 1138, 1151; stratigraphic geology, at the Museum of Practical Geology, 1169; —its claims, 1151, 1166; —should be exhibited, 1193-1196; students, botanical, none, 1156, 1157, 1171; —of dental anatomy using the Museum, 1155, 1157; —special needs of, 1174, 1184; teeth, series shown in Central Hall, 1155, 1157; transference of botanic collections to Kew, its effect on the British Museum, 1138; Trustees, not the mouthpiece of, 1152; vegetable kingdom, general forms shown in cases, 1158, 1159; views on geological department, 1068; visitors to the British Museum, exhibition for,

Lankester, Professor Edwin Ray—*continued.*
1174, 1184; Zoological Department, no advantage of having the Botanical Department in the same building, 1140; —would not be injured by its transference to Kew, 1139, 1141, 1146.

Law, W., letter on proposed removal of herbarium, *Dyer*, p. 97.

Lawes, Sir J. B., mentioned, *Dyer*, 78.

Leather and Collins, Messrs., report on Indian agriculture, *Dyer*, p. 78.

Leaves best studied in gardens, *Holmes*, p. 173.

Lectures at Berlin, p. 169; —at Paris, p. 165-167; —at Vienna, none public, by the staff, p. 162; — herbarium for, in Paris, p. 167; —not permitted in British Museum herbarium, *Murray*, 188-191; —to the garden staff, *Dyer*, p. 59, 60.

Lee-Metford rifle, investigations for, at Kew, *Dyer*, p. 66.

Lepidodendroid plants might be shown, *Seward*, 942.

Leveillé, J. H., authentic specimens at Kew; fate of his herbarium, *Dyer*, p. 98.

Lianes exhibited, Vienna, p. 162.

Librarian, British Museum, use of the term defined, p. 126.

Libraries of the two establishments compared, p. 126; —consulted, *Clarke*, 310; *Hiern*, 951; *Farmer*, 805-807; *Masters*, 676-679; —suggestions made, p. 127, 156.

Library, at Berlin, p. 169, 170; at the British Museum, *Murray*, p. 4; —accessibility, *Farmer*, 807; — —less so than Kew, *Masters*, 676-679; at Brussels, p. 164; at Paris, a general one, p. 165, 168; at St. Petersburg, p. 165; at Vienna, p. 162, 163; catalogue in slip, *Murray*, p. 4; departmental, *Murray*, 176-181; —excellent, *Clarke*, 310, 334; *Seward*, 924; —not to be increased, *Masters*, 690, 691; —should be transferred, *Elwes*, 1044, 1045; — —residue not wanted should be sold without loss, *Elwes*, 1046, 1047; —reported defective, p. 126; — —statement denied, p. 126; —superior to that at Kew, *Carruthers*, p. 135; —use of the general library, *Clarke*, 334; *Hiern*, 961; —herbarium, at Kew, *Clarke*, 310, 319, 334; *Dyer*, p. 58, 98; — —accessibility, *Farmer*, 807; — — more so than at the British Museum, *Masters*, 676-679; —catalogue printed, *Dyer*, p. 98; — deficiencies not noticed, *Elwes*, 1020; —excellent, *Clarke*, 334; *Elwes*, 1019; —extent, *Dyer*, p. 58, 98; —journals wanted, *Clarke*, 310; —should receive the British Museum Botanical Library, *Elwes*, 1044, 1045; — —residue to be sold, *Elwes*, 1046; — —without loss, *Elwes*, 1047.

Lichens, an expert mentioned, *Holmes*, 475; at Vienna, p. 162; kept in drawers, *Dyer*, p. 94; rearrangement of, *Murray*, p. 4.

Light, better at Kew than Cromwell Road, *Masters*, 671.

Lightning, precaution against, *Dyer*, p. 96.

Lights in herbarium not permitted, *Dyer*, p. 95.

Lincoln papers belonging to Banks, p. 101.

Lindley, Dr. John, advantages of transference, p. 119; —articles urging removal, p. 122; —error in taking *Salisburia* leaves for fossil ferns, *Woodward*, 1087; —"Hammersmith botanist" not himself, *Panizzi*, p. 125; — —identified as probably J. Miers, p. 125; —herbarium at Kew an essential, p. 139 — —should be associated with living plants, p. 119; —"Illustrations of Orchideous Plants" cited, *Dyer*, p. 101; —his orchid herbarium at Kew, *Dyer*, p. 95; —letter to the Principal Librarian, p. 122; —memorial to the Chancellor of the Exchequer, p. 123; —report on Kew, p. 112; — —cited, p. 138, 139; *Dyer*, p. 99; —transference urged, p. 119; —types of orchids at Kew, *Dyer*, p. 95.

Linnaeus, Carl (Carl von Linné), his herbarium in the possession of Sir J. E. Smith, p. 111; —now belonging to the Linnean Society, *King*, 231; *Masters*, 649.

Linnean Society of London, collections, *Hiern*, 958, 959; *Masters*, 649; — —should be transferred to Kew, *King*, 231; —flora of China issued by, *Holmes*, 470, 471; —herbaria belonging to, *Carruthers*, p. 137; —library not used by witness to supplement Kew deficiencies, *Clarke*, 334; —"Proceedings" quoted, p. 101, 102; —"Transactions," proportion of amateur and professional work in, *Carruthers*, p. 137; —Wallich collection, *Dyer*, 1338.

Linton, Rev. E. F., consults British Museum collections to name critical plants, *Hanbury*, 511.

Lister, Arthur, loan of specimens to, *Dyer*, p. 93; mycetozoa, and guide, *Murray*, p. 3, 4.

Living collections at Kew, *Dyer*, p. 58, 83; —aid research, *Holmes*, 403; —arrangement, *Dyer*, p. 59, 95.

Living plants, advantageous for comparison with fossils, *Scott*, 1123; *Seward*, 884, 885; —more useful than when dried, *Seward*, 897, 898; —not used in systematic botany, *Carruthers*, 613, 614; —preferable to dried material, *Elwes*, 1017; *Seward*, 897, 898; —proximity to herbarium needless, *Groves*, 367-369.

Loans, not permitted, *Murray*, p. 4; —rarely permitted, *Dyer*, p. 93, 94 (cf. Berlin, p. 169, 170; Brussels, p. 164; Paris, p. 168; St. Petersburg, p. 165; Vienna, p. 163; —of books, p. 163, 164).

Lockyer (afterwards Sir), Joseph Norman, report on the Museum of Natural History, Paris, p. 147.

Loher, Dr. plants from Manilla, *Dyer*, p. 82.

London, best for botanists, *Murray*, 113; —educational exhibition required, *Elwes*, 1033; —herbaria specified, *Carruthers*, p. 137; — most convenient for foreigners, *Clarke*, 331; —preferable as a place for a herbarium, *Groves*, 346.

London Catalogue, use of numbers, *Clarke*, 314.

London School Board, supplies to, *Dyer*, p. 64.

London University, Jodrell Laboratory used by, *Dyer*, p. 66.

Lord Steward's Department, formerly responsible for Kew, p. 113.

Lubbock, Sir John, Bart. (afterwards Baron Avebury), memorial addressed to the Right Hon. W. E. Gladstone, p. 149.

Lyall, Dr. D., collections mentioned, *Dyer*, p. 85.

Lycopods, fossil, shown in the Botanical Department, *Seward*, 942.

Lyell, Sir Charles, letter deprecating removal, p. 121; —cited, p. 134, 137.

Lyons, student of Kew organisation from, *Dyer*, p. 74.

M.

McMurtrie collection of Carboniferous plants, *Woodward*, 1097.

McNab, Prof. W. R., studied in Geological Department, *Woodward*, 1066.

Madagascar, collection, *Dyer*, p. 85; —hypothetic, *Dyer*, 1346-1353.

Magelhaen, collections from, *Dyer*, p. 85; *Richards*, p. 148.

Maiden, J. H., on Kew, *Dyer*, p. 74.

Malay Peninsula, Kew collections richer than the British Museum, *King*, 207.

Mann, G., collections, *Dyer*, p. 85.

Manuscripts in library, *Murray*, p. 4.

Manuscripts and Medals, Department of, p. 111.

Maps of geographic distribution, *Dyer*, p. 58.

Marshall, Rev. E. S., critical plants compared at the British Museum, *Hanbury*, 511.

Maslen, A. J., studied in the Geological Department, *Woodward*, 1066.

Masters, Dr. Maxwell Tylden, F.R.S.—Advantages of two collections, arranged in different order, 667, 668, 670; accessibility of British Museum, an advantage in serious work, 674; affinities of living plants and fossils could be best studied at Kew, 748-750, 752, 753, 755; amalgamation, advantageous, if not too costly, 689; preferably at Kew, 635, 640; —reasons, 636, 637; amateurs, British Museum important to, 673; arrangement of books at both establishments, 676-679; —of plants at Kew preferable to the plan at the British Museum, 636, 637, 665, 671, 672; — —at Kew, *Dyer*, p. 65; books at the British Museum less accessible than those at Kew, 676; botanical sequence at Kew, only partial, 665, 666, 684, 685; —at the British

Masters, Dr. Maxwell Tylden, F.R.S.—*continued.*
Museum, 666, 684; botanists at, British Museum and Kew, 621; —casual visits might be met by leaving British herbarium at Cromwell Road, 700; British Museum at Bloomsbury and at South Kensington visited by him, 710; —accessibility advantageous, 674; —amateurs, important for them, 673; —arrangement less desirable than the Kew plan, 636, 637, 665, 671, 672; —books less accessible than those at Kew, 676; —botanical sequence observed, 666, 684; —botanists casual visits might be met by leaving British herbarium at, 700; —British herbarium, 647; — —should be left, 648, 651, 654; — —sufficient for chance visitors, 699; —collections less rich than Kew, 718, 719; —dilettanti, important for, 678; —expense of transfer hardly warranted, 657, 658, 680; —fossil plants should not be transferred from, 747-755; —garden plants, why now named at, 756-762; —historic herbaria should be left, 647, 655; — —few study them, 650; — —research at, 624, 629; —horticulturists rarely consult it, 739, 740; —journalists get plants named there, 756-762; —library should not be added to, 690, 691; — —less easy to consult than Kew, 676; —morphological collections, 705; — —much used, 706-708; —old collections at, 621, 647; —phanerogams probably less rich than Kew, 721, 722; —plants named for journalists, 756-762; —pre-Linnean herbaria, 647; —researches finished at, 695; —rivalry a possible stimulus, 659, 660; —staff name plants for journalists, 756-762; —suspension of enlargement, 729; —students not taken by him to, 709; —teratology not represented at, 714, 715; —union of herbaria, desirable, 635, 640; — —methods 641; —unity of collections not practically advantageous, 692; competing establishments, 725; —deplored, 727; —not conducive to science, 728; complete collection desirable, 723, 734; —never attainable, 735; cryptogams, cannot assert the respective pre-eminence of either establishment, 722; dilettanti, British Museum important for, 678; distance no impediment to use of Kew, 638, 639, 673, 693, 724; editor of the "Gardeners' Chronicle," 620; educational basis for secondary collection, 736, 754; —herbarium at the British Museum, 651, 652; —new collection, 656; energy of officials, 663, 664; evidence, 620-762; expense of removal hardly warranted, 657, 658, 680; fossil plants should not be taken from the British Museum, 747-755; garden plants named at Kew, 632; —why named at British Museum, 756-762; gardens at Kew important for naming, 702, 703; geographic arrangement at Kew, advantageous, 665, 666, 684; —formerly absent, 686; —not in use at British Museum, 684, 685; geologic collection should possess the fossil plants, 749; Government collections at Kew, the reason for its greater richness, 662; herbaria, amalgamation preferably at Kew, 635, 640; —reasons, 636, 637; historic botany, few study it, 650; —herbaria at British Museum should be left there, 647, 655; —none believed to be at Kew, 675; —research at British Museum, 624, 629; horticulturists chiefly go to Kew, 621, 701, 738; —rarely to British Museum, 621, 739, 740; intercalation of cabinets the best way of union, 642, 643; journalists get plants named at British Museum, 756-762; Kew, amalgamation preferably at, 635, 640; — —reasons given, 636, 637; —arrangement of plants at, 636, 637, 665, 671, 672; —books at, easier consulted, 676; —collections richer than British Museum, 627; —due to reception of Government collections, 662, 633; —fossil plants can be there compared with recent, 748-750, 755; —its former teratological collection, 741-746; —library more accessible than British Museum, 676; —phanerogamic collection better at Kew than British Museum, 721, 722; —researches generally begun at, 694; —reasons for not getting plants named at, 759-762; —size of sheets an impediment to incorporation, 645; —should be the head establishment, 729; —teratological collection formerly there, 742-746; —union at Kew desirable, 635, 640; — —methods, 641; library at British Museum should not be increased, 690, 691; —that at Kew the more accessible, 676; Linnean herbarium in London, 649; London requirements, 711-713; monographers must consult Kew collections, 633; morphological collection at British Museum, 705; —much used, 706-708; natural system employed at the British Museum, 688; old collections at the British Museum, 621; — old herbaria, 647; oscillation of visitors between Kew and the British Museum, 697; —that would cease on amalgamation, 698; phanerogams at Kew better than at the British Museum, 721, 722; pre-Linnean herbaria at the British Museum, 647; present arrangement of both collections satisfactory, 680, 682; researches begun generally at Kew, 694; —finished at the British Museum, 695; —involving a final visit to Kew, 696, 697; —should be the aim of the chief herbarium, 736; rivalry possibly a stimulus, 659, 660; starting *de novo*, only one collection should be maintained, 733; scientific work not hindered by present methods, 730, 732, 737; sheet incorporation almost impossible, 644; size of sheets in two herbaria a bar to complete incorporation, 645, 669; staff of the British Museum name plants for journals, 756-762; stimulus of rivalry, 659, 660; students not taken to the British Museum by witness, 709; teratology, attractive, 716, 717; —collection presented by him to Kew, 742; — —now at the Royal College of Surgeons, 744-746; — —was formed some years ago, 745; —no collection at the British Museum, 714; — —nor Kew, now, 742, 743; —should be represented, 715; time required for incorporation a drawback, 646; types should be at Kew, 729; —but not now to be rectified, 730; union of herbaria at Kew desirable, 635, 640; —methods, 641; unity of collections at the British Museum not practically advantageous, 692.

