

**Reports by the juries. Class IV. Animal and vegetable substances chiefly used in manufactures, as implements, or for ornaments / Richard Owen, Edward Solly, reporters.**

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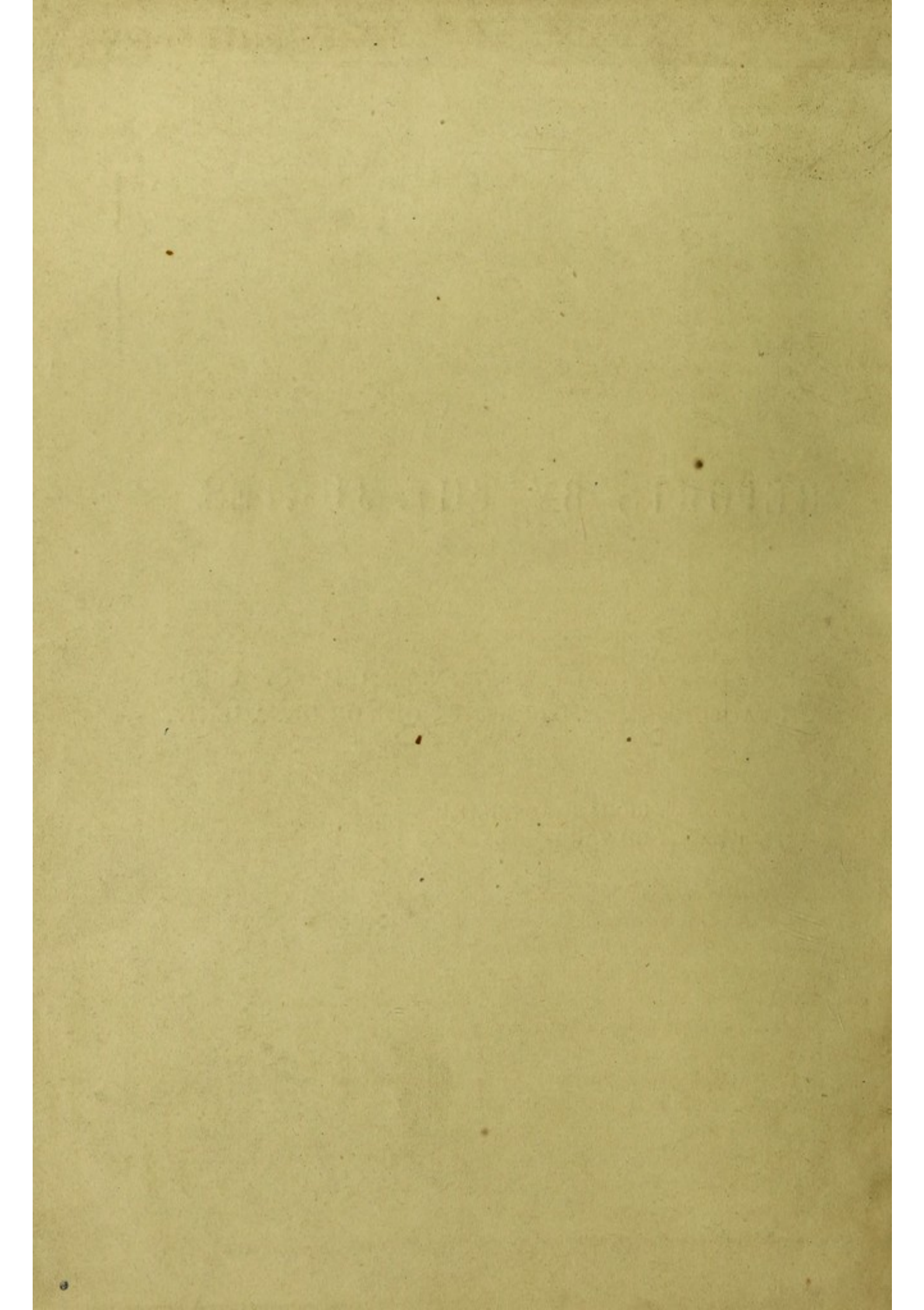
with Professor Owen's respects.

# REPORTS BY THE JURIES.

CLASS IV.

ANIMAL AND VEGETABLE SUBSTANCES CHIEFLY USED IN  
MANUFACTURES, AS IMPLEMENTS, OR FOR ORNAMENTS.

PROFESSOR RICHARD OWEN, F.R.S. }  
PROFESSOR EDWARD SOLLY, F.S.S. } REPORTERS.





*Professor Owen.*

CLASS IV.

REPORT ON ANIMAL AND VEGETABLE SUBSTANCES, CHIEFLY  
USED IN MANUFACTURES, AS IMPLEMENTS, OR FOR ORNA-  
MENTS.

*Jury.*

Professor RICHARD OWEN, F.R.S., *Chairman and Reporter on the Animal Substances*, College of Surgeons, Lincoln's Inn Fields ; Curator to the College of Surgeons.

A. PAYEN, *Deputy Chairman*, France ; Member of the Institute, Professor to the Museum of Arts and Sciences, Member of the Central Jury, &c.

Judge E. S. DUNCAN, United States.

Dr. J. F. ROYLE, F.R.S., Heathfield Lodge, Acton ; Professor of Materia Medica, King's College.

RAMON DE LA SAGRA, Spain ; Corresponding Member of National Institute of France.

Professor E. SOLLY, F.R.S., *Reporter on the Vegetable Substances*, 15 Tavistock Square ; Lecturer on Chemistry at Addiscombe.

