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# Educational (1902) Department.

ORDINARY MS.

G.O., No. 263

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[Despatch Abstract.]

Recording prop. Readdett Comy
Circular from the Govt of India
forwarding a memorandum on the
Scientific & Technical deptt of the
Imperial Institute.

## BACK PAPERS.

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## FURTHER PAPERS.

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CURRENT NO. 692

# Government {1902} of Madras.

## REVENUE.

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Rdp 6/5 DPI

## G.O., No. 341, 7th April 1902.

## APRIL.

### Imperial Institute

Communicating to the Board of Revenue circular from the Government of India forwarding a memorandum on the Scientific and Technical department of the —, and directing the publication of the memorandum in the *Fort St. George Gazette*.

GOVERNMENT OF MADRAS.

## REVENUE DEPARTMENT.

Read—the following letter from J. B. FULLER, Esq., C.I.E., Secretary to the Government of India, Department of Revenue and Agriculture (Practical Arts and Museums), to the Secretary to the Government of Madras, Revenue Department, dated Calcutta, the 24th March 1902, Circular No. 17—34-2 :—

In paragraph 12 of Sir E. Buck's Circular Resolution No. 59—73, dated the 3rd October 1893, which explained the objects and constitution of the Imperial Institute, attention was drawn to the opportunities for research offered by the Scientific Department of the Institute.

2. I am now directed to forward a memorandum on the Scientific and Technical Department of the Institute which has been published with the view of securing a fuller utilization than at present of the special facilities offered by the department, and to request that, with the permission of the Governor-in-Council, publicity may be given to the memorandum, and copies distributed to Chambers of Commerce, Industrial or Agricultural Associations and other public bodies.

3. All correspondence in connection with applications for investigation should continue as heretofore to be addressed to the Reporter on Economic Products, Indian Museum, Calcutta.

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Enclosure.

*The Scientific and Technical Department of the Imperial Institute.*

1. The Executive Council of the Imperial Institute desire to direct attention to the character of the work now carried on in an important Department of the Institute, which has been for several years in operation, and has, of late, undergone considerable extension.

The Scientific and Technical Department of the Institute has been established to acquire information by special enquiries and by experimental research, technical trials and commercial valuation regarding new or little known natural or manufactured products of the various Colonies and Dependencies of the British Empire and of foreign countries, and also regarding known products procurable from new sources, and local products of manufacture which it is desired to export. This work is carried out with a view to the creation of new openings in trade, or the promotion of industrial developments.

2. In an extensive and well-equipped series of research laboratories, a numerous staff of skilled Chemists, under the direction of Professor Wyndham R. Dunstan, M.A., F.R.S., carry out the investigation of the chemical constitution and properties of new dye-stuffs, tanning materials, seeds and food-stuffs, oils, gums and resins, fibres, timbers, medicinal plants and products; animal products, minerals and ores, soils, cements, and various other products, with a view to their commercial utilization. Whenever necessary these materials are submitted to special scientific experts, by whom they are made the subjects of particular investigation or practical tests. Reports are also obtained from technical or trade-experts in regard to the probable commercial or industrial value of any such products, while full information is collected from official or other trustworthy sources regarding the probable extent and cost of available supplies.

3. Appended to this Memorandum is a paper giving illustrations of work of the above nature, which has been carried out for India and the Colonies in the Scientific and Technical Department of the Institute. It will be seen that this work is quite distinct in character from



the services rendered respectively by the Commercial Information Office of the Board of Trade, and by the Botanical Establishment of the Royal Gardens, Kew. But the work of this Department of the Institute may indeed be regarded as an important adjunct to that accomplished by those Government establishments, especially in furnishing the results of chemical investigation and technical trials which most generally determine the commercial value of natural products.

4. All materials requiring scientific or technical examination, or commercial valuation, should be submitted to the Institute for examination either by, or through, the Foreign Office, the Colonial Office, the India Office, or the Board of Trade, or through the Colonial or Indian Government Authorities. Requests for the examination of such materials may also be submitted by Public Commercial Bodies and Institutions of the respective Colonies and Dependencies, or by the Representatives of His Majesty's Government in foreign countries.

5. Reports on the results of enquiries or experimental investigations are supplied, as a rule, without charge, when applied for as above directed, but, should special expenses be incurred in connection with any such reports, or with the commercial valuation of particular materials or manufactured products, which the Council do not consider themselves warranted in meeting, a statement of such actual outlays will be furnished, for repayment, when the reports are supplied to the Public Bodies or Institutions concerned. Should an investigation or report of exceptional character be asked for by a Government Department, an estimate of the attendant expenses will be submitted, with a view to ascertain whether authority for such expenditure will be given.

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[The attention of those who are concerned in finding new markets for Indian and Colonial products may be also directed to the collections of products exhibited in the galleries of the Imperial Institute, illustrating the material resources of the Colonies and Dependencies of the Empire. They represent upwards of forty different countries, and are open free to the public. On application to the Commercial Information Office of the Institute, or to the Curators of individual Sections of the Collections, all available information is furnished regarding any particular product exhibited in the Galleries, and samples are supplied in special instances to merchants and others. Enquiries as to possible supplies (and their probable cost) in any specific case, or for other special information desired, are dealt with promptly, if made in writing to the Honorary Director of the Institute. The assistance of the Government Authorities of the Colonies is invoked to ensure that the Collections of natural and manufactured products, and full information regarding their contents, shall be maintained up to the day.]

F. A. ABEL,
Hon. Dir. and Secy. of the Imperial Institute.

July 1901.

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Staff of the Scientific and Technical Department of the Imperial Institute, 1901.

*Director* :

Professor Wyndham R. Dunstan, M.A., F.R.S., Sec.C.S.

*Assistant Chemists* :

| | |
|---|---|
| Mr. T. A. Henry, D.Sc., Lond., (Salters' Company's Research Fellow). | Mr. E. A. Andrews. |
| Mr. Ernest Goulding, B.Sc., Lond. | Mr. G. S. Blake, Assoc. R.C.S. |
| Mr. Harold Brown. | Mr. J. G. W. Brooker. |

*Special Assistant Chemists* :

| | |
|---|---|
| Dr. F. Lühn, Ph. D., Heidelberg. | Mr. H. H. Robinson, M.A., Oxon. |

Attached to this department is a staff of scientific, technical and commercial referees.

*Illustrations of Scientific and Technical reports made since* 1896,

chiefly at the request of the Indian and Colonial Governments, based upon experimental investigations conducted in the Laboratories of the Department, and on the opinions of scientific, technical and commercial referees.

India.

(For further particulars see "Parliamentary Return of the Imperial Institute, Indian Section, August 1899." Eyre and Spottiswoode, London.)

*Aconites.*

A chemical examination has been made of the constituents of the principal varieties of aconite indigenous to India. The medicinally active constituent has been examined, its chemical composition and properties defined and its exact medicinal action ascertained. Several papers on the subject have been already published (see Addendum) relating to *Aconitum ferox, Aconitum heterophyllum,* and *Aconitum Fischeri.*

*Tobacco.*

A consignment of specially prepared tobacco was sent from Tirhoot for chemical analysis and commercial valuation with a view to the satisfactory sale of the consignment. The results of its analysis, together with a sample of the tobacco, were submitted to a number of tobacco manufacturers and brokers and the consignment was afterwards sold at a fair price.

Arrangements are now being made for a systematic examination of the different varieties of tobacco grown in India with a view to the improvement of certain growths.

*Opium.*

A detailed enquiry is being conducted as to the quality of the opium produced in the different opium districts of India. It originated in a request for a chemical examination of opium specially grown in Jeypore, which proved to contain much less morphine and far more narcotine than is usually present in the best Turkey opium medicinally employed in this country.

The same peculiarity is shown by most of the opium produced in India and the question is being fully investigated with the view of ascertaining the cause of this difference in Indian as compared with Turkey opium and the possibility of improving the Indian product.

If Indian opium could be produced richer in morphine, there is no reason why it should not be medicinally employed in Europe, instead of Turkey opium; and also used as a source of morphine and other alkaloids.

*Podophyllum.*

A complete chemical examination has been made of the constituents of the Indian podophyllum (*Podophyllum emodi*). It has been shown in a paper communicated to the Chemical Society (see Addendum) that its constituents are identical with those of American podophyllum (*Podophyllum peltatum*) which is largely employed in medicine, both in this country and throughout Europe. The exact chemical nature of the medicinally active constituent has been ascertained and it is shown to be present to a greater extent in the Indian product than in the American.

Medical trial has completely substantiated the results of the chemical enquiry (see Addendum). It is proved that this plant, which is abundant in India, is a most efficient substitute for the American podophyllum at present employed and the plant, and medicinal preparations made from it, have now been included in the "Indian and Colonial Addendum to the British Pharmacopœia."

Incidentally, it was discovered that the Indian plant also contains a yellow dye which might be profitably employed in dyeing; being, in fact, identical with the colouring matter of the well-known dye-stuff, quercitron bark.

*Jute.*

An extensive series of samples of jute, collected at different stages of growth and treated under various conditions, are being investigated with the view of securing greater uniformity in the quality of Indian jute fibre.

*Edible Gums.*

A chemical examination has been made of several Indian gums which seemed likely to be of commercial value as substitutes for gum arabic. The results, together with samples of the gums, were submitted to brokers in this country who reported on their commercial value and there have been already commercial enquiries for these gums by manufacturers.

*Iron Ores.*

Chemical analysis has been made of a number of specimens of Indian iron ores, chiefly magnetite, obtained from the Salem district of Madras. The results have given rise to an important discussion as to the possibility of the ores being profitably smelted in India.

*Coal.*

A chemical and technical examination has been made of representative samples of coal obtained from the principal coal districts of India, including many in which the seams at present are not actively worked. A full description of the composition and characters of the



different varieties of Indian coal has been drawn up by Professor Dunstan and issued as a separate paper by the India Office. It is also included in the "Parliamentary Return of the Imperial Institute, Indian Section, August 1899."

*Food-grains.*

All the more important Indian food-grains are being submitted to a complete chemical examination, chiefly by Professor Church, F.R.S., who has already made a number of reports on the subject dealing with their composition and nutritive value.

