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No. 584.

REPORT ON THE WORK OF
THE IMPERIAL INSTITUTE,
1906 AND 1907.

(For Report for 1905, *see* [Cd. 3116] 1906.)

Presented to both Houses of Parliament by Command of His Majesty.
November, 1908.



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IMPERIAL INSTITUTE, 1906 AND 1907.

(For Report for 1905, see [Cd. 3116] of 1906.)

REPORT ON THE WORK OF THE IMPERIAL
INSTITUTE, IN 1906 AND 1907. By PROFESSOR
WYNDHAM R. DUNSTAN, M.A., LL.D., F.R.S., *Director*.

CONTENTS.

	PAGE.
I.—Prefatory Statement	2
II.—General	7
III.—Staff	9
IV.—Exhibition Galleries: Colonial and Indian Collections.	10
V.—Library	15
VI.—“ Bulletin of the Imperial Institute ” and other Publications.	15
VII.—Scientific and Technical Department	21

SUMMARIES OF INVESTIGATIONS.

	PAGE		PAGE
Minerals	30	Dye Stuffs	68
Fibres and Cotton	37	Resins	69
Rubbers	50	Gums	70
Timbers	57	Drugs	70
Oils and Oil Seeds	58	Poisonous Plants	72
Volatile Oils	61	Tobacco	72
Food Stuffs	62	Miscellaneous	73
Spices, &c.	65	Animal Products	74
Tanning Materials	66	Insect and Fun- goid Pests.	75
VIII.—Subsidiary Work			76

I.—PREFATORY STATEMENT.

THE IMPERIAL INSTITUTE OF THE UNITED
KINGDOM, THE COLONIES, AND INDIA.

TRUSTEES.

The First Commissioner of His Majesty's Treasury.
The Secretary of State for the Colonies.
The Secretary of State for India,
The President of the Board of Trade.

IMPERIAL INSTITUTE, 1906 AND 1907.

3.

ADVISORY COMMITTEE.

(Appointed under the provisions of the Imperial Institute Transfer Act, 1902.)

The Right Hon. Lord James of Hereford, G.C.V.O.
(Chairman).

Sir F. Hopwood, G.C.M.G., K.C.B.

Sir Alfred Bateman, K.C.M.G.

The Right Hon. Lord Allerton.

Sir H. Llewellyn Smith, K.C.B.

The Right Hon. Sir C. Clementi Smith, G.C.M.G.

Colonel Sir D. Barr, K.C.S.I.

Sir T. W. Holderness, K.C.S.I.

Sir Thomas Elliott, K.C.B.

Colonel Duncan G. Pitcher.

The Right Hon. Lord Strathcona and Mount Royal,
G.C.M.G.

Captain Muirhead Collins, C.M.G.

The Hon. W. Pember Reeves.

The Hon. Sir W. Arbuckle, K.C.M.G.

Sir C. P. Lucas, K.C.M.G., C.B.

(One vacancy to be filled.)

MANAGING COMMITTEE.

The Right Hon. Sir C. Clementi Smith, G.C.M.G.
(nominated by the Colonial Office).

Sir Alfred Bateman, K.C.M.G. (nominated by the Board
of Trade).

Colonel Duncan G. Pitcher (nominated by the India Office).

DIRECTOR.

Professor Wyndham R. Dunstan, M.A., LL.D., F.R.S.

The Imperial Institute was erected at South Kensington as the National Memorial of the Jubilee of Queen Victoria, by whom it was opened in May, 1893.

The principal object of the Institute is to promote the utilisation of the commercial and industrial resources of the Empire by arranging comprehensive exhibitions of natural products, especially of India and the Colonies, and providing for their investigation and for the collection and dissemination of scientific, technical, and commercial information relating to them.

The work of the Imperial Institute is at present carried on under four principal divisions: (1) The Colonial and

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Indian collections, consisting mainly of raw materials and primary manufactures displayed in the public exhibition galleries, and including a central stand for receiving enquiries and distributing publications; (2) the Scientific and Technical Department, including a special staff and research laboratories occupying the second floor of the building; (3) the Reference Library, containing a large collection of works of reference relating to India and the Colonies, together with the principal periodicals and newspapers; (4) the "Bulletin of the Imperial Institute," a quarterly publication including a record of the work of the Imperial Institute in its various branches, as well as special articles on subjects connected with the industrial utilisation of mineral and vegetable products.

Until the end of 1902 the Imperial Institute was managed by a Governing Body, of which His Royal Highness the Prince of Wales (now His Majesty the King) was President, and an Executive Council, including representatives of the Indian Empire and of all the British Colonies and Dependencies. In 1900 the building became the property of His Majesty's Government, by whom the western portion and galleries were leased to the Governing Body of the Imperial Institute, the greater part of the eastern and central portions being assigned for occupation by the University of London. In July, 1902, an Act of Parliament was passed transferring the management of the Imperial Institute to the Board of Trade, assisted by an Advisory Committee, including representatives of India and the Colonies, as well as of the India and Colonial Offices, the Board of Agriculture, and the Board of Trade. This Act took effect on January 1, 1903.

On October 1, 1907, in virtue of an arrangement made with the Board of Trade and with the approval of the Secretary of State for India, the management of the Imperial Institute was transferred to the Secretary of State for the Colonies, subject to the responsibility of the Board of Trade under the Act of 1902. A Committee of Management of three members, one nominated by each of the three Government Departments chiefly concerned, has been appointed.

The first Director of the Imperial Institute was Sir Frederick Augustus Abel, Bart., G.C.V.O., K.C.B., F.R.S., who held the office until his death in the autumn of 1902. The present Director is Professor Wyndham Dunstan, M.A., LL.D., F.R.S., who was appointed in 1903.

The staff of the Imperial Institute includes officers with special qualifications in the sciences of chemistry, botany, geology, mineralogy, and in certain branches of technology, in their relation to agriculture and to the commercial utilisation of economic products.

The following are the principal departments of the Institute:—

Colonial and Indian Collections.—The collections of economic products, &c., illustrative of the general and commercial resources of India and the Colonies, are arranged, together with other exhibits, on a geographical system in the public galleries of the Imperial Institute, which are open free to the public daily, except on Sundays, Good Friday, and Christmas Day, from 10 a.m. to 5 p.m. in summer, and from 10 a.m. to 4 p.m. in winter.

Special arrangements are made for the conduct of schools and institutions desirous of visiting the Indian and Colonial collections for educational purposes.

A stand has been opened in the centre of the main gallery to facilitate the supply of general information and the distribution of literature. Pamphlets, circulars, handbooks, &c., containing information relating to the commerce, agriculture, mining, and other industries of the principal British Colonies, and also to emigration, are available for gratuitous distribution or for sale. The publications of the Emigrants' Information Office, established by the Colonial Office, may also be obtained. The principal Indian and Colonial newspapers may be seen on application. An officer of the Institute is in attendance at this stand, which is in telephonic communication with the departments in the main building.

The Scientific and Technical Department.—The research laboratories of this department, which occupy the second floor of the Imperial Institute, were established in order to provide for the investigation of new or little-known natural products from India and the Colonies, and of known products from new sources, with a view to their utilisation in commerce, and also to provide trustworthy scientific and technical advice on matters connected with the agriculture, trade, and industries of India and the Colonies.

The work of this department is chiefly initiated by the Government of India and the Home and Colonial Governments. Arrangements have been also made by the Foreign Office, whereby British representatives abroad may transmit to the department for investigation such natural products of the countries in which they are appointed to reside as are likely to be of interest to British manufacturers and merchants.

Materials are first investigated in the research laboratories of the department, and are afterwards submitted to further technical trials by manufacturers and other experts, and finally are commercially valued.

Except under special circumstances investigations are not undertaken for private individuals.

A Reference Sample Room is maintained in this department, in which are arranged samples of the principal materials

which have been investigated and commercially valued during recent years, and as to which full information is available.

The Scientific and Technical Department is now working in co-operation with the Agricultural and Mines Departments in the Colonies, whose operations it supplements by undertaking such investigations and inquiries as are of a special scientific and technical character connected with agricultural or mineral development, as well as enquiries relating to the composition and commercial value of products (vegetable and mineral) which can be more efficiently conducted at home in communication with merchants and manufacturers, with a view to the local utilisation of these products or to their export.

A very large number of reports on these subjects have been made to the Governments of India and the Colonies, a first instalment of which has been printed in a volume of "Technical Reports and Scientific Papers," published in 1903, whilst a selection of the later reports has been printed in the "Bulletin of the Imperial Institute."

Mineral surveys, under the supervision of the Director of the Imperial Institute, and conducted by surveyors selected by him, are in progress in Ceylon, Northern Nigeria, Southern Nigeria, and Nyasaland, and preliminary arrangements of a similar nature have been made in connection with British East Africa and with the Anglo-Congolese Boundary Commission in Uganda. All minerals found are forwarded to the Imperial Institute, where they are examined and, in all cases in which they are likely to be of commercial importance, their composition and commercial value are ascertained. Reports by the Director on the results of the mineral exploration in Ceylon, Northern Nigeria and Southern Nigeria have been printed in the Miscellaneous Series of Colonial Reports.

In connection with the operations of the Agricultural Departments in West Africa, and with a view to correlating their work and that of the Imperial Institute, a Superintendent of Agriculture for British West Africa has been appointed, who visits West Africa each year, and on his return has his headquarters at the Imperial Institute.

Library and Reading-Rooms.—The library and reading-rooms of the Imperial Institute contain a large collection of Indian and Colonial works of reference, and are regularly supplied with the more important official publications, and with many of the principal newspapers and periodicals of the United Kingdom, India, and the Colonies.

The library and reading-rooms are on the principal floor, and admittance to them is obtained through the entrance at the west (Queen's Gate) end of the building. These rooms are available for the use of Life Fellows of the Imperial Institute, and of other persons properly introduced. Books

and newspapers may be consulted for special purposes by permission.

Colonial Conference Rooms.—Three large rooms, specially decorated and furnished, are reserved on the principal floor for use by representatives of the Colonies for meetings and receptions.

Covasjee Jehanghier Hall.—The Bhownagree corridor and rooms in connection with this hall are in the occupation of the Indian Section of the Imperial Institute, whilst the hall is available for lectures, meetings, &c.

The "*Bulletin of the Imperial Institute*" is published quarterly, price one shilling (annual subscription 4s. 8d., including postage), and may be purchased at the Imperial Institute or from Messrs. Eyre and Spottiswoode, East Harding Street, Fleet Street, London, E.C., or from agents in India and the Colonies. The "*Bulletin*" contains records of the principal investigations conducted for India and the Colonies at the Imperial Institute, and special articles chiefly relating to progress in tropical agriculture and the industrial utilisation of raw materials (vegetable and mineral).

The following societies have their headquarters at the Imperial Institute:—

British Women's Emigration Association.—The British Women's Emigration Association has been assigned an office on the first floor, which is open daily from 10 a.m. to 4 p.m., and advice and information respecting emigration and prospects for women in the Colonies may be obtained there free of charge. This Association works in co-operation with the Emigrants' Information Office in Westminster.

Colonial Nursing Association.—This Association has an office on the first floor of the Imperial Institute. Its principal object is the selection of trained hospital and private nurses for service in the Crown Colonies and other British Dependencies.

African Society.—This Society, which is concerned with the discussion and publication of all matters connected with British African Possessions, has been assigned an office on the mezzanine floor, and holds meetings at the Imperial Institute for the discussion of African questions. The "*Journal of the African Society*" is published quarterly.

II.—GENERAL.

The present report deals with the work which has been carried out in each division of the Imperial Institute during the years 1906 and 1907, supplementing the report for 1905 (Cd. 3116 of 1906). It will be seen that the considerable increase in the work of the Imperial Institute recorded in the last report has continued.

In connection with the transfer of the management of the Institute to the Colonial Office in 1907 new arrangements were made by Lord Elgin, then Secretary of State for the Colonies, for the participation of the Colonies in the work of the Imperial Institute, with the result that new collections have been added to the Exhibition Galleries and numerous additional requests for information and investigations have been made to the Scientific and Technical Department. Owing to the large increase in work in all departments the space in the Imperial Institute building which was retained under the arrangement made by the Government in 1900 is no longer adequate, and some additional accommodation has now been provided by a temporary building in the south-west quadrangle which will shortly be supplemented in other ways. It is satisfactory to notice that without any special advertisement and in spite of the inconspicuous entrances, commented upon in the body of this report, the number of visitors to the Exhibition Galleries has very considerably increased, and that the majority of these visitors were genuine enquirers, including a number of schools and educational institutions, many of which made special arrangements for the exhibits illustrating the resources of the British Possessions to be explained in detail. Assistance in this and other ways has been given to the Victoria League and to other bodies which are engaged in Imperial educational work.

The work accomplished by the Scientific and Technical Department for the Colonies and India is recorded in considerable detail in the following pages. It will be seen that this has included investigations in connection with the production and utilisation of every variety of raw material, mineral and vegetable, whilst special information has been supplied on these and similar subjects to manufacturers and others, and this information, in cases in which it seemed desirable, has been made the basis of special articles in the "Bulletin of the Imperial Institute," which now has a wide circulation both in British Possessions and abroad. A number of the more important reports on investigations conducted in the Scientific and Technical Department have also been printed in the "Bulletin," whilst a large number of papers communicating the results of scientific investigations have been published by the Royal Society and other scientific societies.

The large amount of correspondence, &c., entailed by the work of the several sections of the Imperial Institute has been for the most part conducted in the general office by the clerical staff, which has found it difficult to cope with the great increase in this work, and in the collateral work of registration, filing, indexing, &c., which has occurred during the period under review. In addition to minor correspondence which it is convenient to conduct through the department

concerned, and to that of the Indian Section, which has been carried on by a separate staff, the work of the general office included the despatch during 1906 of 7,033 letters and reports, whilst 4,426 letters were received. Of the documents despatched, 282 were detailed reports on special investigations conducted by the Scientific and Technical Department. During 1907, 7,392 documents were despatched, of which 398 were reports on investigations, whilst 4,704 letters were received. The increase in correspondence which occurred during the two years reflects the general increase of the work of the Institute which has taken place in all sections, especially in that of the Scientific and Technical Department.

III.—STAFF.

During the years 1906 and 1907 the principal members of the staff were as follows:—

Director of the Imperial Institute:—

Wyndham R. Dunstan, M.A., LL.D., F.R.S.

Secretary to the Director:—

J. H. Preston, M.A. (Oxon.).

SCIENTIFIC AND TECHNICAL DEPARTMENT.

Principal Assistant:—

T. A. Henry, D.Sc. (Lond.), F.C.S.

Senior Assistants:—

E. Brown.

E. Goulding, D.Sc. (Lond.), F.C.S.

G. S. Blake, B.Sc. (Lond.), A.R.S.M., F.C.S.

T. Crook, A.R.C.Sc.I., F.G.S.

Special Assistants:—

H. H. Robinson, M.A. (Oxon.), F.C.S.

J. W. Evans, D.Sc. (Lond.), F.G.S.

Assistants:—

A. E. Andrews (Salters' Research Fellow).

J. W. G. Brooker, A.I.C. (until July, 1906).

S. J. Johnstone.

R. G. Pelly, A.I.C.

S. M. J. Auld, Ph.D. (Würzburg), A.I.C.

F. W. Barwick.

D. A. Bowack.

S. S. Pickles, M.Sc. (Vict.).

T. C. Thomas (until December, 1906).

R. W. Blair, A.R.C.Sc.I. (until August, 1906).

H. E. Watt, M.Sc. (Dunelm).

W. P. Hayworth, A.I.C.

A. Jordan, M.Sc. (Leeds).

W. R. S. Ladell, A.I.C.

The special officers of the Mineral Surveys of Ceylon, Southern Nigeria, Northern Nigeria, and Nyasaland, now in progress under the supervision of the Director of the Imperial Institute, and of the preliminary surveys which are being undertaken in British East Africa and Uganda, were:—

Ceylon:—

A. K. Coomaraswamy, D.Sc. (Lond.), (until December, 1906).

J. Parsons, B.Sc. (Lond.), F.G.S.

J. A. Daniel, B.A. (Cantab.).

Southern Nigeria:—

J. Parkinson, B.A., B.Sc. (Cantab.), (until September, 1906).

L. H. L. Huddart, M.A. (Cantab.), A.R.S.M. (until June, 1906).

A. E. Kitson, B.A. (Melbourne), F.G.S.

I. A. Stigand, B.A. (Cantab.), A.R.S.M. (until August, 1907)

S. M. Owen, A.R.S.M.

Northern Nigeria:—

J. D. Falconer, M.A., D.Sc. (Edin.), F.G.S.

D. R. Home (until September, 1906).

A. Longbottom, B.A. (Cantab.).

Nyasaland:—

A. R. Andrew, B.Sc. (N.Z.), F.G.S.

F. E. G. Bailey, B.A. (Cantab.).

Uganda:—

J. E. Coates, B.A. (Cantab.), (attached to the Anglo-Congolese Survey Commission).

British East Africa:—

K. H. B. Joll.

COLONIAL AND INDIAN COLLECTIONS.

Superintendent of Colonial Collections:—

W. G. Freeman, B.Sc. (Lond.), F.L.S.

Assistant Superintendents:—

C. H. Nicholls, B.A. (Oxon.), F.L.S.

S. E. Chandler, D.Sc. (Lond.), F.L.S.

E. H. Wilson (until November, 1906).

H. Spooner.

Superintendent of Indian Section:—

C. E. Jones, B.Sc. (Lond.), F.L.S.

IV.—EXHIBITION GALLERIES.

During the period under review considerable progress has been made in re-organizing these collections on a definite plan, a large work which was commenced in 1903. The aim

has been, whilst preserving the original geographical scheme of arrangement preferred by India and the Colonies, to render the collection or "court" of each country an object lesson of its present economic condition; the raw materials, mineral and vegetable, exported by the country or used in its industries or manufactures furnishing the nucleus of each collection. Maps, statistical diagrams and photographs are freely employed as aids to a clear understanding of the present condition and characteristics of each British Possession, whilst by means of specially prepared descriptive labels the chief facts of importance connected with each exhibit are concisely summarised.

The descriptive labels summarising the nature, production, and uses of materials, on the preparation of which special care has been bestowed, have attracted the attention of a number of museums, both in this country and abroad. Specimens of the labels have been supplied at the request of Colonial museums in Germany, France and Belgium, whilst the West Indian Exhibition Committee has asked permission to reprint several of the labels, and has recommended the adoption of similar labels in future in all exhibitions of West Indian products. The collections are thus made to serve several purposes. To the ordinary visitor to the public galleries they convey an attractive and instructive illustration of the leading characteristics of the condition and resources of each British Possession; they serve important educational purposes, especially in connection with the teaching of the geography of the British Empire, and are now visited by a number of schools and educational institutions; whilst they also serve as a guide to the intending emigrant or settler, and also to the manufacturer as an index of the chief resources of each country, and as the starting point of technical inquiries and laboratory investigations, which are dealt with by the expert staff of the Institute, as well as a means of displaying and illustrating the results of these investigations.

Attached to these collections is a special technical staff, consisting of the superintendent and three assistant superintendents. This staff is charged with the general work connected with the arrangement and care of the collections, and it assists, in co-operation with the staff of the Scientific and Technical Department, in answering inquiries and supplying information required by visitors and correspondents. The Indian collection has occupied a distinct position, under the charge of a special superintendent, who, whilst subject to the Director and the general regulations of the Institute, acted as Secretary to the Indian Committee, through which the Indian Section was administered. Besides the technical staff there are attendants who are on duty in the galleries when they are open to the public, in addition to those employed in the general duties of care and maintenance.