Maskelyne, Mervyn Herbert Nevil Story, F.R.S., attractions of Kew, p. 126; —British Museum as a centre of work, p. 126; —evidence, p. 126; —Kew as a place of scientific resort, p. 126; —opinion as to the two establishments, p. 126.

Massalongo, A., exsiccata at Paris, p. 166.

Material, unarranged, at the British Museum, *Murray*, p. 4; — —reported to be large, *Dyer*, 1330; —at Kew, a minimum, *Dyer*, p. 94.

Mauritius flora, *Dyer*, p. 65.

Mayne, Capt., Magelhaen collection, *Dyer*, p. 85.

Medallions of botanists at Kew, *Dyer*, p. 58.

Meller, Dr. C. J., Madagascar collection, *Dyer*, p. 85.

Memorandum of H. M. Office of Works, 1868, p. 126; —1873, p. 151.

Memorial against removal of collections, p. 117; —on Kew management, 1872, p. 149; — —cited, p. 139; —on purchase of Hooker collections, p. 142; —to H.M. Treasury, from the British Association, 1847, p. 113; — —regarding the national herbaria, 1872, p. 146.

Ménissier, A., on Kew, *Dyer*, p. 60, 64.

Merrifield, Mrs. M. P., Algæ named by her, *Holmes*, 485.

Mesozoic plants, external characters, *Seward*, 896; —no recent worker on, *Seward*, 914; —studied by witness, *Seward*, 891; —wanting in structure, *Seward*, 895.

Micheli, M. Marc, at Kew, *Dyer*, p. 66.

Microscope, slides at Berlin, p. 169; —Cromwell Road, *Murray*, 148, p. 2; —at Kew, no collection, *Dyer*, p. 58; at Paris, p. 166, 167; —at Vienna, p. 161; —usually deteriorate, *Farmer*, 839.

Microscopes, provided for study, *Murray*, 80; *Seward*, 910, 911, 924.

Microscopic work in fossil plants, *Seward*, 910, 911.

Miers, John, on the herbarium of the British Museum, p. 147; —referred as probably the "Hammersmith botanist," p. 125.

Milanji, plants at the British Museum, *Dyer*, 1354.

Milhe-Poutingon, A., report on Kew, *Dyer*, p. 67-74.

Milne, A., letter, p. 99.

Mineral collection at the British Museum, very important, *Lankester*, 1154.

Mineralogical Department, early history, *Woodward*, 1062.

Mineralogy at the British Museum, *Owen*, p. 126.

Minute, see *Treasury Minute.*

Miscellaneous notes in "Kew Bulletin," *Dyer*, p. 81.

Models in the British Museum, *Murray*, 138, 139, 149; —in Kew Museums, *Dyer*, p. 58.

Molony, Sir C. A., rubber trade, of West Africa, *Dyer*, p. 76.

Monocotyledons, in Kew Arboretum, hand list, *Dyer*, p. 58; — —Museums, *Dyer*, p. 58, 94; — —tender, hand list, *Dyer*, p. 58; —need studying in living specimens, *Elwes*, 1008, 1022; —not studied by witness in fossil forms, *Seward*, 891.

Monographers, collections consulted by, *Elwes*, 1052; *Masters*, 720; herbarium arranged after, *Murray*, p. 4.

Montagne, J. F. C., cryptogamic herbarium at Paris, p. 166.

Montague House, establishment, p. 111.

Moore, Mr. S. L., at Kew, *Dyer*, p. 65; —on a new acanthaceous plant, *Clarke*, 302.

Morphologic collection, at the British Museum, *Carruthers*, 590-601; *Masters*, 705-709, 711-713; *Murray*, 132, 137, 151; —at Kew, not sufficiently used, *Dyer*, p. 64; —at the Royal College of Science, *Farmer*, 828-834; —at Vienna, p. 162.

Morris, Dr. Daniel, appointed Commissioner of Agriculture, West Indies, *Dyer*, p. 76.

Mosses, arrangement, *Murray*, p. 4.

Mougeot, J. B., exsiccata at Paris, p. 166.

Murchison, Sir Roderick Impey, memorial signed by, 1847, p. 113.

Murray, Mr. George Robert Milne, F.R.S., accessions, 61, 62, p. 3; accumulations, accessible to enquirers, p. 4; —now rapidly being reduced, p. 4; academies, publications accessible in the general library, p. 4; adaptations of plants shown, 12; additional cost during amalgamation, 92, 98, 99; —information, p. 174, 178; additions, each institution gets as many as practicable, 156; advantages of two herbaria, 113; advice, equally competent at either establishment, 163; African botany, certain areas richer than at Kew, 74, 75; Algæ, arrangement, p. 4; amalgamation, by cabinets would lead to incorporation, 153; —no economy, 88-94; — —additional cost during, 92, 93, 98, 99; —not desirable, 113; —should be in London, 113, 114; antiquarian, the word historical substituted, 41; applied botany, referred to Kew, 29; arrangements, authorities used in, p. 4; —of specimens, the main work of the staff, 33; —plants not incorporated, 65; arrangements for working out collections, 172; assistants, permanent and temporary, 4, 5; —research by, 121-123; —work, 140; attendance of visitors, p. 3; Australia, perhaps richer than Kew in types from, 160, 162; Baker, J. G., vascular cryptogams arranged after, p. 4; Banks, Rt. Hon. Sir J., Bart., his herbarium, p. 3; —not kept separate, 42; —fossils, p. 4; —library remained at Bloomsbury, 176; Bentham and Hooker, phanerogams arranged according to, p. 4; Berlin, exchanges with, 68; —organisation copied, 152; Beschereller herbarium, 67; binding, allowance, p. 3; —expenses, 97; —might be halved by union, 103; Birkbeck Institution, students from, p. 3; Bloomsbury, removal from, attracted visitors, 27, 28; —consequent additional space, p. 3; books, p. 3; —how procured, 17; —saving on union small, 93, 94, 102; booksellers employed, p. 4; botanic information afforded by the staff, p. 2; Botanical Department, fossils transferred under own charge, 47-50; cf. *Woodward*, 1063, 1064, 1081, 1084-1086; botanists, facilities for monographing, 17, 79; —pre-Linnean herbaria not a popular display, 40, 41; —provincial and foreign, prefer London amalgamation, 114; —recorded opinions on herbarium-sheets, 154; p. 178; botany, economic, referred to Kew, 29; —systematic, largely based on the pre-Linnean collections, p. 3; Bower, Prof. F. O., work on fossil plants, 53; British botanists, their types before 1841 all practically in the Department, 37; —plants in public gallery, 130, 131; —Mycetozoa, Guide, 35, p. 3; British herbarium, p. 2, 4; —consists of native specimens only, 46, 83; Brown, R., collection of fossil plants, 47, p. 4; —cone described by, 53; —herbarium, p. 3; — —mentioned, 42; —plants annotated by, 154; cabinets, provided with moveable trays, p. 4; —number, p. 178; —required on amalgamation, 89-91; camphor used as a preservative, p. 4; carpological collection in special boxes, 56; —fairly complete, 58; carriage, where charged, 97; Carruthers, W., fossil plants, 47, p. 4; catalogues, cost partly repaid, 97, 105; —official, p. 3, 4; — —printing same, p. 3; Central Hall, exhibition, 133-135; clubs, assisted by staff, 6; collections, accessions, 61, 62; —disposal chiefly a personal question, 96, p. 3; —for teaching purposes, p. 3; —if consisting of duplicates not bought, 126; —new forms found in, 152; —not existing elsewhere, 36, 39; —when unnamed, consume more time, 152; collectors previously instructed, p. 3; colonies, involve economic questions, 164; comparison, proximity of specimens important for, 84; competition practically non-existent, 128, 156; —a healthy stimulus, 156; correspondence with botanists, p. 3; Crown Colonies, enquiries from the agents, 164; cryptogams, accessions since removal, 118, p. 3; —imperfectly represented at Kew, 117; —increase, 117, p. 3; — — predominate over the Kew collections, 116, 162; —resulting from Government expeditions, 173; — sets, 62; —should not be separated from phanerogams, 197; —unarranged, none, 67; —visitors for, diminished during reconstruction, p. 3; cycads, special size of sheets, p. 4; daily visits, 22, 23; demarcation between the two establishments never reached, 166; desultory work avoided, 152; De Toni, G. B., Algae rearranged according to, p. 4; Devonshire Commission, plan proposed unworkable, 167-175; diaries of the officers, p. 2; Director has the funds for the public exhibition, 133-135; distribution of duplicates, no fixed system, 144; drawings, collection of, p. 4; drugs, questions concerning, referred to Kew, 29; Dublin, types at, 37; Dulau and Co., as booksellers, p. 4; duplicate room, 66, 68; duplicates, bequests contain, 126; —collections, 66, 71; —if eliminated, 154, 155; —no fixed system of distribution, 144; —what constitute them, 154*; duties of officers, p. 2; economic botany, referred to Kew, 29; —questions involved by colonial matters, 164; — —primary function of Kew, 165; Edinburgh, herbarium at, 194; —types at, 37; educational use of collections, p. 2, 3; elimination of duplicates, 154, 155; Elliot, G. F. S., his collections divided, 128, 172; Engler, Dr. A., methods at Berlin, 152; enquiries, staff in relation to, 32; evidence, 1-198, p. 1-13; examination, by boiling, p. 4; —purposes of the establishment, 14, 16; exchange of specimens, p. 3; exchanges, from duplicate room, 68; —included in figures, 63; exhibition, compared with others, 149; —for people partially instructed, 150; —none similar to it in London, 141; expansion, room for, 110; extra time, not paid for, 122, 123; Farmer, Professor J. B., and his students, 186; —no exceptional treatment, 193; —no set lecture in the herbarium, 189; ferns, arrangement, p. 4; —special size of paper for, p. 4; Ferro, pre-Linnean herbarium transferred from Kew, p. 3; field clubs, assisted by staff, 6; fire, a reason against amalgamation, 115; fire-proof building essential, 88; —collections housed in, p. 4; fire-risk on amalgamation, 98, 115; Flower, Sir W. H., agreement as to transference of fossils, 47, 48, 49; p. 4; —funds in his hands, 133; —on Index Museum, 133; —policy as to popular instruction, 11, 12; fluid, plants in, compared with models, 138; fossil plants, collections in one series, 47; —Keeper of Botany, has charge of them, 47; — —controverted, *Woodward*, 1081; —now sent to British Museum from Government expeditions, 171; —returned after being borrowed, *Woodward*, 1063; — —including Brown's and Hooker's collections, *Woodward*, 1063; —when well preserved useful to stratigraphic geologists, 87; Foster, Sir M., division of Scott Elliot's collections, 128, 172; fruits, p. 2; —arranged near the dried plants, p. 3; —collections included in the herbarium when possible, 56, 57; —when large, placed in the carpological series, 56; fungi, arrangement, p. 4; furniture and fitttings, p. 3; —enormous cost on amalgamation, 88, 89, 106; —large amount on removal, 89; galleries, devoted to exhibition, 7, 8; —use defined, 78; genera, how arranged, p. 4; general herbarium, p. 2; —compared to Kew, 74, 77; —no British plants in it, 46, 83; general library, 94, 178; —its speciality, 179; genus, undetermined plants in each, 124; geographic arrangement confined to species, p. 4; —botany, great progress made at Kew, 170; Geological Department, fossil plants in, 47; —under the charge of the Keeper of Botany, p. 4; geologists, fossil plants not much used by, 59, 60, 85-87; gift, accessions by, p. 3; glue not employed, p. 4; Government expeditions, plants now sent to Kew, 171, 172; —requisitions from, rare, p. 3; groups of plants under geographic arrangement, p. 4; guides to collections, p. 3, 4; gum, not glue, as an adhesive, p. 4; herbarium, access of students, 129; —accessions, p. 3; —consulted by palaeobotanists, 109; —for use of teachers, 130; —incorporated, p. 3; patrolled during the night, 98; —possibly stronger than Kew in parts, 158, 159; —somnolent once, 156; —staff consulted by palaeobotanists, 108, 109; —used for Seward's "Wealden plants," 87; —utilised for palaeobotany, 53, 54; — —enormous convenience of contiguous collections, 55; Hepatics, present and future arrange-