N. WALLICH, M.D., F.R.S., 5 Upper Gower Street, Bedford Square ; formerly Curator of the Botanical Gardens, Calcutta.

F. WEYHE, Zollverein ; Councillor of Home Economy.

*Associate.*

GEORGE PETERSON, Russia ; 22 Craven Street, Strand ; Member of the Scientific Committee for the Administration of the Domains of the Empire. (Juror in Class XXVIII.)

*Preliminary Remarks.*

FOR the "Raw Materials" from the Vegetable and Animal Kingdoms mankind owes more to the powers and operations of Nature than to the inventions and appliances of Art, and in the series of the various organic products of almost every climate which are exposed to view in the "Exhibition of the Works of Industry of All Nations," the relative excellence of the objects to be compared might be deemed to be due rather to peculiarities of soil and sky than to the individual merits of the Exhibitors.

Almost every vegetable or animal substance may, however, be modified, and, in relation to its utility to man, improved, by a change of the circumstances under which it is naturally developed, the modifications being suggested by a patient study of the respective influences of those circumstances upon the useful properties of such substance.

A further improvement may be effected by carefully defending the raw material during the progress of its development from all external influences calculated to deteriorate or injuriously affect it.

The value of every organic product in commerce is much influenced by the mode of its collection, or removal from the animal or plant when developed, and by the processes for separating the useless or less valuable parts or heterogeneous matters from the marketable constituent. In the sense in which the term "Raw Material" has been extended in its application to that section of the Exhibition assigned to the Jury of Class IV., great scope for both chemical and mechanical skill has been afforded in the extraction and preparation of several of the Vegetable and Animal substances applied "in Manufactures, as Implements, or for Ornaments."

In the examination and comparison of the very numerous and diversified substances confided to their judgment, this Jury have been guided and influenced by the consideration of the invention, ingenuity, skill, and industry manifested in the amelioration and perfection of these several substances, and by the degrees in which unfavourable conditions of soil and climate have been thereby overcome: and in deciding on individual merit, they have carefully taken into account the natural facilities which may have favoured, and the natural difficulties which may have opposed, the realization of the desired qualities in the raw produce transmitted for exhibition.

After a preliminary general survey of their field of operations had shown its vast extent and the great practical importance of the objects to be compared, the Jury, having regard also to the earnest desire expressed for expedition in their decisions, resolved themselves into two Committees, one for the Vegetable, the other for the Animal Kingdom; reviewing and testing from time to time in general meetings the evidence of the special examinations confided to those Committees. In preparing their Report of the results of these labours, it has been deemed advisable to divide it into corresponding sections, the classification of the subjects in each being made, as far as it was practicable, in accordance with that of the original "Jury Lists;" the chief differences being, that—"Dextrine" or starch-gum, and "Starch" as employed in manufactures, have been added to the "Gum and Resin" series, at the recommendation of the Jury of Class III., and that spermaceti, stearine, stearic acid, with the consideration of the various processes, partly chemical and partly mechanical, employed in the preparation of these substances, have been referred to the Jury of Class XXIX., in relation to the manufacture of candles and other practical applications of these substances, already under the review of that Jury. The "Vegetable Charcoal" has been added to the "Animal Charcoal," at the request of the Jury of Class I. "Quills" were transferred to other articles of stationery, the subjects of Class XVII. Lastly, the subdivision C, including the "Vegetable Acids," such as acetic, citric, tartaric, oxalic, and other organic acids employed in the arts being, in almost all cases, the products of distinct chemical operations, have been brought under the consideration of the Jury of Class II. Subject to these changes, therefore, in the list of objects originally assigned to this Class, the present Report will be subdivided, as respects the Vegetable Kingdom, into eight heads, and as respects the Animal Kingdom into five heads; with a preliminary section explanatory of the grounds on which the awards of the Council Medal have been recommended.

*Recommendations of the Council Medal.*

Amongst the numerous samples of Raw Produce contributed by different countries, there are several collections of especial value, which derive additional merit from their completeness, and from the fact that they illustrate the trade and manufactures of an entire country. The importance of such collections, not only in a commercial, but in a statistical and scientific point of view, is very great; and the Jury, therefore, being desirous of expressing their approbation of the practical benefits to be derived from the formation and study of such collections, and the advantages which the commercial and manufacturing community may obtain by their means, have determined to recommend the award of the Council Medal to the Governments of those countries the natural produce of which were thus so instructively and completely exhibited.

The Jury have accordingly recommended the award of a Council Medal\* to the HONOURABLE EAST INDIA COMPANY for the very valuable and important collection of the raw produce of the Indian empire exhibited by them, which illustrates in a remarkable manner the vast natural resources of that empire, and places before manufacturers a number of valuable new, or little-known substances, many of which are likely hereafter to become considerable articles of import.

The Jury have, on the same grounds, recommended the award of a Council Medal\* to the TURKISH GOVERNMENT for the very valuable and important collection of the raw produce of the Turkish empire, shown in the Turkish Department, and which, from its extent and completeness, is most interesting and instructive. Both this collection and that of the Hon. East India Company derive additional value from the fact, that the specimens are not merely picked samples of fine produce, but really represent the average quality of each article; and also from the exhibition of specimens showing the different degrees of goodness, and the comparative superiority or inferiority of the productions of different districts.

A Council Medal has also been awarded to the Government of SPAIN\* for the valuable and extensive collection of raw products, illustrating the natural resources of that country.

The Jury have also recommended the award of a Council Medal\* to the FRENCH MINISTER OF WAR for the very complete and well-arranged collection of Raw Produce of Algeria, remarkable for excellence in many respects, and affording a good example of the progress and improvement of a young colony, in the amelioration of the native productions, and in the successful introduction and cultivation of new branches of industry, by the judicious application of practical science to the development of the raw materials used in various manufactures.