The following British Colonies and Dependencies are represented by collections in the public galleries:—

Canada, Newfoundland; Jamaica, Turks Islands, British Honduras, British Guiana, Bahama Islands, Trinidad and Tobago, Barbados, Windward Islands, Leeward Islands, Bermuda Islands; Falkland Islands; Australia: New South Wales, Victoria, Queensland, Tasmania, South Australia, Western Australia, New Zealand; Fiji; Cape of Good Hope, Natal, Transvaal, Orange River Colony, Rhodesia, Nyasaland; St. Helena; Gambia, Sierra Leone, Gold Coast, Northern Nigeria, Southern Nigeria; British East Africa, Zanzibar and Pemba; Uganda; Somaliland; the Anglo-Egyptian Soudan; Malta; Cyprus, Ceylon, Hong Kong; Mauritius; Seychelles; Straits Settlements and Federated Malay States; and India.

During the period the general improvement of the public galleries was continued. Redecoration of the galleries was carried out on an extensive scale, necessitating the dismantling and subsequent re-arrangement of nearly all the Colonial Courts, which through their re-organization and the additions that were made now give a much more adequate representation of the economic resources and present condition of the Colonies and Protectorates. New exhibits have been received from the West and East African Colonies and Protectorates, Zanzibar, Hong Kong, Ceylon, the West Indies, the Straits Settlements and Federated Malay States, the Falkland Islands, New South Wales and New Zealand, whilst new collections have been received from the Cape, Natal, and for the new courts for the Orange River Colony and the Transvaal. A particularly fine collection illustrating the resources of the Dominion of Canada has been arranged in the Canadian Section under the auspices of the Canadian Government. In connection with the re-arrangement of the collections there has been included a number of Royal presents from the Colonies, lent by His Majesty the King and Their Royal Highnesses the Prince and Princess of Wales. Their inclusion has greatly added to the general interest and attractiveness of the public galleries.

In the arrangement of the British East Africa Court great assistance was rendered by Mr. H. Powell, Assistant to the Director of Agriculture of the Protectorate, who spent three weeks at the Imperial Institute for the purpose. Mr. H. G. Smith, F.C.S., the Assistant Curator of the Sydney Technological Museum, also afforded help in connection with the arrangement of additional specimens of eucalyptus oils in the New South Wales Court. In the West African Section great assistance was rendered by Mr. W. R. Elliott, late Forestry Officer in Northern Nigeria, who was temporarily attached to the collections staff.

The following is a summary of the work which has been carried out in the principal sections of the exhibition galleries during 1906 and 1907:—

India.—Important groups of exhibits have been re-arranged and added to, new labels provided, as well as maps and statistical tables. The entire section is in process of re-arrangement.

Canada.—An entirely new collection has been installed by the Canadian Government.

Ceylon.—New exhibits have been received, including a comprehensive exhibit illustrating the pearl industry, a series of photographs illustrating rubber cultivation and preparation, and a map showing rubber areas. Every industry of the first rank in Ceylon is now well represented in the court.

Australia.—Maps and statistical tables have been added to certain of the Australian courts. Descriptive labels have been prepared, and many of the collections re-arranged and photographs added.

West Indies.—A large number of new exhibits have been added.

Transvaal and Orange River Colonies.—Courts containing illustrations of the resources of these Colonies have been arranged.

Rhodesia.—New exhibits of the resources of Rhodesia have been provided by the British South Africa Company.

Natal.—Many new exhibits have been supplied by the Government of the Colony.

East and West Africa.—Additional exhibits sent from the individual Colonies and Protectorates, and several maps have been included in these collections. A model of a gold dredger was presented by the African Gold Dredging and Mining Concessions, Limited. The principal resources of each of the Colonies and Protectorates of East and West Africa are now shown.

Sudan.—A collection representing the resources of the Sudan is being provided.

Important additions, as well as re-arrangement and relabelling, have been also made in courts belonging to Hong Kong, the Straits Settlements and Federated Malay States, Cape Colony, Falkland Islands, and Zanzibar.

A collection of British minerals, received from the Home Office, was arranged in the galleries.

Descriptive catalogues of the collections of New Zealand, East Africa, Nyasaland, Northern Nigeria, Gambia, and Sierra Leone have been prepared and printed in the "Bulletin of the Imperial Institute," separate copies being available for distribution. Catalogues of other collections are in course of preparation.

The number of visitors to the collections in 1906 was 80,020, and in 1907 123,016, which is the highest number recorded since

1903. These included many schools, for whom special arrangements were made by which members of the staff accompanied each party and afforded additional information. In the same way the services of certain members of the staff have been available on one afternoon in each week during the year to conduct visitors and to give explanations. A visit was paid by members of the Iron and Steel Institute and the American Institute of Mining Engineers on the occasion of their joint meeting in London in July, 1906.

When completely re-organized these collections will, it is hoped, attract visitors in increasing numbers on a scale corresponding with those who now resort to the neighbouring Victoria and Albert Museum and the Natural History Museum. Some steps are, however, still needed to make the public collections more widely known, and among these may be mentioned the provision of better and more conspicuous public entrances.

The central stand, which serves as a general enquiry office in the public galleries and a means of regulating the distribution of literature relating to India and the Colonies, has proved to be a useful feature. 8,759 publications were distributed to enquirers during the year 1906, and 14,866 during 1907. 193 special enquiries, chiefly relating to emigration, settlement, planting, climate, agriculture, and forestry, were dealt with by the expert staff in 1906, and 217 in 1907.

Owing to the interest created by the Cotton Exhibition, which was held during the summer of 1905 in the North Gallery, and the numerous requests for information which have since received, some of the more important cotton exhibits have been placed permanently on view in the North Gallery and additions have been made during 1906 and 1907. A very comprehensive collection of British-grown cottons is now on view.

The extension of the colonial collections in order to include the new exhibits which have been received has necessitated the installation of several courts in the North Gallery, which was formerly reserved for temporary exhibitions and other uses. Half the North Gallery is now occupied in this way by the permanent collections of the Colonies. The remaining portion is still reserved for special exhibitions, &c. Among these temporary exhibitions may be mentioned that of students' work in technology and handicraft held under the auspices of the Technological Department of the City and Guilds of London Institute, including specimens of the work done in several technical schools in the Colonies which had been sent to London for examination.

Loan collections of specimens of economic products have been lent from the galleries to several exhibitions, notably the Liverpool Colonial Products Exhibition, the South African Products Exhibition held in London, the Health,

Food, and Hygiene Exhibition at the Crystal Palace, and the exhibitions held by the Royal Horticultural Society, whilst a number of schools and educational institutions have been supplied with small collections illustrative of the resources of the British Colonies for use in connection with the teaching of geography.

Several of the Crown Colonies find it convenient to make the Imperial Institute a centre from which special exhibits of their resources may be arranged by the technical staff and sent to any exhibition held in this country in which these Colonies may desire to participate. There is a pressing need for further storage accommodation in connection with the Exhibition galleries, the existing accommodation being now entirely inadequate.

V.—THE LIBRARY.

Besides its constant use by members of the staff, the Library has been used during the year by Life Fellows of the Institute as well as by enquirers for special information.

The facilities afforded by the Library and rooms of the Imperial Institute have been utilized during the year by a number of officers of the Colonies and Protectorates at home on leave, who have also been given every facility for pursuing enquiries in connection with the Colonial collections and the work of the Scientific and Technical Department.

VI.—“BULLETIN OF THE IMPERIAL INSTITUTE” AND OTHER PUBLICATIONS.

The “Bulletin” has already a large and increasing circulation in Great Britain, the British Colonies, and also in foreign countries. In addition to exchanges for other publications, over 3,000 copies were sold during 1907, and the subscribers include numerous manufacturing and commercial firms in this country interested in the utilization of raw materials.

The following are the titles of the reports and special articles which appeared in the four numbers of the “Bulletin” for 1906:—

Reports on Investigations.

Timbers from the British East Africa Protectorate.
 "Dika Nuts" from Southern Nigeria.
 Cotton from British North Borneo.
 Agave and Furcraea Fibres from Madras.
 Rubbers from Sierra Leone.
 Tanning Materials of the Soudan.
 Castor Oil and Ground Nut Oil from Southern Rhodesia.
 Tobacco from Jamaica.
 Dammar Resins from the Federated Malay States.
 Rocks and Minerals from British Central Africa.
 Sansevieria Fibres from British East Africa.
 Tobacco from British Honduras.
 Inoy Kernels from West Africa.
 Rubbers from Uganda.
 Minerals from Cyprus.
 China Clay from Queensland.
 Cotton Cultivation in British East Africa.
 Origanum Oil from Cyprus.
 Cape Berry Wax from Cape Colony.
 Occurrence of Monazite in the Tin-Bearing Alluvium
 of the Malay Peninsula.

Special Articles.

Indian Aconites and their Poisonous Constituents.
 The Australian Pearl-Shell Fishery.
 Insects Which Attack Cotton in Egypt.
 The Maple Sugar Industry.
 Mica in Canada.
 Gold Dredging in California.
 The Guayule Rubber of Mexico.
 Recent Progress in the Practice of Green Manuring.
 The Seaweed Industry of Japan.
 Production and Uses of Mohair.
 Mineral Production in India.
 Coalfields of Cape Colony.
 Occurrence of Platinum.
 Production and Uses of Oil of Turpentine.
 Recent Work on African Rubber Vines.
 Nigerian Sorghum in Queensland.
 Recent Developments in German East Africa.
 Geology of Togoland.
 Occurrence and Uses of Corundum.
 Classification of Coals.
 British Association, 1906. Presidential Address to the
 Section of Chemistry and Agricultural Science.
 Cyanogenesis in Plants.
 Chemical Research in the Dutch Indies.
 Improvement of West African Cotton.
 The importance of Humus in Tropical Agriculture with
 special reference to Cocoa.
 Graphite and its Uses.

The following are the titles of the reports and special articles which appeared in the four numbers of the "Bulletin" for 1907:—

Reports on Investigations.

Fibres of British West Africa.
 Oil Beans from Southern Nigeria.
 Latex and Rubber of *Parameria glandulifera* from India.
 Copal Resin from the Gold Coast.
 Yebb Nuts from Somaliland.
 Kola Seeds from the Gold Coast.
 Cocoa from Uganda.
 Ginger from Sierra Leone.
 Timbers from the Mabira Forest, Uganda.
 Occurrence of Indigo in the "Gara Plant" of Sierra Leone.
 Tobacco from Northern Nigeria.
 "Ikpan" seeds from Southern Nigeria.
 Seeds of *Aleurites Fordii* and *Aleurites triloba* from Hong Kong.
 Chromite and Other Minerals from Rhodesia.
 Economic Products from British East Africa.
 Para Rubber from the Federated Malay States.
 Rubbers from the Gold Coast.
 Peat from the Falkland Islands.
 Iron Ore from Parapara, New Zealand.
 Tanning Materials from various Colonies and Protectorates.
 Cocoa from the Gold Coast Colony.
 "Nsa-Sana" Seeds from Southern Nigeria.
 Para Rubber from the Mergui Plantation, Burma.
Cryptostegia grandiflora Rubber from India.
 Jute Substitutes from the Nyasaland Protectorate.
 Silk Cocoons from Uganda.
 Materials for Cement Manufacture from Trinidad.

Special Articles.

Sansevieria and Agave Fibres in East Africa.
 Cotton-Growing in Spain.
 New Zealand Hemp.
 The Rubber Exhibition in Ceylon.
 Recent Developments in Portuguese East Africa.
 Hardwoods of Western Australia.
 Graphite: Its Occurrence and Uses.
 Insects and other Cotton Pests, and the Methods suggested for their Destruction.
 Sources, Manufacture and Industrial Uses of Alcohol.
 Geological Structure of Trinidad.
 Alluvial Tinstone Deposits of Northern Nigeria.
 Vegetable Products of Kontagora Province, Northern Nigeria.

Special Articles—continued.

Extension of the Cultivation of Jute and similar Fibres in India.
 Cotton-Growing in Algeria.
 Manganese Ores: their Uses, Occurrence, and Production.
 Fuel Resources of Canada.
 The Sponge Industry.
 Ceara Rubber in Portuguese East Africa.
 Recent Developments in German East Africa.
 Occurrence and Uses of Tantalum Ores.

Other Publications.

The reports on investigations conducted in the Scientific and Technical Department, referred to in the following pages, have been usually made to the Governments of the Colonies and Protectorates concerned, and, in some instances, have been published in the Government Gazettes and in other local publications. Many of the reports made to the Government of India have been published in the Indian "Agricultural Ledger." Some of the more important reports have appeared in a condensed form in the "Bulletin of the Imperial Institute."

In addition to these the following reports have been issued in this country as Parliamentary Papers during 1906-7:—

Report on the work of the Imperial Institute during the year 1905. (Cd. 3116, 1906.)

Annual Report on the Indian Section of the Imperial Institute for the year 1905-06. (Cd. 3216, 1906.)

Annual Report on the Indian Section of the Imperial Institute for the year 1906-07. (Cd. 3679, 1907.)

Report on the Results of the Mineral Survey of Northern Nigeria, 1904-5. By Professor Dunstan. (Cd. 2875, 1906.)

Reports on the Results of the Mineral Survey of Southern Nigeria, 1903-4 and 1904-5. By Professor Dunstan. (Cd. 2876, 1906.)

Report on the Results of the Mineral Survey of Ceylon, 1904-05. By Professor Dunstan. (Cd. 3190, 1906.)

Report on the Results of the Mineral Survey of Ceylon, 1905-06. By Professor Dunstan. (Cd. 3762, 1907.)

At the York Meeting of the British Association, an address on "Some Imperial Aspects of Applied Chemistry" was delivered by Professor Dunstan, as President of the Section of Chemistry and Agricultural Science. This address included an account of the work of the Scientific and Technical Department of the Imperial Institute in its relation as a Central Department for intelligence and investigation to the work

of agricultural and other technical departments in India and the Colonies, and also considered the importance of the work which is being accomplished by this department to the manufacturing industries of this country. This address was re-printed in the "Bulletin of the Imperial Institute," Vol. IV., p. 310.

Certain investigations have furnished important scientific results which have been communicated to and published by the Royal Society, the Chemical Society, and other special societies. The following is a list of these publications:—

- "The Present Position of the Chemistry of Rubber," by Mr. S. S. Pickles. (Reports of the British Association for the Advancement of Science, York Meeting, 1906.)
- "Report on the Present Position of the Chemistry of Gums," by Mr. H. H. Robinson. (Reports of the British Association for the Advancement of Science, York Meeting, 1906.)
- "The Chemical Aspects of Cyanogenesis in Plants," by Professor W. R. Dunstan and Dr. T. A. Henry. (Reports of the British Association for the Advancement of Science, York Meeting, 1906.)
- "Cyanogenesis in Plants. Part IV. Occurrence of Phaseolunatin in Common Flax," by Professor W. R. Dunstan, Dr. T. A. Henry and Dr. S. J. M. Auld. (Proceedings of the Royal Society, 1906. 78 B. 145.)
- "Cyanogenesis in Plants. Part V. Occurrence of Phaseolunatin in Cassava," by Professor W. R. Dunstan, Dr. T. A. Henry and Dr. S. J. M. Auld. (Proceedings of the Royal Society, 1906. 78 B. 152.)
- "On the Occurrence of Prussic Acid and its Derivatives in Plants," by Dr. T. A. Henry. (Science Progress, 1906.)
- "The Gum of *Cochlospermum Gossypivra*," by Mr. H. H. Robinson. (Transactions of the Chemical Society, 1906.)
- "Investigation of Tanning Materials," by Dr. T. A. Henry. (Year Book of the Manchester, Liverpool, and District Tanner's Federation, 1906, p. 79.)
- "Geikielite and the Ferro-Magnesian Titanates," by Mr. T. Crook and Mr. B. M. Jones. Mineralogical Magazine, 1906, 14, p. 160.)
- "A New Method for the Estimation of Acetone," by Dr. S. J. M. Auld. (Journal of the Society of Chemical Industry, 1906, 25, 100.)
- "The Rocks of the Cataracts of the Rio Madeira and the adjoining portions of the Beni and Mamose," by

Dr. J. W. Evans. (Quarterly Journal of the Geological Society, 1906, 62, p. 88.)

“The Identity of the Amiantos or Karystian Stone of the Ancients with ‘Chrysotile,’” by Dr. J. W. Evans. Dr. J. W. Evans. (Science Progress, 1906.)

“Gnomonic Projections on two planes,” by Dr. J. W. Evans. (Mineralogical Magazine, 1906, 14, p. 149.)

“Determination of the Optic Axial Angle of Biaxial Crystals in Parallel Polarized Light,” by Dr. J. W. Evans. (Mineralogical Magazine, 1906, 14, p. 157.)

“The Quantitative Classification of Igneous Rocks,” by Dr. J. W. Evans. (Science Progress, 1906.)

1907:—

“Cyanogenesis in Plants. Part VI. Phaseolunatin and the Allied Ferments in Flax, Cassava, and the ‘Lima bean,’” by Professor W. R. Dunstan, Dr. T. A. Henry, and Dr. S. J. M. Auld. (Proceedings of the Royal Society, 1907. 79 B. 315.)

“Le glucoside cyanogenetique de *Phaseolus lunatus*,” by Professor W. R. Dunstan and Dr. T. A. Henry. (Annales de Chimie et de Physique, 1907, 10, p. 118.)

“Le glucoside cyanogenetique de lin,” by Professor W. R. Dunstan and Dr. T. A. Henry. (Bulletin de l’Academie Royale de Belgique, 1907, No. 7, p. 790.)

“Note on the Constituents of the Seeds of the Para rubber tree (*Hevea brasiliensis*),” by Professor W. R. Dunstan. (Proceedings of the Chemical Society, 1907, 23, 168.)

“The Rusting of Iron,” by Professor W. R. Dunstan. (Proceedings of the Chemical Society, 1907, 23, 63.)

“Baddeleyite from Ceylon,” by Mr. G. S. Blake and Dr. G. F. Herbert Smith. (Mineralogical Magazine, 1907, 14, 378.)

“Titaniferous Volcanic Rocks,” by Mr. T. Crook. (Geological Magazine, 1907; April.)

“The Use of the Electro-Magnet in Petrography,” by Mr. T. Crook. (Science Progress, 1907; July.)

“An Automatic Vacuum Regulator,” by Mr. A. E. Andrews. (Chemical News, 1907; August 16, 96.)

“The Relationship between the Colour and Constitution of Organic Compounds,” by Dr. S. J. M. Auld. (Science Progress, 1907; April.)

“Mercury Derivatives of Pseudo-Acids containing the group -CO-NH,” by Dr. S. J. M. Auld. (Journal of the Chemical Society, 1907, 91, p. 1045.)

IMPERIAL INSTITUTE, 1906 AND 1907. 21

- "The Hydrolysis of Amygdalin by Emulsin," by Dr. S. J. M. Auld. (Proceedings of the Chemical Society, 1907, 23, p. 72.)
- "Ueber Mercuri-Nitrophenole," by Dr. A. Hantzsch and Dr. S. J. M. Auld. (Berichte, 1906, 39, 1105.)
- "Notes on Skiodroms and Isogyres," by Dr. J. W. Evans. (Mineralogical Magazine, 1907, 14, 230.)
- "A simple arrangement and notation of the thirty-two classes of symmetry based on the symmetry of zone-axes," by Dr. J. W. Evans. (Mineralogical Magazine, 1907, 14, 360.)
- "How should 'faults' be named and classified," by Dr. J. W. Evans. (Economic Geology, 1907, 2, 803.)