*Fibres.*

A large number of Indian fibres have been chemically examined, and afterwards examined by fibre experts. The results have been communicated to the Indian Government so that suitable action might be taken in those cases in which it seems desirable. Among these fibres are *Pine-apple, Sabai, Tacca, Madar, Ban Reha,* the fibre of *Phœnix paludosa,* and the floss of *Calotropis procera.*

*Timbers.*

The mechanical properties of Pyinma wood have been carefully tested by Professor Unwin, F.R.S., with a view to its application in engineering and building construction.

*Tanning Materials.*

Systematic chemical examination is being conducted of the principal plants now used, as well as those which seem likely to be applicable, in tanning. Those which prove to be rich in tanning are afterwards submitted for trial in the tan-yards. In this way a large number of astringent plants are being investigated and reports on the tanning value of the following classes have already been made:—*Myrobalans, Mangroves* and the *Cœsalpinias.*

At the instance of the Indian Government the question of the best method of preparing extracts of tanning agents is being carefully enquired into, with the object of rendering available the enormous supply of astringent plants which are abundant in the forests of India.

Much interest in this matter has been taken by tanners in this country and the whole subject promises to be a most important one from a commercial point of view.

*Edible Oils.*

An extensive series of samples of the principal edible oils of India having been made under the direction of Dr. Watt, each oil has been subjected to systematic chemical examination and compared with oils of the same type which command a ready sale in this country. The composition and chief properties of these oils have now been put on record (see Addendum) and many of them are likely to be commercially important.

*Dye-stuffs.*

The principal Indian dye materials are being investigated with the assistance of Professor Hummel and Mr. A. G. Perkin, of the Dyeing department, Yorkshire College, Leeds. An account of the dyeing properties of *Delphinium Zalil,* has already been given whilst the constituents of "Kamala" have been investigated and a description of its adulterants provided, which it is hoped will lead to the export from India of this dyeing material in a purer condition.

*Medicinal Plants.*

It is most important that the numerous plants abundant in India and held there in high repute as medicinal agents, should be completely investigated, both as regards their principal constituents and their medicinal value. It has been shown from an examination of an Indian henbane, *Hyoscyamus muticus,* that this plant contains a valuable alkaloid (hyoscyamine) in a form in which it can be more readily isolated than from the other plants which are now resorted to for this purpose (see Addendum).

The constituents of Indian hemp are also being examined with the object of ascertaining the cause of, and, if possible, of providing a remedy for, the rapid deterioration in quality which this drug undergoes when stored.

A number of samples of Indian kino have been examined and reports as to their commercial value obtained. Suggestions have been made for the better collection and export of the drug to this country.

*India Rubber and Gutta Percha.*

A chemical examination is being made of the constituents of the *latices* which furnish these products and of similar *latices,* possible substitutes for india rubber and gutta percha. A chemical examination has been made, and commercial valuation obtained of various samples of rubber produced in India, with a view to their improvement.

*Minerals.*

A number of samples of mica have been forwarded from Jeypore for the purpose of ascertaining their fitness for the various purposes for which mica is industrially employed. The samples were judged to be inferior and the authorities of Jeypore have been provided with a complete statement of the quality and character which mica should possess in order to command a satisfactory price in the English market.

A large number of specimens of limestones, chiefly from Madras, have been submitted to examination in order to determine their fitness for use in the smelting of iron.

Canada.

*Canadian Honey.*

This honey was chemically examined and compared with the best honey sold in the English markets, in order to estimate its suitability for sale in this country. The result was not wholly favourable, and defects in the product were pointed out to the Board of Agriculture. These have now been remedied and large shipments have since been made to this country.

*Sweet Clover Fibre.*

A sample of this fibre, stated to be derived from *Melilotus alba*, or sweet clover, which is very plentiful in some districts of the Province of Quebec, was submitted by the Minister of Agriculture, and chemically examined in the department, and also by fibre experts. The valuable properties of the fibre were pointed out and suggestions made for its utilisation.

*Methods of Grading Wheat.*

A memorandum on the elaborate methods in use on the Continent in grading and analysing wheat was drawn up for the guidance of Canadian millers who had applied for the information.

*Canadian Graphite.*

Several samples of graphite were submitted to brokers for valuation on the basis of the results of chemical analysis. They proved to be inferior to the graphite at present obtained from Ceylon.

*Canadian Felspar.*

A sample from a new deposit of Canadian felspar was analysed and shown to be soda felspar. The material was next successfully tried in several potteries, and consignments of the felspar have since been exported to this country.

*Canadian Mica.*

A report on the special characteristics and commercial value of Canadian amber mica and its application for electrical purposes.

*Canadian Sumach.*

The chemical constituents of this plant, which is abundant in Canada, have been examined and its value as a tanning agent determined by actual trial in a large tannery. The results were in some respects very satisfactory, and a number of suggestions were made as to the cultivation and preparation of the plant for use in tanning. The report was illustrated with samples of leather tanned with the sumach.

Grenada.

*Fibres.*

Report on the quality and uses of three fibres from Grenada, *Agave rigida, Sansevieria zeylanica* and *Furcræa gigantea.*

British Guiana.

*Timbers.*

Report on mechanical tests, carried out at the Central Technical College, by Professor Unwin, F.R.S., of thirteen different timbers from British Guiana.

*Goupia Tomentosa.*

Report on the constituents of the wood of *Goupia tomentosa.* The use of this hard and valuable wood is interfered with by its very offensive odour. This was shown to be due to the presence of certain volatile organic acids which can be dissipated by heating.



Jamaica.

*Timbers.*

Report by Professor Unwin on the mechanical tests of a series of twenty-four of the principal timbers of Jamaica.

Montserrat.

*Timbers.*

Report by Professor Unwin on the mechanical tests of two timbers from Montserrat.

Cape of Good Hope.

*Wines.*

Report on the analysis of selected samples of Cape wines. A chemical analysis was made of these wines and they were then submitted to an expert. The causes of the defects were ascertained, remedies were suggested and recommendations made for the improvement of Cape wines so as to render them more readily saleable in Europe.

*Timbers.*

Report by Professor Unwin on the mechanical tests of twenty-five Cape timbers.

Natal.

*Shale.*

Report on the chemical examination of a shale supposed to be suitable for the production of oil and gas.

*Acacia Woods for Pulp-manufacture.*

Report on the suitability of the wood of two species of acacia (*A. dealbata* and *A. mollissima*) for conversion into wood-pulp for paper-making. These woods were converted into pulp by the two principal processes in use for this purpose and commercial valuations of the wood and pulp were obtained.

*Medicinal Plants.*

The constituents of a purgative plant were examined and shown to resemble those of Jalap.

*Timbers.*

Report by Professor Unwin on the mechanical tests of six Natal timbers.

*Ash of Natal Aloes.*

A report on its composition and possible uses.

*India Rubber.*

Report on the chemical properties and commercial value of a sample of india rubber produced in Zululand.

Newfoundland.

*Haematite.*

Report on the composition of two samples of haematite iron ore from Newfoundland. The producers were brought into communication with iron manufacturers in this country.

*Coal and Chrome Iron Ore.*

Report on the composition of samples of coal and chrome iron ore from Newfoundland.

*Steatite.*

Report and analysis of a sample of a new variety of steatite. This sample was submitted to buyers of the mineral, in order to draw attention to the existence of valuable deposits in Newfoundland.

Trinidad.

*Carapa Oil.*

Carapa oil is extracted from the nuts of a tree abundant in the West Indies. A full report on its chemical composition and technical value was furnished.

*Sisal fibre.*

Report on the comparative value of a sample of sisal fibre grown experimentally in the Royal Botanic Gardens, Trinidad.

*Chione Glabra.*

The bark of *Chione glabra* is used in Trinidad as a drug. The precise nature of the active principle was determined, and this constituent was afterwards prepared artificially.

Windward Islands.

*Groo-groo Fibre.*

Report on the composition, quality and uses of groo-groo fibre, grown in the Botanical Gardens, St. Vincent.

British Central Africa.

*Minerals.*

Report on the analysis and technical examination of coal discovered in the West Shire district. This coal proved to be of excellent quality.

Report on the analysis and technical examination of two samples of coal from Nyasaland.

Report on a sample of washed sand, which proved to be titaniferous magnetic iron oxide, and on some pieces of rock believed to be auriferous, also on a further sample of coal from North-West Nyasaland.

Report on a sample of sand, and on volcanic rock.

Report on two collections of pyritous and ferruginous minerals.

Report on a specimen of rock-crystal. This was statad by experts, to whom it was submitted, after chemical examination, to be a brilliant specimen of this material, which is largely used in making optical instruments.

Report on a sample of crystal. This proved to be Iceland spar, good specimens of which are greatly sought after by manufacturers of optical instruments. Suggestions were made with reference to the collection and selection of this material.

*Fibre.*

Report on a sample of fibre from an indigenous plant.

Somaliland.

Samples of mica have been submitted to examination and commercial valuation.

New Zealand.

*Minerals.*

Reports on samples of iron ore, limestone and haematite.

Report on a specimen of greenstone.

Reports on samples of jet and jasper.

Report on the suitability of samples of sand and clay for glass-making, by chemical analysis, and examination by experts.

Fiji.

Report on a sample of bark as a possible substitute for sassafras.

Report on a sample of fibre.

Report on a sample of oil.

Victoria.

*Perfumes.*

Report on the results of the preliminary chemical examination of a series of essential oils and essences from the Government Flower Farm, Dunolly.

*Fibres.*

Report on a series of thirty-two fibres grown experimentally in the Melbourne Botanical Gardens.

*Meat Extract.*

Report on the examination of a sample of meat extract.



*Coal.*

An examination of three samples of brown coal.

Tasmania.

*Timbers.*

Report by Professor Unwin on the mechanical tests of three timbers.

Western Australia.

*Water.*

Report on the analysis of three samples of water taken from the "Perth Station Yard Bore."

*Coal.*

Report on the analysis and technical examination of coal from the Wallsend Colliery of the Collie Coal Field.

New South Wales.

*Cotton.*

Report on the properties and commercial value of cotton grown in New South Wales, proving that most satisfactory cotton can be produced in the Colony.

*Sisal Fibre.*

Report on the composition and commercial value of sisal fibre grown in New South Wales. This report was very favourable.