After comparing together the various samples of American cotton, and contrasting them with those of other countries, the Jury were desirous of testifying their admiration of the unrivalled excellence of the long-staple cottons of the United States, depending not merely on the length, strength, and silky fineness

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\* Owing to technical objections these Council Medals were not passed by the Council of Chairmen.

of the fibre, but being also due to the improved modes of culture, cleaning, and packing—the results of long experience and repeated efforts. The Jury found it quite impossible to decide between the minute shades of difference of the individual bales of cotton; besides which they considered that the merit was due not to any one exhibitor, but rather to the cotton-planters of America generally; they, therefore, recommended the award of a Council Medal\* to the GOVERNMENT OF THE UNITED STATES for the excellent samples of long-staple cotton shown, which exhibit such marked and superior excellence as to leave hardly any further improvement to be desired.

On the same grounds the Jury were desirous of testifying their sense of the peculiar value and excellence of the felting wools, adapted to the manufacture of the finest kinds of cloth, which are exhibited in the Austrian Department, by recommending the transmission of a Council Medal\* to the GOVERNMENT OF THAT EMPIRE. And with regard to the superior quality of the raw silks shown in the French Department, the Jury, by their recommendation of the award of the Council Medal\* to the “CENTRAL SOCIETY OF SERICICULTURE OF FRANCE,” have desired to testify their admiration of the specimens exhibited by many members of that Society, and their appreciation of the important influence which it has exercised in the improvement of this beautiful and valuable product of the animal kingdom.

Two other collections, though not quite analogous to these, were for similar reasons deemed worthy by the Jury of the highest commendation, and have been accordingly recommended for the award of the Council Medal;\* namely, the collection of Messrs. LAWSON of Edinburgh,† and the series of Liverpool imports. The former consists of a most complete and well-arranged collection of the vegetable productions of Scotland, the value of the whole mainly depending on the excellent systematic manner in which the specimens are arranged and classified, the careful and accurate information which accompanies the different samples, the manner in which the practical uses of each raw product are shown and illustrated, and the valuable catalogues which have been drawn up by Messrs. Lawson.

The LIVERPOOL collection of imports, though it does not of course represent either the exports or the imports of any individual country, is nevertheless, owing to the extensive trade of that port, and the large number of imports which it includes, a fair representation of a very large portion of the commerce of the country: like the preceding collection of Messrs. Lawson, it derives much of its practical value from its arrangement, and from the useful information which accompanies each specimen. Much valuable knowledge, which no book can give, is to be obtained from the attentive study of this collection, as the different productions of various countries are in it placed side by side, with a memorandum appended to each, showing the quantity of it imported into Liverpool during the last ten years.

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\* Owing to technical objections these Council Medals were not passed by the Council of Chairmen.

† This Medal was given conjointly with the Jury of Class III., in whose Award List it is inserted.

The Jury also recommended the award of a Council Medal to the "ROYAL SOCIETY FOR THE IMPROVEMENT OF THE CULTIVATION OF FLAX IN IRELAND," for their persevering and successful efforts to improve the growth and preparation of flax in the British empire. The Jury believe that the rapid and progressive advance which during the last dozen years has been made in the cultivation of flax in Ireland, is mainly, if not entirely, due to the exertions and influence of this valuable institution.

In the class of vegetable raw produce, the following subject was found to be of sufficient importance, in the opinion of the Jury, to merit special commendation, namely, MERCER'S Process for Modifying the Fibre of Cotton (Class XVIII., 48); this was considered so valuable and so important a discovery that the Jury determined to recommend it as worthy of the distinction of a Council Medal. The process itself consists principally in steeping cotton in a dilute solution of caustic soda, the effect of which is, to alter the physical and chemical properties of the fibre in a very remarkable manner, causing each single fibre to reassume to some extent its original character and microscopic appearance, exchanging the ribbon-like or flattened appearance which cotton ordinarily presents, for one of a more or less distinctly cylindrical character. The shrinking of the fibre which is thus caused, whilst it produces a most remarkable difference in the appearance of all woven fabrics, does not at all decrease its strength, but, on the contrary, renders it even stronger. At the same time that these physical alterations are produced, the chemical nature of the cotton is likewise modified, and its relation to colouring matter and mordants is changed in an equally remarkable manner; the prepared cotton taking the dyes more easily and far more perfectly than that which has not been prepared, so that the colour dyed in the same vat is far superior with the prepared than with ordinary cotton.

Amongst the vegetable charcoals which this Jury were requested to examine and report upon, they found worthy of special notice the following series, exhibited in France:—

No. 1404, by M. POPELIN DUCARRE; viz., specimens of prepared charcoal in cylindrical masses, called "charbon de Paris;" specimens of carbonized twigs and small branches of trees and of carbonized tan, accompanied with models of the machinery employed in the manufacture of the prepared charcoal.

The first merit of the ingenious invention here illustrated, and that which renders it of especial importance in countries dependent on wood for fuel, is the modification of the ovens for carbonizing, without incineration, those small ligneous portions of plants and shrubs which had previously been of no value in the formation of charcoal, and were regarded as the waste of the forest: this mode of carbonization is equally applicable to underwood, furze-bushes, cane-brake, and even to the refuse tan of many manufactures. The charcoal thus produced, together with the dust from ordinary charcoal magazines, is then converted into a kind of artificial coke, in a manner analogous to that by which coal-dust has been for many years past converted into similar fuel in England. The produce of the ovens in M. Popelin Ducarre's extensive works is pulverized, mixed with a certain proportion of coal-tar or gas-tar (*goudron de houille*), and moulded into small cylinders, which are a second time submitted to carbonization. The



machinery effecting these purposes is remarkable for its ingenuity and efficiency; and the result is a regular, solid, hard, heavy, but porous charcoal-coke, which is used with economy and success, as is amply testified by the Reports of the "Central Jury" of the Exposition at Paris in 1849, of the "Society of Encouragement," and of the "Central Society of Agriculture," of France, and by the written testimonials of many eminent manufacturers in France, requiring large quantities of an economical fuel. The "charbon de Paris" is peculiarly adapted for those manufactures in which a low and long-sustained heat is required to be maintained, and it is sold at a rate one-fourth cheaper than ordinary charcoal.