Murray, Mr. George Robert Milne, F.R.S.—*continued.*
ments, p. 4; historic collections, 40-41; holiday, popular visits during a, 9; Holmes's charges, reply to, p. 178; Hooker, Sir J. D., collection of fossil plants, 47; p. 4; —on Indian flora, 74; —plants, annotated by, 154; —wanted help on grasses, 119; Hooker, Sir W. J., and J. G. Baker, "Synopsis filicum," the authority for arranging ferns, p. 4; identification of specimens, 124; —help in, 18-20; importers of drugs referred to Kew, 29; incorporation of specimens, p. 3; — —continuous, p. 4; —less than acquirements, 70; — —explanation, 71; — — rapid reduction, 66, 69, 72; —not laid in, 64, 66; —yet available, 65; incorporation of both herbaria, labour immense, 93; —would result from amalgamation by cabinets, 153; India, botanists work first at Kew, 161; —Kew collections outweigh British Museum, 74, 77, 157, 161; initial expense of union large, 98, 106, 107, 112, 115; instruction of collectors, p. 3; —popular, 6; instruments for botanic work provided, 79; interchanged visits of staffs, 113, 119, 120; Jaeger, A. and —Sauerbeck, mosses arranged according to, p. 4; Keeper of Botany, 1; —his duties, p. 2; Kew, African collections, 74, 75; —botanist living at, prefers London for amalgamation, 153; —India better represented at, than at the British Museum, 74, 77; —needs a herbarium, 194; —practice as to duplicates, 127; labelling of exhibition collection, 12; —nearly completed, 13; labels, printed for gallery, 97; laboratory, p. 4; —microscopic preparations in, 148; —not confined to cryptogams, 145; —methods for examination, p. 4; —utility, 147; —well equipped, p. 4; leakage in numbers, 73; library, at Bloomsbury remained there, 176; —departmental, p. 3, 4; —expenses, 93, 94; —extent p. 4; —new one at Cromwell Road, 177-181; —not used for examinations, 14; Lichens, in course of rearrangement, p. 4; Linnean Society, papers published by, 121; Lister, A., British Mycetozoa, 35; —Mycetozoa arranged according to his catalogue, p. 4; —sale of his guide, p. 3; loan of specimens not permitted, p. 4; London, amalgamation preferably in 113, 114, 153; —no similar exhibition in, 141; manuscripts, p. 4; microscope slides, number, p. 2; —prepared in laboratory, 148; microscopes provided for botanic visitors, 80; cf., *Seward*, 924; models in galleries, 138, 139; monographers compelled to consult the collections, 36; monographs as the basis of arrangement, p. 4; mosses, arrangement, p. 4; morphologic collections, 132, 143, 147; —not prominent, 147; —plan for continuation, 151; —points occasionally worked at, 146; —progress stopped by the Director, 133-135; — —regret at same, 137, 151; morphology, fossils to illustrate, 47; Mycetozoa, arrangement, p. 4; —British, 35; —guide to, p. 3; named collections, 152; naming specimens, main work, 33; —public gallery, 131; naturalists' clubs assisted by the staff, 6; new species in unnamed collections, 152; œcological collection, 132; — —developed, 136, 143; Oliver, Prof. F. W., no set lecture in the Herbarium, 189; —special exhibition for, 15; opinions written on sheets of herbarium, 154; p. 178; organised work on a collection, 152; palaeobotanists, consult staff rather collections, 108, 109; —who have used the collections, 53; palaeontological, animal remains better adapted for geologists than plants, 85-87; —collections, p. 4; —department, 47; palms, special size of sheets for, p. 4; Paris, disastrous separation of cryptogams and phanerogams, 197; —instance of no competition and the result, 156; patrol, fire, at Cromwell Road, 98; plant-adaptations, 12; plant-identification, 18-20; plant-models in galleries, 138, 139; plants, economic, usually referred to Kew, 29; —unarranged, 64; — —available, 65; — —reduced in bulk, 66; — —shrinkage rapid, 69, 72; popular exhibition of models, 138; —instruction, 6, 8; post-Linnean collections all in the general herbarium, 43-45; pre-Linnean collections, systematic botany largely based on, p. 3; —herbaria used in botanic investigation, 40; preparing allowance, p. 3; —no reduction on amalgamation, 104; preservative fluids, specimens in, p. 2; printing allowance for catalogues, p. 3; —no economy on amalgamation, 97; professors not allowed to lecture in the Herbarium, 188, 190, 192; proximity of the two herbaria, advantageous, 153; public collections for teaching purposes, p. 3; publications, p. 3; purchase of specimens, p. 3; —slight saving on amalgamation, 101; pure botany, work confined to,

Murray, Mr. George Robert Milne, F.R.S.—*continued.*
29; questions submitted for replies, p. 1-2; recommendations of the Devonshire Commission, some unworkable, 167, 175; reconstruction of cryptogamic herbarium, and effects, p. 3; reduction in expense on union, presumably none, 88, 97-107; removal from Bloomsbury, p. 3; —effect on visitors, 27, 28; remuneration of temporary assistant, 51, 52; Rendle, Dr. A. B., help to Sir J. D. Hooker on Indian grasses, 119; reply to Mr. E. M. Holmes's charges, p. 178; —to questions, p. 2-4; requisitions from Government rare, p. 3; research, facilities for, 17, 79-81; —herbarium, an instrument for, 129; —if withdrawn, would be disastrous for science, 82; —visits for, could be ascertained, 24-26; —work of assistants, 121-123; researchers alone can perceive the difference of the two establishments, 163; rivalry, 156; —effect of none, 156; Royal College of Science, advantage of British Museum collections and library being near, 183-185; —exhibition for, 15; —no arrangement with, 182; —restrictions, 186; —special facilities would require sanction of the Trustees, 195; teaching at, 142, 143; Saccardo, P. A., fungi arranged according to, p. 4; salaries, p. 3; —no reduction on union, 88, 91; — —increase during, 99; Saturday afternoon, popular visits, 9; saving on union doubtful, 88; —small, 98, 107, 111; schools, regulations, 9; Scott, Dr. D. H., no set lecture in the herbarium, 189; —special exhibition for, 15; —worked at fossil plants, 53; Scott Elliot, see *Elliot, G.F.S.*; semi-incorporation, 153; sets of plants bought, 62; Seward, Mr. A. C., arranging fossil plants, 47; —temporary assistance, 51, 52; —worked on fossil plants, 53; sheets, number, p. 178; —sizes, p. 4; shelves in cabinets are moveable trays, p. 4; sizes of cabinets, difference in, 90, 91; — —new requisite for amalgamation, 90, 91; —of sheets, p. 4; slip-catalogue of book-titles, p. 4; —Sloane, Sir Hans, his collections, p. 2, 3; —fruits, p. 2; —incorporation in the general herbarium undesirable, p. 4; South Kensington, removal to, and its effects, 27, 28; Sowerby, J., models of fungi, and guide, p. 3; space available for extension, p. 4; special exhibitions, 15; specialisation, advance by, 165; species, geographic arrangement, p. 4; —how represented, 3; specimen, defined, p. 178; specimens, allowance for purchase, p. 3; —identification, 124; —naming and arranging, 33; — —by comparison in public gallery, 131; —not species, counted, 3; —worthless state of some purchased, 72; staff, constitution, 4; —could not be reduced, 100; —educational functions, p. 3; —help to students, 6-21; —interchange of visits, 113, 119, 120; statement in reply to interrogatories, p. 2-4; —put on, 2; Stephani, F., hepatics arranged according to, p. 4; stratigraphic geologists do not now use fossil plants, 59, 60, 85-87; students, access to herbarium, 129; —kinds of, 17; —of Royal College of Science, 183-187; —tickets for, 14; —use of collections, p. 2, 3; —visits with their professors, 189, 190, 192; study series, all plants identified before incorporation, 124; —term defined, 125; subsidiary collections, p. 4; "Synopsis filicum," ferns arranged by, p. 4; "Synopsis hepaticarum," hepatics arranged by, p. 4; systematic botany, largely based on pre-Linnean collections, p. 3; —character of work, 146; —collection in public galleries, 130-132: —series exhibited, 8; teaching, at the Royal College of Science, 142, 143; —collections, 8, 11, p. 3; —herbarium, 129; temporary assistant, employed, 4, 5; —for reducing unarranged plants, 66; Trustees' sanction, 51, 52; time, chief demand on, 34; —for popular instruction, 9, 10; —on galleries, 11, 12; —professors take up little, 17, 30, 31; —visitors, 17,18; Toynbee Hall students, p. 3; tracts in the departmental library, p. 4; transactions, available from the general library, p. 4; transference of fossil plants, 47; travellers instructed in collection, p. 3; Trustees, consent required in all cases of duplicates, 144; —present specimens, 68; —publish Lister's British Mycetozoa, 35; and Seward's Wealden flora, 87; —transference of fossil plants not yet sanctioned by, 48-50; trays, number in each cabinet, p. 178; types, 36; —added to, 38; —enormous number, 37; —more cryptogams and fewer phanerogams than Kew, 116; —not needed for teaching, 194; unarranged plants, 64; —available for research, 65; —reduction in number, 66; — —rapid, 69, 72; union, no economy, 88; unique specimens, 116; University College, special exhibition, 15; —students

Murray, Mr. George Robert Milne, F.R.S.—*continued.* from, p. 3; University towns possess teaching herbaria, 194; unmounted specimens, their number, p. 4; unnamed collections, new species in, 152; visits interchanged of staffs, 113, 119, 120; visitors, affected by removals, 27; —how reckoned, 22, 23; —now reduced by set of British plants in public gallery, 130; —numbers, p. 3; —reasons for diminution, p. 3; —reported to Trustees, 21; —two classes, 21; volumes in the departmental library, p. 4; Wealden flora, 87; Williamson collection, partly purchased by the Botanical Department, 47; woods, near the dried plants, p. 3; —number of specimens, p. 2; workers on fossil plants, p. 53.