*Meat Preservative.*

Report on the value of an antiseptic material proposed for use on the large scale in the preservation of meat.

*Leather.*

Report on the character and commercial value of leather tanned in New South Wales.

Queensland.

*Hides, Skins and Leather.*

These samples were received through the Agent-General from the Department of Agriculture at Brisbane, with a request that a report should be obtained on the commercial value of the skins, which had been cured by a special process. In order to test the efficiency of the curing process, samples of hides and skins were tanned, and the leather so produced, submitted to experts. A detailed report on the value of the process and of the leather produced was furnished, with the opinions of leather experts and brokers.

*Australian Leather.*

Report on the market in this country for various types of Australian leather.

*Divi-Divi Pods.*

The pods of this plant (*Cæsalpinia coriaria*) are used in tanning. The Queensland sample was analysed and found to be of excellent quality, and was highly valued by the brokers to whom it was submitted.

*Wine.*

Report on samples of wine produced in the Colony.

*Fibres.*

Report on the composition and uses of the fibres of *Hibiscus heterophylla* and *Hibiscus sabdariffa*, grown in Queensland.

*Timbers.*

Report by Professor Unwin on the mechanical properties of seven timbers.

British Honduras.

*Timbers.*

Report by Professor Unwin on the mechanical tests of fifteen timbers from British Honduras.

Hong-Kong.

*Tung Oil.*

Report on the composition and properties of tung oil (Chinese wood oil).

Ceylon.

*Timbers.*

Report by Professor Unwin on the mechanical tests of twenty-two of the principal Ceylon timbers.

*Kekuna Oil.*

Report on the chemical composition and medicinal action of this oil.

*Cocoa Nut Oil.*

Report on the chemical composition of a sample purified by a special process.

Egypt.

*Poisonous and Medicinal Plants.*

An enquiry into the nature of the poison of an Arabian vetch (*Lotus arabicus*). This was proved to be due to prussic acid formed from a new glucoside present in this plant, which has been named *lotusin* (see Addendum). This glucoside disappears as the seeds ripen, when the plant becomes non-poisonous and can be used as fodder.

An examination of the alkaloid contained in *Hyoscyamus muticus* and *Datura Stramonium* grown in Egypt (see Addendum). Both these plants, the former especially, are shown to be valuable commercial sources of the alkaloid hyoscyamine and are now being exported to this country.

F. A. ABEL,
Hon. Director and Secretary of the Imperial Institute.

WYNDHAM R. DUNSTAN,
Director of the Scientific and Technical Department of the Imperial Institute.

July1901.

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Addendum.

List of the principal papers communicated to scientific societies on subjects arising out of the above-mentioned and other enquiries conducted in the Scientific and Technical Department of the Imperial Institute :—

A chemical investigation of the constituents of Indian and American Podophyllum (*Podophyllum emodi* and *P. peltatum*). By Professor W. R. Dunstan, F.R.S., and T. A. Henry, B.Sc., Lond. (Transactions of the Chemical Society, 1898).

Physiological action and Therapeutic properties of Podophyllin, with special reference to Indian Podophyllin. By H. W. G. Mackenzie, M.D., F.R.C.P., and A. E. Dixon, M.B. (Edinburgh Medical Journal, November 1898).

Occurrence of hyoscyamine in the *Hyoscyamus muticus* of India. By Professor W. R. Dunstan, F.R.S., and Harold Brown. (Transactions of the Chemical Society, 1899).

Occurrence of orthohydroxyacetophenone in the volatile oil of *Chione glabra*. By Professor W. R. Dunstan, F.R.S., and T. A. Henry, B.Sc., Lond. (Transactions of the Chemical Society, 1898).

The volatile constituents of the wood of *Goupia tomentosa*. By Professor W. R. Dunstan, F.R.S., and T. A. Henry, B.Sc., Lond. (Transactions of the Chemical Society, 1898).

The action of alkyl haloids on aldoximes and ketoximes. By Professor W. R. Dunstan, F.R.S., and E. Goulding, B.Sc., Lond. (Transactions of the Chemical Society, 1897).

The Pharmacology of Aconitine, Diacetylaconitine, Benzaconine and Aconine considered in relation to their chemical constitution. By Professor J. T. Cash, F.R.S., and Professor W. R. Dunstan, F.R.S. (Philosophical Transactions of the Royal Society, 1898).

Contributions of our knowledge of the Aconite Alkaloids. Part XIV.—On Pseudaconitine. By Professor W. R. Dunstan, F.R.S., and F. H. Carr. (Transactions of the Chemical Society, 1897).

Report on the chief physical and chemical characters of a series of Indian Edible Oils. By A. W. Crossley, Ph.D., D.Sc., and H. R. Le Sueur, B.Sc., Lond. (Journal of the Society of Chemical Industry, December 1898).

The nature and origin of the poison of *Lotus arabicus*. By Professor W. R. Dunstan, F.R.S., and T. A. Henry, B.Sc., Lond. (Proceedings of the Royal Society, 1900 and 1901).



The alkaloid of *Hyoscyamus muticus* and of *Datura Stramonium* grown in Egypt. By Professor W. R. Dunstan, F.R.S., and Harold Brown. (Transactions of the Chemical Society, January 1901).

The action of alkyl haloids on hydroxylamine. Formation of substituted hydroxylamines and oxamines. By Professor W. R. Dunstan, F.R.S., and E. Goulding, B.Sc. (Transactions of the Chemical Society, 1890).

The action of hydrogen peroxide on secondary and tertiary aliphatic amines. Formation of alkylated hydroxylamines and oxamines. By Professor W. R. Dunstan, F.R.S., and E. Goulding, B.Sc. (Transactions of the Chemical Society, 1899).

Contributions to our knowledge of the Aconite Alkaloids. Part XV.—On japaconitine and the alkaloids of Japanese aconite. By Professor W. R. Dunstan, F.R.S., and H. M. Read. (Transactions of the Chemical Society, 1899).

Note on the hide powder filter. By. R. L. Jenks. (Journal of the Society of Chemical Industry, June 1896).

The Pharmacology of Pseudaconitine and Japaconitine considered in relation to that of Aconitine. By Professor J. T. Cash, F.R.S., and Professor Wyndham R. Dunstan, F.R.S. (Proceedings of the Royal Society, 1901).

The Pharmacology of Pyraconitine and Methylbenzaconine considered in relation to their chemical constitution. By Professor J. T. Cash, F.R.S., and Professor Wyndham R. Dunstan, F.R.S. (Proceedings of the Royal Society, 1901).

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Order—No. 341, Revenue, dated 7th April 1902.

Miscellaneous.

Communicated to the Board of Revenue.

2. The memorandum will be published in the supplement to the *Fort St. George Gazette* for general information.

(True Extract.)

(Sd) G. S. Forbes

Secretary to Government.

To the Board of Revenue (Revenue Settlement, Land Records and Agriculture).
,, the Board of Revenue (Land Revenue).
,, ,, (Separate Revenue).
,, the Educational Department.
,, the Superintendent, School of Arts,
,, the ,, Government Central Museum, } through the Educational Department.
,, the Madras Chamber of Commerce.
,, the United Planters' Association, Southern India.
,, the Madras Mahajana Sabha.
,, the Honorary Secretary, Agri-Horticultural Society, Madras.
Editors' Table.

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(By order)
C. Rathavelu Mudr
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# Government {1902} of Madras.

## REVENUE.

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**G.O., No. 341, 7th April 1902.**

**APRIL.**

**Imperial Institute**

Communicating to the Board of Revenue circular from the Government of India forwarding a memorandum on the Scientific and Technical department of the —, and directing the publication of the memorandum in the *Fort St. George Gazette*.

GOVERNMENT OF MADRAS.

## REVENUE DEPARTMENT.

Read—the following letter from J. B. FULLER, Esq., C.I.E., Secretary to the Government of India, Department of Revenue and Agriculture (Practical Arts and Museums), to the Secretary to the Government of Madras, Revenue Department, dated Calcutta, the 24th March 1902, Circular No. 17—34-2 :—

In paragraph 12 of Sir E. Buck's Circular Resolution No. 59—73, dated the 3rd October 1893, which explained the objects and constitution of the Imperial Institute, attention was drawn to the opportunities for research offered by the Scientific Department of the Institute.

2. I am now directed to forward a memorandum on the Scientific and Technical Department of the Institute which has been published with the view of securing a fuller utilization than at present of the special facilities offered by the department, and to request that, with the permission of the Governor-in-Council, publicity may be given to the memorandum, and copies distributed to Chambers of Commerce, Industrial or Agricultural Associations and other public bodies.

3. All correspondence in connection with applications for investigation should continue as heretofore to be addressed to the Reporter on Economic Products, Indian Museum, Calcutta.

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Enclosure.

*The Scientific and Technical Department of the Imperial Institute.*

1. The Executive Council of the Imperial Institute desire to direct attention to the character of the work now carried on in an important Department of the Institute, which has been for several years in operation, and has, of late, undergone considerable extension.

The Scientific and Technical Department of the Institute has been established to acquire information by special enquiries and by experimental research, technical trials and commercial valuation regarding new or little known natural or manufactured products of the various Colonies and Dependencies of the British Empire and of foreign countries, and also regarding known products procurable from new sources, and local products of manufacture which it is desired to export. This work is carried out with a view to the creation of new openings in trade, or the promotion of industrial developments.

2. In an extensive and well-equipped series of research laboratories, a numerous staff of skilled Chemists, under the direction of Professor Wyndham R. Dunstan, M.A., F.R.S., carry out the investigation of the chemical constitution and properties of new dye-stuffs, tanning materials, seeds and food-stuffs, oils, gums and resins, fibres, timbers, medicinal plants and products; animal products, minerals and ores, soils, cements, and various other products, with a view to their commercial utilization. Whenever necessary these materials are submitted to special scientific experts, by whom they are made the subjects of particular investigation or practical tests. Reports are also obtained from technical or trade-experts in regard to the probable commercial or industrial value of any such products, while full information is collected from official or other trustworthy sources regarding the probable extent and cost of available supplies.