The Jury, appreciating the value of this invention of the ingenious Exhibitor, especially to countries which, like France, are not abundantly supplied with coal, have recommended the award of the Council Medal to M. POPELIN DUCARRE.

Amongst the series of wools shown in the French Department are specimens characterised by a well-skilled English Expert as "a wool of singular and peculiar properties—the hair glossy and silky, similar to mohair, retaining at the same time certain properties of the merino breed." This wool is exhibited under No. 245, by J. L. GRAUX, of the farm de Mauchamp, Commune de Juvincourt (Aisne), as the produce of a peculiar variety of the merino breed of sheep.

The Jury entered into an inquiry, not only into the commercial value and application, but into the particulars of the production of this new kind of wool, and finding it to be one of the very few instances in which the origination of a distinct variety of a domestic quadruped can be satisfactorily traced, with all the circumstances attending its development well authenticated, a brief statement of these has been deemed appropriate in the present Report.

In the year 1828, one of the ewes of the flock of merinos in the farm of Mauchamp produced a ram which became remarkable for the long, smooth, straight, and silky character of the fibre of the wool, and for the smoothness of its horns: it was of small size, and presented certain defects in its conformation, which have disappeared in its descendants. In 1829 M. Graux employed this ram with a view to obtain other rams having the same quality of wool. The produce of 1830 included only one ram and one ewe having the silky quality of the wool; that of 1831 produced four rams and one ewe with the fleece of that quality; in the year 1833 the rams with the silky variety of wool were sufficiently numerous to serve, of themselves, the whole flock. In each subsequent year the lambs have been of the two kinds; one preserving the characters of the ancient race, with the curled, elastic wool, only a little longer and finer than in the ordinary merinos; the other resembling the rams of the new breed, some of which retained the large head, long neck, narrow chest, and long flanks of the abnormal progenitor, whilst others combined the ordinary and better-formed body with the fine silky wool. M. Graux, profiting by this partial resumption of the normal type of the merino in certain of the descendants of the mal-formed original variety, at length succeeded, by a judicious system of crossing and interbreeding, in obtaining a flock combining the long fine silky fleece with a smaller

head, shorter neck, broader flanks, and more capacious chest. Of this breed the flocks have become sufficiently numerous to enable the proprietor to sell examples of the breed for exportation. The crossing of the Mauchamp variety with the ordinary merino has also produced a valuable quality of wool, known in France as the "Mauchamp-merino." The fine, silky wool of the pure Mauchamp breed is remarkable for its qualities as combing-wool, owing to the strength as well as the length and fineness of the fibre. It is found of great value by the manufacturers of Cachemere shawls, being second only to the true Cachemere fleece in the fine flexible delicacy of the fibre, and is of particular utility, when combined with the Cachemere wool, in imparting to the manufacture qualities of strength and consistence in which the pure Cachemere is deficient.

Although the quantity of the wool yielded by the Mauchamp variety is less than by the ordinary merinos, the higher price which it obtains in the French markets (25 per cent. above the best merino wools\*), and the present value of the breed, have fully compensated M. Graux for the pains and care which he has manifested in the establishment of the Mauchamp variety.

The Jury, considering the quality of invention which has been superadded to the skill and industry requisite for obtaining the finer qualities of wool under any circumstances, in the development of the new variety of sheep yielding the specimens exhibited in No. 245, have recommended that the Council Medal be awarded to J. L. GRAUX.

The most remarkable progress in the economical extraction and preparation of pure gelatines and glues from the waste remnants of the skins, bones, tendons, ligaments, and other gelatinous tissues of animals has been made in France, where the well-organised and admirably-arranged establishments for the slaughter of cattle, sheep, and horses in large towns, give great and valuable facilities for the economical applications of all the waste parts of animal bodies. Among the beautiful productions of this industry, the specimens exhibited by its chief originator, L. F. GRENET, under No. 247, merit peculiar approbation. They include different kinds of gelatine in thin layers, adapted for the dressing of stuffs, and for gelatinous baths, in the clarification of wines which contain a sufficient quantity of tannin to precipitate the gelatine; pure and white gelatines cut into threads for the use of the confectioner; very thin white and transparent sheets called papier glacé or ice paper, for copying drawings; and, finally, a quantity of objects of luxury or ornaments formed of dyed, silvered, or gilt gelatines, adapted to a variety of purposes, and to the fabrication of artificial or fancy flowers. M. Grenet, who was the first to fabricate on a large scale, out of various residues of animal bodies of little value, these beautiful and diversified products, many of which had previously been derived from isinglass, has been deemed by the Jury to merit special notice in the present section of the Report, and they have recommended to him the award of the Council Medal.

A considerable number of collections of raw produce from various countries are exhibited, each including a number of different specimens, many of which,

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\* According to the able Report of M. A. Yvart, Inspector of the Veterinary Schools and National Sheepfold of France, p. 42.

taken singly or in groups, are of importance, either from their novelty, their superior excellence, or the locality from which they are sent; the Jury considered it most advisable to treat each of these collections as a whole or unit, and they accordingly awarded Prize Medals for the following collections respectively:—

To Hon. Lieut.-Colonel BUTTERWORTH, Governor of Prince of Wales Island and Singapore, for a collection of raw produce from Singapore and the Straits.