Murray, Rev. R. P., at Kew, *Dyer*, p. 65.

Museum at Kew, a model for the British Museum, *Bentham*, 143.

Muséum d'Historire Naturelle, Paris, report on, p. 165-168.

Museum of Natural History, Paris, *Lockyer*, p. 147.

Museum of Practical Geology, fossil plants, *Carruthers*, p. 137; —stratigraphic geology at, *Lankester*, 1169.

Museums at Kew, *Dyer*, p. 58, 82, 94, 95; —additions to, *Dyer*, p. 75; —attitude of Sir H. Primrose, and Lord Esher, *Dyer*, 1312; —contents, *Dyer*, p. 58; —library, *Dyer*, p. 58; —revision of, *Dyer*, p. 97; —space for extension, *Dyer*, p. 98; —use of, *Dyer*, p. 66.

Mycetozoa, Guide to, *Murray*, 35, p. 3; herbarium arrangement, *Murray*, p. 4.

Myxomycetes lent, *Dyer*, p. 93.

N.

Naming collections, *Murray*, 33, 34; —at Kew, *Hemsley*, 1202, 1204; —of specimens, views on, *Holmes*, p. 173.

National botanic collections, should be at Kew, *Ball*, p. 131; *Holmes*, 407; —should be in London, *Carruthers*, p. 137; ——its requirements, p. 137.

National Herbarium should be at Kew, *Hooker*, p. 126; —statement denied, *Bennett*, p. 126.

Natural and Artificial Productions, a Department, p. 111.

Natural History, proposal to remove it, p. 117.

Natural History Museum, its superior advantages, *Carruthers*, p. 138.

Natural Orders, arrangement at the British Museum, *Masters*, 666; ——partly so at Kew, *Masters*, 687; —as known to students, *Holmes*, 418; —of economic products, *Dyer*, p. 61-62.

Naturalists' societies, *Murray*, 6.

Naval officers, accessions from *Cornu*, p. 168.

Neilreich, August, herbarium at Vienna, p. 161, 162.

New plants should be sent to Kew, *King*, 271; *Masters*, 729.

New Guinea, plants from, *Dyer*, p. 87.

New York, Museum, fireproof, *Dyer*, p. 86.

New Zealand, flora, *Dyer*, p. 65; —private collection from, *Dyer*, p. 86.

Newton, Prof. A., Admiralty collections sent to, *Richards*, p. 148.

Niger expedition collection, *Dyer*, p. 85.

Nitophyllum, Dickie's error concerning, *Holmes*, p. 173.

Nomenclature of living collections at Kew, *Dyer*, p. 58.

Notice as to use of herbarium, *Dyer*, p. 94.

Normal size of sheets, *Holmes*, 388.

North Gallery at Kew, *Dyer*, p. 58, 75.

North, Miss Marianne, *Dyer*, p. 58, 75.

Nottingham, application for duplicates, *Dyer*, p. 66.

Numbers, collectors', *Clarke*, 314.

O.

Object of Kew collections, *Dyer*, p. 58.

Œcological collections, *Murray*, 132, 136.

Office of Works, enquiry, 1868-69, p. 126; ——mentioned, *Carruthers*, p. 134; *Owen*, p. 152; —memorandum, 1873, p. 151.

Official evidence, not as a scientific expert, *Dyer*, 1300-1302, 1321, 1322, 1335-1337; —publication of research by staff, undesirable, *Dyer*, 1373; —publications, *Dyer*, p. 98.

Officials not blameable for differences in the two establishments, *Masters*, 663.

Oils, vegetable, at Paris, p. 166.

Old collections at the British Museum, *Hemsley*, 1207.

Oliver, Prof. D., flora of tropical Africa, *Dyer*, p. 65.

Oliver, Prof. F. W., exhibition for his pupils, *Murray*, 161, 189.

Oolitic shale, fossil plants from, *Woodward*, 1087.

Opinion, personal, *Lankester*, 1152.

Orchid flowers, in fluid, at Vienna, p. 162.

Orchids at Kew, hand list, *Dyer*, p. 58; —best studied living, *Elwes*, 1022; —in "Kew Bulletin," *Dyer*, p. 79.

Orders of economic plants, *Dyer*, p. 61-62.

Organisation at the Jardin des Plantes, *Cornu*, p. 165.

Organography, professor of, at Paris, p. 166.

Origin of the British Museum collections, p. 111; —Royal Botanic Gardens, Kew, p. 112.

Overlapping of collections, unintentional, *Murray*, 165.

Owen, Prof. (afterward Sir), Richard, Admiralty collections sent to, *Richards*, p. 148; botany, his changed opinion, p. 125; British Museum, statement concerning, 151-154, 156-157; collections might be removed without disadvantage, p. 119; evidence, 1858, p. 119; —1860, p. 125; fossil plants in the national collections, p. 120; Index Museum, *Lankester*, 1183; Jermyn Street Museum and mineralogy, p. 126; Kew, development and proposed transference of botany thither, p. 126; —statement concerning, p. 151-154, 156-157; proposal to merge the two herbaria, p. 140; —rejected by the Devonshire Commission, p. 140; remarks on the British Museum and Kew, p. 156, 157; statement relative to the two institutions, p. 151-154; views on the proposed transference, *Dyer*, p. 57.

Oxford herbarium should be kept up to date, *Fawcett*, 542.

Oxford University, cost of printing "Index Kewensis," borne by, *Dyer*, p. 76.

Oxford and Mortimer, Robert Harley, Earl of, see *Harley*.

P.

Pacific, collections at the British Museum, *Dyer*, 1275.

Palaeo-botanic assistant refused for the Geological Department, *Woodward*, 1079.

Palaeobotanists, need more than a reference herbarium, *Woodward*, 1069-1074; —none on the staff of the British Museum, *Woodward*, 922; —working in the British Museum, *Murray*, 53; *Woodward*, 1066.

Palaeobotany, *Dyer*, p. 95; —its technique, *Dyer*, 1368 —should not be split up too much, *Dyer*, 1367; —transference of fossil plants would be a great loss, *Woodward*, 1076.

Palaeontologic collections, *Murray*, p. 3; —department of the British Museum, a striking success, *Dyer*, 1366.

Palaeontologists, collection arranged for, *King*, 257; —special type of workers, *Lankester*, 1146; —who have used the Geological Department, *Woodward*, 1066.

Palaeontology, arrangement suggested, p. 141; —at Brussels, p. 164; —at Paris, p. 166; —at St. Petersburg, p. 165; —distinct aims of, *Dyer*, 1360; —in the Geological Department, *Lankester*, 1142, 1143, 1147; —vegetable, *Dyer*, p. 95.
See also *Fossil Plants*.

Palaeozoic plants, their anatomy, *Seward*, 895.

Palaeozoologic collection, *Woodward*, 1083.

Palaeozoology, its technique, *Dyer*, 1368.

Palliser, Capt., collections, *Dyer*, p. 85.

Palms, at Kew, *Dyer*, p. 83; —at Paris, p. 166; —at Vienna, p. 162; —best studied living, *Elwes*, 1022; —size of sheets for, at British Museum, *Murray*, p. 4; — —at Kew, *Dyer*, p. 95.

Panizzi (afterwards Sir), Antonio, evidence, 1850, alluded to, p. 117; —1860, p. 125; extent of Botanical Department, p. 125; library, approximate cost of forming a new botanic, p. 125.

Para rubber for India, *Dyer*, p. 64.

Parliamentary Enquiry, see *House of Commons*.

Paris, Exhibition, collections shown, *Dyer*, p. 76; Jardin des plantes, —advantageous to possess those collections, *Dyer*, 1338; —application for information, p. 161; —botanic professors at, *Brown*, p. 117; cf. p. 147; —collections utilised, *Dyer*, 1281; —herbaria, p. 166-168; —no duplicate collections, *Carruthers*, p. 135; —not to be copied, *Murray*, 156; —reply, with report, *Cornu*, p. 165-168; —separation of cryptogams from phanerogams, disastrous, *Murray*, 198; — special organisation, *Cornu*, p. 165.

Parker, Dr. G. W., at Kew, *Dyer*, p. 65.

Patrolment of the British Museum, *Murray*, 98.

Paxton (afterwards Sir), Joseph, survey of Kew Gardens, p. 112.

Peck, C. H., types of Erysiphaceæ at Kew, *Dyer*, p. 98.

Percentage of increase of Kew collections, not known, *Hemsley*, 1263.

Periodical publications, how procured, *Dyer*, p. 98.

Personal opinion, unofficial, *Lankester*, 1152.

Petiver, J., herbarium mentioned, *Batters*, p. 179.

Pfeiffer von Wellheim, F., slides prepared by, p. 162.

Phanerogams, at Kew, not practically known to witness, *Seward*, 869; —rich collection, *Masters*, 683; at Paris, p. 166; evidence confined to, *King*, 261; fossils, studied by Mr. C. Reid, *Seward*, 915; not within his range of work, *Seward*, 894; probably not better at the British Museum than at Kew, *Masters*, 722.

Pharmaceutical Society's herbarium, how specimens are incorporated, *Holmes*, 388.

Philippine Islands, botany, *Dyer*, p. 82.

Phillips, John, a legatee under Banks's codicil, p. 100.

Phillips, Prof. John, fossil fruits from Purbeck, p. 122.

Photographs shown at Kew, *Dyer*, p. 58.

Physics and chemistry, lectures, *Dyer*, p. 59, 60.

Physiological botany, provided at Kew by private munificence, *Dyer*, 1362-1365; —should be provided for, p. 141.

Physiology, professor of, at Paris, p. 166.

Pictures, of botanists, at Kew, *Dyer*, p. 58; —of plants in North Gallery, *Dyer*, p. 58.

Pierre, L., at Kew, *Dyer*, p. 82.

Piper, duplicates in large genera such as, not desirable, *Holmes*, 384.

Pittoni, herbarium at Vienna, p. 162.

Plant-diseases, in "Kew Bulletin," *Dyer*, p. 80; plant-portraits in Museums, *Dyer*, p. 58.

Plants, examined by Hooker or Brown, *Murray*, 154; for botanic stations, *Dyer*, p. 76; from unnamed collections, *Murray*, 152; identification by the public, *Murray*, 18-20; importers of, referred to Kew, *Murray*, 29; named or verified at Kew, *Dyer*, p. 64; *Hemsley*, 1202, 1204; purchased, *Dyer*, p. 87.

Plowman, Mr. E. P., on cost of binding at Kew, p. 173, 174.

Plunket, Hon. D. R., statement concerning the "Kew Bulletin," *Dyer*, p. 78, 79.

Poeppig, E. F., drawings at Vienna, p. 162.

Pohl, J. E., drawings at Vienna, p. 162.

Poison for specimens, *Dyer*, p. 94; —blackening of sheets produced by, *Dyer*, p. 94; —not employed, *Murray*, p. 4.

Poisson, E., at Kew, *Dyer*, p. 66; —study of Kew organisation, *Dyer*, p. 74.

Pollen, best studied in gardens, *Holmes*, p. 173.

Polypetalæ of Kew Arboretum, hand list, *Dyer*, p. 58.