3. Appended to this Memorandum is a paper giving illustrations of work of the above nature, which has been carried out for India and the Colonies in the Scientific and Technical Department of the Institute. It will be seen that this work is quite distinct in character from



the services rendered respectively by the Commercial Information Office of the Board of Trade, and by the Botanical Establishment of the Royal Gardens, Kew. But the work of this Department of the Institute may indeed be regarded as an important adjunct to that accomplished by those Government establishments, especially in furnishing the results of chemical investigation and technical trials which most generally determine the commercial value of natural products.

4. All materials requiring scientific or technical examination, or commercial valuation, should be submitted to the Institute for examination either by, or through, the Foreign Office, the Colonial Office, the India Office, or the Board of Trade, or through the Colonial or Indian Government Authorities. Requests for the examination of such materials may also be submitted by Public Commercial Bodies and Institutions of the respective Colonies and Dependencies, or by the Representatives of His Majesty's Government in foreign countries.

5. Reports on the results of enquiries or experimental investigations are supplied, as a rule, without charge, when applied for as above directed, but, should special expenses be incurred in connection with any such reports, or with the commercial valuation of particular materials or manufactured products, which the Council do not consider themselves warranted in meeting, a statement of such actual outlays will be furnished, for repayment, when the reports are supplied to the Public Bodies or Institutions concerned. Should an investigation or report of exceptional character be asked for by a Government Department, an estimate of the attendant expenses will be submitted, with a view to ascertain whether authority for such expenditure will be given.

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[The attention of those who are concerned in finding new markets for Indian and Colonial products may be also directed to the collections of products exhibited in the galleries of the Imperial Institute, illustrating the material resources of the Colonies and Dependencies of the Empire. They represent upwards of forty different countries, and are open free to the public. On application to the Commercial Information Office of the Institute, or to the Curators of individual Sections of the Collections, all available information is furnished regarding any particular product exhibited in the Galleries, and samples are supplied in special instances to merchants and others. Enquiries as to possible supplies (and their probable cost) in any specific case, or for other special information desired, are dealt with promptly, if made in writing to the Honorary Director of the Institute. The assistance of the Government Authorities of the Colonies is invoked to ensure that the Collections of natural and manufactured products, and full information regarding their contents, shall be maintained up to the day.]

F. A. ABEL,
July 1901. Hon. Dir. and Secy. of the Imperial Institute.

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Staff of the Scientific and Technical Department of the Imperial Institute, 1901.

*Director* :

Professor Wyndham R. Dunstan, M.A., F.R.S., Sec.C.S.

*Assistant Chemists* :

| | |
|---|---|
| Mr. T. A. Henry, D.Sc., Lond., (Salters' Company's Research Fellow). | Mr. E. A. Andrews. |
| Mr. Ernest Goulding, B.Sc., Lond. | Mr. G. S. Blake, Assoc. R.C.S. |
| Mr. Harold Brown. | Mr. J. G. W. Brooker. |

*Special Assistant Chemists* :

| | |
|---|---|
| Dr. F. Lühn, Ph. D., Heidelberg. | Mr. H. H. Robinson, M.A., Oxon. |

Attached to this department is a staff of scientific, technical and commercial referees.

*Illustrations of Scientific and Technical reports made since* 1896,

chiefly at the request of the Indian and Colonial Governments, based upon experimental investigations conducted in the Laboratories of the Department, and on the opinions of scientific, technical and commercial referees.

India.

(For further particulars see "Parliamentary Return of the Imperial Institute, Indian Section, August 1899." Eyre and Spottiswoode, London.)

*Aconites.*

A chemical examination has been made of the constituents of the principal varieties of aconite indigenous to India. The medicinally active constituent has been examined, its chemical composition and properties defined and its exact medicinal action ascertained. Several papers on the subject have been already published (see Addendum) relating to *Aconitum ferox*, *Aconitum heterophyllum*, and *Aconitum Fischeri*.

*Tobacco.*

A consignment of specially prepared tobacco was sent from Tirhoot for chemical analysis and commercial valuation with a view to the satisfactory sale of the consignment. The results of its analysis, together with a sample of the tobacco, were submitted to a number of tobacco manufacturers and brokers and the consignment was afterwards sold at a fair price.

Arrangements are now being made for a systematic examination of the different varieties of tobacco grown in India with a view to the improvement of certain growths.

*Opium.*

A detailed enquiry is being conducted as to the quality of the opium produced in the different opium districts of India. It originated in a request for a chemical examination of opium specially grown in Jeypore, which proved to contain much less morphine and far more narcotine than is usually present in the best Turkey opium medicinally employed in this country.

The same peculiarity is shown by most of the opium produced in India and the question is being fully investigated with the view of ascertaining the cause of this difference in Indian as compared with Turkey opium and the possibility of improving the Indian product.

If Indian opium could be produced richer in morphine, there is no reason why it should not be medicinally employed in Europe, instead of Turkey opium; and also used as a source of morphine and other alkaloids.

*Podophyllum.*

A complete chemical examination has been made of the constituents of the Indian podophyllum (*Podophyllum emodi*). It has been shown in a paper communicated to the Chemical Society (see Addendum) that its constituents are identical with those of American podophyllum (*Podophyllum peltatum*) which is largely employed in medicine, both in this country and throughout Europe. The exact chemical nature of the medicinally active constituent has been ascertained and it is shown to be present to a greater extent in the Indian product than in the American.

Medical trial has completely substantiated the results of the chemical enquiry (see Addendum). It is proved that this plant, which is abundant in India, is a most efficient substitute for the American podophyllum at present employed and the plant, and medicinal preparations made from it, have now been included in the "Indian and Colonial Addendum to the British Pharmacopœia."

Incidentally, it was discovered that the Indian plant also contains a yellow dye which might be profitably employed in dyeing; being, in fact, identical with the colouring matter of the well-known dye-stuff, quercitron bark.

*Jute.*

An extensive series of samples of jute, collected at different stages of growth and treated under various conditions, are being investigated with the view of securing greater uniformity in the quality of Indian jute fibre.

*Edible Gums.*

A chemical examination has been made of several Indian gums which seemed likely to be of commercial value as substitutes for gum arabic. The results, together with samples of the gums, were submitted to brokers in this country who reported on their commercial value and there have been already commercial enquiries for these gums by manufacturers.

*Iron Ores.*

Chemical analysis has been made of a number of specimens of Indian iron ores, chiefly magnetite, obtained from the Salem district of Madras. The results have given rise to an important discussion as to the possibility of the ores being profitably smelted in India.

*Coal.*

A chemical and technical examination has been made of representative samples of coal obtained from the principal coal districts of India, including many in which the seams at present are not actively worked. A full description of the composition and characters of the



different varieties of Indian coal has been drawn up by Professor Dunstan and issued as a separate paper by the India Office. It is also included in the "Parliamentary Return of the Imperial Institute, Indian Section, August 1899."

*Food-grains.*

All the more important Indian food-grains are being submitted to a complete chemical examination, chiefly by Professor Church, F.R.S., who has already made a number of reports on the subject dealing with their composition and nutritive value.

*Fibres.*

A large number of Indian fibres have been chemically examined, and afterwards examined by fibre experts. The results have been communicated to the Indian Government so that suitable action might be taken in those cases in which it seems desirable. Among these fibres are *Pine-apple*, *Sabai*, *Tacca*, *Madar*, *Ban Rehu*, the fibre of *Phœnix paludosa*, and the floss of *Calotropis procera*.

*Timbers.*

The mechanical properties of Pyinma wood have been carefully tested by Professor Unwin, F.R.S., with a view to its application in engineering and building construction.

*Tanning Materials.*

Systematic chemical examination is being conducted of the principal plants now used, as well as those which seem likely to be applicable, in tanning. Those which prove to be rich in tanning are afterwards submitted for trial in the tan-yards. In this way a large number of astringent plants are being investigated and reports on the tanning value of the following classes have already been made:—*Myrobalans*, *Mangroves* and the *Cæsalpinias*.

At the instance of the Indian Government the question of the best method of preparing extracts of tanning agents is being carefully enquired into, with the object of rendering available the enormous supply of astringent plants which are abundant in the forests of India.

Much interest in this matter has been taken by tanners in this country and the whole subject promises to be a most important one from a commercial point of view.

*Edible Oils.*

An extensive series of samples of the principal edible oils of India having been made under the direction of Dr. Watt, each oil has been subjected to systematic chemical examination and compared with oils of the same type which command a ready sale in this country. The composition and chief properties of these oils have now been put on record (see Addendum) and many of them are likely to be commercially important.

*Dye-stuffs.*

The principal Indian dye materials are being investigated with the assistance of Professor Hummel and Mr. A. G. Perkin, of the Dyeing department, Yorkshire College, Leeds. An account of the dyeing properties of *Delphinium Zalil*, has already been given whilst the constituents of "Kámala" have been investigated and a description of its adulterants provided, which it is hoped will lead to the export from India of this dyeing material in a purer condition.

*Medicinal Plants.*

It is most important that the numerous plants abundant in India and held there in high repute as medicinal agents, should be completely investigated, both as regards their principal constituents and their medicinal value. It has been shown from an examination of an Indian henbane, *Hyoscyamus muticus*, that this plant contains a valuable alkaloid (hyoscyamine) in a form in which it can be more readily isolated than from the other plants which are now resorted to for this purpose (see Addendum).

The constituents of Indian hemp are also being examined with the object of ascertaining the cause of, and, if possible, of providing a remedy for, the rapid deterioration in quality which this drug undergoes when stored.

A number of samples of Indian kino have been examined and reports as to their commercial value obtained. Suggestions have been made for the better collection and export of the drug to this country.

*India Rubber and Gutta Percha.*

A chemical examination is being made of the constituents of the *latices* which furnish these products and of similar *latices*, possible substitutes for india rubber and gutta percha. A chemical examination has been made, and commercial valuation obtained of various samples of rubber produced in India, with a view to their improvement.

*Minerals.*

A number of samples of mica have been forwarded from Jeypore for the purpose of ascertaining their fitness for the various purposes for which mica is industrially employed. The samples were judged to be inferior and the authorities of Jeypore have been provided with a complete statement of the quality and character which mica should possess in order to command a satisfactory price in the English market.

A large number of specimens of limestones, chiefly from Madras, have been submitted to examination in order to determine their fitness for use in the smelting of iron.