To Major F. JENKINS, Chairman of the Assam Committee, for the collection of the raw produce of Assam.

To the AGRICULTURAL SOCIETY OF THE CAPE OF GOOD HOPE, for the collection of the raw produce of that country.

To the PRESIDENT OF THE MONTREAL COMMITTEE (Canada, 80), for the collection of the timber and other woods of Canada.

To the ROYAL AGRICULTURAL AND COMMERCIAL SOCIETY OF BRITISH GUIANA, for the collection of the raw produce of that colony.

To His Excellency Lord HARRIS, Governor of Trinidad, for the collection of the raw produce of Trinidad.

To His Excellency Sir W. T. DENISON, Governor of Van Diemen's Land, for the collection of the raw produce of that colony.

To Messrs. W. P. HAMMOND and Co., for a collection of the raw produce of Siam and the Indian Archipelago, including fine specimens of caoutchouc, gutta percha, gamboge, gums and resins, terra japonica, shells, ivory, isinglass, &c.

To the COLONIZATION ASSURANCE CORPORATION, per W. B. P. WOOD, for a collection of the raw produce of Western Australia.

To SIDI Mahmoud BENYAD of Tunis, Commissioner for the Government of Tunis, for a collection of the raw produce of that country.

To ABDUL HAMID of Alexandria, Commissioner for the Government of Egypt, for a collection of the raw produce of that country.

To the PRESIDENT OF THE MARYLAND COMMITTEE (United States, 371), for a collection of specimens of the principal raw produce of that state.

To the AGRICULTURAL BOARD OF VALENCIA, for the collection of raw produce.

To the AGRICULTURAL BOARD OF SARAGOSSA (Spain, 94), for the collection of raw produce.

To Sir ROBERT SCHOMBURGK, H.M. Consul to the Dominican Republic, for specimens of the raw produce of that republic.

To the ROYAL TECHNOLOGICAL INSTITUTE OF TUSCANY, for the collection of the raw produce of that country.

## PART I.—VEGETABLE KINGDOM.

FROM the fact that the Exhibition is the first attempt to bring together a complete collection of the natural raw produce of all parts of the globe, and from the very different views which were entertained in various countries as to the nature of the Exhibition, and the kind of substances which it was desirable to collect and exhibit, it necessarily follows that the collection, viewed as a whole, is very incomplete. In some cases, abundant and numerous specimens have been sent of all the various kinds of raw produce, constituting the staple productions of the country, their value and importance having been evidently felt and acknowledged; whilst, in other instances, it is apparent that the mere raw materials of any manufacture have been regarded as of comparatively little importance, and are consequently either not shown at all, or else are but imperfectly and inadequately exhibited, in the form of small or inferior samples. This circumstance, whilst, on the one hand, it has perhaps somewhat diminished the labour of the Jury, has, at the same time, rendered their task even more difficult than it would have been had the entire collection been more uniform and complete. It is therefore necessary to bear in mind, that as the duty of the Jury was only to consider and decide on the individual merits of the different specimens exhibited, so it necessarily happens that in some cases they have to report, as being the best sample shown, a specimen of second-rate quality, and one even decidedly inferior to what is often met with in commerce as an import from some other country, specimens of which, however, do not happen to be shown in the Exhibition. Every substance was examined carefully and considered separately; and in awarding a prize, it was only compared with substances of a similar nature: it is of course evident that the award of a medal to two different things does not infer that they are of equal merit or importance; but merely that each taken separately, and upon its own merits alone, was found worthy of high commendation and approval. It is also right to observe, that as the value of any sample of raw produce does not rest merely on its own intrinsic superiority, but depends on a number of different circumstances, which may modify its value; so, even a second-rate sample, either from a new locality, or prepared by a new and more advantageous method, may have more real merit, and be more fully entitled to favourable mention, than a superior sample possessing no peculiar novelty, and deriving its excellence rather from accident than from either the skill or the ingenuity of the producers. These remarks apply to all the classes of subjects brought under the consideration of the Jury; but in no instance do they more strongly than in the case of gums and resins.

SECTION I.—*Gum and Resin Series.*

A great deal of practical inconvenience and confusion are caused by the indiscriminate manner in which the term "gum" is used in commerce and the arts: it would certainly be an advantage if the distinctions used in scientific books were to be generally adopted by merchants and drug-brokers, the term gum being solely applied to those natural vegetable exudations which soften or dissolve in water, and yield a more or less perfect mucilage, but which are wholly insoluble in

spirit; the term "resin" being applied to those fusible and combustible vegetable substances which are quite insoluble in water, but which soften and dissolve in ether, the essential oils, and spirit of wine; and the term "gum resin" being used to designate those mixtures of gum and resin, which are intermediate in properties, and partake of the nature of each, being partially and imperfectly soluble both in water and in alcohol.

Gum, properly so called, is used in large quantities for a number of purposes in the arts; it is generally distinguished into soluble gum or gum arabic, which readily and perfectly dissolves in water, forming a clear mucilage; and cherry-tree gum or gum tragacanth, and those difficultly-soluble kinds of gum, which, though they soften easily, do not readily form mucilage. Gum is extensively used in finishing and giving lustre to crapes, silk goods, &c.; by calico-printers; shoemakers; and in other trades. A very large quantity of British gum, dextrine, or starch gum, is artificially prepared by roasting starch, and is extensively used as a cheap and strong form of gum for various purposes, especially in calico-printing, and in the manufacture of adhesive labels. The resins are, for the most part, used in the formation of varnishes and lacquers, for various purposes in dyeing, and in the manufacture of size for paper-makers, sealing-wax, &c. Those resins which naturally contain a portion of volatile oil, such as the balsams, or oleo-resins like common turpentine, are used as sources of the volatile oils. Gum resins are chiefly used in medicine.