The following papers communicated by their authors to scientific societies deal with the investigations made at the suggestion of, and with materials supplied by, the Imperial Institute:—

- "Calmatambin: A new Glucoside," by Dr. F. L. Pyman. (Transactions of the Chemical Society, 1907, p. 1228.)
- "An Indigo-Yielding Plant," by Mr. A. G. Perkin. (Journal of the Society of Chemical Industry, 1907, 26, 389.)

VII.—SCIENTIFIC AND TECHNICAL DEPARTMENT.

Each year, since it was fully established in 1896, the work of this department has increased. In 1907, the staff consisted of 28 members, all of whom were qualified by scientific and technical training to assist in the conduct of researches, and to supply scientific and technical information concerning the occurrence and production of economic products, their industrial uses and commercial value. The reference sample room has proved of great value in supplying information to manufacturers and others who have enquired about new sources of raw materials, and also to agricultural and other officials from the Colonies who have visited the Institute.

The investigations conducted in the department during 1906 and 1907, which are described in detail in the separate sections, relate either to problems of tropical agriculture connected with the improvement of the cultivation and preparation of vegetable products, or to their technical uses and commercial value. Included under this head are a number

of products which are new to commerce. A very large number of minerals have also been examined and their chemical composition ascertained as the first step towards determining their commercial value. When results of special scientific importance are obtained these are communicated to the Royal Society or to one of the other scientific societies. During 1906 and 1907 a considerable number of papers from members of the scientific staff have been published (*see* list on pages 19-21). The resources of many of the Colonies and Protectorates being little known, it is important, with a view to development, that an inventory or *catalogue raisonné* of their products should be prepared and a decision arrived at as to those materials which are likely to repay collection or cultivation. The department has devoted much attention to this work. So far as vegetable products are concerned, their collection in the particular countries has usually been undertaken by the Agricultural and Botanical Departments which exist in many of the Colonies and Protectorates. Through the officers of these departments selections have been made of the subjects of greater importance, and the necessary material collected and forwarded to the Imperial Institute for investigation. In many of the Colonies and Protectorates no geological officers exist, and in several of these arrangements have been made for specially qualified men to conduct surveys of selected areas, and to collect authentic specimens of minerals which are forwarded to the Imperial Institute for investigation and report. The officers thus engaged in tropical Colonies and Protectorates return to this country during the wet season of each year, and assist at the Imperial Institute in the examination of the collected minerals, resuming the work of exploration in the ensuing season.

During 1906 and 1907, mineral surveys under the general supervision of the Director of the Imperial Institute, were in operation in four countries. Preliminary surveys were also undertaken in British East Africa and Uganda.

It is obvious that the success of the work of the department largely depends on the fullness and accuracy of the information and material supplied from the Colonies and Protectorates, and it is a great advantage for members of the staff, whenever they can be spared, to proceed to the countries concerned to prosecute special investigations and arrange for the conduct of local enquiries and experiments and the supply of authentic material. Unfortunately, the staff of the department has not been sufficiently extensive, whilst its current work has been too great to enable this temporary detachment of its officers to take place except under very special circumstances.

In addition to the systematic survey of the resources of the newer Colonies and Protectorates which has been referred to, the department has received from more developed Colonies and from many of the self-governing Colonies, as well as

from India, enquiries for information and investigation connected with agricultural problems and the utilisation of raw materials, many of which were of a confidential character.

Enquiries from business firms and others interested in the utilisation of raw materials have been freely answered and samples and information supplied, but laboratory investigations for commercial firms and private individuals have not been undertaken except under special circumstances. Requests for ordinary analyses have been referred to competent professional analysts.

It will be evident that, in order effectively to discharge the duties of a department for the supply of information and advice on tropical agriculture and tropical products, it is necessary to be in constant touch with the developments which are taking place and with the progress which is being made not only in every British Possession, but also in foreign countries and their colonies and protectorates. The collection and collation of all published information on subjects within the scope of the work of the department, and correspondence with similar departments abroad, has been an important part of its operations. In the subject of cotton cultivation alone, this has been a large and important work which, as far as possible, has been extended to other economic products.

The staff of the department consists of a number of scientific and technical assistants who have been for some years engaged in the investigation of the value of various classes of economic products, and with the numerous agricultural, geological, botanical, and other problems connected with their production or cultivation. Under their supervision are a number of junior assistants who have already received a scientific training and special chemical qualifications at a university or at a technical college where they have taken the usual degree or diploma. These men now specialise so as to gain experience in the applications of science to the solution of the practical problems with which the department is mainly concerned.

Although the applied sciences of chemistry, botany, geology and mineralogy are represented, it has not been possible to provide among the permanent staff experts in every branch of applied science, and in any case, it is desirable to utilise as far as possible the facilities offered by existing scientific and technical institutions for assisting the work of the department.

A reciprocal arrangement has been made with the Royal Gardens, Kew, by which all purely botanical matters have been referred to Kew, whilst all questions connected with the composition, utilisation, and commercial value of vegetable products are referred from Kew to the Imperial Institute. Similarly, in relation to animal products and the identification of insects, the Natural History Department of the British Museum and the Biological Department of the Agricultural College at Wye have been consulted.

Special problems connected with the composition and value of the vegetable dyes have been referred to the dyeing department of the Yorkshire College, Leeds, whilst several technical investigations, suggested by the scientific work of the department in connection with the utilisation of tanning materials, have been carried out by the Herold's Institute for tanning at Bermondsey. Several special questions relating to the utilisation of fibres have been referred to the Bradford Technical College.

Similarly, in connection with special technical investigations, assistance has been rendered by a number of distinguished authorities, among whom may be mentioned Professor Unwin, F.R.S., Professor Dalby, and Mr. Herbert Stone (technical examination of timbers), Professor Church, F.R.S. (value of food grains and feeding stuffs), Mr. A. G. Perkin, F.R.S. (dyes), Dr. Lewkowitsch (oils), Dr. Gordon Parker, (tanning materials), Mr. F. V. Theobald, M.A. (economic entomology), Professor J. T. Cash, F.R.S., and Professor Cushny, F.R.S. (drugs), Sir Thomas Wardle (silk). These and other authorities have dealt with special problems arising out of the work of the department.

A large number of manufacturing firms, merchants, and brokers have also rendered much assistance in determining the commercial value of raw materials on the basis of the results of their examination in the department.

The department has, therefore, been in a position not only to determine the nature and composition of materials, but also to submit to the expert referees and manufacturers, &c., suggestions for the commercial utilisation of these materials to be subsequently verified by actual technical trial on the large scale. By this means a trustworthy basis has been obtained for determining their actual commercial value and possibilities.

The principal investigations conducted during the year are summarised below under the headings of the various economic products to which they relate.

During 1906, 297 requests for investigations were received from India, the Colonies and Protectorates, whilst 282 enquiries were completed and reports made. In 1907, 392 requests for investigations were received and 398 reports completed. These investigations were conducted in connection with subjects concerning the following countries:—Bahamas, Barbados, Bermuda, British Guiana, British Honduras, Canada, Cape Colony, Ceylon, Cyprus, Dominica, East Africa Protectorate, Falkland Islands, Fiji, Gambia, Gold Coast, Grenada, Hong Kong, India, Jamaica, Lagos, Mauritius, Natal, New Zealand, Northern Nigeria, Nyasaland, Orange River Colony, Queensland, Rhodesia, St. Helena, St. Vincent, Seychelles, Sierra Leone, Somaliland, South Australia, Southern Nigeria, Sudan, Straits Settlements and Federated Malay Straits, Tasmania, Transvaal, Trinidad, Turks Islands, Uganda, Virgin Islands, Western Australia, Zanzibar.

A detailed account follows of the various subjects which have claimed the chief attention of the department during the two years under review. Brief allusion may be made here to a few of the most important of these subjects in connection with the countries concerned.

The progress of cotton cultivation in all the British Possessions has been carefully watched and information has been obtained as to the work which is being carried on in other countries. Samples of cotton grown in each British Possession have been examined and valued, reports being made to the Governments of the countries concerned and information supplied with reference to the various problems of cotton cultivation. In the summer of 1907 the Director visited Asia Minor at the instance of the Colonial Office in order to report on agricultural developments in that country, with special reference to cotton cultivation and other matters of importance in connection with similar developments in British Possessions.

Close touch has been maintained with the work of the British Cotton Growing Association, which has placed at the disposal of the department the reports of their managers and superintendents in the Colonies and Protectorates.

Considerable attention has also been given to the production of other fibre-yielding plants. The recent scarcity of Indian jute has rendered it desirable to consider whether jute and similar "bast" fibres could not be produced in West Africa, and a systematic investigation of the native fibres of Sierra Leone has been undertaken in conjunction with the Government of the Colony, and in association with the users of this class of fibre at home. The results of trial shipments of these fibres have shown that fibre of value to the jute manufacturer in this country can be grown in West Africa, including fibre from species of *Hibiscus*, *Honckenya* and *Triumfetta*, and in this connection it may be mentioned that a specimen of *Triumfetta semitriloba* fibre from the Gold Coast was valued in London at £35 per ton, with finest Bengal jute at £35 to £40 per ton.

A number of investigations have been conducted at the instance of the Government of St. Helena in connection with the establishment in the island of a fibre-producing industry. The growth of *Phormium tenax* (New Zealand hemp) has been extended, and arrangements made for the extraction of the fibre, which is now being shipped to this country.

The production of rubber has now become a most important subject for many of the tropical Colonies and Protectorates, and the department has supplied a great deal of information on the subject, and has examined and reported on the quality of the rubber produced by native and cultivated trees. The native collection of rubber from wild vines and trees will continue for many years to afford a substantial return, and the value of native rubber may be enhanced by the introduction of improved methods of collection and preparation.

It is, however, clear that the control of the methods of rubber collection and preparation adopted by the natives in the vast territories of forest in which rubber trees and plants occur presents administrative difficulties, and involves an expenditure which, in most cases, stands in the way of the introduction of anything approaching to the efficient regulation of the native rubber industry. Systematic planting of the larger rubber trees (such as *Hevea brasiliensis*), after adequate trial on a small scale of the suitability of the climate and other conditions, affords the best chance of securing a regular supply of rubber of the highest quality, and the progress already achieved in Ceylon and the Federated Malay States is causing other countries to consider this question. The West African Colonies and Protectorates in particular, as well as other Colonies, have been in communication with the department, with reference to the cultivation and production of rubber.

In connection with the present extensive planting of the Para rubber tree (*Hevea brasiliensis*), the fact that the abundant seeds of this tree can be utilised as the source of a valuable oil may become a matter of commercial importance in the near future, when the seeds will be available in quantities far in excess of those required for planting. The investigations conducted in the department have proved that this oil, which resembles linseed oil, will probably command about the same price as the latter commodity, whilst the residue of the seeds from which the oil has been expressed may prove to be serviceable locally as a feeding stuff for cattle. It is, therefore, possible that a valuable subsidiary industry may arise in connection with rubber planting.

The great possibilities of West Africa for the production of tropical products has led to a large share of the attention of the department being given to these Colonies and Protectorates. Besides cotton, fibres and rubber, the timbers and oil seeds of Southern Nigeria have been the subject of investigation, and certain new seeds have been introduced to manufacturers as sources of useful oils, especially for the manufacture of soap, and trial shipments of several of these have been arranged for. The tanning industry of West Africa has also been made the subject of investigation, with a view to the improvement of the leather at present produced, especially of certain kinds now demanded by the British manufacturer. The production of cocoa is an industry of growing importance in West Africa, especially in Southern Nigeria and the Gold Coast. In the latter Colony the subject of the improvement of the quality of the cocoa at present produced has engaged much of the attention of the department. The main point has been the demonstration by trial shipments that cocoa of the quality required by the British manufacturer can be produced. This has now been successfully shown, and as a result Messrs. Cadbury Brothers, Limited, have sent a representative to the Gold Coast in order to report upon the methods by which

this firm could advantageously co-operate with the native producer. In Uganda also conditions appear to be favourable to the cultivation of cocoa.

The production of ginger is a minor industry of some importance in Sierra Leone. Improvements in the methods of cultivation and preparation of this product have been suggested by the department, with the result that trial consignments of ginger produced by the improved methods have realised prices considerably above the average hitherto attained by West African ginger.

The Superintendent of Agriculture for British West Africa (Mr. G. C. Dudgeon) has been placed in communication with the Institute and has his headquarters there during his stay in England. The series of valuable reports which he has made have materially assisted the work of developing the resources of West Africa. Officers from Northern Nigeria, East Africa and other Colonies have also been attached to the Imperial Institute for special work either in connection with investigations or the arrangement of collections.

The mineral surveys of Southern and Northern Nigeria have made very satisfactory progress, and have been the means of bringing to light a number of minerals which seem likely to be of commercial importance to these countries. Two reports on the results of these surveys were published in 1906 (*see p. 18*). In Northern Nigeria limestone has been discovered in an accessible area, whilst an investigation has been made of the salt springs, with a view to determining their suitability for the production of salt of good quality. Tinstone and monazite sand have also been found in new localities. The quality and abundance of the tin-stone deposits justifies the belief that Northern Nigeria will become an important tin-producing country, as soon as transport facilities have been provided.

In Ceylon the mineral survey has had the result of attracting commercial attention to the varied mineral wealth of the island, and to the discovery of several minerals of commercial importance. Reports on the results of this survey have been issued as Parliamentary Papers (*see Publications, p. 18*).

In Nyasaland, in the first year of the survey, occurrences of coal, graphite, limestone, ores of iron and tin, and corundum have been located. The circumstance that extensive deposits of iron ore of good quality occur in the Protectorate may be of considerable importance in the future.

Extensive deposits of peat occur in the Falkland Islands, of which little or no use is made. The results of an exhaustive investigation of samples of this peat in the department showed that it is of excellent quality and adapted for the manufacture of briquettes. In view of the demand for fuel in South America, especially for use in steamers and locomotives, a syndicate has been formed with a view to the instalment of a peat briquetting industry in the Falkland Islands.

Considerable attention has been given during the period under review to an investigation of the resources of the

Seychelles, and numerous reports have been made to the Government of that Colony. It has been shown that several barks of trees belonging chiefly to the mangrove class are particularly suitable for the preparation of tanning extracts, and the commercial side of this question is now under consideration. The examination of certain volatile oils produced by plants grown in the islands has shown that these are of a quality which renders them of considerable value as perfumes.

In Cyprus, also, the examination of the oils derived from *origanum* and *marjoram*, which are used for perfuming soap, has shown that the production of such oils will prove to be a remunerative industry. A considerable quantity of Cyprus *origanum* oil has now been sold in England, and suggestions have been made with a view to improvements being effected in its quality.

As a result of an examination of a series of samples of gum arabic collected in Northern Nigeria, the attention of the users of this product was directed to the suitability of Northern Nigeria gum, with the result that a demand has arisen leading to an increase in the amount of gum collected and exported to this country. In the summer of 1907 the Director, at the instance of the Colonial Office, collected information abroad respecting the organisation of the trade in Senegal and Sudanese gum at Trieste and elsewhere, and steps have been taken to develop the industry in Northern Nigeria.

In the case of the Straits Settlements and Federated Malay States, besides minerals, fibrous plants and rubbers, a number of essential oils and perfumes have been examined, and found to be of excellent quality. It seems probable that these may become the basis of a new industry.

Attention has also been given to the cultivation and preparation of tobacco in various Colonies. The conditions in Uganda and East Africa having been proved to be suitable, an expert selected by the Director of the Imperial Institute has been despatched by the Colonial Office to advise the local Governments on this subject and to start experimental work.

The investigations conducted for the Government of India form the subject of special reports issued as Parliamentary Papers (Cd. 3216, 1906, and Cd. 3679, 1907).

The Indian subjects dealt with have been very varied, among the more important being the examination and valuation of tanning materials, fibrous plants, the investigation of drugs and poisonous plants and of the quality of india-rubber.

A large number of manganese ores from different deposits in India were examined at the request of the Geological Survey of India. The results obtained will be of great value to those interested in the development of these important deposits. In connection with the attention which the Geological Survey of India is also giving to the possible utilisation of the deposits of bauxite which occur in India as sources of aluminium and

aluminous compounds, a number of typical Indian bauxites have been examined from the scientific and technical standpoint.

In connection with tropical agriculture an investigation of much practical importance to India, and to the Colonies, as well as of purely scientific interest, is that relating to the poisonous properties which are occasionally exhibited by certain food-grains and fodder plants. During the period under review further investigations on this subject have been completed, especially in connection with cassava and linseed, and the results of scientific interest communicated to the Royal Society (*see* list of papers on pp. 19-21). The poisonous action in most of the cases investigated is due to prussic acid, which is now shown to be formed from an occasional constituent of the plant, which has been very fully studied and the conditions of its production ascertained. The Board of Agriculture, as well as several manufacturing firms, have been in communication with the Imperial Institute on several practical questions of importance in connection with the use of certain animal-feeding materials which are imported from abroad for use in this country.

The scientific and technical work conducted for India at the Imperial Institute is carried on in communication with the Board of Scientific Advice appointed in India by the Government. This Board includes the heads of all the scientific and technical establishments in India. At the request of the Government of India the Royal Society acts in an advisory capacity in connection with this work, and has appointed a special Advisory Committee, of which the Director of the Imperial Institute is a member.

In India, as in the Colonies, the scientific and technical work of the Imperial Institute is directed towards supplementing and extending the work of the local scientific and technical departments (agricultural, botanical and mineral) by undertaking such investigations as cannot be conducted on the spot, and especially economic investigations which have to be supplemented by reference to manufacturers and commercial experts.

At the request of the Government of India the methods employed in the manufacture of opium alkaloids from waste opium at the opium factory at Ghazipur, have been studied and improved. A report on the improved processes suggested has been furnished, and the new plant required has since been despatched to India.

In addition to the work conducted for India and the Colonies, a number of materials produced in foreign countries have been examined at the instance of British Consuls abroad, on account of the probable interest of these products for the British manufacturer.

Several special investigations and enquiries have been undertaken for the Board of Trade, the Board of Agriculture, and the Foreign Office.

In the following account of the work carried on in the department during 1906 and 1907, the subjects are mentioned under the names of the various economic products to which the work has related. It will be seen that the work of the department is becoming of increasing importance to the Colonies, not only as a means of investigating and providing trustworthy reports as to the probable value of little-known materials, but also through the supply of information respecting the constantly changing requirements of manufacturers and users of well-known raw materials.

The reports of the Institute are generally made to the Colonial Governments, but there has been during the period a remarkable increase in the requests for information made to the Institute by manufacturers and users of raw materials both in this country and abroad.

SUMMARY OF INVESTIGATIONS.
MINERALS.