Canada.

*Canadian Honey.*

This honey was chemically examined and compared with the best honey sold in the English markets, in order to estimate its suitability for sale in this country. The result was not wholly favourable, and defects in the product were pointed out to the Board of Agriculture. These have now been remedied and large shipments have since been made to this country.

*Sweet Clover Fibre.*

A sample of this fibre, stated to be derived from *Melilotus alba*, or sweet clover, which is very plentiful in some districts of the Province of Quebec, was submitted by the Minister of Agriculture, and chemically examined in the department, and also by fibre experts. The valuable properties of the fibre were pointed out and suggestions made for its utilisation.

*Methods of Grading Wheat.*

A memorandum on the elaborate methods in use on the Continent in grading and analysing wheat was drawn up for the guidance of Canadian millers who had applied for the information.

*Canadian Graphite.*

Several samples of graphite were submitted to brokers for valuation on the basis of the results of chemical analysis. They proved to be inferior to the graphite at present obtained from Ceylon.

*Canadian Felspar.*

A sample from a new deposit of Canadian felspar was analysed and shown to be soda felspar. The material was next successfully tried in several potteries, and consignments of the felspar have since been exported to this country.

*Canadian Mica.*

A report on the special characteristics and commercial value of Canadian amber mica and its application for electrical purposes.

*Canadian Sumach.*

The chemical constituents of this plant, which is abundant in Canada, have been examined and its value as a tanning agent determined by actual trial in a large tannery. The results were in some respects very satisfactory, and a number of suggestions were made as to the cultivation and preparation of the plant for use in tanning. The report was illustrated with samples of leather tanned with the sumach.

Grenada.

*Fibres.*

Report on the quality and uses of three fibres from Grenada, *Agave rigida, Sansevieria zeylanica* and *Furcræa gigantea.*

British Guiana.

*Timbers.*

Report on mechanical tests, carried out at the Central Technical College, by Professor Unwin, F.R.S., of thirteen different timbers from British Guiana.

*Goupia Tomentosa.*

Report on the constituents of the wood of *Goupia tomentosa.* The use of this hard and valuable wood is interfered with by its very offensive odour. This was shown to be due to the presence of certain volatile organic acids which can be dissipated by heating.



Jamaica.

*Timbers.*

Report by Professor Unwin on the mechanical tests of a series of twenty-four of the principal timbers of Jamaica.

Montserrat.

*Timbers.*

Report by Professor Unwin on the mechanical tests of two timbers from Montserrat.

Cape of Good Hope.

*Wines.*

Report on the analysis of selected samples of Cape wines. A chemical analysis was made of these wines and they were then submitted to an expert. The causes of the defects were ascertained, remedies were suggested and recommendations made for the improvement of Cape wines so as to render them more readily saleable in Europe.

*Timbers.*

Report by Professor Unwin on the mechanical tests of twenty-five Cape timbers.

Natal.

*Shale.*

Report on the chemical examination of a shale supposed to be suitable for the production of oil and gas.

*Acacia Woods for Pulp-manufacture.*

Report on the suitability of the wood of two species of acacia (*A. dealbata* and *A. mollissima*) for conversion into wood-pulp for paper-making. These woods were converted into pulp by the two principal processes in use for this purpose and commercial valuations of the wood and pulp were obtained.

*Medicinal Plants.*

The constituents of a purgative plant were examined and shown to resemble those of Jalap.

*Timbers.*

Report by Professor Unwin on the mechanical tests of six Natal timbers.

*Ash of Natal Aloes.*

A report on its composition and possible uses.

*India Rubber.*

Report on the chemical properties and commercial value of a sample of india rubber produced in Zululand.

Newfoundland.

*Hæmatite.*

Report on the composition of two samples of haematite iron ore from Newfoundland. The producers were brought into communication with iron manufacturers in this country.

*Coal and Chrome Iron Ore.*

Report on the composition of samples of coal and chrome iron ore from Newfoundland.

*Steatite.*

Report and analysis of a sample of a new variety of steatite. This sample was submitted to buyers of the mineral, in order to draw attention to the existence of valuable deposits in Newfoundland.

Trinidad.

*Carapa Oil.*

Carapa oil is extracted from the nuts of a tree abundant in the West Indies. A full report on its chemical composition and technical value was furnished.

*Sisal fibre.*

Report on the comparative value of a sample of sisal fibre grown experimentally in the Royal Botanic Gardens, Trinidad.

*Chione Glabra.*

The bark of *Chione glabra* is used in Trinidad as a drug. The precise nature of the active principle was determined, and this constituent was afterwards prepared artificially.

Windward Islands.

*Groo-groo Fibre.*

Report on the composition, quality and uses of groo-groo fibre, grown in the Botanical Gardens, St. Vincent.

British Central Africa.

*Minerals.*

Report on the analysis and technical examination of coal discovered in the West Shire district. This coal proved to be of excellent quality.

Report on the analysis and technical examination of two samples of coal from Nyasaland.

Report on a sample of washed sand, which proved to be titaniferous magnetic iron oxide, and on some pieces of rock believed to be auriferous, also on a further sample of coal from North-West Nyasaland.

Report on a sample of sand, and on volcanic rock.

Report on two collections of pyritous and ferruginous minerals.

Report on a specimen of rock-crystal. This was statad by experts, to whom it was submitted, after chemical examination, to be a brilliant specimen of this material, which is largely used in making optical instruments.

Report on a sample of crystal. This proved to be Iceland spar, good specimens of which are greatly sought after by manufacturers of optical instruments. Suggestions were made with reference to the collection and selection of this material.

*Fibre.*

Report on a sample of fibre from an indigenous plant.

Somaliland.

Samples of mica have been submitted to examination and commercial valuation.

New Zealand.

*Minerals.*

Reports on samples of iron ore, limestone and haematite.

Report on a specimen of greenstone.

Reports on samples of jet and jasper.

Report on the suitability of samples of sand and clay for glass-making, by chemical analysis, and examination by experts.

Fiji.

Report on a sample of bark as a possible substitute for sassafras.

Report on a sample of fibre.

Report on a sample of oil.

Victoria.

*Perfumes.*

Report on the results of the preliminary chemical examination of a series of essential oils and essences from the Government Flower Farm, Dunolly.

*Fibres.*

Report on a series of thirty-two fibres grown experimentally in the Melbourne Botanical Gardens.

*Meat Extract.*

Report on the examination of a sample of meat extract.



*Coal.*

An examination of three samples of brown coal.

Tasmania.

*Timbers.*

Report by Professor Unwin on the mechanical tests of three timbers.

Western Australia.

*Water.*

Report on the analysis of three samples of water taken from the "Perth Station Yard Bore."

*Coal.*

Report on the analysis and technical examination of coal from the Wallsend Colliery of the Collie Coal Field.

New South Wales.

*Cotton.*

Report on the properties and commercial value of cotton grown in New South Wales, proving that most satisfactory cotton can be produced in the Colony.

*Sisal Fibre.*

Report on the composition and commercial value of sisal fibre grown in New South Wales. This report was very favourable.

*Meat Preservative.*

Report on the value of an antiseptic material proposed for use on the large scale in the preservation of meat.

*Leather.*

Report on the character and commercial value of leather tanned in New South Wales.

Queensland.

*Hides, Skins and Leather.*

These samples were received through the Agent-General from the Department of Agriculture at Brisbane, with a request that a report should be obtained on the commercial value of the skins, which had been cured by a special process. In order to test the efficiency of the curing process, samples of hides and skins were tanned, and the leather so produced, submitted to experts. A detailed report on the value of the process and of the leather produced was furnished, with the opinions of leather experts and brokers.

*Australian Leather.*

Report on the market in this country for various types of Australian leather.

*Divi-Divi Pods.*

The pods of this plant (*Cæsalpinia coriaria*) are used in tanning. The Queensland sample was analysed and found to be of excellent quality, and was highly valued by the brokers to whom it was submitted.

*Wine.*

Report on samples of wine produced in the Colony.

*Fibres.*

Report on the composition and uses of the fibres of *Hibiscus heterophylla* and *Hibiscus sabdariffa*, grown in Queensland.

*Timbers.*

Report by Professor Unwin on the mechanical properties of seven timbers.

British Honduras.

*Timbers.*

Report by Professor Unwin on the mechanical tests of fifteen timbers from British Honduras.

Hong-Kong.

*Tung Oil.*

Report on the composition and properties of tung oil (Chinese wood oil).

Ceylon.

*Timbers.*

Report by Professor Unwin on the mechanical tests of twenty-two of the principal Ceylon timbers.

*Kekuna Oil.*

Report on the chemical composition and medicinal action of this oil.

*Cocoa Nut Oil.*

Report on the chemical composition of a sample purified by a special process.

Egypt.

*Poisonous and Medicinal Plants.*

An enquiry into the nature of the poison of an Arabian vetch (*Lotus arabicus*). This was proved to be due to prussic acid formed from a new glucoside present in this plant, which has been named *lotusin* (see Addendum). This glucoside disappears as the seeds ripen, when the plant becomes non-poisonous and can be used as fodder.

An examination of the alkaloid contained in *Hyoscyamus muticus* and *Datura Stramonium* grown in Egypt (see Addendum). Both these plants, the former especially, are shown to be valuable commercial sources of the alkaloid hyoscyamine and are now being exported to this country.

F. A. ABEL,
Hon. Director and Secretary of the Imperial Institute.

WYNDHAM R. DUNSTAN,
Director of the Scientific and Technical Department of the Imperial Institute.

July1901.

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Addendum.

List of the principal papers communicated to scientific societies on subjects arising out of the above-mentioned and other enquiries conducted in the Scientific and Technical Department of the Imperial Institute :—

A chemical investigation of the constituents of Indian and American Podophyllum (*Podophyllum emodi* and *P. peltatum*). By Professor W. R. Dunstan, F.R.S., and T. A. Henry, B.Sc., Lond. (Transactions of the Chemical Society, 1898).

Physiological action and Therapeutic properties of Podophyllin, with special reference to Indian Podophyllin. By H. W. G. Mackenzie, M.D., F.R.C.P., and A. E. Dixon, M.B. (Edinburgh Medical Journal, November 1898).