The total quantity of "gum" imported into England in 1848 and 1849, as shown by the Custom-house returns, was,—

	1848	1849
	Cwts.	Cwts.
Arabic - - - - -	24,022	33,136
Senegal - - - - -	7,404	6,577
Copal and anime (resins) -	2,958	4,315
Tragacanth - - - - -	234	314
	34,618	44,342

The largest import of gum, therefore, is Arabic, and under this head a considerable variety is probably included; the countries from which the 33,136 cwts. were imported, in 1849, are as follows:—

	Cwts.		Cwts.
The East Indian Empire -	13,687	Brought forward - -	31,523
Egypt - - - - -	6,232	Gibraltar - - - - -	460
Morocco - - - - -	6,064	Aden - - - - -	397
South African Colonies -	4,876	Australia - - - - -	372
Italy - - - - -	664	France - - - - -	212
	31,523	Miscellaneous - - - -	172
Carry forward - - -	31,523	Total - - - - -	33,136

Of the resins and oleo-resins, the most important are turpentine and lac. Of the former, 412,042 cwts. were imported in 1849, nearly the whole of which was brought from the United States. The quantity of lac imported in 1849 was 14,786 cwts.; of this, 14,556 cwts. were the produce of the East Indian empire.

The collection of resins exhibited by E. REA (116), shown as illustrations of the chief substances used in the manufacture of varnish and lacquers, &c., is complete and interesting, comprising a tolerably numerous series of the various resinous substances employed by manufacturers. The specimens are good, well arranged and shown. The collection includes a good series of lac, namely, the insects themselves, the *Coccus lacca*, which, living on the branches of various trees, cause the lac to form and collect as an incrustation on the young shoots and twigs; the chief varieties of lac known in commerce, both from Siam and from Bengal, namely, stick lac, seed lac, orange and ruby shell lac, lump and button lac; lac dye, and the various colours prepared from it; and white or bleached lac, together with samples of the lac wax, which separates from it during the process of purification. Of the hard resins, there are good specimens of copal, anime, kauri gum or New Zealand copal, dammer or East India copal, colophony or rosin, the resin of common turpentine, sandrac or sandarach, mastic, dragon's-blood, and the fine resin of the black-boy or grass tree of Australia, *Xanthorrhœa Australis*. Two perfectly distinct resins are obtained from the *Xanthorrhœa*, namely, the "black-boy gum," a dark-red brittle brilliant resin; and the "yellow gum," an orange-yellow resin resembling gamboge, which contains benzoic and cinnamic acids. These valuable resins, it is said, may be had in large quantities, and at a low price; they are gradually coming into use in the manufacture of varnish, and for other purposes; being in some respects quite as good, if not superior to, shell lac. Bleached lac is extensively used in the manufacture of the finer sorts of sealing-wax: the wax which separates during the purification of the lac is comparatively little known; it is a hard substance, readily fusible, and may be well employed in taking casts, which it does with great sharpness. It is probable also that it might be advantageously used to mix with other and more fusible materials in the manufacture of candles. Of the oleo-resins and balsams there are varieties of common turpentine and Canada balsam, elemi, and thus or frankincense. The Jury awarded a Prize Medal for this collection.

A series of the ordinary turpentines of commerce is shown by ENGLISH'S PATENT CAMPHINE COMPANY of Hull (61), accompanied by samples of resin, and refined oil of turpentine, and an interesting collection of the various insects found in crude turpentine. The specimens of resin are by no means first-rate; they serve merely as illustrations of the ordinary articles as commonly met with in commerce. The collection also contains a number of samples of oils and oil-seeds (see page 191). The Jury deemed the whole series worthy of Honourable Mention.

Some very capital specimens of various resins and gum resins are exhibited in the interesting collection of the LONDON DRUG TRADE (Class II., 117). These are especially valuable, because several samples of each substance are shown, those of first-rate quality being contrasted with the ordinary commercial products. The Jury considered this part of the series well worthy of Honourable Mention.

In the very admirable and instructive collection of LIVERPOOL IMPORTS (see page 166) there is a numerous series of gums, resins, and gum resins. The chief of these are enumerated in the following Table; the last column shows the quantity of each substance which has been imported into Liverpool during the last two years.