Minerals reported on during 1906.	No.	Minerals reported on during 1907.	No.	Minerals awaiting investigation at the end of 1907.	No.
Sierra Leone ...	22	Cyprus ...	1	Cyprus ...	5
*Southern Nigeria and Lagos.	34	Sierra Leone ...	4	*Southern Nigeria and Lagos.	328
Cape Colony ...	2	Gold Coast Colony	2	*Northern Nigeria	242
Orange River Colony.	3	*Southern Nigeria and Lagos.	8	Cape Colony ...	3
Transvaal ...	1	*Northern Nigeria	771	*British East Africa.	26
Rhodesia ...	5	St. Helena ...	3	†Uganda ...	58
Nyasaland ...	5	Cape Colony ...	6	Rhodesia ...	4
Uganda ...	22	Natal ...	2	*Nyasaland ...	242
British East Africa	123	Orange River Colony.	7	India ...	97
Zanzibar ...	8	Rhodesia ...	2	*Ceylon ...	48
Sudan ...	8	Nyasaland ...	7	Federated Malay States.	1
Seychelles ...	2	Uganda ...	9	South Australia ...	3
India ...	65	British East Africa.	3	Falkland Islands	6
*Ceylon ...	230	Seychelles ...	4		
Federated Malay States.	7	India ...	8		
South Australia ...	5	*Ceylon ...	235		
Western Australia	1	Federated Malay States.	11		
New Zealand ...	1	Tasmania ...	4		
Falkland Islands ...	13	Queensland ...	1		
British Honduras	1	Fiji ...	1		
Trinidad ...	2	Falkland Islands	1		
Turks Islands ...	1	Virgin Islands ...	3		
Newfoundland ...	3	Dominica ...	1		
Foreign Countries	8	Trinidad ...	2		
Miscellaneous ...	5	Canada ...	1		
		United Kingdom	16		
		Foreign Countries	25		
Total ...	537	Total ...	1140	Total ...	1063

* Mainly collected by the officers of the mineral survey.

† Includes samples collected by the mineralogist attached to the Anglo-Congolese Boundary Commission.

Sierra Leone.—The minerals received from this Colony were mainly sands supposed to contain rare earths. One or two of these proved to contain traces of monazite. Iron ore of fair quality has been reported on, as well as several sands consisting mainly of ilmenite and magnetic iron ore.

Gold Coast.—Specimens of mineral oil and bitumen were examined during 1907.

St. Helena.—Several specimens of the manganese ores found in this Island were examined during 1907. They proved to be of rather poor quality and unsuitable for use without preliminary dressing.

Cape Colony.—China clay of excellent quality, probably suitable for export, was examined in 1906. During 1907 manganese ores, crocidolite asbestos, china clay, chromite, and rocks containing traces of platinum were received for examination, and most of these were the subjects of reports to the Government during the year.

Natal.—The minerals received during 1907 included graphite and iron ore. The latter proved to be of good quality. The graphite is still under investigation.

Orange River Colony.—The minerals from this Colony, examined during 1907, included two of some general interest, viz., a crude salt containing 61 per cent. of true salt (sodium chloride) and a specimen of sodium sulphate. Both these products were obtained from natural salt springs.

Rhodesia.—Several minerals of economic interest were received in 1906, viz., antimony and chromium ores, a supposed gold ore, and marble, suitable for decorative stone work. In 1907 several other minerals were received for identification, and in addition a memorandum was prepared suggesting suitable manurial treatment for a series of soils on the basis of the results of analyses by the Agricultural Department at Bulawayo. At the end of 1907 soils, plumbago, clay, mica, and other minerals were still under investigation.

British East Africa.—During 1906 an extensive series of rocks collected during the course of the Anglo-German Boundary Commission in East Africa was received for identification. Soil from the neighbourhood of the Tana River was also examined.

Uganda.—Reference has been made above to the examination of minerals of interest collected during the progress of the Anglo-Congolese Boundary Commission.

In addition a number of minerals from this Protectorate have been received from the Government. In 1906 these included iron ore, limestone, graphite, and kaolin, and in 1907, specimens of water and brine from mineral springs, and an iron ore from the Masindi district. Iron is smelted by the natives in this district in a primitive fashion, and as transport

from the coast is difficult and expensive, it appears likely that the native iron smelting industry is worth encouragement, and at the request of the Government, a memorandum has been prepared describing a furnace of a simple type suitable for smelting iron, which can be operated by means of cold blast produced by water power.

Sudan. The minerals examined during 1906 included varieties of "natron" (consisting of sodium carbonate and sodium sulphate) and of graphitic schist, iron ore, and locally smelted iron.

Seychelles.—The composition and value of the phosphate deposits has been considered in consultation with users of these materials in this country.

During 1906 the mineral phosphates found in Alphonse and Marie Louise Islands were examined. These proved to be of excellent quality, containing from 64 to 67 per cent. of calcium phosphate with satisfactorily small amounts of impurities, such as iron and alumina, and were valued at 35s. to 40s. per ton. In 1907 specimens of the yellow laterites found in several of the islands were received: these proved to be of poor quality and unsuitable for the manufacture of aluminous products.

India.—During 1906 an extensive series of manganese ores collected by the Geological Survey of India were examined and reported on, and early in 1907 a supplementary report giving the results of complete analyses of a certain number of the ores was forwarded to India. These manganese ores are typical of those obtainable in the Central Provinces in India, and the results of these combined geological and chemical investigations should be of service not only to those interested in the development of these deposits in India, but also to steel manufacturers in this country and elsewhere. Information concerning these ores has been supplied to commercial firms in this country.

The Geological Survey of India has also been giving attention to the possibility of utilising the extensive deposits of bauxite (laterite), which occur in India, for the preparation of alumina and aluminous compounds and possibly for the manufacture of metallic aluminium. In connection with this enquiry six typical Indian bauxites were sent to the Imperial Institute for examination. The results showed that they were of promising character, and that although differing in certain respects from the typical bauxites now used in Europe as a source of aluminium and aluminous compounds, they did not present any insuperable difficulties for use as raw materials for such purposes.

A series of Indian pottery clays collected by the Officiating Reporter on Economic Products, in consultation with the Geological Survey of India, has also been received and is still under investigation.

Apart from the minerals referred to above, various minerals for valuation or identification have been received, partly from officers of provincial governments in India and partly from commercial firms and private individuals. Among samples so received may be mentioned, mica, gypsum, calcite, orpiment, samarskite, pitchblende, &c.

Federated Malay States.—In 1906 samples of corundum, monazite sand, "amang" (a local term for the residues from washing operations carried out in the preparation of tin ore for smelting), and "mineral tailings" were examined. The first three products proved to be of economic value, and as regards "amang," a method of recovering the tinstone and monazite from the mixture, was suggested. The separation of monazite from tinstone may in the future prove to be a profitable undertaking, enabling the valuable monazite to be separated and making it possible to smelt the tinstone.

In 1907 a series of tin ores and of limestone carrying tinstone were received for examination and reported on. At the end of 1907 further samples of "amang" were under investigation.

Western Australia.—Specimens of tantalite were received in 1906 and during the two years under review, information regarding the market for, and developments in the uses of, this ore has been supplied to the Government of the State.

Southern Australia.—The minerals received from this State for examination have included raw sienna, graphite, kaolin, and carnotite. The last-mentioned rare mineral is still under investigation.

Falkland Islands.—The peat from these islands has been fully examined and reported on during 1906 and 1907. The peat proved to be of good quality, and full information was supplied as to modern methods of making compressed peat fuel. As a result of this work a concession to work the deposits has been applied for by a syndicate, with a view to the production of compressed peat fuel for use in the islands and in the neighbouring South American States.

New Zealand.—A sample of the iron ore found at Parapara was received and examined. It proved to be a very rich ore, of great value for smelting purposes.

Trinidad.—Further samples of manjak were received for examination in 1906. In 1907 limestone and marl were received from the Colonial Geologist for examination and technical trial as cement-making materials. Cement made from these materials proved to be of good quality and quite suitable for constructional purposes.

Turks Island.—The salt produced in this Island, mainly for export to the United States, was received for examination.

This material is much in favour in the United States for salting provisions. The sample proved to be exceptionally pure.

Foreign Countries.—A considerable number of samples were received during the two years from British Consuls in foreign countries. None of the mineral samples so received proved to be of special economic interest.

Mineral Surveys.

The mineral surveys in Ceylon, Southern Nigeria and Northern Nigeria, referred to in the previous report, were continued during 1906, and a new survey was undertaken in the Nyasaland Protectorate. During 1907 arrangements were also made for the examination at the Imperial Institute of minerals collected by (1) the mineralogist appointed to accompany the Anglo-Congolese Boundary Commission, and (2) the Government mining expert appointed in British East Africa.

Ceylon.—1906.—Three reports were made during the year to the Government of Ceylon giving the results of the examination at the Imperial Institute of minerals forwarded from Ceylon in connection with the mineral survey, and these have since been published by the Colonial Office, together with the previous year's report, in Professor Dunstan's "Report on the Results of the Mineral Survey in 1904-05" (Cd. 3190 of 1906). The most interesting minerals described were zirke-lite, tscheffkinite, monazite, fergusonite and pitchblende, all of which contain the valuable oxide thoria, which is the basis of the mantles used for incandescent gas lighting. None of these minerals is, however, so rich in thoria as the new mineral, thorianite, previously described, but they are all likely to be of commercial value as sources of thoria.

The same report gives the results of the examination of a very large number of gravels sent, with the approval of the Government of Ceylon, to the Imperial Institute by residents in Ceylon interested in mineral production. Most of these gravels consisted of zircon or ilmenite, and were of no commercial value, but a few contained minerals of economic interest, such as tinstone, allanite, monazite, thorite and thorianite, and where such minerals were present in sufficient quantity, those interested were placed in communication with manufacturers in this country, who wished to utilize such minerals.

1907.—Professor Dunstan's "Report on the Results of the Mineral Survey in 1905-06" was issued during the year in the Miscellaneous Series of Colonial Reports (Cd. 3762 of 1907). This gives the results of the examination of minerals collected during the course of the survey in 1905-06. The minerals received were mainly concentrates prepared in the course of a systematic investigation of stream beds and alluvial deposits in various districts for thorianite and other

rare minerals. This investigation has shown that thorite, thorianite, monazite and gold are widely distributed in Ceylon, but usually only in small quantities and somewhat irregularly. Further exploration in Ceylon will decide whether such gravels will repay working.

Other minerals of economic interest received and reported on were kaolin, galena, limestone, rutile and molybdenite. The specimens awaiting investigation at the end of 1907 were mainly clays, micas, and concentrates containing thorium minerals.

In addition, a large number of minerals, mainly for identification and valuation, were received from residents in Ceylon.

Southern Nigeria and Lagos.—1906.—The samples of natural pitch collected by the officers of the survey during their investigation of the bituminous sand deposits of Lagos were reported on. These proved to be mainly sands, containing from 10 to 20 per cent. of true bitumen. In most cases the material is unsuitable for paving purposes, as the siliceous matrix will not bind under pressure in the same manner as the European asphalt (which have a limestone matrix) at present utilized.

1907.—A number of minerals of considerable economic importance were reported on during the year. These included lignite from Moroko, which proved to be similar to the deposits at Okpenam and Ibousa previously examined, and galena and zinc blende from the deposits at Amago-Omegga. The lignite deposits are likely to be of great importance in the Colony, as affording a supply of fuel, which will be suitable for steam-raising. At the end of 1907 there were still awaiting investigation a large number of samples of lignite collected at various points in the areas surveyed during the season 1906-07, and a number of concentrates prepared from river gravels in the same neighbourhoods.

Northern Nigeria.—During the two years 1906 and 1907 over 700 specimens of rocks, concentrates and massive minerals were received for examination, and most of them have now been reported on to the Government of the Colony, whilst summary reports on the progress and results of the survey are in preparation.

The concentrates were essentially of three types (1) containing tinstone, (2) containing monazite, and (3) containing magnetic iron oxide intermixed with more or less ilmenite. These were collected over a very considerable area of the Protectorate, and the results of their examination have thrown much light on the distribution of these various minerals. Tinstone is already being worked in the Bauchi district of the Protectorate, and arrangements have been made for smelting the metal locally. As regards monazite it appears that although this mineral is widely distributed the deposits, so

far known, are not rich enough to be worth working by the methods at present available and at the prices now obtainable.

Deposits of limonitic iron ore of excellent quality were located during 1906. These are situated near navigable rivers and may be of value for export purposes if the deposits prove to be sufficiently extensive. These deposits are being used at present to a small extent by the natives for smelting iron for local use.

Among the more important economic work conducted by the survey, was the investigation of the brine springs at Awe, which appear to have been used in a primitive and uneconomical fashion since early times by the natives as a source of salt. Systematic borings have been made in this neighbourhood, in order to obtain knowledge of the sources of the salt. These investigations are still in progress. It has been already found that the outflow of brine can be enormously increased. This brine on evaporation yields salt of excellent quality. The brine is unfortunately rather weak, and its economical evaporation is a problem of some difficulty, but in view of the low price of labour in the Protectorate and the fact that there is a long dry season during which evaporation, by solar heat can be carried on to great advantage, it seems likely that this could be cheaply effected. A preliminary scheme involving the employment of "salins" of the type used in France and Spain has been suggested for use in the Protectorate, and as the price of salt at Awe varies from £12 to £26 per ton, depending on its quality, it seems likely that this industry, if properly organised, and carried out on modern lines, should be remunerative. The district in which the brine springs occur is not far from navigable rivers, so that it ought to be possible to distribute the salt cheaply throughout a considerable part of the Protectorate, and render unnecessary the considerable import of European salt which takes place at present.

Nyasaland.—This survey was commenced in September, 1906. Since then a large number of rocks and minerals have been received for examination, and at the end of 1907 a report on those collected during the season 1906-07 was in preparation. These included corundum, iron ores, coal, shale and graphite. The graphite may be of some importance. The samples consisted of flake graphite of excellent quality.

At the end of 1907 there remained under investigation a number of minerals of which the most important were coal from two deposits which have been thoroughly explored by the officers of the survey.

A considerable number of minerals forwarded by Political officers have also been reported on. These include limestones, iron ores, and quartz crystals, all of which are of commercial interest.

Anglo-Congolese Survey Commission.—The mineralogist nominated by the Director of the Imperial Institute to accompany this Commission during the work of delimiting the frontier between Uganda and the Congo Free State has examined the geological structure of the country along the boundary, and has sent to the Imperial Institute periodical reports on the structure of the country traversed. The rocks and minerals collected are at present under investigation.

British East Africa. The mining expert, recently appointed by the Government of the Protectorate to deal with mining claims and mineral rights, is working in communication with the Imperial Institute with a view to ascertaining the nature and value of minerals found in the Protectorate. A number of minerals have been received and are at present under investigation.

FIBRES (INCLUDING COTTON).

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples awaiting investigation at the end of 1907.	No.
Cyprus	1	Cyprus	2	Cyprus	1
Sudan	5	Sudan	10	British East Africa.	2
British East Africa	33	British East Africa.	10	Sierra Leone ...	1
Uganda	2	Nyasaland Protectorate.	43	Southern Nigeria	1
Rhodesia	5	Uganda	11	Northern Nigeria	4
Transvaal... ..	40	Rhodesia... ..	4	India	1
Gambia	1	Natal	22	Foreign countries	31
Gold Coast ...	2	Transvaal	45		
Sierra Leone ...	17	Orange River Colony.	4		
Southern Nigeria...	8	Cape Colony ...	3		
St. Helena	2	Gambia	7		
India	5	Gold Coast	18		
Straits Settlements and Federated Malay States.	2	Sierra Leone ...	6		
West Indies ...	17	Southern Nigeria	54		
British Honduras	1	Northern Nigeria	33		
Australia	1	Mauritius	13		
Foreign countries	15	St. Helena	2		
Unknown sources	4	India	27		
		Ceylon	2		
		Straits Settlements and Federated Malay States.	1		
		West Indies ...	1		
		British Guiana ...	18		
		Australia	2		
		United Kingdom	1		
		Foreign countries	14		
		Unknown sources	2		
Total... ..	161	Total... ..	365	Total... ..	41

Cotton.

The number of cottons reported on in 1906 was 71, and in 1907 256. At the end of 1907, 31 samples were awaiting investigation.

In addition to the 327 samples reported on in 1906-07, 104 samples were examined and added to the reference collection, which now amounts to nearly 1,000 samples of cotton and cotton-plant specimens. A collection of standard commercial cottons, comprising about 60 samples, has also been formed.

The reports on cottons included a technical examination of the cotton and valuations by commercial experts. Insect pests were frequently found in the samples: in most cases these were identified and suggestions for remedial measures were incorporated in the report. The insect pests were labelled and preserved for future reference.

Much agricultural information has been given in reply to enquiries with reference to soil, manures and the treatment of insect and fungoid pests in their relation to cotton cultivation. A number of articles on cotton cultivation have been contributed to the "Bulletin of the Imperial Institute," and all available information appertaining to the progress of cotton cultivation in the various British Colonies and Dependencies has been collected and arranged for reference.

Cotton has been received for examination from the following countries:—Sudan, British East Africa, Uganda, Nyasaland, the Transvaal, Orange River Colony, Natal, Cape Colony, Gambia, Sierra Leone, Gold Coast Colony, Southern Nigeria, Northern Nigeria, India, Ceylon, Mauritius, St. Helena, Federated Malay States, Grenada, Barbados, St. Vincent, Trinidad, British Guiana, British Honduras, Mozambique, Java, and New Caledonia.

The results of the examination of cotton are briefly summarised in the following paragraphs:—

1906:

Sudan.—Two samples, one ginned and the other unginned, from the Bahr-el-Ghazal were similar to Peruvian cotton, but contained a quantity of short fibre.

East Africa Protectorate.—Thirteen samples were examined, comprising nine Egyptian, two American and two Sea Island varieties. The Egyptian cottons were valued at 2½*d.* to 3½*d.* per pound less than "fully good fair" Brown Egyptian, the American at 50 points less than "middling American," and the Sea Island at 1½*d.* to 3½*d.* per pound less than "fancy" Florida Sea Island. The Egyptian varieties were probably the most promising. In many of the samples there were insect pests of *Oxycaenus sp.*, and some small grubs were found alive in the seeds.

Uganda.—A sample of Egyptian cotton grown at Entebbe was examined. It was of the "Abassi" type, but rather rough, and worth $7\frac{1}{2}d.$ to $7\frac{3}{4}d.$ per pound when "good" Abassi was quoted at $9\frac{1}{2}d.$ per pound.

Transvaal.—Twenty-seven samples of cotton grown in the Zoutpansberg district were examined. Twenty-one were of improved American Upland type, four were Egyptian and the remaining two Sea Island varieties. The American Upland cottons were the most satisfactory; they were generally of excellent quality, and were valued at from $5.75d.$ to $8.25d.$ per pound, with "middling" American at $6.08d.$ per pound. The Egyptian cottons were of the "Mitaffi" type, of promising quality, and worth from $7\frac{3}{4}d.$ to $8\frac{1}{2}d.$ per pound, "good" Brown Egyptian at $8\frac{1}{2}d.$ per pound. The Sea Island variety was of fairly good quality, and was regarded as worth $9d.$ per pound, with "fancy" Georgia Sea Island at $10\frac{1}{2}d.$ per pound.

Four samples were examined which had been grown in Swaziland; they were stated to consist of the residue left on the bushes after the first picking. All the samples were of useful quality.

British West Africa. Thirty-one samples were received; one from Southern Nigeria (Lagos) was examined and valued, whilst one from the Gambia, and twenty-nine from the Gold Coast were added to the reference collection.

The cotton from Southern Nigeria was of the Sea Island variety; it was of promising quality and worth $10d.$ to $11d.$ per pound, with "fancy" Florida Sea Island at $13d.$ per pound.

India.—A sample of unginned cotton grown in the Singbhum district of Bengal was short and harsh, but of satisfactory quality. It was valued at $3\frac{3}{4}d.$ per pound, with "fine" Bengal at $4\frac{1}{2}d.$ per pound.