Ponsonby, Rt. Hon. John William, 4th Earl of Bessborough, see *Duncannon*.

Popular collections should be at the British Museum, *King*, 223, 224, 227, 263-269; *Masters*, 648-656; exhibition, *Lankester*, 1170; instruction at the British Museum, *Murray*, 6-16, 30-32; —at Kew, none direct, *Dyer*, p. 59; museums, p. 123.

Popularisation of labels not attempted, *Woodward*, 1097.

Portfolios of drawings, *Dyer*, p. 58, 98.

Portraits at Kew, *Dyer*, p. 58.

Position of specimens of fossil plants at the British Museum, *Seward*, 923.

Post-Linnean collections all in the general herbarium, *Murray*, 42.

Prain, Dr. D., at Kew, *Dyer*, p. 65.

Precautions against fire, *Dyer*, p. 96; *Hemsley*, 1239, 1240.

Preece, Sir W., lightning conductor fixed, *Dyer*, p. 96.

Pre-Linnean, collections mentioned, *Hemsley*, 1208; herbaria always consulted, *Murray*, 40; should be left at the British Museum, *Bentham*, p. 130; *Carruthers*, p. 137; *Masters*, 647; —should go to Kew, *Holmes*, 411, 412; *King*, 231; —systematic botany largely based on, *Murray*, p. 3; —used seldom by witness, *Groves*, 344.

Preparing, cost at Berlin, p. 169; at the British Museum, *Murray*, p. 3; at Paris, p. 168; —not diminished by union, *Murray*, 104.

Prescott, J. D., herbarium could not be bought for the British Museum, p. 115.

Present state considered satisfactory, *Masters*, 680-682.

Preservative fluids, plants in, *Murray*, p. 2.

Primrose, Sir H. W., his dislike of museums, *Dyer*, 1312.

Principal Librarian, correspondence as to collections, *Dyer*, p. 86; origin of the title, p. 111.

Printed Books, Department of, p. 111.

Printing allowance for catalogues, *Murray*, p. 3.

Prints and drawings at Kew, *Dyer*, p. 98.

Proceedings of the Linnean Society, quoted, p. 101, 102.

Products, vegetable, in the Sloane herbaria, p. 111.

Proteaceæ, leaf-characters not trustworthy, p. 136; not known to students, *Holmes*, 418.

Protectorates, Kew work for, dependent on the herbarium, *Dyer*, 1308.

Psilotum, students desirous of seeing a specimen, *Holmes*, 397.

Public collections at the British Museum, *Seward*, 931-936; for teaching, *Murray*, p. 2, 3.

Publication of researches by staff, *Dyer*, 1372.

Publications, official, *Dyer*, p. 98; *Murray*, p. 3.

Pulteney, Dr. R., herbarium mentioned, *Batters*, p. 179.

Purchase, accessions by, at Berlin, p. 169; —British Museum, *Murray*, p. 3; — —fluctuations, *Murray*, 62; —Brussels, p. 164; —Kew, *Dyer*, 1291, p. 74, 87, 88; — —books, *Dyer*, p. 87, 99; — —competition small *Hemsley*, 1254-1256; —Paris, p. 167, 168; —St. Petersburg, p. 165; —Vienna, p. 162; saving on amalgamation would be trifling, *Murray*, 101.

Purdie, W., collections, *Dyer*, p. 85.

Q.

Quartin-Dillon, R., plants at Paris, p. 168.

Queensland, sugar-cane in, *Dyer*, p. 64.

R.

Rabenhorst, L., exsiccata at Paris, p. 166.

Radstock coalfield, plants in the Geological Department, *Woodward*, 1097.

Ray, John, his "Historia plantarum" as an index to the Sloane herbarium, p. 111.

Rearrangement of relations consequent on amalgamation, *Seward*, 937.

Recent plants, difficulties arising from their removal, *Seward*, 916-918; —relations with fossil plants, *Lankester*, 1149; —should be together, *Seward*, 877.

Recognition in the Colonial Office List, *Dyer*, 1318-1320, p. 56.

Recommendations of the Devonshire Commission, p. 138-141 ; —cited, *Dyer*, 1358-1365 ; *Murray*, 167-175.

Reconstruction of the cryptogamic herbarium, *Murray*, p. 3.

Record of the last quarter century at Kew, *Dyer*, p. 76.

Reduction of arrears, *Murray*, 69-73.

Redundancy, inevitable, *Dyer*, p. 95.

Reference collection as a residue, *Holmes*, 388, 397 ; —herbarium, always unsatisfactory, *Carruthers*, 617 ; —every herbarium is such, *King*, 217 ; —further explanation, *Holmes*, 418 ; —insufficient for a palaeobotanist, *Woodward*, 1069-1073, 1077, 1078, 1098 ; —might mislead, *Seward*, 899, 900 ; —might suffice for living plants, but not for fossil, *Carruthers*, 578 ; —wanted for study of fossil plants, *Seward*, 883, 884 ; —would help students, *Woodward*, 1069, 1077, 1078.

Regulations for Colonial botanic gardens, *Dyer*, p. 75 ; garden staff, *Dyer*, p. 59 ; study in the herbarium, *Dyer*, p. 65 ; use of collections, at Berlin, p. 169-170 ; —at Kew, *Dyer*, p. 94 ; —at Vienna, p. 163-164

Reichenbach, Prof. H. G., general herbarium at Vienna, p. 162 ; orchid collection, p. 162 ; —mentioned, p. 162 ; work at Kew since his death, *Dyer*, p. 79.

Reid, Mr. Clement, his study of fossil phanerogams, *Seward*, 915 ; work in Geological Department, *Woodward*, 1066, 1076.

Relations between the two establishments, *Dyer*, p. 57.

Relative cost of building, *Dyer*, 1329.

Remounting of the Kew collections, *Clarke*, 311, 312, 322.

Removal of the herbarium from the fossils, *Carruthers*, 616, 618 ; —of the natural history collections, proposed, p. 117 ; — —space gained by, *Murray*, p. 3.

Renault, B., in charge of fossil plants, Paris, p. 166.

Rendle, Dr. A. B., at Kew, *Dyer*, p. 65 ; help on Indian flora, *Murray*, 119 ; used the Geological Department, *Woodward*, 1066.

Reply to interrogatories, *Dyer*, p. 58-103 ; *Murray*, p. 2-4 ; —special, to Mr. Holmes's charges, *Batters*, p. 179 ; *Carruthers*, p. 177, 178 ; *Murray*, p. 178.

Representative herbarium at the British Museum, *King*, 223, 277, 278, 282, 283, 290 ; —essential, *Scott*, 1121, 1122.

Report, Devonshire Commission, 1871-75 p. 138-147 ; Keeper of Botany, monthly, *Murray*, 21 ; Dr. Lindley to the Treasury, on Kew, p. 112 ; Select Committee, 1835, p. 111 ; Trustees, p. 122 ; —cited, *Carruthers*, p. 134.

Reputation of Kew, *Hiern*, 949.

Requirements of students, *Holmes*, 397.

Requisitions of Government, rare, *Murray*, p. 3.

Research, at the British Museum, *Murray*, 6, 17-24 ; —by assistants, *Murray*, 121, 123 ; conditions, *Murray*, 81, 82 ; how far allowed to staff, *Dyer*, 1370-1373 ; essential to a museum, *Farmer*, 845 ; herbarium intended for, *Dyer*, p. 97 ; its results should be published by the Government, *Holmes*, 470 ; —should be confined to Kew, *King*, 278, 279 ; —should be first made there, *Masters*, 654 ; —should be near living collections, *Holmes*, 403 ; ultimate end of the collections, *Dyer*, p. 64.

Reserve of specimens, supply, *Farmer*, 792-795, 853 ; *Seward*, 933-936 ; —from Kew, *Elwes*, 1035-1038 ; *King*, 271.

Responsibility, increase on amalgamation, *Dyer*, 1289 ; two establishments compared, *Dyer*, p. 57.

Restriction in collections, *Dyer*, p. 74.

Revesby Abbey, directions in Banks's codicils, p. 101.

Rhodymenia, errors in naming, *Holmes*, p. 173.

Richards, Adm. George Henry, evidence, p. 147.

Richmond Park, water supply from, *Dyer*, p. 97.

Ridley, H. N., Fernando Noronha collections, *Dyer*, p. 87.

Riedel, L., Brazilian collections at St. Petersburg, p. 165.

Ripon, the Most Hon. the Marquess of, on Colonial work, *Dyer*, p. 74, 76.

Risk of fire, not great, *Hemsley*, 1249. See also Fire.

Rivalry between two establishments, *Murray*, 156 ; —beneficial, *Fawcett*, 529, 530 ; —may be useful, *King*, 234 ; —not causing undue expense, *Fawcett*, 537, 563 ; —not productive of good, *Holmes*, 414 ; Masters, 727, 728.

Roberge, specimens collected by, *Dyer*, p. 98.

Robertson-Glasgow, C.P., at Kew, *Dyer*, p. 65.

Robinson, the Most Hon. George Frederick Samuel, Marquess of Ripon. See *Ripon*.

Rosa, a critical botanist needed for, *Hanbury*, 509.

Ross, Sir J. C., plants of his expedition, *Owen*, p. 153.

Royal Botanic Gardens, Kew, p. 103. See *Kew*.

Royal College of Science, *Farmer*, 763-773, 804, 810, 833 ; collections, *Carruthers*, 599, 602 ; exhibition for, *Murray*, 15 ; general herbarium, *King*, 243 ; mentioned, *Holmes*, 429 ; museum, *Lankester*, 1173 ; no standing arrangement, *Murray*, 182-187, 193, 195, 196 ; relations, *Murray*, 142, 143 ; specimens not required should be made over to, *Holmes*, 388 ; students, *Murray*, p. 3 ; *Woodward*, 1097 ; visits to Jodrell Laboratory, *Dyer*, p. 66.

Royal College of Surgeons, teratological collection at, *Farmer*, 840-841 ; *Masters*, 742-746.

Royal Commission, 1847-50, p. 113 ; —1871-75, p. 127-149.

Royal Geographical Society, arrangement to instruct travellers, *Dyer*, p. 66 ; —library used, *Dyer*, p. 98.

Royal Mint, Banks's papers relating to, p. 101.

Royal School of Art, supplied, *Dyer*, p. 64.

Royal Society, Banks's papers, *Dyer*, p. 101 ; —library used, *Clarke*, 334 ; *Dyer*, p. 98.

Royal Veterinary College, students, *Murray*, p. 3.

Rubber plants, cultivated at Kew, *Dyer*, p. 64 ; —in India, *Dyer*, p. 76 ; in "Kew Bulletin," *Dyer*, p. 80 ; trade in Africa, *Dyer*, p. 76.

Rubus, a critical botanist needed, *Hanbury*, 509.

Rufford, P., work in Geological Department, *Woodward*, 1066.

Rusby, Dr. H. H., at Kew, *Dyer*, p. 82 ; —on fire risks at Kew, *Dyer*, p. 97.

Russell, G., memorandum, 126 ; reply, *Bennett*, p. 126 ; —cited, *Owen*, p. 152-153.

Russell, Right Hon. Lord John, memorial addressed to, 1847, p. 113.

Russian herbarium at St. Petersburg, p. 164, 165.

S.

Saccardo, P.A., fungi arranged after, *Murray*, p. 4.

St. Helena, flora, *Dyer*, p. 65.

St. Petersburg, application for information, p. 161 ; herbarium at, *Brown*, p. 117 ; local herbarium, p. 164 ; report from Director, p. 164-165.

St. Vincent, collections, *Dyer*, p. 87.

Salaries, at Berlin, p. 169 ; British Museum, *Murray*, p. 3 ; Brussels, p. 164 ; Kew, p. 141 ; *Dyer*, p. 59, 88-93 ; Paris, p. 166-167 ; St. Petersburg, p. 165 ; Vienna, p. 162 ; increase on amalgamation, *Murray*, 99.