NAME.	Plant which yields it.	Whence Imported.	1849 <sup>1</sup>	1850
			Tons.	Tons. Cwts.
Ammoniacum - -	Dorema Ammoniacum - - - - -	Bombay - -	14	17 0
Anime - - - -	Hymenæa Courbaril - - - - -	" - -	14	17 0
Assafoetida - - -	Narthax Assafoetida - - - - -	" - -	7	2 0
" 2nd qual.	" " - - - - -	" - -	-	-
Benzoin (drop) - -	Boswellia thurifera - - - - -	" - -	-	-
Benzoin - - - -	Styrax Benzoin - - - - -	Singapore - -	4	7 0
" 1st quality	" " - - - - -	" - -	-	-
" 2nd quality	" " - - - - -	" - -	-	-
" 3rd quality	" " - - - - -	" - -	-	-
" 4th quality	" " - - - - -	" - -	-	-
Black-boy resin - -	Xanthorrhœa arborea - - - - -	Swan River - -	-	-
Burgundy pitch - -	Abies excelsa - - - - -	Hamburg - -	-	0 10
Canada balsam - -	Abies balsamea - - - - -	Quebec - -	-	0 17
Caoutchouc - - -	Siphonia elastica - - - - -	Maranham - -	40	500 0
Copaiba balsam - -	Copaifera sp. - - - - -	Para - - -	7	11 0
Copal, African - -	Hymenæa sp. (?) - - - - -	Sierra Leone -	14	17 0
Copal, New Zealand	Dammara Australis - - - - -	New Zealand -	14	17 0
Copal, Brazil - -	Trachylobium Martinianum - - - - -	South America -	-	8½ 0
Dragon's-blood - -	Dracœna Draco - - - - -	Calcutta - -	-	0 18
Dragon's-blood (tears)	Dorema ammoniacum - - - - -	" - -	-	0 5
Elemi - - - -	- - - - -	Hamburg - -	-	0 17
Frankincense - -	Abies excelsa - - - - -	" - -	-	0 6
Gamboge, pipe - -	Hebradendron - - - - -	Africa - - -	-	-
Gamboge, lump - -	- - - - -	Siam - - -	-	-
Guaiacum - - -	Guaiacum officinale - - - - -	Jamaica - -	4	7 0
Gum-arabic - - -	Acacia vera, Arabica, and other species -	Turkey - -	27	32 0
Gum-arabic elect - -	" " - - - - -	" - -	-	-
Gum-barbary - -	Acacia gummifera (?) - - - - -	Mogadore - -	-	-
Gum-oomrawuttee - -	" " - - - - -	East Indies -	14	17 0
Gum-gedda - - -	" " - - - - -	Gedda - - -	-	-
Gum-senegal - - -	- - - - -	Africa - - -	-	-
Gum-tragacanth, or dragon. - - -	Astragalus gummifera and other species -	Smyrna - -	-	15 0
Gutta percha - -	Isonandra gutta - - - - -	Singapore - -	200	280 0
Lac, stick - - -	Coccus lacca - - - - -	Calcutta - -	1	22 0
Lac, lump - - -	" " - - - - -	" - -	90	440 0
Lac, seed - - -	" " - - - - -	" - -	10	16 0
Lac, plate - - -	" " - - - - -	" - -	-	-
Lac, liver plate - -	" " - - - - -	" - -	-	-
Lac, garnet - - -	" " - - - - -	" - -	-	-
Lac, livery orange -	" " - - - - -	" - -	-	-
Lac, orange - - -	" " - - - - -	" - -	-	-
Mastic - - - -	Pistacia Lentiscus and Atlantica - - - - -	Constantinople -	-	0 12
Myrrh - - - -	Balsamodendron Myrrha - - - - -	Persian Gulf -	-	0 30
Myrrh - - - -	" " - - - - -	Turkey - -	-	-
Olibanum - - -	Boswellia thurifera - - - - -	East Indies -	-	5 0
Peru balsam - - -	Myrospermum peruiferum - - - - -	Lima - - -	-	0 2
Rosin, American - -	Abies sp. and Pinus sp. - - - - -	United States	600	500 0
Rosin, American, pale	" " - - - - -	" - -	-	-
Sandarach or Juniper	Callitris quadrivalvis - - - - -	Mogadore - -	-	-
Scammony, virgin - -	Convolvulus Scammonia - - - - -	Smyrna - -	-	-
" " - - -	" " - - - - -	" - -	-	0 12
Turpentine - - -	Pinus palustris - - - - -	United States	100	120 0
Turpentine, common	" " - - - - -	" - -	300	175 0
Turpentine, 2nd qual.	" " - - - - -	" - -	100	100 0
Yellow gum - - -	Xanthorrhœa hastilis - - - - -	Swan River - -	-	-

In the collection of imports, exhibited by the HULL COMMITTEE, there are

samples of common turpentine and of rosin from the United States ; of the former about 30,000 barrels, and of the latter, about 2,000 barrels are annually imported into Hull. Turpentine is separated by distillation into oil or spirit of turpentine, sometimes called camphine, and resin or colophony. In its raw state turpentine is of very little use, it is chiefly important as yielding those substances.

The collection of gums and resins exhibited by the EAST INDIA COMPANY is very extensive and interesting, and forms an important division of the great collection of the raw produce of the Indian empire, for which the Jury have recommended the award of a Council Medal. The series is so numerous, and many of the substances which it contains are so little known in Europe, that it would hardly be possible at present to give any detailed report on the individual samples. In the following remarks, therefore, only a few of the more striking substances are noticed, whilst a great number of substances are necessarily reserved for future study and investigation. Even a slight examination of the natural raw produce of India shows the immense resources of the country ; and when we remember the varied and abundant productions, which may be had in almost unlimited quantities, and at very little more trouble than the mere cost of collection (for in such a soil and climate, nature needs but little artificial aid), it is not saying too much to assert that no portion of the globe is more highly favoured by nature, or more able to supply those substances which minister to the wants and luxuries of mankind. With a fertile soil and a generous climate, vegetation of all sorts is rapid and luxuriant ; and as labour is cheap and abundant, everything seems most favourable to agriculture and the growth of all vegetable products. There are, however, several great obstacles which have ever retarded the increasing prosperity of India, and which present the most serious difficulties in the way of its commercial development ; especially the inert, careless, and indifferent habits of the natives, confirmed and kept up by religious peculiarities and long-established prejudices. Not only are the natives of India wholly ignorant of the value of many of the natural productions of the empire, and therefore quite indifferent to their very existence, but at the same time, also, the manufacturers of Europe being unacquainted with many of these substances, or being ignorant that they may be had in almost unlimited quantities from our eastern possessions, do not avail themselves of the advantages which are in fact within their reach. Many of the natural productions of India will unquestionably become important articles of trade to this country, when their value is better known, and this, whilst advantageous to our own country, will at the same time greatly benefit India, and will lead to the construction of good roads, or other modes of transit, by means of which, internal traffic, and the speedy, cheap, and safe carriage of merchandize may be effected. The continued and persevering efforts of European skill and capital will no doubt, in time, to a great extent remove or diminish these obstacles ; but, in the mean time, the evil effect which they produce on the natural advantages of the Indian empire is enormous.