Grenada.—Two samples of ginned cotton grown in Carriacou were examined. One was of "Sea Island" character, of good quality and worth $10d.$ to $10\frac{1}{2}d.$ per pound, with "fancy" Florida Sea Island at $13d.$ per pound. The second sample, consisting of "Marie Galante" cotton, was of Peruvian type and was valued at $7d.$ to $7\frac{1}{2}d.$ per pound, with "good" moderately rough Peruvian at $7\frac{3}{4}d.$ per pound.

Barbados.—Six samples were added to the reference collection.

St. Vincent.—Fourteen samples of ginned Sea Island cotton were examined and found, in the majority of cases, to be of excellent quality, highly lustrous and uniform in colour. It was pointed out that some of the samples had been stained by oil from crushed seeds, and it was recommended that the gins should be more carefully adjusted.

British Honduras.—A sample of unginned Sea Island cotton grown at the Corozal station, was examined. It was found to

be stained, immature, and greatly deteriorated, and nominally worth about 8*d.* per pound, with "fancy" Florida Sea Island at 12*d.* per pound. It was suggested that better results might perhaps be obtained by the cultivation of American Upland or Egyptian cottons.

Mozambique.—Three samples of ginned cotton were examined; two were probably native varieties, but were not unlike Egyptian cotton. The third sample, a brown Egyptian variety, was the most satisfactory; it was very clean, soft and of good colour. The first two were sold at 6*d.* and 7½*d.* per pound, and the third at 9*d.* per pound, with "fully good fair" brown Egyptian at 9½*d.* per pound.

Java.—Two samples of ginned brown Egyptian cotton were examined and found to be of good useful quality, but not equal to a standard sample of brown Egyptian cotton with which they were compared.

1907.

Sudan. Two samples of ginned and eight samples of unginced cotton were examined. They comprised American Upland, Sea Island, Egyptian, Caravonica and native varieties. The American cottons were of very good quality and were valued at prices higher than those current for "middling" American cotton. The other specimens, although not equal in value to standard samples, were of promising quality, and would be readily saleable.

Uganda.—Two samples of Caravonica cotton of the so-called "silk" variety, and one sample of "Black Rattler" American cotton were examined. The Caravonica cotton was of very good quality, similar to Egyptian Abassi, and was valued at 9½*d.* to 10*d.* per pound, with "good" Abassi at 14½*d.* per pound. The American cotton which had been grown in the Chiole district, though rather harsh and woolly, was worth about ½*d.* per pound more than "middling" American cotton.

Nyasaland.—Thirty-nine samples of cotton, twenty-two ginned and seventeen unginced, which were examined, included American Upland, Sea Island, Egyptian and native varieties. There was a great variation in the quality of the material, the same variety of cotton grown on different estates showing widely different qualities. Many of the samples were stained and showed signs of the attack of insect pests. It was considered that on the whole the cottons were of very promising quality, and that with greater care in cultivation and the adoption of preventive measures against the attacks of insect pests, it would be possible to grow very good, marketable cotton, both American and Egyptian, in Nyasaland. Three additional samples were added to the reference collection.

Transvaal.—Forty-three samples of cotton were examined; fifteen were stated to have been badly picked, fifteen were

“ratooned” cottons, and the remaining thirteen samples had been picked from the plants of the first year, grown on land which had been twice irrigated. The varieties included American, Sea Island, Egyptian and Indian. The American cottons were the most promising and were valued at 5*d.* to 7.75*d.* per pound, with “middling” American at 5.66*d.* per pound. The other specimens were fairly satisfactory, but not equal to standard samples of the corresponding varieties.

Orange River Colony.—A sample of unginned cotton grown from improved American seed was examined. It was of very good quality but slightly immature, and was valued at 5½*d.* to 6½*d.* per pound, with “middling” American at 6.18*d.* per pound.

Natal.—Twenty-eight samples of ginned cotton were received from Natal, comprising American, Sea Island, Egyptian and “kidney” varieties. The improved American cottons were the most satisfactory, being valued at from 5½*d.* to 11*d.* per pound, with “middling” American at 7.40*d.* per pound. As many of the samples contained stained and immature cotton, the adoption of improved methods of cultivation and harvesting, as well as preventive measures against the ravages of insect pests, were especially recommended.

Cape Colony.—Two samples of cotton were received for examination. One, which had been grown in Griqualand West, was found to be a mixture of Sea Island and brown Egyptian cotton; it was of fair quality and was valued at about 9½*d.* per pound, with “fully good fair” brown Egyptian at 10½*d.* per pound. The advisability of keeping the different varieties distinct was specially pointed out. The second sample, which had been grown at Port Elizabeth, consisted of Sea Island cotton of promising quality, and was valued at 12*d.* per pound, with “fancy” Florida Sea Island at 18½*d.* per pound.

British West Africa.—Seventy-six samples were examined, of which one was grown in the Gambia, two in Sierra Leone, thirteen in the Gold Coast, thirty-one in Southern Nigeria and twenty-nine in Northern Nigeria, as follows:—

Gambia.—A sample of unginned native cotton which was examined was found to be of fairly good quality and somewhat similar to American cotton. It contained a quantity of stained fibre and was valued at 7*d.* per pound, with “middling” American at 7.40*d.* per pound.

Sierra Leone.—Two samples of unginned “Quondi” cotton were found to be of good quality and similar to Indian cotton. They were valued at 5½*d.* and 5¾*d.* per pound, with “good” Broach at 5¾*d.* per pound.

Gold Coast.—Thirteen samples of unginned cotton received from the Gold Coast, comprised American, native and hybrid varieties. The cotton was of very good quality, certain

samples being valued at $6\frac{1}{2}d.$ to $7\frac{1}{2}d.$ per pound, with "middling" American at $6\frac{6}{8}d.$ per pound.

Southern Nigeria.—Eight samples of ginned cotton, grown on the Moor Plantation, Lagos, were examined. They consisted of native and hybrid varieties of good quality and of a little higher commercial value than "middling" American cotton.

Sixteen samples of ginned cotton from the Government Plantation at Oloke-Meji had apparently been grown from American seed, with the exception of one native or "khaki" cotton. The American varieties were of very good quality and were valued at from $6\frac{3}{8}d.$ to $7\frac{1}{2}d.$ per pound, when "middling" American was quoted at $6\frac{6}{8}d.$ per pound.

Seven samples, consisting of American, native and hybrid varieties were examined and found to be of good marketable quality.

Eighteen additional samples were added to the reference collection.

Northern Nigeria.—The twenty-nine samples of cotton examined had been grown in various provinces. They comprised American, Egyptian, Brazilian and native varieties. The cotton was generally of promising quality, although some of the samples were much stained. The American cottons were valued at from $5\frac{1}{2}d.$ to $7\frac{1}{2}d.$ per pound, with "middling" American at $6\frac{3}{8}d.$ per pound. The native varieties were also of good value, but the Egyptian and Brazilian cottons were of poor quality and not likely to repay cultivation.

One additional sample was added to the reference collection.

India.—A sample of long-stapled cotton grown at Deesa, Bombay, was examined. The cotton was rather rough but of good quality and somewhat similar to an American Upland cotton.

A sample from the Singbhum district of Bengal was of very satisfactory quality and worth about $6d.$ per pound, with "fine" machine-ginned Broach at $5\frac{1}{8}d.$ per pound.

Six samples of long-stapled cotton from Burma and Bengal were examined and found to be of promising quality and about equal in value to "middling" American cotton.

Three samples of Caravonica cotton from Madras were of excellent quality and were valued at from $12d.$ to $14d.$ per pound, with "good" Abassi at $14\frac{7}{8}d.$ per pound.

Seven samples of cotton from Poona, Bombay, were examined and found to be of poor quality; they were valued at from $3d.$ to $4\frac{1}{2}d.$ per pound, with "middling" American at $7\frac{1}{8}d.$ per pound.

Forty additional samples of cotton, sixteen samples of cotton-soil, and a large number of herbarium specimens were added to the reference collection.

Burma.—Two samples were added to the reference collection.

Ceylon.—Three samples were added to the reference collection.

Mauritius.—Twelve samples of unginned cotton were examined; of these, two were of the Sea Island variety, three were Egyptian Mitafifi, and seven were American Upland cottons. The samples were of fair quality, but in some cases appeared to have been grown from mixed seed, and were consequently of low commercial value.

St. Helena.—One sample was added to the reference collection.

Federated Malay States.—A sample of cotton, stated to be an Egyptian variety, was examined and found to be harsh but of good colour and length. It approached a Peruvian type in character, and was valued at 8*d.* per pound, with "good" moderately rough Peruvian at 8*35d.* per pound.

Trinidad.—A sample of improved American "Sunflower" cotton was soft and silky and of very good quality. It was valued at 10*d.* per pound, when "middling" American was quoted at 7*18d.* per pound.

British Guiana.—Eighteen samples of ginned cotton of different varieties were examined. They comprised American, Sea Island, Egyptian, Peruvian, Caravonica and native cottons. These samples were of very promising quality and were valued at prices generally equal to, if not higher than, those of standard samples of similar varieties with which they were compared.

Mozambique.—Two samples of ginned cotton of brown Egyptian variety were found to be of fairly good quality but uneven in colour, and worth, respectively, 6*d.* and 6½*d.* per pound, when "fully good fair" brown Egyptian cotton was 10¼*d.* per pound.

New Caledonia.—Two very small samples of ginned cotton were examined; one was stated to be a native variety and the other American Upland. The samples appeared to be of promising quality, but they were too small for valuation.

At the end of the year, 30 samples of cotton from Asia Minor and one sample from Turkey remained under investigation.

Jute and Similar Fibres.

1906.—In continuation of the endeavours which are being made to establish a fibre industry in Sierra Leone, specimens of the fibres of *Hibiscus quinquelobus*, *H. lasiocarpus*, *H. esculentus* and *Honckenya ficifolia* were examined, together with a sample of a fibre termed "Borfroko," the botanical identity of which is at present unknown. The fibre of

Hibiscus quinquelobus ("Kowe" or "Corwey" fibre) has received particular attention in Sierra Leone owing to the facility with which it can be prepared. The sample examined was of good quality and resembled jute in its chemical composition and behaviour. The specimen of *H. esculentus*, although of promising character, was weak and of inferior length. This sample had been collected after the second series of fruits had been gathered. It was suggested that samples should be collected at different ages and submitted for examination in order that the best period for the extraction of the fibre could be ascertained, and this is being done. *Honckenya ficifolia* ("Napunti") grows abundantly in the swamps of the Sierra Leone Protectorate, and would yield a constant supply of fibre if care was taken in cutting it. It has been stated, however, that considerable difficulty is experienced in extracting the fibre, especially in the case of the older plants, and it has therefore been recommended that experiments should be carried out with the object of determining whether the fibre can be more successfully prepared from young plants. A sample of *Honckenya ficifolia* fibre was also received from the Gold Coast, but had been imperfectly cleaned, and was consequently of little value.

All these fibres, after examination, have been referred to manufacturers and commercial experts, and recommendations made to the authorities in the Colony as to further action.

Fibres of the jute class from the Sudan, Gambia and Mexico were also examined and reported on.

1907.—One of the most important fibre investigations carried out during 1907 was in connection with the Nyasaland fibres, known locally as "Denji" and "Nzonogwe," derived from *Sida rhombifolia* and *Triumfetta rhomboidea*, respectively. The fibres were found to be of useful quality. Three bales of the material which were forwarded for technical trials were submitted to a firm of spinners, who found that the fibres could be spun into very fair yarns, which could be utilised for the manufacture of bagging. The fibres were considered to be about equal in value to the medium grades of jute.

A consignment of about 1½ tons of "Kowe" (*Hibiscus quinquelobus*) fibre was received from Sierra Leone. The product was too coarse and harsh to be employed as a jute substitute, but realised £17 to £18 in the London market, for use in rope manufacture. A sample of "Napunti" (*Honckenya ficifolia*) fibre also forwarded from Sierra Leone, consisted of coarse, brown, bast ribbons, and it was stated that this represented the only form in which the natives could prepare the fibre. The material was only suitable for use as a paper material, and its collection and exportation for this purpose would probably be unremunerative.

A specimen of *Triumfetta semitriloba* fibre of excellent quality was received from the Gold Coast, and was valued at £35 per ton (with finest Bengal jute at £35 to £40).

Samples of jute were forwarded from the Gambia and from Northern and Southern Nigeria and furnished conclusive evidence that jute of excellent quality can be grown in West Africa if other conditions are favourable to the industry. The two samples from the Gambia were valued at £21 and £28, whilst the Northern Nigeria specimens were valued at £22 and £24 per ton. The samples from Southern Nigeria were very weak and in a matted and tangled condition, and worth not more than a few pounds per ton for use as tow. This bad result was probably due to over-retting.

Other jute-like fibres included those of *Hibiscus tiliaceus*, *H. quinquelobus*, *H. rostellatus* and *Urena lobata* from the Gambia, *Hibiscus esculentus* and *H. lunariifolius* from Southern Nigeria, *H. cannabinus* from Uganda, *H. radiatus* from Brazil, and *Hibiscus* sp. and *Urena* sp. from India.

A sample of jute from Southern Nigeria was under investigation at the close of the year.

Plantain and Banana Fibres (Musa spp.).

1906.—Fibres of *Musa* spp. were examined from Southern Nigeria, British East Africa, the Straits Settlements and Abyssinia. The samples from Southern Nigeria and the Straits Settlements had not been well prepared, but were of promising quality. The fibre of *Musa malaccensis* from the latter country was regarded as a useful fibre, and if carefully prepared and of good strength would be worth £41-£42 per ton. Four samples of wild banana fibre from British East Africa were of good quality and value, two of them being considered worth £45 to £46 and £48 to £50 per ton, respectively. These products were comparable with the best grades of Manila hemp, and would be readily saleable for rope making.

1907.—Specimens of plantain and banana fibres from the Gold Coast were of good quality but rather weaker than Manila hemp, and were valued at £40 and £36 per ton, respectively. A sample of native fibre from Rhodesia, evidently derived from *Musa* sp., was short and rather lacking in lustre, but if improved in these respects would probably be able to compete with fair or good Manila hemp at about £44 per ton. Samples of less value were received for examination from Lagos and Ceylon.

"Aloe" Fibres (Agave, Sansevieria and Furcraea).

1906.—Among the fibres of this class, attention was principally directed to the "bowstring" hems (*Sansevieria* spp.), samples of which were received for examination from British East Africa, Sierra Leone, Lagos and the Sudan. Attempts have been made during the last two or three years

to develop a fibre industry in British East Africa, an account of which has been given in the "Bulletin of the Imperial Institute." (1907, V, 24.) The fibre which is being produced in the greatest quantity is that of *S. Ehrenbergii*. Specimens of this fibre which were examined showed that the product was of a useful character, and worth £24 to £28 per ton. This fibre shows a marked variation in the diameter of the strands or filaments, the fibre from the interior of the leaf being fine whilst that from the more external parts is very coarse. A sample of *S. Volkensii* was valued at £28 per ton, and was regarded as readily saleable. Samples of *S. guineensis* were valued at about the same prices as those of *S. Ehrenbergii*, but would have been worth a good deal more if they had been more carefully prepared.

Some excellent specimens of *S. guineensis* fibre were received from Sierra Leone, and were valued at from £28 to £40 per ton. Two small specimens of the fibre of the same plant were forwarded from Lagos, but were badly prepared and of uneven length. It was evident, however, that by careful preparation a product of useful quality could be obtained. Two samples of *S. guineensis* fibre from the Sudan were imperfectly prepared, but were sufficient to indicate that with greater care a good fibre could be obtained.

Other fibres of this class included specimens of Sisal hemp from Sierra Leone, *Furcræa* fibre from Sierra Leone, Southern Rhodesia and St. Helena, and *Dracæna* fibre from Sierra Leone and the Gold Coast.

1907.—A specimen of *Sansevieria guineensis* fibre from Sierra Leone was found to be well cleaned, of good colour and worth £31 per ton. Samples of the fibre of *S. Ehrenbergii*, *S. sulcata*, *S. Stuckyi*, and of an unknown species from British East Africa were examined, that of *S. sulcata* being valued at £25 to £30 per ton. *Sansevieria* fibres were also received from Rhodesia and Uganda.

Samples of *Furcræa gigantea* fibre (Mauritius hemp) were received from India, Natal, British East Africa, Uganda and St. Helena. The specimen from India was of somewhat uneven length and colour and was valued at £27 to £28 per ton, whilst that from Natal was of good colour but rather weak. The East African and Uganda samples were incompletely prepared, and worth £22 to £23, and £25 to £25 10s. per ton, respectively. The specimen from St. Helena was of unusual length (average six feet), and was worth £25 to £27 per ton, but would have been more valuable if better cleaned.

A specimen of *Agave rigida* fibre (sisal hemp) from India was of excellent length and colour and of fair strength, and was regarded as worth about £36 to £38 per ton. A sample of this fibre from British East Africa was valued at the current price of Mexican sisal (£34 to £35 per ton). A specimen of the fibre of *Agave americana* from India was of pro-

missing quality but somewhat imperfectly cleaned, and was valued at £27 to £28 per ton.

At the end of the year, a sample of *Sansevieria* fibre from Sierra Leone remained under investigation.

New Zealand Hemp (Phormium tenax).

1906.—A sample of *Phormium tenax* fibre from St. Helena was examined and found to be of good length and colour and of fair strength. The product had been somewhat injured in the process of preparation, some of the strands having been crushed and weakened, but otherwise was of excellent quality and readily saleable.

1907.—Phormium fibre from St. Helena was further examined in connection with the question as to the creation of a local "flax" industry. The specimen had not been very well cleaned, and was about equal to "fair" New Zealand hemp, and worth about £32 to £33 per ton. Circumstances being apparently favourable to the establishment of such an industry, it was recommended that an expert from New Zealand should be asked to proceed to St. Helena and advise as to the steps which should be taken.

Samples were also received for examination from Ireland and Buenos Ayres. An article on "New Zealand Hemp" was published in the "Bulletin of the Imperial Institute." (1907, V, 36.)

Paper-making Fibres.

1906.—A consignment of the sheathing leaves of *Musa textilis* from India was examined and found to be suitable for paper making locally, but probably not of sufficient value to export for the purpose. Other products examined were the leaves of *Hypoxis rigidula* and the stem of *Vellozia retinervis* from the Transvaal, and the fibre of *Broussonetia papyrifera* from Turkey.

1907.—Specimens of a native grass and palm leaf from North-Western Rhodesia, of a bulrush and "palmiet" plant from Cape Colony, and of "Napunti" bark from Sierra Leone were examined with the object of ascertaining their value for paper making. It is doubtful whether any of these materials could form the basis of a remunerative paper-making industry, under present conditions.

Flosses or Silk-Cottons.

1906.—Samples of "kapok," the seed-hairs of *Eriodendron anfractuosum*, were received from Madras, Lagos and Madagascar. The Indian product was of good quality, but contained a good deal of seed. It was regarded as worth 4½d. a pound, but if free from seed would have been worth 6½d.

per pound. The specimen from Lagos was inferior in colour to ordinary commercial "kapok," whilst the Madagascar sample was equal to a standard specimen from Java. A specimen of a silk-cotton (probably derived from *Bombax buonopozense*) from Uganda was equal in quality to a standard sample of "kapok." Among other specimens examined may be mentioned the floss of *Funtumia elastica* from West Africa. This product, however, is of little value, and is regarded as nominally worth about 1*d.* per pound.