Sdlisburia leaves mistaken for ferns, *Woodward*, 1087.

Salmon, E. S., at Kew, *Dyer*, p. 65 ; on Erysiphaceæ of Kew herbarium, *Dyer*, p. 98.

Saving on amalgamation, *Murray*, 96, 98-107, 111, 112 ;

Saxicolous lichens, *Dyer*, p. 94.

Scandinavian plants for comparison, *Groves*, 364.

Scarborough, fossil plants from, *Woodward*, 1087.

Schizymenia, error in naming, *Holmes*, p. 173.

Schomburgk, Sir Richard, collections, *Dyer*, p. 85.

Schomburgk, Sir Robert Hermann, drawings of Guiana plants, p. 116.

Schott, H. W., drawings at Vienna, p. 162.

Schultz, C. H., numbers employed by, *Clarke*, 314.

Schweinitz, L. de, specimens at Kew, *Dyer*, p. 98.

Science, at Kew, regulation concerning, *Dyer*, p. 78 ; freedom of Director, in all matters of, *Dyer*, 1312-1315.

Scientific work, injury by duplication, *Elwes*, 1052, 1054.

Scott, Dr. Dukinfield Henry, F.R.S., at laboratory, *Dyer*, p. 66 ; botanical interest of fossil plants greater than the geological, 1111-1113 ; —investigator, Kew fossils should be arranged for, 1117 ; botanist himself, 1110 ; British Museum collections known to him, 1105 ; —large number of fossil plants there, 1107 ; —magnificent collection of structural specimens, 1129, 1130 ; — —mostly worked up elsewhere, 1130 ; —might retain all the fossil plants, 1137 ; —should keep representative specimens showing external characters, 1116, 1118 ; — —and also the bulk of the ordinary specimens, 1124 ; division of fossil plants suggested, 1114-1120 ; —no very strong reasons for it, 1136, 1137 ; exhibition for his students, *Murray*, 16 ; external characters, plants showing these might remain at Cromwell Road, 1116, 1118, 1124 ; —work done by means of them, 1127 ; evidence, 1104-1137 ; fossil plants specially studied by him, 1104 ; geological investigator, British Museum fossils might be arranged for, 1118 ; —research on fossil plants less than botanical, 1111-1113 ; Kew, collections known to him, 1105 ; —of fossil plants small in number, 1106, 1131 ; — —accidental, 1132, 1134 ; —not representative, 1131 ; —no attempt there to form a palæobotanic collection, 1133 ; —presented mostly, 1134 ; —should have the fossil plants, as being the great botanic centre, 1114 ; —specimens showing internal structure should be at Kew, 1116 ; living plants advantageous for comparison with fossil, 1123 ; overpowering reasons for dividing fossil collections absent, 1136, 1137 ; palæobotanic collection not attempted at Kew, 1133 ; palæobotany, *Dyer*, p. 95 ; *Murray*, 53 ; palæontology needs external form as well as internal structure, 1125 ; representative specimens only need be transferred to Kew, 1115, 1136 ; —the rest of the collection might remain at Cromwell Road, 1121, 1122 ; structural specimens the chief study of witness, 1126 ; students of, *Murray*, 189 ; transfer of fossil specimens to Kew, not necessary, 1114 ; —if complete would be a loss, 1119, 1121 ; —representative specimens only required, 1115 ; —those showing internal structure should be transferred, 1116 ; —strong reasons not apparent for transference, 1137 ; use of British Museum collections, *Seward*, 910 ; *Woodward*, 1066 ; Williamson collection, in the British Museum, 1109 ; —his first study in palæobotany, 1108.

Searles-Wood collection, *Woodward*, 1083.

Secondary herbarium for Kew, *Hiern*, 963-966 ; — would be adequate, *Hiern*, 966.

Seed distribution at Kew, *Dyer*, p. 64.

Seedling sugar cane, *Dyer*, p. 64.

Seeds and fruits, collections at British Museum, *Murray*, p. 23 ; Brussels, p. 164 ; Kew, *Dyer*, p. 94 ; Paris, p. 166, 167 ; St. Petersburg, p. 165 ; Vienna, p. 162.

Select Committee, report, p. 111.

Semi-incorporation, *Murray*, 153.

Sets of plants, distributed by Kew, *Hemsley*, 1261 ; in both establishments, *Hemsley*, 1246, 1257, 1258 ; published, *Murray*, 62.

Seward, Mr. Albert Charles, F.R.S., amalgamation advantageous, 920 ; — —herbaria only, 930, 932 ; botanical and geological specimens should be in the British Museum, 941, 945 ; —public collections might be left, 931 ; botany, fossil, 868 ; British Museum, catalogues, drawn up by him, 894 ; —collections to remain, 931, 941, 945 ; —fossil collection exceedingly good, 869 ; —general herbarium does not obviate the need of referring to Kew herbarium, 903 ; —reference herbarium needed, 886, 889, 890 ; — —essential, 919 ; — —possibly misleading if imperfect, 899, 900 ; —transfer of herbarium only recommended, 930, 932 ; —unity in display of all branches, important, 928, 929 ; catalogues of fossils in the British Museum drawn up by him, 939, 940 ; —Wealden, *Murray*, 87 ; *Woodward*, 1079 ; cryptogams, fossil, 912 ; —own work among the recent, 891 ; cycads studied by him, 891 ; dicotyledons not much worked at by him, 891 ; difficulty in the study of fossil plants, if the herbarium is transferred to Kew, 916-918 ; employed by the Trustees, *Murray*, 37, 51, 52 ; *Woodward*, 1079 ; external characters used in fossil botany, 897 ; evidence, 867-945 ; facilities for study of fossil plants at the British

Seward, Albert Charles, F.R.S.—*continued.*
Museum not very good, 927 ; ferns at Kew known to him, not the flowering plants, 869 ; —in connection with fossil forms, 912 ; fossil botany, special study, 868 ; —plants, botanic value greater than their geologic, 875, 876 ; —British Museum collection exceedingly good, 869 ; — —in the Geological Department, 872 ; — —larger proportion always there than in the Botanical Department, 878 ; — —state of the collections, 881 ; —herbarium at the British Museum used by him, 912, 913 ; — —imperfect herbarium would mislead, 899, 900 ; —living plants preferable to dried, for comparison with fossils, 897, 898 ; —recent plants essential for study of fossils, 883, 884 ; —should go with the recent plants, 877 ; — —the whole collection, 879, 882 ; — —transferred to Kew, 885, 921 ; —their study in the British Museum difficult, 924 ; geologic use of fossil plants, 875 ; geological and botanical specimens should be in the British Museum, 941, 945 ; —the Geological Department without adequate microscopes, 924 ; geology studied by witness, 874 ; gymnosperms at Kew, 869 ; —chief work on, 891 ; —collection in the British Museum, 912 ; inconveniences of transference, 916 ; Jurassic plants studied by him, 892 ; catalogue drawn up by witness, 939 ; Kew, herbarium needs consultation, even after the general herbarium, British Museum, 903 ; —part of collections not known to him, 869 ; library of Botanical Department, British Museum, excellent, 924 ; living plants when at hand more useful for comparison with fossils than dried specimens, 897, 898 ; microscopes from Botanical Department, 924 ; —wanting in Geological Department, 924 ; — —might be easily supplied, 926 ; microscopical structure not well preserved in mesozoic plants, 896 ; — —work referred to, 910, 911 ; mesozoic plants studied by witness, 892, 894, 895 ; —no late writer on, 914 ; monocotyledons not much studied by him, 891 ; palaeobotany considered in the light of amalgamation, 920 ; —no official at the British Museum conversant with, 922, 923 ; —work on, *Murray*, 53 ; palaeozoic plants can be investigated anatomically, 896 ; —Dr. Scott's work chiefly, 910 ; phanerogams at Kew practically unknown to him, 869 ; —fossil, not within his present range of work, 894 ; —workers on, 915 ; public collections might be left at the British Museum, 931 ; reference herbarium should be retained at the British Museum, 886, 889, 890 ; —essential, 919 ; —might be misleading if imperfect, 889, 900 ; reserve material for herbarium at the British Museum, 933-935 ; —might be supplied from Kew, 936 ; study of fossils, difficulties at the British Museum, 924 ; transference of herbarium only, recommended, 930, 932 ; types not required for ordinary purposes of comparison, 887 ; unity in display of all branches, important, 928, 929 ; use of Geological Department, *Woodward*, 1066, 1076 ; vascular cryptogams and gymnosperms in the British Museum, 912 ; Wealden plants studied by witness, 892 ; —his catalogue of them, 939 ; *Murray*, 87 ; *Woodward*, 1079 ; Williamson collection of palaeozoic plants showing internal structure, 924 ; work referred to, *Scott*, 1127.

Seychelles, flora, *Dyer*, p. 65.

Shale, oolitic, fossil plants in, *Woodward*, 1087.

Sharks, geologic time of, *Woodward*, 1103.

Shaw, Sir E. M., report on fire risks, *Dyer*, p. 96.

Shaw-Lefevre, Right Hon. G. J., opinion as to the Trustees, *Dyer*, p. 57.

Sheets, herbarium, normal size, *Holmes*, 388 ; —not to be cut down, *Hemsley*, 1216, 1219 ; *Hiern*, 972 ; — should be remounted, *Clarke*, 305 ; sizes, at British Museum, *Murray*, p. 4 ; —at Kew, *Dyer*, p. 95 ; —of drawings, *Dyer*, p. 58, 98.

Shelves, fixed, *Dyer*, p. 95 ; —movable, *Murray*, p. 4.

Shrubs, hand list of, *Dyer*, p. 58.

Siehe, W., collections, *Hemsley*, 1257.

Sinai survey collections, *Dyer*, p. 85.

Sinapis incana, identified at Kew, *Holmes*, p. 173 ; remarks on, *Murray*, p. 178.

Sintenis, P., collections mentioned, *Hemsley*, 1257.

Sizes of sheets, British Museum, *Murray*, p. 4 ; —a bar to amalgamation, *Hiern*, 971 ; *King*, 212 ; —cannot be cut down, *Hemsley*, 1215, 1231 ; *Hiern*, 972 ; Kew, *Dyer*, p. 95 ; Paris, p. 166.

Sketches, see *Drawings*.

Slides, microscope, at Berlin, p. 169; Cromwell Road, *Murray*, 148, p. 2; Kew, no collection, *Dyer*, p. 58; Paris, p. 166, 167; Vienna, p. 161; usually deteriorate, *Farmer*, 839.

Slip catalogue of book titles, *Murray*, p. 4.

Sloane, Sir Hans, collections, p. 111; *Murray*, p. 2-4; directions as to keeping intact, p. 124; herbaria, p. 111; —alleged neglect, p. 111; —uninjured, p. 115; *Carruthers*, 616; opinions as to remaining in London, *Bentham*, p. 120; *Hooker*, p. 118; *Lindley*, p. 119.

Smith, Sir James Edward, owner of the Linnean Herbarium, 1823, p. 111; —mentioned, *Carruthers*, p. 137.

Smith, John, evidence as to use of dried material in descriptions, *Carruthers*, 613; foreman at Kew, p. 112; names affixed to plants by him, p. 112.

Smith, Captain John Donnell, at Kew, *Dyer*, p. 66, 82.

Smith, William, on characteristic forms of life, *Woodward*, 1102.

Societies for garden staff, *Dyer*, p. 62, 63.

Solander, Daniel Carl, librarian to Sir J. Banks, p. 111; manuscripts in the British Museum, p. 116; work on "Hortus Kewensis," p. 112.

Solms-Laubach, H. Graf zu, at Kew, *Dyer*, p. 66; work in Geological Department, *Woodward*, 1066, 1076.

Somerset House, woods used in shipbuilding shown, p. 122.

Somerville, Professor W., on Indian agriculture, *Dyer*, p. 78.

Sonder, Dr. O. W., Cape flora, *Dyer*, p. 64.