Occurrence of hyoscyamine in the *Hyoscyamus muticus* of India. By Professor W. R. Dunstan, F.R.S., and Harold Brown. (Transactions of the Chemical Society, 1899).

Occurrence of orthohydroxyacetophenone in the volatile oil of *Chione glabra*. By Professor W. R. Dunstan, F.R.S., and T. A. Henry, B.Sc., Lond. (Transactions of the Chemical Society, 1898).

The volatile constituents of the wood of *Goupia tomentosa*. By Professor W. R. Dunstan, F.R.S., and T. A. Henry, B.Sc., Lond. (Transactions of the Chemical Society, 1898).

The action of alkyl haloids on aldoximes and ketoximes. By Professor W. R. Dunstan, F.R.S., and E. Goulding, B.Sc., Lond. (Transactions of the Chemical Society, 1897).

The Pharmacology of Aconitine, Diacetylaconitine, Benzaconine and Aconine considered in relation to their chemical constitution. By Professor J. T. Cash, F.R.S., and Professor W. R. Dunstan, F.R.S. (Philosophical Transactions of the Royal Society, 1898).

Contributions of our knowledge of the Aconite Alkaloids. Part XIV.—On Pseudaconitine. By Professor W. R. Dunstan, F.R.S., and F. H. Carr. (Transactions of the Chemical Society, 1897).

Report on the chief physical and chemical characters of a series of Indian Edible Oils. By A. W. Crossley, Ph.D., D.Sc., and H. R. Le Sueur, B.Sc., Lond. (Journal of the Society of Chemical Industry, December 1898).

The nature and origin of the poison of *Lotus arabicus*. By Professor W. R. Dunstan, F.R.S., and T. A. Henry, B.Sc., Lond. (Proceedings of the Royal Society, 1900 and 1901).



The alkaloid of *Hyoscyamus muticus* and of *Datura Stramonium* grown in Egypt. By Professor W. R. Dunstan, F.R.S., and Harold Brown. (Transactions of the Chemical Society, January 1901).

The action of alkyl haloids on hydroxylamine. Formation of substituted hydroxylamines and oxamines. By Professor W. R. Dunstan, F.R.S., and E. Goulding, B.Sc. (Transactions of the Chemical Society, 1890).

The action of hydrogen peroxide on secondary and tertiary aliphatic amines. Formation of alkylated hydroxylamines and oxamines. By Professor W. R. Dunstan, F.R.S., and E. Goulding, B.Sc. (Transactions of the Chemical Society, 1899).

Contributions to our knowledge of the Aconite Alkaloids. Part XV.—On japaconitine and the alkaloids of Japanese aconite. By Professor W. R. Dunstan, F.R.S., and H. M. Read. (Transactions of the Chemical Society, 1899).

Note on the hide powder filter. By. R. L. Jenks. (Journal of the Society of Chemical Industry, June 1896).

The Pharmacology of Pseudaconitine and Japaconitine considered in relation to that of Aconitine. By Professor J. T. Cash, F.R.S., and Professor Wyndham R. Dunstan, F.R.S. (Proceedings of the Royal Society, 1901).

The Pharmacology of Pyraconitine and Methylbenzaconine considered in relation to their chemical constitution. By Professor J. T. Cash, F.R.S., and Professor Wyndham R. Dunstan, F.R.S. (Proceedings of the Royal Society, 1901).

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Order—No. 341, Revenue, dated 7th April 1902.

Miscellaneous.

Communicated to the Board of Revenue.

2. The memorandum will be published in the supplement to the *Fort St. George Gazette* for general information.

(True Extract.)

(Sd) G. S. Forbes
Secretary to Government.

To the Board of Revenue (Revenue Settlement, Land Records and Agriculture).
,, the Board of Revenue (Land Revenue).
,, ,, (Separate Revenue).
,, the Educational Department.
,, the Superintendent, School of Arts, } through the Educational Department.
,, the ,, Government Central Museum, }
,, the Madras Chamber of Commerce.
,, the United Planters' Association, Southern India.
,, the Madras Mahajana Sabha.
,, the Honorary Secretary, Agri-Horticultural Society, Madras.
Editors' Table.

Forwarded to the Supt: Govt. Central Museum thro' the Edl. Dept:
(By order)
C. Rathinavelu Mudr
Registrar

Exd. C. Parthasarathy.

100 Copies.

CURRENT NO. 694

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# Government {1902} of Madras.

## REVENUE.

*Recd.* } 1902.
*Regd.* 15.

*Enclosures*

*Spare copies*

**G.O., No. 341, 7th April 1902.**

## APRIL.

### Imperial Institute

Communicating to the Board of Revenue circular from the Government of India forwarding a memorandum on the Scientific and Technical department of the — , and directing the publication of the memorandum in the *Fort St. George Gazette.*

GOVERNMENT OF MADRAS.

## REVENUE DEPARTMENT.

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1. The Executive Council of the Imperial Institute desire to direct attention to the character of the work now carried on in an important Department of the Institute, which has been for several years in operation, and has, of late, undergone considerable extension.

The Scientific and Technical Department of the Institute has been established to acquire information by special enquiries and by experimental research, technical trials and commercial valuation regarding new or little known natural or manufactured products of the various Colonies and Dependencies of the British Empire and of foreign countries, and also regarding known products procurable from new sources, and local products of manufacture which it is desired to export. This work is carried out with a view to the creation of new openings in trade, or the promotion of industrial developments.

2. In an extensive and well-equipped series of research laboratories, a numerous staff of skilled Chemists, under the direction of Professor Wyndham R. Dunstan, M.A., F.R.S., carry out the investigation of the chemical constitution and properties of new dye-stuffs, tanning materials, seeds and food-stuffs, oils, gums and resins, fibres, timbers, medicinal plants and products; animal products, minerals and ores, soils, cements, and various other products, with a view to their commercial utilization. Whenever necessary these materials are submitted to special scientific experts, by whom they are made the subjects of particular investigation or practical tests. Reports are also obtained from technical or trade-experts in regard to the probable commercial or industrial value of any such products, while full information is collected from official or other trustworthy sources regarding the probable extent and cost of available supplies.

3. Appended to this Memorandum is a paper giving illustrations of work of the above nature, which has been carried out for India and the Colonies in the Scientific and Technical Department of the Institute. It will be seen that this work is quite distinct in character from



the services rendered respectively by the Commercial Information Office of the Board of Trade, and by the Botanical Establishment of the Royal Gardens, Kew. But the work of this Department of the Institute may indeed be regarded as an important adjunct to that accomplished by those Government establishments, especially in furnishing the results of chemical investigation and technical trials which most generally determine the commercial value of natural products.

4. All materials requiring scientific or technical examination, or commercial valuation, should be submitted to the Institute for examination either by, or through, the Foreign Office, the Colonial Office, the India Office, or the Board of Trade, or through the Colonial or Indian Government Authorities. Requests for the examination of such materials may also be submitted by Public Commercial Bodies and Institutions of the respective Colonies and Dependencies, or by the Representatives of His Majesty's Government in foreign countries.

5. Reports on the results of enquiries or experimental investigations are supplied, as a rule, without charge, when applied for as above directed, but, should special expenses be incurred in connection with any such reports, or with the commercial valuation of particular materials or manufactured products, which the Council do not consider themselves warranted in meeting, a statement of such actual outlays will be furnished, for repayment, when the reports are supplied to the Public Bodies or Institutions concerned. Should an investigation or report of exceptional character be asked for by a Government Department, an estimate of the attendant expenses will be submitted, with a view to ascertain whether authority for such expenditure will be given.

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[The attention of those who are concerned in finding new markets for Indian and Colonial products may be also directed to the collections of products exhibited in the galleries of the Imperial Institute, illustrating the material resources of the Colonies and Dependencies of the Empire. They represent upwards of forty different countries, and are open free to the public. On application to the Commercial Information Office of the Institute, or to the Curators of individual Sections of the Collections, all available information is furnished regarding any particular product exhibited in the Galleries, and samples are supplied in special instances to merchants and others. Enquiries as to possible supplies (and their probable cost) in any specific case, or for other special information desired, are dealt with promptly, if made in writing to the Honorary Director of the Institute. The assistance of the Government Authorities of the Colonies is invoked to ensure that the Collections of natural and manufactured products, and full information regarding their contents, shall be maintained up to the day.]

F. A. ABEL,
July 1901. Hon. Dir. and Secy. of the Imperial Institute.

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Staff of the Scientific and Technical Department of the Imperial Institute, 1901.

*Director* :

Professor Wyndham R. Dunstan, M.A., F.R.S., Sec.C.S.

*Assistant Chemists* :

| | |
|---|---|
| Mr. T. A. Henry, D.Sc., Lond., (Salters' Company's Research Fellow). | Mr. E. A. Andrews. |
| Mr. Ernest Goulding, B.Sc., Lond. | Mr. G. S. Blake, Assoc. R.C.S. |
| Mr. Harold Brown. | Mr. J. G. W. Brooker. |

*Special Assistant Chemists* :

| | |
|---|---|
| Dr. F. Lühn, Ph. D., Heidelberg. | Mr. H. H. Robinson, M.A., Oxon. |

Attached to this department is a staff of scientific, technical and commercial referees.

*Illustrations of Scientific and Technical reports made since* 1896,

chiefly at the request of the Indian and Colonial Governments, based upon experimental investigations conducted in the Laboratories of the Department, and on the opinions of scientific, technical and commercial referees.

India.

(For further particulars see "Parliamentary Return of the Imperial Institute, Indian Section, August 1899." Eyre and Spottiswoode, London.)

*Aconites.*

A chemical examination has been made of the constituents of the principal varieties of aconite indigenous to India. The medicinally active constituent has been examined, its chemical composition and properties defined and its exact medicinal action ascertained. Several papers on the subject have been already published (see Addendum) relating to *Aconitum ferox, Aconitum heterophyllum,* and *Aconitum Fischeri.*

*Tobacco.*

A consignment of specially prepared tobacco was sent from Tirhoot for chemical analysis and commercial valuation with a view to the satisfactory sale of the consignment. The results of its analysis, together with a sample of the tobacco, were submitted to a number of tobacco manufacturers and brokers and the consignment was afterwards sold at a fair price.