1907.—A specimen of "kapok" from Mauritius was of inferior colour and lustre, and was valued at 4½*d.* to 5*d.* per pound. Other flosses examined included those of *Bombax malabaricum* from Burma and *Calotropis* spp. from India and from Fernando Po.

Ramie Fibre (Boehmeria nivea).

1906.—Specimens of ramie were received for examination from Cyprus, North-Eastern Rhodesia, East Africa Protectorate and Argentina. The Cyprus sample consisted of ribbons of unprepared bark, nominally worth about £10 per ton. The samples from Rhodesia were of promising quality, but were not suitably prepared for the market. Those from the East Africa Protectorate consisted of six specimens of flasse prepared by different processes and were examined particularly with reference to their relative strength.

In view of the uncertain market for this material it has been recommended that cultivation should be undertaken with caution.

1907.—Specimens of ramie were examined from Natal, Mozambique and Buenos Ayres. The Natal product consisted of ribbons of bark; it was of good quality, but was not in the condition in which ramie is usually met with in the market. A sample from British East Africa was under investigation at the end of the year.

Flax.

1906.—A sample of flax straw from the Transvaal was examined and found to be short, much branched and of no value as a source of flax fibre. Several samples from Broussa, Turkey, were also examined.

1907.—Samples were received from the Orange River Colony, East Africa Protectorate, Cyprus and Bengal. The sample from the Orange River Colony had been over-retted. It was of poor quality and was regarded as of no commercial value. The East African flax had also been over-retted, but was stated to be quite saleable as "codilla," and worth about £26 per ton. The samples received from Cyprus had not been perfectly prepared. The product was therefore regarded as worth only about £10 per ton. The Bengal flax had not

been retted, but it appeared to be of very promising quality and likely to repay cultivation.

A further sample from Cyprus was under investigation at the close of the year.

Silk.

1906.—A sample of silk waste from Broussa, Turkey, was found to consist of the inner portions of cocoons; it was found that the material would be suitable for the manufacture of "spun silk."

1907.—Samples of silk from Uganda, the Transvaal and Ceylon, were reported on.

Several samples of a new variety of silk received from Uganda consisted of nests or colonies of cocoons formed by silk-worms of *Anaphe* sp. The material obtained from the cocoons and from their silky coverings was found to be suitable for the manufacture of spun silk. The cocoons were too small and too loosely constructed to be suitable for reeling.

Two samples of cocoons spun by the true silk-worm, *Bombyx* spp., from the Transvaal were of very promising quality, and were regarded as being worth 3s. to 3s. 6d. per pound.

A sample of Tussur silk cocoons probably spun by the silk-worm, *Attacus ricini*, were received from Ceylon. The silk was of good quality and worth about 1s. per pound.

At the end of 1907, samples of a new variety of silk of *Anaphe* sp. from Northern and Southern Nigeria were under examination.

Wool.

1906.—Three samples of wool "tops" were received from the Bradford Technical College and were reported on with special reference to their comparative strengths.

Five samples of "greasy" wool from British East Africa were found to be somewhat inferior in quality and to contain a large amount of "kemps" or dead hairs.

Miscellaneous Fibres.

1906.—A number of fibrous products were received for examination from the Transvaal, including the bulb of *Buphane disticha* (the "gift bol"), the leaves of *Sansevieria elhiopica*, which contain a fine but rather short fibre, the bark of *Asclepias fruticosa*, the bulb of *Hypoxis rigidula*, and the leaves of *Helichrysum* sp.

A fibrous material derived from a marine plant, *Posidonia australis*, from South Australia, and a sample of *Raphia* bass from Sierra Leone were examined. Specimens of coir fibre from Sierra Leone were reported on, and a memorandum was

forwarded to the Colony describing the methods of preparing the fibre for export.

1907.—A small consignment of the fibre of *Asclepias semilunata* ("Kafumba" fibre) was received from Uganda. This product was of excellent quality and strength and contained a very large proportion of cellulose (88·1 per cent.). It would be useful for the manufacture of rope and twine and would be readily saleable in large quantities at about £28 to £33 per ton.

Fibrous material from *Securidaca longepedunculata* ("Buaze" fibre) of Nyasaland was investigated. The product was found to contain a useful fibre, which, however, could not easily be freed from the gummy matters associated with it. It was recommended that attempts should be made locally to extract the fibre in a clean condition from the fresh material.

Other samples examined included pineapple fibre from the Gold Coast, bark-cloth from Uganda, various fibrous materials from Southern Nigeria, *Orthanthera viminea* from India, the bark fibre of *Acacia cyanophylla* from Natal, and *Xanthorrhiza Preissii* from Western Australia.

RUBBER.

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples under investigation at the end of 1907.	No.
India	2	India	6	India	3
Federated Malay States.	17	Federated Malay States.	1	Sierra Leone ...	10
Sierra Leone ...	13	Gambia	1	Gold Coast ...	11
Gold Coast ...	7	Sierra Leone ...	9	Southern Nigeria	5
Southern Nigeria	2	Gold Coast ...	26	Portuguese East Africa.	15
Senegal	1	Southern Nigeria	3	Rhodesia... ..	1
Liberia	3	Northern Nigeria	1	Jamaica	1
Sudan	15	Portuguese West Africa.	1	British Guiana ...	20
Abyssinia... ..	4	East Africa Protectorate.	3		
Uganda	5	Portuguese East Africa.	2		
Portuguese East Africa.	1	Natal	2		
Natal	2	Cape Colony ...	4		
Rhodesia	1	Transvaal	3		
		Rhodesia	2		
		Trinidad... ..	25		
		Formosa... ..	1		
Total... ..	73	Total... ..	90	Total... ..	66

A large number of specimens of rubber have been investigated in order to determine their intrinsic and commercial

value, to throw light on obscure points connected with their preparation, or as a basis for deciding questions as to the cultivation of the plants which furnish them.

1906.

India.—Samples of the rubber of *Cryptostegia grandiflora* and *Parameria glandulifera* were reported on during 1906.

The *Cryptostegia grandiflora* rubber was forwarded from Bombay, where the plant is stated to be very common. Specimens of this rubber from Madras and the Central Provinces had been previously examined at the Imperial Institute. The rubber from Bombay was found to be of very fair quality, although contaminated with earthy matter. There is no doubt that carefully prepared consignments of the rubber would be readily saleable (see "Bulletin of the Imperial Institute," 1907, V., 371).

The *Parameria glandulifera* rubber from the Andaman Islands was briefly referred to in the report for 1905 in connection with the similar samples from Burma. The rubber was of good quality judging from its chemical composition, but its value was depreciated by the external stickiness of the balls, probably caused by overheating during preparation or in transit (see "Bulletin of the Imperial Institute," 1907, V., 14).

Federated Malay States.—Sixteen samples of Para rubber (*Hevea brasiliensis*) which had been specially prepared in the Federated Malay States were reported on. The rubbers showed a very high degree of purity, the percentages of true caoutchouc ranging from 92.64 to 96.35 per cent. Four of the specimens contained over 95 per cent. of caoutchouc and seven others between 94 and 95 per cent. of this constituent (see "Bulletin of the Imperial Institute," 1907, V., 246).

A specimen of diseased bark from Para trees in the Federated Malay States was also examined, and suggestions were made for further action on the spot.

Sierra Leone.—The rubbers from this Colony reported on in 1906 included "Jenje," "Gbogboi," and "Njawa" rubbers, and ten samples of *Landolphia* rubbers.

The "Jenje" rubber is derived from a vine know as Poré, which has not been identified with certainty. From botanical specimens accompanying the rubber, the plant appears to be a *Landolphia* very near *L. owariensis*, Beauv. The rubber is of good quality.

The "Gbogboi" rubber was obtained in the Panguma district, and was of considerable interest, as the leaves which accompanied the specimen appeared to belong to *Funtumia elastica*, Stapf, the well-known Lagos rubber tree, the presence of which in Sierra Leone had not been definitely recorded. This determination has since been confirmed, and

the fact that *Funtumia elastica* is indigenous in the country is of considerable importance in connection with rubber planting in Sierra Leone. The sample of "Gbogboi" rubber submitted was rather sticky and contaminated with vegetable impurities, but carefully prepared specimens would be of good quality and readily saleable at satisfactory prices.

The "Njawa" rubber is of inferior quality on account of the large amount of resin (22 per cent.) which it contains. The botanical source of this rubber is uncertain (*see* "Bulletin of the Imperial Institute," 1906, IV., 29).

Ten samples of *Landolphia* rubber were specially prepared by the Curator of the Botanic Station in Sierra Leone in order to demonstrate that the quality of the rubber could be greatly enhanced by the adoption of improved methods of preparation.

The results of the chemical examination and valuation of the samples show that the rubber prepared in sheets or "biscuits" will realise much better prices than the same rubber made into balls by the usual native process. This conclusion confirms the results of similar experiments on the preparation of *Landolphia* rubber which have been conducted in other parts of tropical Africa.

Gold Coast.—The seven samples from the Gold Coast which were reported on in 1906 included specimens of the following rubbers: (1) Ceara rubber from *Manihot Glaziovii*; (2) Assam rubber from *Ficus elastica*; (3) "Memleku" rubber from *Ficus Vogelii*; "Krepi" ball rubber from *Landolphia owariensis*; and (5) Ofruntum rubber from *Funtumia elastica* (*see* "Bulletin of the Imperial Institute," 1907, V, 248).

The Ceara rubber was in the form of "scrap," and was found to be of very fair quality.

The *Ficus elastica* rubber, which was also in the form of "scrap," contained a little more resin than is desirable (11.6 per cent.), but was otherwise of good quality.

The "Memleku" rubber from *Ficus Vogelii* is of very resinous character, the two samples examined containing 44 per cent. of this constituent. The rubber is, therefore, of inferior quality, and would only realise a comparatively low price.

The "Krepi ball" rubber from *Landolphia owariensis* was of very good quality, containing over 91 per cent. of caoutchouc and only small quantities of resin and proteids.

The two samples of "Ofruntum" rubber from *Funtumia elastica*, prepared in "biscuit" form, were both of good quality, and the valuation obtained for one of them was almost equal to the current quotation for fine hard Para rubber from South America.

Southern Nigeria.—A specimen of *Funtumia elastica* rubber was examined and found to be of very fair quality, though capable of considerable improvement by better preparation.

Botanical specimens of a rubber plant were also submitted for identification.

Senegal.—A sample of *Landolphia Heudelotii* rubber prepared at the Rubber School of Banfora, Upper Senegal-Niger, was received from His Majesty's Consul-General at Dakar through the Foreign Office. The rubber was very well prepared and of good quality.

Liberia.—Three "lump" rubbers from Liberia were examined. They were found to be satisfactory in composition and in physical properties, but possessed very objectionable odours. These rubbers could be greatly improved by more careful preparation.

Sudan.—In continuation of the work in connection with the rubber resources of the Bahr-el-Ghazal, 15 samples of rubber from that province were reported on during 1906. The specimens represented the rubber of *Landolphia owariensis* var. *tomentella* prepared in "biscuits," cakes, and scrap. The results of the examination fully confirm the high opinion which had been previously formed of the quality of this rubber. Some of the "biscuits" were valued by brokers in London at the same price as Para "biscuits" from Ceylon and the Federated Malay States.

Abyssinia.—Four samples of rubber from Abyssinia were received through the Sudan Government. The rubber is of very fair quality, although the percentage of resin in all the samples is a little high; if carefully prepared it would be readily saleable. This rubber is derived from a species of *Landolphia* which has not been definitely identified.

Uganda.—Specimens of the rubbers of *Funtumia elastica*, *Clitandra orientalis* and *Landolphia Davei* from this Protectorate were reported on in 1906 (see "Bulletin of the Imperial Institute," 1906, IV, 202).

All the samples were well prepared and exhibited good physical properties. In consequence high valuations were obtained, the prices quoted being only a little below the current values of Para "biscuits" from Ceylon and the Federated Malay States.

Portuguese East Africa.—A small specimen of rubber, described as Ceara, from this territory was examined and found to be of good quality.

Natal.—A small consignment of "Ibungu" rubber derived from *Landolphia Kirkii* in Natal was received, and after analysis which showed it to be of good quality, it was sold in London at a very satisfactory price.

A succulent root supposed to contain rubber was also examined.

Rhodesia.—A rubber-like material, the botanical source of which was unknown, was examined and found to be very resinous and of little commercial value.

1907.

India.—The rubbers from India reported on in 1907 included specimens derived from (1) *Ficus elastica*, (2) *Hevea brasiliensis*, (3) a climber from Central India, and (4) a species of *Euphorbia*.

Two samples of *Ficus elastica* rubber from the Kulsu plantation were both found to contain a rather high percentage of resin. One of them was otherwise of satisfactory quality, and consignments of similar character would be readily saleable; the other specimen was soft, sticky and rather weak, and would therefore be difficult to sell.

A specimen of *Ficus elastica* rubber collected by natives in Northern Arakan was also received. It was very impure, and a better specimen has been requested.

An excellent sample of Para rubber was forwarded from the Mergui plantation. It contained 95·2 per cent. of caoutchouc, 1·6 per cent. of resin, and 2·4 per cent. of proteid. In composition and physical properties this rubber compares favourably with Para rubber from Ceylon and the Federated Malay States (see "Bulletin of the Imperial Institute," 1907, V, 371).

The rubber obtained from a climbing plant in Central India was found to contain rather high percentages of resin and mineral impurity. This rubber may possibly have been derived from *Cryptostegia grandiflora*.

A resinous material, possibly derived from a species of *Euphorbia*, was examined and found to be of no commercial value.

Federated Malay States.—A special sample of gutta percha prepared by tapping the standing trees was forwarded by the Conservator of Forests in the Federated Malay States and Straits Settlements. The material was found to be of excellent quality, containing a higher percentage of "gutta" than is usually present in the better grades of gutta percha which appear in commerce.

Gambia.—A specimen of *Ficus Vogelii* rubber from this Colony was found to contain less resin than samples from other parts of West Africa previously examined at the Imperial Institute. A larger sample of the rubber has been requested for technical trials.

Sierra Leone.—Five samples of rubber collected in the Gola Forest were examined. Four of them were of very promising quality, and if carefully collected and prepared the rubber

would command satisfactory prices in the market. The fifth specimen contained a large amount of resin, which would reduce its value. No information is available regarding the identity of the plants from which these rubbers were obtained, but botanical specimens have been asked for.

Further samples of Landolphia rubbers and of *Funtumia elastica* rubber were also submitted.

A comparative examination of Landolphia rubber prepared (1) in sheets by an improved method, and (2) in balls by the ordinary native process, again showed that the former would realise the best price.

Two specimens of *Funtumia elastica* rubber in biscuits were examined and shown to be of good quality, containing 90.5 and 91.2 per cent. of caoutchouc, respectively.

Gold Coast.—A series of 21 samples of *Funtumia elastica* rubber prepared in "biscuit" form was forwarded from Ashanti. With two exceptions the specimens were of very promising quality, and the valuations obtained showed that the rubber in this form would realise much higher prices than the ordinary native lump rubber.

Four other samples of *Funtumia* rubber, and one specimen of *Ficus Vogelii* were also dealt with during the year.

The *Funtumia* rubber was prepared by different methods, including the use of an infusion of the leaves of *Bauhinia reticulata* for coagulating the latex. They were all of good quality, and very satisfactory valuations were obtained for them. The use of a hot infusion of the leaves of *Bauhinia reticulata* for coagulating *Funtumia* latex appears to give very good results. The infusion is acid and contains tannin, of which 8 per cent. is present in the dry leaves. It seems probable that the tannin is the active coagulating agent as it has been found that solutions of gallo-tannic acid and infusions of astringent materials such as the pods of *Acacia arabica* exert a similar action. This method of preparing *Funtumia* rubber promises to yield very satisfactory results, as it entirely obviates the necessity of applying heat directly to the latex.

The *Ficus Vogelii* rubber examined contained 35.6 per cent. of resin, which is rather less than was found in the two previous specimens from the Colony. A small consignment of this rubber has been asked for so that technical trials can be made.

Southern Nigeria.—Two samples of *Funtumia* rubber were forwarded but proved to be too small for chemical examination. Very satisfactory valuations were, however, obtained.

The latex from a species of *Mimusops*, probably *M. Djave*, has been investigated. The product obtained on coagulation is of resinous character and would have very little commercial value.

Northern Nigeria.—A sample of "Kano rubber," derived from *Ficus platyphylla* was forwarded from Katsena. It was found to be similar in composition to previous samples.

East Africa Protectorate.—A specimen of rubber obtained from a tree growing on the Shimba Hills was examined and found to be of very fair quality. The rubber could be improved by careful preparation as the sample contained a considerable amount of vegetable impurity. The tree yielding this rubber has since been identified as *Mascarenhasia elastica* K. Schum.

The rubber obtained from a vine growing in the country to the South of Kericho was of very fair quality, although the percentage of resin (11.6) was a little high. The identity of the vine which furnished this rubber is not known, but botanical specimens have been asked for with a view to its determination.

A small quantity of latex, stated to be derived from a species of Cactus growing in the Protectorate, was examined, but the product was very resinous and unsuitable for technical use.

Portuguese East Africa.—Samples of latex and of the coagulated product obtained from it were forwarded by His Majesty's Consul at Beira. The material was thought to resemble "gutta-percha" in properties, but no information was available regarding either its botanical or exact geographical source. The product consisted largely of resin and would have little, if any, commercial value.

South Africa.—A number of specimens of the latex and coagulated product obtained from different species of Euphorbia have been forwarded from Natal, Cape Colony, the Transvaal and Rhodesia. All the samples have proved to be of resinous character, and on that account it would be difficult to utilise them for any important technical purpose. The commercial value of such material would only be very low and would probably not repay the cost of collection and transit.

Trinidad.—Twenty-five samples of rubber from Trinidad have been examined. The collection included specimens of the rubbers of *Hevea brasiliensis* (Para rubber), *Funtumia elastica* and *Castilloa elastica* obtained from trees growing on lands belonging to the Botanical Department or on private estates.

The Para rubber is of very good quality, two specimens in "biscuit" form containing 94.9 and 92.7 per cent. of caoutchouc, respectively. Very satisfactory valuations were obtained for the samples.

Several of the samples of Castilloa rubber were of inferior quality on account of the large amounts of resin present. Two specimens from 7½-year old trees growing on lands

belonging to the Botanical Department contained 52 and 57 per cent. of resin, respectively. These percentages are very high for the product of 7½-year old trees, but it may be noted that the trees in question are stated to be of small growth owing to the fact that they have been outgrown by surrounding Para trees.

The *Castilloa* rubber from private estates was less resinous on the whole than the above specimens, for although one sample contained 37·2 per cent. of resin the amount present in the remaining specimens ranged from 15·6 to 23 per cent. Even these latter percentages are much higher than those usually recorded for *Castilloa* rubber from adult trees. It will be of interest to see whether the average percentage of resin in the *Castilloa* rubber obtained in Trinidad will diminish as the trees become older.

The single specimen of *Funtumia* rubber was of very fair quality.

In addition to the above specimens, samples of *Loranthus* rubber and of balata from Venezuela were included in the collection.

Formosa.—A specimen of the rubber obtained from a vine discovered in Formosa, and identified as *Ecdysanthera utilis*, was forwarded by His Majesty's Consul at Tamsui. It was found to be of good quality so far as chemical composition is concerned, and if carefully prepared would be readily saleable at satisfactory prices.