Soot not found injurious, *Carruthers*, 616.

Sowerby, James, models of fungi, p. 114, 115; —guide, *Murray*, p. 3; types of "English Botany," *Carruthers*, p. 180.

Space for future growth, *Murray*, p. 4; —needed, *Dyer*, p. 97; *Hemsley*, 1241-1245; — —application ignored, *Dyer*, p. 98.

Special articles in "Kew Bulletin," *Dyer*, p. 80.

Specialisation suggested by the Devonshire Commission, *Dyer*, p. 97.

Specialists, outside, *Dyer*, p. 94.

Speciality, might be advantageous, *Farmer*, 858-862.

Species, arrangement in large genera, *Dyer*, p. 95; *Murray*, p. 4.

Specimen, definition, *Dyer*, p. 58; *Hemsley*, 1234-1236; *Murray*, p. 178.

Specimens, at Berlin, p. 168; —British Museum, *Murray*, p. 2, 178; — —compared with Kew, *Hemsley*, 1232; —Brussels, p. 164; —Kew, *Dyer*, p. 58; — —compared with Cromwell Road, *Hemsley*, 1232; —Paris, p. 167; —St. Petersburg, p. 165; —Vienna, p. 161, 162; counted, *Murray*, 3; glued down, *Dyer*, p. 94; gummed down, *Murray*, p. 4; method of using different sizes of paper, *Holmes*, 388; naming and arrangement, *Murray*, 33, 34; not allowed outside, *Clarke*, 303; —for comparison, *Seward*, 877; not lent, as a rule, *Dyer*, p. 93, 94; supply from reserve, *Farmer*, 792-795, 863; transference and expense, *Bennett*, p. 127.

Sphacelaria, species mixed in herbarium, *Holmes*, p. 173.

Spices shown, at Kew, p. 128; at Paris, p. 166.

Spirit preparations, Berlin, p. 168; British Museum, *Murray*, p. 2; Kew, *Dyer*, p. 58; Paris, p. 166, 167; Vienna, p. 162.

Stackhouse, J., on Hudson's herbarium, *Batters*, p. 179.

Staff, at Berlin, p. 169; at British Museum, *Murray*, 4, p. 2; —could not be diminished, *Murray*, 100; —educational functions, *Murray*, p. 2, 3; —increased since 1880, *Dyer*, 1290; —relation to field clubs, *Murray*, 6; at Brussels, p. 164; at Kew, *Dyer*, p. 88-93; —herbarium, *Dyer*, p. 58; —museum, *Dyer*, p. 59; —notice in Colonial Office List, *Dyer*, p. 83; research by, *Dyer*, 1369-1373.

Standing Committee of Trustees, *Dyer*, p. 86.

Stanhope, Hon. J. H., in Banks's codicils, p. 100, 101.

Stanley, Right Hon. Edward Henry, 15th Earl of Derby, letter addressed to, p. 102.

Stanley, Right Rev. Edward, Bishop of Norwich, President of the Linnean Society, memorial, 1847, p. 113.

Stapeliæ, specimens cannot be properly shown in herbaria, *Holmes*, 402.

Statement in reply to interrogatories, *Dyer*, p. 56-103; *Murray*, p. 2-4.

Stationery Office, neglect to print sufficiency of copies, *Dyer*, 1324-1328; purchase of books, *Dyer*, p. 99; wood pulp paper, *Dyer*, p. 94.

Steel cabinets suggested, *Dyer*, p. 95.

Stephani, F., hepaticae lent to, *Dyer*, p. 93; rearrangement after, *Murray*, p. 4.

Stephen, Leslie, at Kew, *Dyer*, p. 66.

Stephenson, Sir B. C., letter, *Dyer*, p. 99.

Stimulus of rivalry, *Fawcett*, 529, 530; *Holmes*, 414; *King*, 234; *Masters*, 727, 728.

Storehouse at Kew, *Hemsley*, 1240.

Straits Settlements, flora in preparation, *Dyer*, p. 82.

Stratigraphic geology, fossil plants not so important for as formerly, *Murray*, 60, 86, 87; —reasons suggested, *Murray*, 85-87; not represented in the British Museum, *Lankester*, 1151, 1166; —partially so in Jermyn Street, *Lankester*, 1169; *Woodward*, 1099; should be at Cromwell Road; *Lankester*, 1193-1195; of, *Woodward*, 1103; students' collection, *Woodward*, 1095.

Structural specimens of fossil plants at the British Museum, *Scott*, 1130; — —transference to Kew, *Scott*, 1116, 1124.

Students, arrangements for, at Berlin, p. 169; at British Museum, *Carruthers*, 602-604; *Murray*, 14-17, 183-187, 192, p. 2, 3; —in the Geological Department, *Woodward*, 1095; —no provision for, *Lankester*, 1155-1157, 1171, 1185; at Kew, *Dyer*, p. 64; at Paris, p. 166, 167; at St. Petersburg, p. 165; at Vienna, p. 162; collection needed for, *Holmes*, 389; facilities for, *Murray*, 130, 131; garden for, *Dyer*, p. 64; *Farmer*, 775; provision for in the British Museum, *Carruthers*, 602-604; *Murray*, 14-17, 183-187, 192; —Geological Department, *Woodward*, 1095; —none, *Lankester*, 1155-1157, 1171, 1185; needs of, *Lankester*, 1174; requirements of, *Holmes*, 397; regulations for, *Dyer*, p. 64; systematic botany for, *Holmes*, 405; uneducated not permitted in herbarium, *Murray*, 129.

Study, facilities afforded, at Berlin, p. 169; Brussels, p. 164; Paris, p. 166, 167; St. Petersburg, p. 165; Vienna, p. 162.

Study series, term explained, *Murray*, 125.

Stur, Prof. D., work in Geological Department, *Woodward*, 1066.

Subsidiary collections, *Murray*, p. 4; deprecated, *Dyer*, p. 95.

Sugar cane, disease investigated, *Dyer*, p. 67; seedling "Kewensis," *Dyer*, p. 64.

Suggestions for Colonial botanic gardens, *Dyer*, p. 74, 75.

Summary of previous enquiries, p. 111-158.

Superintendents of Colonial botanic gardens, *Dyer*, p. 64; suggestions for, *Dyer*, p. 75.

Surplus material distributed, *Dyer*, p. 66.

Survey, botanic, of the Empire, *Dyer*, p. 64.

Swainson, Wm., correspondence mentioned, p. 111; criticism of the British Museum, 1823, p. 111.

Swede turnip, new disease in, *Dyer*, 1310.

Switzerland, a representative herbarium recommended, *King*, 225, 226, 230.

Symonds, Sir W., timber for shipbuilding, p. 121.

"Synopsis filicum" and "Synopsis hepaticarum," followed in arrangement, *Murray*, p. 4.

Systematic arrangement, herbarium should be at Kew, *King*, 229, 230; reference herbarium in, *Holmes*, 405; suggestions by the Devonshire Commission, *Dyer*, 1357, p. 97.

Systematic botany, at Kew, p. 141; can only be properly studied at Kew, *Elwes*, 1008; —modern, largely based on the pre-Linnean herbaria, *Murray*, p. 3.

T.

Table-cases in Museums, *Dyer*, p. 58.

Table-space, inadequate, *King*, 253-257.

Tasmanian plants, private collection, *Dyer*, p. 86.

Taxonomic use of living collections, *Dyer*, p. 64.

Taxpayers, their right to consult the collections, *Carruthers*, 616.

Taylor, Sir J., report on fire risks at Kew, *Dyer*, p. 96.

Teachers' requirements, *Holmes*, 429.

Teaching collections, *Murray*, p. 3; —herbarium, *Farmer*, 771.

Technique of palaeontology, *Dyer*, 1368.

Teeth, series exhibited, *Lankester*, 1152.

Temperate House completed, *Dyer*, p. 75.

Temporary assistance, to reduce arrears, *Murray*, 4, 5, 66; —in Geological Department, *Murray*, 51, 52.

Teratological collection, attractive, *Masters*, 716, 717; not displayed at the British Museum, *Masters*, 714; —or Kew now, *Masters*, 741; presented to Kew, *Masters*, 742; —discarded, *Masters*, 742, 743; Royal College of Surgeons' collection, *Farmer*, 840, 841; *Masters*, 742-746; should be represented at Cromwell Road, *Masters*, 715.

Textile fibres, at Paris, p. 166; see also *Fibres*.

Thollon, plants at Paris, p. 168.

Thompson, Sir E. M., letter, p. 180.

Thomson, Dr. Thomas, British Museum collections should be amalgamated, p. 132; collections alluded to, *Dyer*, p. 86; competition, p. 132: evidence, p. 132; fossil plants should remain at Kew, p. 132; —not studied there, p. 132; main botanic collection should be at Kew, p. 132; separate collection to be in London, p. 132; subordination of British Museum to Kew recommended, p. 132; superintendence by Kew, p. 132; transference of collections, p. 132.

Thwaites, G. H. K., Ceylon plants, *Dyer*, p. 64.

Tickets, at Berlin, p. 170; British Museum, *Murray*, 12; *Woodward*, 1097; Kew, *Hooker*, p. 128; Paris, p. 166.

Timbers in Museums, *Dyer*, p. 58, 94; hand list of, *Dyer*, p. 58; geographic arrangement, *Dyer*, p. 95; used for shipbuilding, p. 121; value of the collection, *Dyer*, p. 82.

Todmorden School Board, duplicate presented to, *Dyer*, p. 66.

Toynbee Hall students, *Murray*, p. 3.

Tournefort, Joseph Pitton de, herbarium at Paris, p. 166.

Tracts in the library, *Murray*, p. 4.

Trail, Dr. J. W. H., at Kew, *Dyer*, p. 65.

Traill, Dr. Thomas Stewart, anonymous attack on the British Museum, 1823, p. 111.

Transactions, available from the general library, *Murray*, p. 4.

Transcripts not included in the enumeration, *Murray*, p. 4.

Transference, by selection, *Hiern*, 963, 964; of fossil plants, and its effects, *Woodward*, 1066, 1081-1084; —reasons not overpowering, *Scott*, 1136, 1137; —would be a great loss, *Woodward*, 1076; suggested formerly, *Dyer*, p. 97; —cost, *Bennett*, p. 127.

Travel, Kew library rich in works of, *Dyer*, p. 98.

Travellers, accessions from, *Dyer*, p. 74; *Elwes*, 1024, 1042; Paris, p. 168; training, *Dyer*, 1292, 1293, p. 66; *Murray*, p. 3.

Trays, *Dyer*, p. 95; *Murray*, 4.

Treasury, H. M., assurance that Kew collections shall not be transferred, *Dyer*, p. 97; Committee of enquiry, 1838, p. 112; *Dyer*, p. 57; correspondence with Sir J. Banks, *Dyer*, p. 85; extension at Kew, *Dyer*, 1298, p. 97; expenses on behalf of Kew, p. 113; memorial to the First Lord, 1847, p. 113; —1858, p. 122; —1873, p. 146; Minute, 24 July, 1872, p. 154; *Dyer*, 1311, 1312, p. 57, 78; — —the nearest approach to a constitution for Kew, *Dyer*, p. 57; —19 April, 1899, *Dyer*, p. 56; temporary assistant sanctioned, *Murray*, 51.

Trees, at Kew, hand list, *Dyer*, p. 58; best studied living, *Elwes*, 1022.

Triana, José, collection at the British Museum, *Holmes*, 375; visitor to the Botanical Department, *Carruthers*, p. 134.

Trimen, Henry, and W. T. Thiselton-Dyer, statement in their "Flora of Middlesex," as to Hudson's plants, *Batters*, p. 179.

Tropical Africa, suggested work on its flora, *Fawcett*, 546, 549.