Arrangements are now being made for a systematic examination of the different varieties of tobacco grown in India with a view to the improvement of certain growths.

*Opium.*

A detailed enquiry is being conducted as to the quality of the opium produced in the different opium districts of India. It originated in a request for a chemical examination of opium specially grown in Jeypore, which proved to contain much less morphine and far more narcotine than is usually present in the best Turkey opium medicinally employed in this country.

The same peculiarity is shown by most of the opium produced in India and the question is being fully investigated with the view of ascertaining the cause of this difference in Indian as compared with Turkey opium and the possibility of improving the Indian product.

If Indian opium could be produced richer in morphine, there is no reason why it should not be medicinally employed in Europe, instead of Turkey opium; and also used as a source of morphine and other alkaloids.

*Podophyllum.*

A complete chemical examination has been made of the constituents of the Indian podophyllum (*Podophyllum emodi*). It has been shown in a paper communicated to the Chemical Society (see Addendum) that its constituents are identical with those of American podophyllum (*Podophyllum peltatum*) which is largely employed in medicine, both in this country and throughout Europe. The exact chemical nature of the medicinally active constituent has been ascertained and it is shown to be present to a greater extent in the Indian product than in the American.

Medical trial has completely substantiated the results of the chemical enquiry (see Addendum). It is proved that this plant, which is abundant in India, is a most efficient substitute for the American podophyllum at present employed and the plant, and medicinal preparations made from it, have now been included in the "Indian and Colonial Addendum to the British Pharmacopœia."

Incidentally, it was discovered that the Indian plant also contains a yellow dye which might be profitably employed in dyeing; being, in fact, identical with the colouring matter of the well-known dye-stuff, quercitron bark.

*Jute.*

An extensive series of samples of jute, collected at different stages of growth and treated under various conditions, are being investigated with the view of securing greater uniformity in the quality of Indian jute fibre.

*Edible Gums.*

A chemical examination has been made of several Indian gums which seemed likely to be of commercial value as substitutes for gum arabic. The results, together with samples of the gums, were submitted to brokers in this country who reported on their commercial value and there have been already commercial enquiries for these gums by manufacturers.

*Iron Ores.*

Chemical analysis has been made of a number of specimens of Indian iron ores, chiefly magnetite, obtained from the Salem district of Madras. The results have given rise to an important discussion as to the possibility of the ores being profitably smelted in India.

*Coal.*

A chemical and technical examination has been made of representative samples of coal obtained from the principal coal districts of India, including many in which the seams at present are not actively worked. A full description of the composition and characters of the



different varieties of Indian coal has been drawn up by Professor Dunstan and issued as a separate paper by the India Office. It is also included in the "Parliamentary Return of the Imperial Institute, Indian Section, August 1899."

*Food-grains.*

All the more important Indian food-grains are being submitted to a complete chemical examination, chiefly by Professor Church, F.R.S., who has already made a number of reports on the subject dealing with their composition and nutritive value.

*Fibres.*

A large number of Indian fibres have been chemically examined, and afterwards examined by fibre experts. The results have been communicated to the Indian Government so that suitable action might be taken in those cases in which it seems desirable. Among these fibres are *Pine-apple, Sabai, Tacca, Madar, Ban Reha,* the fibre of *Phœnix paludosa,* and the floss of *Calotropis procera.*

*Timbers.*

The mechanical properties of Pyinma wood have been carefully tested by Professor Unwin, F.R.S., with a view to its application in engineering and building construction.

*Tanning Materials.*

Systematic chemical examination is being conducted of the principal plants now used, as well as those which seem likely to be applicable, in tanning. Those which prove to be rich in tanning are afterwards submitted for trial in the tan-yards. In this way a large number of astringent plants are being investigated and reports on the tanning value of the following classes have already been made:—*Myrobalans, Mangroves* and the *Cœsalpinias.*

At the instance of the Indian Government the question of the best method of preparing extracts of tanning agents is being carefully enquired into, with the object of rendering available the enormous supply of astringent plants which are abundant in the forests of India.

Much interest in this matter has been taken by tanners in this country and the whole subject promises to be a most important one from a commercial point of view.

*Edible Oils.*

An extensive series of samples of the principal edible oils of India having been made under the direction of Dr. Watt, each oil has been subjected to systematic chemical examination and compared with oils of the same type which command a ready sale in this country. The composition and chief properties of these oils have now been put on record (see Addendum) and many of them are likely to be commercially important.

*Dye-stuffs.*

The principal Indian dye materials are being investigated with the assistance of Professor Hummel and Mr. A. G. Perkin, of the Dyeing department, Yorkshire College, Leeds. An account of the dyeing properties of *Delphinium Zalil,* has already been given whilst the constituents of "Kamala" have been investigated and a description of its adulterants provided, which it is hoped will lead to the export from India of this dyeing material in a purer condition.

*Medicinal Plants.*

It is most important that the numerous plants abundant in India and held there in high repute as medicinal agents, should be completely investigated, both as regards their principal constituents and their medicinal value. It has been shown from an examination of an Indian henbane, *Hyoscyamus muticus,* that this plant contains a valuable alkaloid (hyoscyamine) in a form in which it can be more readily isolated than from the other plants which are now resorted to for this purpose (see Addendum).

The constituents of Indian hemp are also being examined with the object of ascertaining the cause of, and, if possible, of providing a remedy for, the rapid deterioration in quality which this drug undergoes when stored.

A number of samples of Indian kino have been examined and reports as to their commercial value obtained. Suggestions have been made for the better collection and export of the drug to this country.

*India Rubber and Gutta Percha.*

A chemical examination is being made of the constituents of the *latices* which furnish these products and of similar *latices,* possible substitutes for india rubber and gutta percha. A chemical examination has been made, and commercial valuation obtained of various samples of rubber produced in India, with a view to their improvement.

*Minerals.*

A number of samples of mica have been forwarded from Jeypore for the purpose of ascertaining their fitness for the various purposes for which mica is industrially employed. The samples were judged to be inferior and the authorities of Jeypore have been provided with a complete statement of the quality and character which mica should possess in order to command a satisfactory price in the English market.

A large number of specimens of limestones, chiefly from Madras, have been submitted to examination in order to determine their fitness for use in the smelting of iron.

Canada.

*Canadian Honey.*

This honey was chemically examined and compared with the best honey sold in the English markets, in order to estimate its suitability for sale in this country. The result was not wholly favourable, and defects in the product were pointed out to the Board of Agriculture. These have now been remedied and large shipments have since been made to this country.

*Sweet Clover Fibre.*

A sample of this fibre, stated to be derived from *Melilotus alba*, or sweet clover, which is very plentiful in some districts of the Province of Quebec, was submitted by the Minister of Agriculture, and chemically examined in the department, and also by fibre experts. The valuable properties of the fibre were pointed out and suggestions made for its utilisation.

*Methods of Grading Wheat.*

A memorandum on the elaborate methods in use on the Continent in grading and analysing wheat was drawn up for the guidance of Canadian millers who had applied for the information.

*Canadian Graphite.*

Several samples of graphite were submitted to brokers for valuation on the basis of the results of chemical analysis. They proved to be inferior to the graphite at present obtained from Ceylon.

*Canadian Felspar.*

A sample from a new deposit of Canadian felspar was analysed and shown to be soda felspar. The material was next successfully tried in several potteries, and consignments of the felspar have since been exported to this country.

*Canadian Mica.*

A report on the special characteristics and commercial value of Canadian amber mica and its application for electrical purposes.

*Canadian Sumach.*

The chemical constituents of this plant, which is abundant in Canada, have been examined and its value as a tanning agent determined by actual trial in a large tannery. The results were in some respects very satisfactory, and a number of suggestions were made as to the cultivation and preparation of the plant for use in tanning. The report was illustrated with samples of leather tanned with the sumach.

Grenada.

*Fibres.*

Report on the quality and uses of three fibres from Grenada, *Agave rigida*, *Sansevieria zeylanica* and *Furcræa gigantea*.

British Guiana.

*Timbers.*

Report on mechanical tests, carried out at the Central Technical College, by Professor Unwin, F.R.S., of thirteen different timbers from British Guiana.

*Goupia Tomentosa.*

Report on the constituents of the wood of *Goupia tomentosa*. The use of this hard and valuable wood is interfered with by its very offensive odour. This was shown to be due to the presence of certain volatile organic acids which can be dissipated by heating.



Jamaica.

*Timbers.*

Report by Professor Unwin on the mechanical tests of a series of twenty-four of the principal timbers of Jamaica.

Montserrat.

*Timbers.*

Report by Professor Unwin on the mechanical tests of two timbers from Montserrat.

Cape of Good Hope.

*Wines.*

Report on the analysis of selected samples of Cape wines. A chemical analysis was made of these wines and they were then submitted to an expert. The causes of the defects were ascertained, remedies were suggested and recommendations made for the improvement of Cape wines so as to render them more readily saleable in Europe.

*Timbers.*

Report by Professor Unwin on the mechanical tests of twenty-five Cape timbers.

Natal.

*Shale.*

Report on the chemical examination of a shale supposed to be suitable for the production of oil and gas.

*Acacia Woods for Pulp-manufacture.*

Report on the suitability of the wood of two species of acacia (*A. dealbata* and *A. mollissima*) for conversion into wood-pulp for paper-making. These woods were converted into pulp by the two principal processes in use for this purpose and commercial valuations of the wood and pulp were obtained.

*Medicinal Plants.*

The constituents of a purgative plant were examined and shown to resemble those of Jalap.

*Timbers.*

Report by Professor Unwin on the mechanical tests of six Natal timbers.

*Ash of Natal Aloes.*

A report on its composition and possible uses.

*India Rubber.*

Report on the chemical properties and commercial value of a sample of india-rubber produced in Zululand.

Newfoundland.

*Haematite.*

Report on the composition of two samples of haematite iron ore from Newfoundland. The producers were brought into communication with iron manufacturers in this country.

*Coal and Chrome Iron Ore.*

Report on the composition of samples of coal and chrome iron ore from Newfoundland.

*Steatite.*

Report and analysis of a sample of a new variety of steatite. This sample was submitted to buyers of the mineral, in order to draw attention to the existence of valuable deposits in Newfoundland.