TIMBERS.

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples awaiting investigation at the end of 1907.	No.
Uganda	18	Southern Nigeria	26	Gambia	2
Foreign countries	1	Uganda	52	Sierra Leone ...	1
		East Indies ...	2	Rhodesia... ..	1
		West Indies ...	1	Sudan	10
				Mauritius	12
Total... ..	19	Total... ..	81	Total... ..	26

Uganda.—The 70 timbers received from this Protectorate in 1906 and 1907 were representative of the materials obtainable in the Mabira or Chagwe Forest and other parts of the Protectorate recently explored by the Forestry Officer of Uganda, and included a number of interesting woods, such as "African Blackwood" and several timbers which would be saleable as mahogany.

Southern Nigeria.—This set of 26 samples represented some of the chief woods obtainable in this Colony, and information was supplied regarding their working qualities and mechanical properties. A number of these timbers will be suitable for export to the United Kingdom if the cost of collection and transport does not prove to be too high.

East and West Indies.—The three timbers included in this group were samples of woods which were stated to cause skin diseases in operatives working with them. All three woods were found to contain interesting substances, which are still under investigation.

The samples awaiting investigation at the end of the year included mahogany and rosewood from the Gambia and a number of interesting hard woods from Mauritius and the Sudan.

The timbers received have been tested for their working qualities, and when suitable and sufficiently large specimens were received the timbers were also submitted to mechanical tests, so that their strength and other physical characters might be ascertained.

OILS AND OIL-SEEDS.

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples awaiting investigation at the end of 1907.	No.
Sudan	13	Sudan	8	Sudan	1
Uganda	1	British East Africa	1	Uganda	4
Rhodesia	1	Rhodesia... ..	9	Rhodesia... ..	2
Cape Colony	1	Gold Coast	1	Sierra Leone	3
Southern Nigeria...	3	Sierra Leone	1	Southern Nigeria	3
Northern Nigeria...	3	Southern Nigeria	7	Northern Nigeria	2
Hong Kong	2	Northern Nigeria	3	India	6
West Indies	1	India	4	Foreign countries	2
United Kingdom...	1	Ceylon	1		
		Source unknown	1		
Total... ..	26	Total... ..	36	Total... ..	23

In view of the scarcity of oils and fats suitable for soap manufacture during 1906-7, special attention was directed to the examination of vegetable oils.

1906.

Cape Berry Wax.—A sample of Cape berry wax, derived from a species of *Myrica*, was received for examination from Cape Colony. The properties of this substance indicated that it might be utilised for soap-making and possibly for the

manufacture of candles. The product was regarded as worth about 25s. per cwt., and a trial consignment was requested.

"Ikpan" Seeds.—A sample of "Ikpan" seeds, probably derived from a plant of the *Cucurbitaceae*, was received from Southern Nigeria. These seeds were found to yield an oil, which would probably be useful as an edible product, whilst the cake left after expressing the oil would be of value as a cattle food.

Seeds of Aleurites spp.—Specimens of the seeds of *Aleurites triloba* and *A. Fordii* were forwarded for examination from Hong Kong. The kernels of the former species were found to contain 60·8 per cent. of an oil which could be employed for the manufacture of soft soap or as a substitute for linseed oil for paints and varnishes. The kernels were valued at £12 to £13 per ton. It was recommended that the shells should be removed from the seeds and the kernels only exported.

The seeds of *A. Fordii* yielded an oil which resembled the Tung oil of commerce.

Seeds of Carapa grandiflora. These seeds from Uganda were examined and found to contain an oil which would probably be useful for soap-making and worth about £22 per ton. A consignment was requested for technical trials.

Castor Oil Seed.—Seven samples of castor oil seed from the Sudan were found to be of average quality and worth £11 to £12 per ton.

Beeswax.—Three samples of beeswax were received from the Sudan. One was of rather dark colour and worth about £6 per cwt. The others were somewhat dirty, but when purified by melting and straining, the product was in each case regarded as worth £7 per cwt.

Among other products examined may be mentioned samples of the oil and oil-cake obtained from the seeds of *Moringa pterygosperma* from Northern Nigeria, ground nuts, sesame and linseed from the Sudan, palm kernels from Southern Rhodesia, seeds of *Thevetia neriiifolia* from Southern Nigeria, and ground nuts and oil from Northern Nigeria.

1907.

Shea Nuts and Butter.—Four samples of shea nuts, the seeds of *Butyrospermum Parkii*, and one sample of the fat (known as "Shea butter") extracted from these seeds were received for examination from Southern Nigeria. Shea butter could be used for the manufacture of candles or soap, although it would be more suitable for the latter purpose if a variety can be found nearly free from unsaponifiable matter. It was valued at £27 5s. to £27 10s. per ton.

A specimen of shea butter ("Lulu" oil) from the Sudan was also examined.

Seeds of Minusops Djave.—A consignment of these seeds was received from Southern Nigeria. They were found to contain a fat which resembles shea butter and would have similar commercial applications.

Seeds of Ricinodendron sp.—A sample of "Nsa-sana" seeds, probably derived from a species of *Ricinodendron*, were received from Southern Nigeria, and were found to contain a quick drying oil which could be utilised as a substitute for Tung oil.

Seeds of Carapa guineensis.—The seeds of *Carapa guineensis* from the Gold Coast were examined and found to yield an oil which would be useful for soap-making, and would probably realise from £22 to £30 per ton.

Castor Oil Seeds.—Six samples of castor oil seed were received from the Sudan, three from the Red Sea Province, two from the Bahr-el-Ghazal and one from the Kassala Province. One of the samples from the Red Sea Province was worth about 5s. per ton in advance of Bombay castor seed, one was dirty and almost unsaleable, and all the other samples were of about the average quality of Bombay castor seed.

Eight samples of castor oil seed from Southern Rhodesia were of good quality and worth, on the average, £12 per ton.

A memorandum on the cultivation of the castor oil plant, the collection of the seed, and the preparation and utilisation of the oil was forwarded to Cape Colony in reply to a request for information on the subject.

Oil from the Seeds of Lophira alata.—Samples of this oil were received from Sierra Leone and also from the Sudan. Both specimens contained a quantity of unsaponifiable matter which would interfere with the use of the product for soap-making. It was considered probable, however, that this undesirable substance might not be removed from the seeds by the methods used for expressing the oil on a manufacturing scale, in which case the oil would be worth about £20 per ton.

Several other products were examined including the oils of *Calophyllum tomentosum* and *Amoora Rohituka* from India, "Margose" seed and seeds of *Melia Azadirachta* from India, fruits of *Pycnanthus* sp. from Northern Nigeria, a sample of beeswax from Rhodesia and a sample of sesame seed from Southern Rhodesia.

Among the various products remaining under investigation at the end of the year may be mentioned two samples of a variety of shea nuts from Sierra Leone, a specimen of castor oil seed from Rhodesia, dika nuts from Southern Nigeria, mafoureira nuts from Mozambique, and raphia wax from Madagascar.

VOLATILE OILS.

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples awaiting investigation at the end of 1907.	No.
Cyprus	2	Cyprus	1	Cyprus	3
Federated Malay States.	2	Seychelles	6	Uganda	1
Seychelles...	10	Fiji	2	India	3
		Sierra Leone	1		
Total... ..	14	Total... ..	10	Total... ..	7

Cyprus.—A sample of the origanum oil produced in Cyprus in 1905 was found to be of good quality and similar to the 1904 crop. A consignment of the oil was subsequently sold at 3s. per pound. A sample of Marjoram herb was also received for examination.

Seychelles.—Ten specimens of volatile oils were received from the Seychelles, including Bigarade, Seychelles lemongrass, Ceylon lemongrass, Ylang ylang, Mozambique orange, Ceylon citronella and cananga oils. The samples were too small for more than a preliminary examination. The results, however, were very promising and were considered to justify the preparation of larger quantities of the oils with a view to testing the market.

Federated Malay States.—Samples of patchouli and citronella oils from the Federated Malay States were examined. Both were of good quality and saleable at 9d. per oz. and 1s. 10d. per lb. respectively.

1907.

Cyprus.—A sample of geranium oil was received from Cyprus, but was insufficient for complete examination. A memorandum was forwarded on the cultivation and collection of peppermint and geranium plants and the methods of distilling the oils from them.

Seychelles.—Two samples of citronella oil and two samples of lemongrass oil were examined. The citronella oils were of good quality and regarded as worth 1s. 10d. to 2s. per pound. The lemongrass oils were of rather low grade.

A specimen of clove leaf oil was received for examination. This product possessed an odour somewhat different from that of ordinary clove oil, but contained 87 per cent. of eugenol, and was valued at 4s. to 4s. 6d. per pound. It was pointed out that the production of this essential oil would appear to afford good prospects in the Seychelles.

A sample of cinnamon bark oil was found to differ considerably from that prepared from Ceylon cinnamon bark, and to

contain less than one-third of the usual amount of cinnamic aldehyde (the chief constituent). It was suggested that this peculiarity may have been due to faulty preparation.

Fiji.—Two small samples of the volatile oil of *Cinnamomum pedatinervium* bark were examined and found to be similar to that examined previously. This product would be useful for perfuming soaps, and would probably realise about 1s. 6d. per pound.

Sierra Leone.—A consignment of the leaves of *Ocimum viride* was received for examination. This product yields a volatile oil which would doubtless be of value on account of the large proportion (32 per cent.) of thymol which it contains, and it is probable that the residue left after removing the thymol could be used for scenting soaps.

A request was received from a firm of merchants working in Southern Nigeria for information with reference to lemon-grass oil. In reply, a memorandum was forwarded giving a general description of the cultivation of lemongrass and the process of obtaining the oil.

At the close of 1907, the following materials remained under investigation: the turpentine oil of *Pinus longifolia* from India, Origanum oil from Cyprus, and the roots of *Chlorocodon* sp. from Uganda.

FOODSTUFFS.

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples awaiting investigation at the end of 1907.	No.
Gold Coast ...	7	Gambia	2	Southern Nigeria	3
Transvaal... ..	1	Gold Coast	2	Natal	17
Somaliland ...	1	Southern Nigeria	14	Rhodesia... ..	1
Sudan	12	Natal	1	Trinidad... ..	2
Seychelles... ..	2	Uganda	1		
India	14	Sudan	4		
Ceylon	2	Ceylon	1		
Hong Kong ...	1	British Honduras	1		
United Kingdom...	1	United Kingdom	38		
Total... ..	41	Total... ..	64	Total... ..	23

The samples included under this heading belong to comparatively few groups, which may conveniently be discussed separately.

Tea.

In view of the statement frequently made that Chinese tea is less harmful in use than Indian tea, a careful comparison was made at the request of the India Office, of typical samples

of these two classes of teas. The results show that the Indian teas are richer in the stimulant alkaloid caffeine than Chinese teas, and yield more extractive matter to water; but they also contain more tannin.

This enquiry was also extended to Natal teas, typical samples of which were forwarded by the Natal Government at the close of the South African Products Exhibition held recently in London. The Natal teas proved similar to Indian teas on the whole, but the samples from one estate were found to contain rather less tannin than average Indian tea.

The sample from Hong Kong was tea from plantations in the New Territory. It was of poor quality and not suitable for import into this country.

Samples of a substitute for tea prepared in Ceylon were also examined. These consisted of the dried leaves of *Cassia auriculata* and contained only a trace of caffeine, so that they are unsuitable for use in place of tea.

Coffee.

A number of samples of coffee from Abyssinia as imported into the Anglo-Egyptian Sudan were received from the Government of the Sudan for examination, and samples of coffee were also received from the Transvaal and India. The last mentioned samples were from an estate in Mysore and represented the products obtained before and after manuring the land on which the plants were grown. The effects of the manuring were a slight increase in the amount of caffeine in the berries, and an increase both in the size of the berries and in their density.

Cocoa.

An unusual amount of interest has been aroused in this product, during recent years, owing to the very high prices which have prevailed, and consequently a considerable number of samples of cocoa both from Colonies which have not hitherto produced this material in quantity, and from Colonies in which the industry has long been established, have been received for examination and report.

Cocoa cultivation is being established on a large scale in the Gold Coast, and this article is now one of the most important exports. The product exported is, however, of inferior quality, the beans being small and usually incompletely fermented. Further the industry is said to be hampered to some extent by certain trading difficulties. Both these sides of the problem, viz., the agricultural and economic, have received attention during the two years under review, and several reports and recommendations have been made.

In 1906 a series of samples of cocoa prepared in the Botanic Gardens at Aburi were received for examination. These had

been fermented in various ways and for different periods of time. They were subjected to complete chemical examination, and from the results obtained it was possible to draw up a series of recommendations for the improvement of the cultivation and preparation of Gold Coast cocoa.

During 1907 the Government of the Colony desired to obtain exact information as to the prices which the better classes of Gold Coast cocoa would secure when sold in the United Kingdom, so that if necessary steps might be taken to improve the local trade conditions under which the same price is paid for cocoa of all grades of quality. In consultation with the Imperial Institute, two consignments of selected cocoa were sold in Liverpool. These realised unusually good prices, ranging from 65 to 69 shillings per cwt. So far, Gold Coast cocoa has been utilized on the Continent and has not attracted much attention from manufacturers in this country, but as the result of the action recorded above, several British firms have begun to take an interest in this product, and it seems likely that in the near future a larger proportion of this cocoa will be used in this country.

Interesting samples of cocoa produced experimentally in British Honduras and Uganda were received during 1907. Both of these proved to be of good quality, and the commercial experts who examined the samples regarded them as both readily saleable in this country. In Uganda especially there seems to be an important future for cocoa cultivation.

FOOD GRAINS.

The samples examined included wheat, barley, rice, millet, guinea corn, and maize, and were received for the most part from the Sudan and the West African Colonies. A memorandum on the cultivation, preparation, and marketing of maize was prepared for the Government of Southern Nigeria, and similar information regarding wheat was supplied to the Government of the Sudan.

A material of special interest was the "yebb" or "yeheb" nuts received from Somaliland. As the seeds were apparently unknown they were submitted to Kew for botanical identification. On examination these seeds proved to be rich in carbohydrates, oil, and proteids, so that they form in themselves a complete food. It is stated that yeheb nuts have formed almost the sole food of the Somalis during recent famine years. If further investigations should prove that the seeds are readily digestible, the plant (*Cordeauia edulis*, Hemsley) may prove to be of value in other countries.

Miscellaneous Food Products.

These included "cocoa nut water" from Ceylon, which was examined with a view to ascertaining if it could be used as

a source of sugar; native sugar cane from Rhodesia, which is still under investigation; alcohol prepared in Ceylon from the cashew nut, and rum obtained from sugar residues in Natal.

A large number of samples of English cured hams have been examined during 1907 for the Board of Trade and the Foreign Office, in connection with the new regulations with reference to the importation of hams into certain foreign countries.

SPICES, &c.

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples awaiting investigation at the end of 1907.	No.
Sierra Leone ...	4	Sierra Leone ...	3	Seychelles ...	3
Gold Coast ...	1	Sudan ...	6		
Southern Nigeria...	1	Federated Malay States.	1		
Sudan ...	7	Mauritius ...	1		
Total... ..	13	Total... ..	11	Total... ..	3

1906.

Sierra Leone.—The spices received from this Colony were samples of ginger, guinea grains and fruits of *Xylopia ethiopica*. The first of these represented ordinary Sierra Leone ginger prepared by native methods, and a second sample the spice prepared by improved methods, involving washing and partial decortication. The sample prepared in the latter way proved to be much superior to the ordinary quality, and was valued at a higher price.

Gold Coast.—A sample of cinnamon bark was received, prepared from trees grown in the Botanical Gardens at Aburi. It was not well prepared, but was of good aroma and flavour, and was valued at 5*d.* to 6*d.* per pound, as compared with 8*d.* to 9*d.* per pound then being paid for well-prepared cinnamon.

Sudan.—The samples received included ginger, cardamoms, cumin seed and foenugrec, products which reach that country from Abyssinia. Most of these materials were of fair and saleable quality.

1907.

Sierra Leone.—The question of improved cultivation and preparation of ginger in the Colony received further attention during this year. A memorandum was prepared for the Government of the Colony giving information on these subjects and subsequently small consignments of ginger were shipped to this country representing: (1) ginger prepared by

the improved method, (2) ginger prepared by the native method, but thoroughly dried. These were sold in London by arrangement with the Imperial Institute. The better prepared ginger realised from 64s. to 66s. per cwt. as against 32s. 6d. paid for the product prepared in the usual way, clearly indicating that it would be advantageous for planters to devote more attention to the preparation of the ginger for the market.

Sudan.—These samples included garlic, ginger, coriander, cumin, and cardamoms as imported into the Sudan from Abyssinia. They were mostly of readily saleable quality.

A sample of cinnamon bark was received from the Federated Malay States, and a specimen of the fruits of *Pimenta acris* from Mauritius. The first of these was thick and not well prepared, and therefore of merely nominal value. Further supplies of the fruits of *Pimenta acris* have been asked for for examination. At the end of the year samples of vanilla from the Seychelles were under investigation.

TANNING MATERIALS.

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples awaiting investigation at the end of 1907.	No.
Transvaal... ..	1	Gambia	1	Gold Coast	1
Uganda	2	Sierra Leone	1	Foreign Countries	3
Somaliland	3	Gold Coast	1		
Sudan	1	Transvaal	1		
Seychelles... ..	1	Cape Colony	10		
India	14	Uganda	3		
Western Australia	3	Sudan	2		
British Guiana ...	1	Seychelles	12		
		British Honduras	4		
		Brazil	1		
Total... ..	26	Total... ..	36	Total... ..	4

1906.—None of the samples of tanning materials examined proved to be sufficiently rich in tannin to be worth consideration for export to the United Kingdom, but most of them were of fair quality and suitable for local use in tanning. This is the case, for example, with the three interesting materials from Somaliland, viz., "Wattu" leaves derived from *Osyris abyssinica*, a near relative of the plant which yields the so-called "Cape Sumach," "gallol root bark," from a species of *Acacia* near *Acacia latronum*, and "maua bark," of unknown botanical origin. These yielded respectively 24·8, 24·0, and 13·7 per cent. of tannin. The two first-mentioned furnished leathers of medium quality whilst that prepared with maua bark was of fair quality, but rather harsh and somewhat dark coloured.

The samples from India were extracts prepared from the barks of *Shorea robusta*, *Terminalia tomentosa* and *Rhizophora mucronata*. Of these the most promising were those prepared from the last-named bark. They contained high percentages of tannin, but were rather dark coloured, indicating the need for greater care in evaporating the liquors prepared as a first step in the manufacture of the extracts.

1907.—The samples from Cape Colony included six samples of wattle bark derived from the golden wattle, *Acacia pycnantha*, and the black wattle, *Acacia decurrens*. All these proved to be of good quality and similar in type to the wattle barks now imported from Natal and Australia. They were valued at from £7 10s. 0d. to £7 15s. 0d. per ton.

The other samples from Cape Colony were samples of barks from indigenous trees, "White thorn" (*Acacia horrida*), "Krupeehout," "Kliphout," and of Cape Sumach. These were all of poorer quality than the wattle barks, and most of them though suitable for local use were of no value for export.