Trustees of the British Museum, claim to collections, *Dyer*, p. 85-87; deprecate enquiry by this Committee, p. 179, 180; enquiry in 1858, p. 118; in 1858, disposed to transfer the botanic collections, *Dyer*, p. 57; no such body for Kew, *Hooker*, p. 128; peculiar position, *Dyer*, p. 57; publications, *Hiern*, 952, 953; *Murray*, 35, 87, p. 3, 4; *Woodward*, 1079.

Turkestan, special herbarium at St. Petersburg, p. 164.

Turner, W. Dawson, on Hudson's plants, *Batters*, p. 179.

Type, defined, *Dyer*, 1277; *Elwes*, 1025.

Types, at the British Museum, *Murray*, 36, 39; —added to, *Murray*, 38; —enormous number, *Murray*, 37; —more in cryptogams than Kew, but fewer phanerogams, *Murray*, 116; —some which are not at Kew, *Murray*, 77; — —at Dublin and Edinburg, *Murray*, 37; herbarium of types not needed for ordinary comparison, *Seward*, 888-890; not required for naming living plants, *Carruthers*, 579; of the early collections, *Hemsley*, 1213; of Myxomycetes, *Dyer*, p. 94; should be at Kew, *King*, 220; —and marked in the herbarium, *Holmes* 384; their value, *Dyer*, 1305.

Types (in teachers' meaning) of natural orders should be shown, *Holmes*, 418, 420, p. 173.

Typical museums, p. 123.

U.

Unarranged collections, p. 126; material at the British Museum, *Dyer*, 1330; *Murray*, 64-73, p. 4; —at Kew, *Dyer*, p. 94.

Under-librarians, their position, p. 111; —title changed to keeper, p. 112.

Underwood, Prof. L. M., on fire risks at Kew, *Dyer*, p. 96.

Undigested material, *Dyer*, 1286.

Unincorporated plants, *Murray*, 64; —available, *Murray*, 65; named, *Murray*, 66.

Unique specimens should be at Kew, *Masters*, 729.

United States, generous donors of books, *Dyer*, p. 99.

Unity of collections as a whole, *Seward*, 928, 929.

University College, special exhibition for, *Murray*, 15; —students, *Murray*, p. 3.

University of London, Jodrell Laboratory used by, *Dyer*, p. 66.

Unnamed collections, *Murray*, 152; —plants should be sent to Kew, *Ball*, p. 132.

Unmounted specimens, *Murray*, 64-73, p. 4.

Unofficial opinion on the British Museum, *Lankester*, 1152.

Unopened parcels of plants, *Ball*, p. 132; cf. p. 145.

Uvedale, Rev. R., herbarium mentioned, *Batters*, p. 179.

V.

Vaillant, S., herbarium at Paris, p. 166.

Van Tieghem, Prof. P., professor of organography and vegetable physiology, at Paris, p. 166.

Vascular cryptogams, arrangement, *Murray*, p. 4; collection at Kew, *Dyer*, p. 64; fossil forms studied, *Seward*, 912.

Vegetable kingdom, cases for, *Lankester*, 1158, 1159; products in the Sloane collection, p. 111.

Vélins du Muséum, description, p. 168.

Verification of plant-names, *Dyer*, p. 64.

Vidal y Soler, Don S., work at Kew, *Dyer*, p. 82.

Vienna, application for information, p. 161; no duplicate collections there, *Carruthers*, p. 135; report on, p. 161, 162.

Visitors catered for, *Lankester*, 1174; —to Botanical Department, p. 114, *Murray*, 21-28, p. 3; —to Kew *Dyer*, p. 59; — —herbarium, *Dyer*, p. 65.

Visits of staffs interchanged, *Murray*, 113, 119, 120.

Voelcker, Dr. A., report on Indian agriculture, *Dyer*, p. 77-78.

Voight, Dr. A., at Kew, *Dyer*, p. 66.

Volumes, in the Botanical Department, *Murray*, p. 4; —Kew, *Dyer*, p. 58.

Vote, how expended, *Dyer*, 1313-1315.

Voyages, accessions from, Paris, p. 168.

W.

Wall-cases in museums, *Dyer*, p. 58.

Wallich, Dr. N., collections desirable, *Dyer*, 1338; herbarium mentioned, *Carruthers*, p. 137; his numbers, *Clarke*, 314.

Ward, Prof. H. M., at Kew, *Dyer*, p. 65.

Water, supply in case of fire, *Dyer*, p. 96, 97; *Hiern*, 961.

Waterhouse, George Robert, evidence, 1860, p. 124; —cited, p. 125; *Carruthers*, p. 134; Keeper of the Geological Department, *Woodward*, 1061.

Watson, H. C., British herbarium at Kew, *Dyer*, p. 95; —not suited for study, *Hanbury*, 506; numbers, *Clarke*, 314.

Watt, Dr. G., Dictionary of Economic Products, *Dyer*, p. 76.

Wax models, Paris, p. 166.

Wealden plants studied, *Seward*, 891; —catalogue of, *Murray*, 87, 109; *Seward*, 939; *Woodward*, 1079.

Weeding out, requisite training for, *Dyer*, 1287.

Weiss, Prof., work in Geological Department, *Woodward*, 1066.

Welby, Rt. Hon. Reginald Earle, 1st Baron, quoted, *Dyer*, p. 57.

Welwitsch, F. M. J., collections at the British Museum, *Holmes*, 375, 397, 407; visitor to the Botanical Department, *Carruthers*, p. 134.

West African plants, *Hiern*, 950.

West Indies, botanic stations, *Dyer*, p. 76, 79; collections from, *Dyer*, p. 85; flora of, *Dyer*, p. 65.

Westminster Medical School, witness formerly taught at, *Holmes*, 467.

Wheat, Bauer's drawings of, p. 116.

Wilford, C., collections, *Dyer*, p. 85.

William III., manuscripts, p. 111.

Williams, F. N., at Kew, *Dyer*, p. 65.

Williamson, Prof. W. C., collection of fossil plants, *Dyer*, p. 95; —consists of microscope slides, *Woodward*, 1063; how acquired, *Woodward*, 1090, 1091; palæozoic plants in, *Seward*, 924; purchase for the British Museum, *Murray*, 47; reasons why not bought for Kew, *Woodward*, 1068; work in the Geological Department, *Woodward*, 1066.

Willis, J. C., at Kew, *Dyer*, p. 65.

Willows, critical botanist wanted for, *Hanbury*, 509.

Wilson, Mr., assisted Dr. Lindley in surveying Kew, p. 112.

Wolley-Dod, Major A. H., at Kew, *Dyer*, p. 65.

Wood specimens should be left for comparison with fossils, *Woodward*, 1077.

Woodrow, G. M., at Kew, *Dyer*, p. 65.

Woods, collections, at the British Museum, *Dyer*, p. 82; *Murray*, p. 2, 4; *Woodward*, 1077; at Brussels, p. 164; at Kew, *Dyer*, p. 58, 85; at Paris, p. 167; at St. Petersburg, p. 165; at Vienna, p. 162.

Woods, Forests, Land Revenues and Buildings, management of Kew transferred to that department in 1841, p. 113.

Woodward, Dr. Henry, F.R.S., assistant, 1858-80; and keeper from 1880 of Geological Department, British Museum, 1062; balances, unexpended, not now returned to the Treasury, 1092; biological aspect of palaeontology, 1075; Birkbeck Institution, students from 1096; books on botany, duplicates should be left, 1076; —on palaeobotany, a large collection, 1093; — —not the same in the Botanical Department which is confined to recent plants, 1094; borrowed, term as used in the British Museum, 1082, 1083; botanical arrangement in the Department, 1065; —assistance from outside, 1079; *Seward*, 881; — —Department advanced part purchase money for Williamson collection, 1090; botanists who have used the collections of fossil plants, 1066; Brown, Robert, collection of fossil plants, 1063, 1084; carboniferous plants, catalogue of, 1079; catalogues of parts of the Geological Department, 1079; coal plants given by McMurtrie, 1096; collection of illustrative plants might be left, 1069; collections transferred interdepartmentally, 1083; Devonian sharks, 1103; dismemberment of Department by transference of fossil plants to Kew, 1068, 1074; distribution in geologic time important on palaeobotany, 1067; duplicates, books on botany should be left, 1076; elementary collection would be insufficient, 1073, 1074; evidence, 1059-1103; formations characterised by certain peculiar forms of life, 1102; fossil plants, Brown collection, 1063, 1084; — general collection is large, 1062; —Hooker collection, 1063, 1084; —history, from 1815, 1061, 1062; —if transferred to Kew, would be the dismemberment of the Department, 1067; —microscope slides in, 1063, 1064; —specialist refused, 1079; —specimens in Museum at Jermyn Street, 1101; —transference from Botanical Department of Brown's and Hooker's collections, 1063; — —now entierly under his charge, 1064, 1081, 1084-1086; —Williamson collection, 1064; — —all microscope slides on glass, 1063; — —how acquired, 1090, 1091; — —why refused by Kew, 1068; geological collection absent from the British Museum, 1065; —research difficult to discriminate from botanical, 1065; herbarium used for comparison of recent and fossil plants, 1087-1089; Hooker, J. D., collection, 1063, 1084; Jermyn Street, Museum of Practical Geology, in, a stratigraphical collection, 1099; — —only of British specimens, 1100; —fossil plants in, 1101; Judd, Prof. J. W., students from, 1096; keeper of the Geological Department since 1880, 1059, 1062; labels not popularised, 1096; McMurtrie, collection of coal plants, 1096; Museum of Practical Geology, Jermyn Street, arranged stratigraphically, 1065; fossil plants in, 1101; —geologists usually go thither, 1099, 1100; —only British, 1100; microscope slides in Department, 1063, 1064; oolitic shale plants, errors in interpretation of, 1087; palæobotanic assistant to Department refused, reasons given, 1079; —collection never supposed would be transferred elsewhere, 1074; — —of books, large, 1093; — —but not the same as in Botanical Department, which is entirely concerned with recent plants, 1094; palæontology a more correct term than geology for the Department, 1065; popularisation of labels not attempted, 1096; purchase of Williamson collection, 1090; Radstock coalfield, fossil plants from, 1096; reference collection would not satisfy scientific workers, 1069-1073; —herbarium would be useful to students, 1077; Royal College of Science, students, 1096; Searles Wood collection, 1083; shale, fossil plants in, 1087; sharks from Devonian times, 1103; specimens exhibited in galleries, 1095; stratigraphical collection absent from the British Museum, 1065; — —present at Jermyn Street Museum, 1099, 1100; —not an important aspect at Cromwell Road, 1103; student's collection in Geological Department arranged stratigraphically, 1095; —a limited number of fossil plants in it, 1096; —provision for, 1095; transference of botanical collections would be a great loss to palæobotanists, 1076; Treasury, and unexpended balances, 1092; type herbarium more satisfactory than a reference herbarium, 1088, 1089; Wealden plant catalogue, 1079; Williamson collection, 1064; —consists of slides on glass, 1063; — its acquisition, 1090, 1091; —reason of refusal by Kew, 1068; woods, recent, a set required for comparison with fossil woods, 1077; world-wide fossils in the Department, 1100; zoological arrangement prevalent in the Geological Department, 1065.

World-wide collection of fossil plants in the Geological Department, *Woodward*, 1068.

Wrottesley, Rt. Hon. John, 2nd Baron, President of the Royal Society, p. 118.

Wulfen, F. X., Freiherr von, drawings at Vienna, p. 162.

X.

Xanthium as a "type" of Compositæ, *Holmes*, 421.

Y.

Yorkshire coast, Jurassic plants from, catalogued, *Seward*, 939.

Z.

Zahlbruckner, Dr. Alexander, report on the herbarium at the Hofmuseum, Vienna, p. 161-163.

Zanzibar, unknown gum from, *Dyer*, p. 66.

Zoologic collections need not be near botanic collections, *Elwes*, 1016, 1018.

Zoological Department, its needs as compared with the Botanical Department, *Woodward*, 1079; —would not suffer by transference of the Botanical Department, *Lankester*, 1139-1141.