Trinidad.

*Carapa Oil.*

Carapa oil is extracted from the nuts of a tree abundant in the West Indies. A full report on its chemical composition and technical value was furnished.

*Sisal fibre.*

Report on the comparative value of a sample of sisal fibre grown experimentally in the Royal Botanic Gardens, Trinidad.

*Chione Glabra.*

The bark of *Chione glabra* is used in Trinidad as a drug. The precise nature of the active principle was determined, and this constituent was afterwards prepared artificially.

Windward Islands.

*Groo-groo Fibre.*

Report on the composition, quality and uses of groo-groo fibre, grown in the Botanical Gardens, St. Vincent.

British Central Africa.

*Minerals.*

Report on the analysis and technical examination of coal discovered in the West Shire district. This coal proved to be of excellent quality.

Report on the analysis and technical examination of two samples of coal from Nyasaland.

Report on a sample of washed sand, which proved to be titaniferous magnetic iron oxide, and on some pieces of rock believed to be auriferous, also on a further sample of coal from North-West Nyasaland.

Report on a sample of sand, and on volcanic rock.

Report on two collections of pyritous and ferruginous minerals.

Report on a specimen of rock-crystal. This was statad by experts, to whom it was submitted, after chemical examination, to be a brilliant specimen of this material, which is largely used in making optical instruments.

Report on a sample of crystal. This proved to be Iceland spar, good specimens of which are greatly sought after by manufacturers of optical instruments. Suggestions were made with reference to the collection and selection of this material.

*Fibre.*

Report on a sample of fibre from an indigenous plant.

Somaliland.

Samples of mica have been submitted to examination and commercial valuation.

New Zealand.

*Minerals.*

Reports on samples of iron ore, limestone and haematite.

Report on a specimen of greenstone.

Reports on samples of jet and jasper.

Report on the suitability of samples of sand and clay for glass-making, by chemical analysis, and examination by experts.

Fiji.

Report on a sample of bark as a possible substitute for sassafras.

Report on a sample of fibre.

Report on a sample of oil.

Victoria.

*Perfumes.*

Report on the results of the preliminary chemical examination of a series of essential oils and essences from the Government Flower Farm, Dunolly.

*Fibres.*

Report on a series of thirty-two fibres grown experimentally in the Melbourne Botanical Gardens.

*Meat Extract.*

Report on the examination of a sample of meat extract.



*Coal.*

An examination of three samples of brown coal.

Tasmania.

*Timbers.*

Report by Professor Unwin on the mechanical tests of three timbers.

Western Australia.

*Water.*

Report on the analysis of three samples of water taken from the "Perth Station Yard Bore."

*Coal.*

Report on the analysis and technical examination of coal from the Wallsend Colliery of the Collie Coal Field.

New South Wales.

*Cotton.*

Report on the properties and commercial value of cotton grown in New South Wales, proving that most satisfactory cotton can be produced in the Colony.

*Sisal Fibre.*

Report on the composition and commercial value of sisal fibre grown in New South Wales. This report was very favourable.

*Meat Preservative.*

Report on the value of an antiseptic material proposed for use on the large scale in the preservation of meat.

*Leather.*

Report on the character and commercial value of leather tanned in New South Wales.

Queensland.

*Hides, Skins and Leather.*

These samples were received through the Agent-General from the Department of Agriculture at Brisbane, with a request that a report should be obtained on the commercial value of the skins, which had been cured by a special process. In order to test the efficiency of the curing process, samples of hides and skins were tanned, and the leather so produced, submitted to experts. A detailed report on the value of the process and of the leather produced was furnished, with the opinions of leather experts and brokers.

*Australian Leather.*

Report on the market in this country for various types of Australian leather.

*Divi-Divi Pods.*

The pods of this plant (*Cæsalpinia coriaria*) are used in tanning. The Queensland sample was analysed and found to be of excellent quality, and was highly valued by the brokers to whom it was submitted.

*Wine.*

Report on samples of wine produced in the Colony.

*Fibres.*

Report on the composition and uses of the fibres of *Hibiscus heterophylla* and *Hibiscus sabdariffa*, grown in Queensland.

*Timbers.*

Report by Professor Unwin on the mechanical properties of seven timbers.

British Honduras.

*Timbers.*

Report by Professor Unwin on the mechanical tests of fifteen timbers from British Honduras.

Hong-Kong.

*Tung Oil.*

Report on the composition and properties of tung oil (Chinese wood oil).

Ceylon.

*Timbers.*

Report by Professor Unwin on the mechanical tests of twenty-two of the principal Ceylon timbers.

*Kekuna Oil.*

Report on the chemical composition and medicinal action of this oil.

*Cocoa Nut Oil.*

Report on the chemical composition of a sample purified by a special process.

Egypt.

*Poisonous and Medicinal Plants.*

An enquiry into the nature of the poison of an Arabian vetch (*Lotus arabicus*). This was proved to be due to prussic acid formed from a new glucoside present in this plant, which has been named *lotusin* (see Addendum). This glucoside disappears as the seeds ripen, when the plant becomes non-poisonous and can be used as fodder.

An examination of the alkaloid contained in *Hyoscyamus muticus* and *Datura Stramonium* grown in Egypt (see Addendum). Both these plants, the former especially, are shown to be valuable commercial sources of the alkaloid hyoscyamine and are now being exported to this country.

F. A. ABEL,
Hon. Director and Secretary
of the Imperial Institute.

WYNDHAM R. DUNSTAN,
Director of the Scientific and Technical
Department of the Imperial Institute.

July1901.

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Addendum.

List of the principal papers communicated to scientific societies on subjects arising out of the above-mentioned and other enquiries conducted in the Scientific and Technical Department of the Imperial Institute :—

A chemical investigation of the constituents of Indian and American Podophyllum (*Podophyllum emodi* and *P. peltatum*). By Professor W. R. Dunstan, F.R.S., and T. A. Henry, B.Sc., Lond. (Transactions of the Chemical Society, 1898).

Physiological action and Therapeutic properties of Podophyllin, with special reference to Indian Podophyllin. By H. W. G. Mackenzie, M.D., F.R.C.P., and A. E. Dixon, M.B. (Edinburgh Medical Journal, November 1898).

Occurrence of hyoscyamine in the *Hyoscyamus muticus* of India. By Professor W. R. Dunstan, F.R.S., and Harold Brown. (Transactions of the Chemical Society, 1899).

Occurrence of orthohydroxyacetophenone in the volatile oil of *Chione glabra*. By Professor W. R. Dunstan, F.R.S., and T. A. Henry, B.Sc., Lond. (Transactions of the Chemical Society, 1898).

The volatile constituents of the wood of *Goupia tomentosa*. By Professor W. R. Dunstan, F.R.S., and T. A. Henry, B.Sc., Lond. (Transactions of the Chemical Society, 1898).

The action of alkyl haloids on aldoximes and ketoximes. By Professor W. R. Dunstan, F.R.S., and E. Goulding, B.Sc., Lond. (Transactions of the Chemical Society, 1897).

The Pharmacology of Aconitine, Diacetylaconitine, Benzaconine and Aconine considered in relation to their chemical constitution. By Professor J. T. Cash, F.R.S., and Professor W. R. Dunstan, F.R.S. (Philosophical Transactions of the Royal Society, 1898).

Contributions of our knowledge of the Aconite Alkaloids. Part XIV.—On Pseudaconitine. By Professor W. R. Dunstan, F.R.S., and F. H. Carr. (Transactions of the Chemical Society, 1897).

Report on the chief physical and chemical characters of a series of Indian Edible Oils. By A. W. Crossley, Ph.D., D.Sc., and H. R. Le Sueur, B.Sc., Lond. (Journal of the Society of Chemical Industry, December 1898).

The nature and origin of the poison of *Lotus arabicus*. By Professor W. R. Dunstan, F.R.S., and T. A. Henry, B.Sc., Lond. (Proceedings of the Royal Society, 1900 and 1901).



The alkaloid of *Hyoscyamus muticus* and of *Datura Stramonium* grown in Egypt. By Professor W. R. Dunstan, F.R.S., and Harold Brown. (Transactions of the Chemical Society, January 1901).

The action of alkyl haloids on hydroxylamine. Formation of substituted hydroxylamines and oxamines. By Professor W. R. Dunstan, F.R.S., and E. Goulding, B.Sc. (Transactions of the Chemical Society, 1890).

The action of hydrogen peroxide on secondary and tertiary aliphatic amines. Formation of alkylated hydroxylamines and oxamines. By Professor W. R. Dunstan, F.R.S., and E. Goulding, B.Sc. (Transactions of the Chemical Society, 1899).

Contributions to our knowledge of the Aconite Alkaloids. Part XV.—On japaconitine and the alkaloids of Japanese aconite. By Professor W. R. Dunstan, F.R.S., and H. M. Read. (Transactions of the Chemical Society, 1899).

Note on the hide powder filter. By. R. L. Jenks. (Journal of the Society of Chemical Industry, June 1896).

The Pharmacology of Pseudaconitine and Japaconitine considered in relation to that of Aconitine. By Professor J. T. Cash, F.R.S., and Professor Wyndham R. Dunstan, F.R.S. (Proceedings of the Royal Society, 1901).

The Pharmacology of Pyraconitine and Methylbenzaconine considered in relation to their chemical constitution. By Professor J. T. Cash, F.R.S., and Professor Wyndham R. Dunstan, F.R.S. (Proceedings of the Royal Society, 1901).

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Order—No. 341, Revenue, dated 7th April 1902.

Miscellaneous.

Communicated to the Board of Revenue.

2. The memorandum will be published in the supplement to the *Fort St. George Gazette* for general information.

(True Extract.)

(Sd) G. S. Forbes
Secretary to Government.

To the Board of Revenue (Revenue Settlement, Land Records and Agriculture).
,, the Board of Revenue (Land Revenue).
,, ,, (Separate Revenue).
,, the Educational Department.
,, the Superintendent, School of Arts,
,, the ,, Government Central Museum,
} through the Educational Department.
,, the Madras Chamber of Commerce.
,, the United Planters' Association, Southern India.
,, the Madras Mahajana Sabha.
,, the Honorary Secretary, Agri-Horticultural Society, Madras.
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