The samples from Uganda included "Busana bark," derived from a species of *Acacia*, probably *Acacia spirocarpa*. This is being used in the neighbourhood of Entebbe as a tanning material. It contains about 10 per cent. of tannin and yields a rather harsh, dark-coloured leather, and should only be used in admixture with the better materials imported to Uganda from India. A sample of the bark of *Terminalia velutina* was also received from Uganda. This contained 12 per cent. of tannin and yielded a light-coloured leather of fair quality.

The Sudan materials were samples of Kili bark from *Ficus sp.*, and "Alimu" bark from *Ximenia americana*. The latter proved to be of fair quality for local use.

The samples from the Gambia, Sierra Leone, Gold Coast Colony, Seychelles and British Honduras were all mangrove barks. Of these samples certain of those from the Seychelles alone yield sufficient tannin (*i.e.*, over 40 per cent.) to be worth consideration for export. The other samples could only be used locally for tanning or for the manufacture of tanning extracts. The samples from British Honduras and the Gambia, however, included barks which were of special interest on account of the unusually good and light-coloured leather they produced, for mangrove barks. The examination of this large collection of mangrove barks has enabled some useful information to be obtained regarding the value of scraping off the outer bark before shipment, and it seems certain that in most cases the outer bark contains little or no tannin, and its removal before export raises the average tannin content of the bark and reduces the bulk.

The sample from Brazil was "barbatimao bark," sent by the British Consul at Rio de Janeiro with a view to ascertain-

ing whether this material, largely used in Brazil for tanning, is of commercial value. The sample proved to contain 27·8 per cent. of tannin and to yield a leather of very good quality. It is worth noting that this tree has been introduced recently into German East Africa with a view to the utilisation of its bark for tanning purposes.

At the end of the year a sample of divi-divi pods from the Gold Coast and samples of mangrove bark from Portuguese East Africa were still under investigation.

DYE STUFFS.

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples awaiting investigation at the end of 1907.	No.
Lagos	1	Sierra Leone ...	1	Nil.	
Rhodesia	2	Rhodesia	1		
		Sudan	2		
		Seychelles	4		
		India	4		
		Miscellaneous ...	3		
Total	3	Total	15	Total	Nil.

Natural dyestuffs are now of little or no economic importance, and with the exception of indigo and a few of the yellow dyewoods and logwood, they have been almost entirely supplanted in European dyehouses by synthetic dyes of chemical origin.

1906.—The samples received in 1906 consisted of annatto seeds from Lagos and native-made indigos from Rhodesia. Annatto is still used to a considerable extent in colouring butter and margarine. The Lagos sample was of good quality. The Rhodesian indigos contained only 3·7 to 18·5 per cent. of real indigo, and were of no value for export purposes.

1907.—The "Gara" plant is used as a blue dyestuff in West Africa. It contains indigotin identical with that present in the various species of *Indigofera* used as sources of indigo in India, Java and elsewhere.

The Sudan samples were of the red dye "Sikhtiyān," derived from a species of "dura," the stems of which secrete the red colouring matter. The latter was shown to be a substantive red dye of the type present in red sandal wood.

The Seychelles samples were "orchella weeds," for which there is still some slight demand as a dye. Three of these samples were of good quality and equal to the weed now exported from Ceylon and Portuguese East Africa.

Of the three Indian dyestuffs *Onosmea echioides* contained a red dye like that present in alkanet root; *Hibiscus Sabdariffa*,

IMPERIAL INSTITUTE, 1906 AND 1907. 69

two yellow colouring matters, one of which is of the quercetin type of yellow dye; and *Thespesia Lampas*, the yellow colouring matter quercetin. In *Baccaurea sapida* no evidence of the possession of tinctorial properties could be obtained.

During 1907 a memorandum describing the cultivation of annatto and the preparation of the seed and dye for the market was prepared for the Government of Ceylon.

The miscellaneous dyestuffs received were mainly from commercial firms in this country, and included camwood and several lichens of the orchella and other types.

RESINS.

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples awaiting investigation at the end of 1907.	No.
Sierra Leone ...	2	Cyprus	1	Gold Coast ...	1
Gold Coast ...	3			Southern Nigeria	1
India	1			India	3
Federated Malay States.	1				
Foreign countries...	1				
Total... ..	8	Total... ..	1	Total... ..	5

West African Colonies.—These samples were chiefly copals sent for valuation and for information as to the desirability or otherwise of “scraping” and “grading” them for shipment.

India.—These included samples of the resin of *Canarium bengalense*, which was found to be suitable for use as a varnish, and specimens of the common resin or colophony prepared from the “long-leaf pine” of India. The latter is still under examination, and a careful comparison of it with French and American colophony is being made.

The other samples received included specimens of elemi from Liberia and Southern Nigeria, and a sample of ladanum from Cyprus—a material at one time used in medicine and perfumery.

GUMS.

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples awaiting investigation at the end of 1907.	No.
Northern Nigeria	1	Orange River	1	Northern Nigeria	1
Sudan	1	Colony.		Foreign Countries	16
		Uganda	1		
		Somaliland ...	4		
		Foreign Countries	1		
Total... ..	2	Total... ..	7	Total... ..	17

1906.—The sample of gum from Northern Nigeria was sent by the Forestry Officer from Bornu Province. It was of the usual Nigerian type and of good quality. The Sudan sample was Talh gum of the usual quality.

1907.—The sample of gum from the Orange River Colony was from the "white thorn" (*Acacia horrida*), and was of a type not readily saleable in this country. That from Uganda was from *Albizzia Brownii*, and was of insoluble type. The samples of Somaliland gums were too small for examination or valuation.

At the end of 1907 a sample of gum from *Acacia Caffra*, collected in Northern Nigeria, was still under investigation, in connection with the question of the development of the gum industry in that country.

DRUGS.

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples awaiting investigation at the end of 1907.	No.
Gold Coast ...	4	Gold Coast ...	3	Sierra Leone ...	4
Sierra Leone ...	13	Northern Nigeria ...	4	Northern Nigeria ...	1
Uganda ...	1	Sudan ...	2	Lagos ...	1
Rhodesia ...	1	Nyasaland ...	1	British East Africa ...	1
Zanzibar ...	1	Natal ...	1	Somaliland ...	1
Transvaal ...	1	India ...	1	India ...	30
Sudan ...	3	Straits Settlements ...	19	Straits Settlements ...	1
India ...	3	Federated Malay States ...	1	New South Wales ...	1
		New South Wales ...	1	Foreign Countries ...	2
		British Honduras ...	2		
		Foreign Countries ...	2		
Total... ..	27	Total... ..	37	Total... ..	42

A considerable number of drugs have been dealt with during the two years 1906 and 1907. In this connection it may be noted that Indian *Podophyllum* (*P. Emodi*) and Egyptian henbane (*Hyoscyamus muticus*), the constituents of which have been previously examined at the Imperial Institute and shown to be of medicinal value, are now being regularly exported for use as drugs.

The most important of these investigations conducted in the two years referred to are those carried on for the Government of India, and include the chemical examination of Indian species of *Aconites*, *Hyoscyamus*, *Datura* and *Strychnos*, and also Indian opium and opium alkaloids. Considerable progress has been made with the first four of these enquiries, which are, however, not yet completed.

The investigation of the best process of extracting the alkaloids from Indian opium is now practically complete. A new process has been devised for the preparation of morphine and codeine from waste Indian opium at the Indian Government Factory at Ghazipur. Preliminary trials of this process on a small commercial scale have been carried out, and these were so successful that plant for carrying out this process has been devised, and is now being constructed under the supervision of the Department for despatch to India.

The other samples referred to above have been mainly drugs in use by natives in the countries mentioned, and in a few cases the preliminary examination of these has shown that they are likely to be worth full investigation, and arrangements have been made for undertaking this. Passing mention may be made of drugs from the Sudan, which were specimens of the well-known drugs, senna leaves and pods. These were of fair quality.

The samples from the Straits Settlements in 1907 consisted of morphine salts, forwarded for a report on their purity and commercial value. A sample of coca leaves was received from the Federated Malay States, where the cultivation of this plant is now receiving attention. These proved to be of fair quality, and suggestions were made as to improvements in the preparation of this material for the market.

Other samples received in 1907 and worth mention were kola nuts from the Gold Coast Colony which were of saleable quality, hops from India, valued at 30s. per cwt. as compared with English hops then selling at 40s. per cwt., and a number of arrow poisons from Northern Nigeria, which proved almost invariably to be species of *Strophanthus*.

Two so-called "soap plants" were examined, "Gusangus" root from Somaliland and "soap berries" and leaves from British Honduras; both of these contained saponin-like substances.

The products awaiting investigation at the end of 1907 were mainly native drugs of the types already alluded to. Those from India were *Hyoscyamus*, *Datura* and *Aconitum* species, the investigation of which is being continued.

POISONOUS PLANTS.

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples awaiting investigation at the end of 1907.	No.
Lagos and Southern Nigeria.	2	India	6	Transvaal	1
				Cape Colony	1
				Federated Malay States.	1
				New South Wales	1
Total	2	Total	6	Total	4

In continuation of the work done at the Imperial Institute since 1900 in the investigation of plants which have proved poisonous to cattle, a number of materials of this type have been investigated during 1906 and 1907.

From Lagos samples of the "afon" fruit reputed to be poisonous to horses were received, but on chemical and physiological examination of this material no toxic substance could be detected.

Chaillctia cymosa from the Transvaal, *Senecio latifolius* from Cape Colony, and *Swainsona galegifolia* from New South Wales are under investigation, and some progress has been made with all of those, but as such work involves the isolation and complete investigation of the toxic constituent present in each plant, progress is of necessity slow.

The vegetable products from India referred to in the table were all white or red Rangoon beans submitted usually by commercial firms for identification and information as to their suitability for feeding cattle. The question of the safety of using these beans for feeding purposes in Great Britain is still under investigation in consultation with the Board of Agriculture.

TOBACCO.

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples awaiting investigation at the end of 1907.	No.
Southern Nigeria...	1	Northern Nigeria	3	St. Vincent ...	1
Northern Nigeria...	1	British East Africa.	1	Foreign countries	54
Rhodesia ...	1	Trinidad... ..	1		
Ceylon	1	Bahamas... ..	2		
British Honduras	1				
Bermuda	1				
Total ...	6	Total ...	7	Total ...	55

1906.

Northern Nigeria.—This was a sample of tobacco grown on the banks of the Kaduma River and prepared by native methods. It was of fair quality, and though not fully fermented, burned well, and was valued at about 4*d.* per lb.

Rhodesia.—The sample from Rhodesia was a Turkish tobacco of promising quality, and was valued at 10*d.* per lb.

British Honduras.—This sample of tobacco was prepared by Indians in the Colony by the usual methods. It was of rather full flavour and pungent, but possessed good burning properties and fair aroma, and was valued at 4*d.* per lb.

The other samples received were not of a quality saleable in the United Kingdom; that from Bermuda was part of a crop raised experimentally in the Island, and was of good appearance, but did not burn well. The Ceylon tobacco was of the usual type produced in the Island, which has a large export trade in coarse tobacco to India and elsewhere. This tobacco is, however, quite unsuitable for import into the United Kingdom.

1907.

British East Africa.—Considerable interest is being shown in this Protectorate and in Uganda in the possibility of producing tobacco suitable for export to the United Kingdom, and at the suggestion of the Director of the Imperial Institute, an expert has been appointed by the Colonial Office to conduct experiments in the cultivation and preparation of tobacco, and to give advice to planters and others on these matters. The sample received in 1907 was from a firm of planters in the Protectorate. It was of the cigar class, and proved to be of a good type, but was improperly fermented and did not burn well.

The samples from Trinidad and the Bahamas were portions of experimental crops, and, though suitable for local use for cigar manufacture, were not of a type which is saleable in this country.

At the end of 1907, 54 typical samples of Greek and Turkish tobaccos obtained by the Director of the Imperial Institute during his visit to the Levant for the Colonial Office, were under investigation in connection with the growth of similar tobaccos elsewhere.

MISCELLANEOUS.

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples awaiting investigation at the end of 1907.	No.
Southern Nigeria...	2	Southern Nigeria	2	Nil.	
Natal	1	Northern Nigeria	1		
Sudan	2	Sudan	1		
Ceylon	1	Various	2		
Various	6				
Total... ..	12	Total... ..	6	Total... ..	Nil.

In this group is included a number of products, which do not readily fall into any of the groups already dealt with. A few of these materials are of some general interest. The

specimens from Southern Nigeria included "ninkon fruits" used in West Africa as a sweetening agent. These were found to contain a small quantity of an intensely sweet substance, but the difficulty of extracting it makes the fruits of no economic value.

The sample from Ceylon was papain, the ferment present in the fruit of the papaw, which is used to some extent in medicine as a digestive agent. This was of fair quality and was valued at 5s. per pound.

From Natal, Itala nuts, the product of *Hyphaene crinita*, were received. These may be of some value as a source of vegetable ivory.

During the two years under review, collections of botanical specimens have been received from Northern Nigeria, Somali-land, and from various West African Colonies. These have been transmitted to the Royal Gardens, Kew, for identification. In addition, a considerable number of separate botanical specimens received in connection with vegetable products under examination at the Imperial Institute have been received, and these also have been identified at Kew.

ANIMAL PRODUCTS.

Samples reported on during 1906.	No.	Samples reported on during 1907.	No.	Samples awaiting investigation at the end of 1907.	No.
Sudan	6	Natal	1	Transvaal	1
New South Wales	1	Uganda	5	Sudan	1
		Sudan	2	India	1
		India	1		
		Ceylon	1		
		Western Australia	1		
Total... ..	7	Total... ..	11	Total... ..	3

Uganda.—Skins and leather tanned with local or imported tanning materials were sent for valuation and for suggestions as to methods of improvement. The products were all of saleable, though rather poor, quality, and various recommendations were made as to the preparation and tanning of skins intended for export to the United Kingdom.

Sudan.—The samples included civet imported from Abyssinia, hippopotamus teeth, and sponges, all of which were sent for valuation. The first two were of good quality and of types readily saleable in this country. The sponges, on the contrary, were of doubtful quality, and there may be some

difficulty in finding a market for such products in this country.

Transvaal.—The sample from this Colony consisted of dried locusts. These have been analysed, and it is considered that they may be found suitable for use as a poultry food.

Sponges were received from Ceylon and Natal, New South Wales and Western Australia. Several of these were of promising though rather poor quality, but most of them were of no value in this country.

INSECT AND FUNGOID PESTS.

Specimens reported on during 1906.	No.	Specimens reported on during 1907.	No.	Specimens awaiting investigation at the end of 1907.	No.
Seychelles... ..	4	West Africa ... British East Africa.	1 1	Nil.	.
Total... ..	4	Total... ..	2	Total... ..	Nil.

The insect pests received included several which attack coco-nut palms and some of those affecting banana plants in the Seychelles. From West Africa was received a "blight" which attacks guinea corn. These pests were identified by the experts of the Natural History Section of the British Museum.

The East African material was a root of a coffee plant affected by a fungus, which was identified at the Royal Gardens, Kew.

Where possible recommendation for the destruction and prevention of these pests were supplied by the Authorities referred to, and were transmitted to the Governments concerned.

A number of questions connected with the occurrence and treatment of insect pests in West Africa have been dealt with by Mr. G. C. Dudgeon.

VIII.—SUBSIDIARY WORK.

As has been previously stated in connection with the supply of information respecting emigration and settlement in the Colonies, the Imperial Institute has worked in co-operation with the Emigrants' Information Office, as well as with the agencies established in London under the auspices of the Colonial Governments. The publications issued by the Emigrants' Information Office have been supplied to enquirers as well as those published by the Governments concerned. The British Women's Emigration Association, which carries on special work connected with the emigration of women, has been provided with an office in the Imperial Institute, which, under the charge of Miss Lefroy, has been largely consulted by enquirers.

The Colonial Nursing Association, which has branches in most of the Crown Colonies and Protectorates, has been provided with a central office in the Imperial Institute, under the care of Miss Dalrymple Hay. From this office the work of selecting trained nurses for the Colonies has been carried on.

The African Society for the study of questions relating to the African Colonies and Protectorates has been granted the use of an office in the Imperial Institute, and the meetings of the Council have been held in the African Conference Room, where meetings of Committees of the Egyptian Government have also been held.

The Conference Rooms have been utilised for several meetings, and larger meetings have been held in the Jehanghier Hall or in the Great Hall. The British Women's Emigration Association, the Colonial Nursing Association, the Royal British Nurses' Association, the Victoria League, and the National Indian Association are among the societies which have held such meetings. A reception was held in the galleries in July, 1906, by Lord Strathcona, High Commissioner for Canada. The Annual Meeting in July, 1907, of the Victoria League, which was held in the Great Hall, under the presidency of the Countess of Jersey, was very largely attended, and was followed by a reception held in the Exhibition Galleries. The Colonial Premiers, at that time in England, took part in the proceedings.

COLONIAL REPORTS.

The following recent reports relating to His Majesty's Colonial Possessions have been issued, and may be obtained from the sources indicated on the title page :—

ANNUAL.							
No.	Colony, &c.						Year.
547	Mauritius	...	...	...	...	...	1906
548	Fiji	...	...	...	...	...	"
549	Jamaica	...	...	...	...	...	1906-1907
550	British Guiana	...	...	...	...	...	"
551	Northern Nigeria	...	...	...	...	...	"
552	British Honduras	...	...	...	...	...	1906
553	St. Lucia	...	...	...	...	...	1906-1907
554	Southern Nigeria	...	...	...	...	...	1906
555	St. Vincent	...	...	...	...	...	1906-1907
556	Basutoland	...	...	...	...	...	"
557	East Africa Protectorate	...	...	...	...	...	"
558	Uganda Protectorate	...	...	...	...	...	"
559	Swaziland	...	...	...	...	...	"
560	St. Helena	...	..	...	...	...	1907
561	Ceylon	...	...	...	...	...	"
562	Falkland Islands	...	...	...	...	...	"
563	Gibraltar	...	...	...	...	...	"
564	Ashanti	...	...	...	...	...	"
565	Colonial Survey Committee	...	...	...	...	...	1907-1908
566	Northern Territories of the Gold Coast	...	...	...	...	...	1907
567	Seychelles	...	...	...	...	...	"
568	Bermuda	...	...	...	...	...	"
569	Weihaiwei	...	...	...	...	...	"
570	Hong Kong	...	...	...	...	...	"
571	Malta	...	...	...	...	...	1907-1908
572	British Honduras	...	...	...	...	...	1907
573	Gold Coast	...	...	...	...	...	"
574	Nyasaland Protectorate	...	...	...	...	...	1907-1908
575	Bahamas...	...	...	...	...	...	"
576	Gambia	...	...	...	...	...	1907
577	St. Vincent	...	...	...	...	...	1907-1908
578	Turks and Caicos Islands	...	...	...	...	...	1907
579	St. Lucia	...	...	...	...	...	"
580	Fiji	...	...	...	...	...	"
581	Mauritius	...	...	...	...	...	"
582	Straits Settlements	...	...	...	...	...	"
583	Southern Nigeria	...	...	...	...	...	"

MISCELLANEOUS.

No.	Colony, &c.	Subject.
49	East Africa Protectorate	... Veterinary Department.
50	British Colonies, &c.	... Cotton Cultivation.
51	Southern Nigeria	... Forest Administration.
52	South Africa	... Native Education.
53	East Africa Protectorate	... Veterinary Bacteriological Work, 1907-8.
54	Newfoundland	... Governor's Visit to the Micmac Indians.
55	Cape Colony	... Rietfontein Area.
56	Turks and Caicos Islands	... Salt Industry.

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