Amongst the East Indian resins there are some interesting specimens of lac ; the sample of shell-lac in large thin orange sheets is of very superior excellence, and is altogether far above any met with in commerce.

The specimens of lac from Singapore, which is stated to be abundant in the jungles of the Peninsula, but has not hitherto been collected as an article of com-



merce though not first-rate, are still highly commendable, and worthy of encouragement. The Jury deemed them deserving of Honourable Mention.

Good samples of lac are also contributed from Bombay; from Ganjam, by A. P. ONSLOW; by G. G. NICHOL, from Siam; from Nepal, by HIS HIGHNESS THE MAHARAJAH of Nepal; from Beerbhoom, specimens of the two varieties called bala and chanch; and from the Rajpootana States, samples of bur-lac or lac produced on the *Ficus indica*, also lac from the *Ficus religiosa*, *Zizyphus jujuba*, and the *Acacia concinna* or *Mimosa abstergens*. An interesting series of samples from Assam, illustrating the formation, collection, and uses of lac, is contributed by Dr. C. HUFFNAGLE. For this series, together with several other small collections of raw produce shown in illustration of the native manufactures of India, the Jury awarded a Prize Medal to Dr. Huffnagle.

The samples of gutta percha from Johore, Malay peninsula, contributed by W. KERR, of Singapore, together with the illustrations of the native modes of working the substance, and the purposes to which it is applied, are interesting and important. It is to be regretted that the same careless and wasteful mode of collecting this valuable substance is, for the most part, still employed, as was originally the case when it was first introduced into Europe eight years since by Dr. Montgomerie, of Singapore; namely, recklessly cutting down the large trees for the sake of a few pounds of the substance: from this, it naturally follows that the tree gradually becomes less abundant, and, consequently, ere long the price of the article will probably increase so much as to preclude it altogether from being used for many purposes. The Jury award a Prize Medal for this series. Some of the first samples of gutta percha (*Isonandra gutta*), sent over to the East India Company by Dr. Montgomerie, and for the introduction of which he received the Gold Medal of the Society for the Encouragement of Arts and Manufactures, in 1843, are exhibited by Col. BONNER, of the East India House.

The specimen of gutta trap from Singapore, a substance evidently allied to gutta percha and caoutchouc, and employed there in the manufacture of bird-lime, is interesting. It is stated to be the inspissated juice of an *Artocarpus*; and it is highly probable that there are a number of similar vegetable productions, such as the Atti Jegota, *Ficus racemosa*; and Mangegatu, *Ficus indica*, from Vizagapatam, which might be advantageously introduced into commerce, and which could be profitably employed in the arts for similar purposes to those for which caoutchouc and gutta percha are now so extensively employed. The Jury deemed the specimen of gutta trap worthy of Honourable Mention.

The samples of caoutchouc or India-rubber are of considerable interest; those from Sumatra and Java, in particular, are deserving of notice. A considerable number of specimens of caoutchouc from different localities, and prepared in different manners, is shown by Dr. ROYLE, including samples of India-rubber, obtained from the *Ficus elastica*, in Assam, by Captain Veitch, and some prepared by Dr. Scott; and a portion of the wood and juice of the *Urceola elastica*, from Singapore, is contributed by W. BROCKEDON, as well as a young plant of the *Ficus elastica*. A good series of samples of the different forms of India-rubber commonly known in commerce, is also exhibited by Messrs. MACKINTOSH, in illustration of the various useful and beautiful applications which are made of it in the arts. Many of the specimens of East Indian caoutchouc, however, show that

unfortunate "tackiness," which so greatly diminishes the value of some forms of India-rubber. The samples from Assam, in particular, illustrate the great importance of care and attention in the preparation of caoutchouc; the specimens sent over some years since by Capt. Veitch are of excellent quality, and have not undergone any change since they have been in England. They were evidently formed from many successive layers of sap, each layer being allowed to dry before a fresh one was applied. On the other hand, many of the more recent specimens are sticky and in a partially decomposing state. These have plainly been formed by the coagulation of a considerable bulk of the sap rapidly collected; a little time and attention have thus been saved, but at the sacrifice of the most useful properties of the caoutchouc. All samples of India-rubber from new localities, where there is any probability of a large quantity being obtained, are valuable.

In connection with these specimens, particular attention should be drawn to the Cuttemundoo, or Kattimundoo, a highly-interesting substance exhibited from Vizagapatam by Mr. W. ELLIOT, and obtained from the Akoo Chenroodoo, or Bramha Chemoodoo, the *Euphorbia antiquorum* of Roxburgh. It is of a dark-brown colour, opaque except in thin pieces, is hard and somewhat brittle at common temperatures, but easily softened by heat; in boiling water it is perfectly insoluble, but it becomes soft, viscid, and remarkably sticky and adhesive, like bird-lime: as it cools it reassumes its original character. Heated, it melts and burns with a bright and smoky flame, at the same time giving out a peculiar odour, somewhat resembling that of burning caoutchouc or gutta percha.

This remarkable substance appears to be a hydro-carbon, closely resembling caoutchouc and gutta percha in chemical composition, but considerably different from both in physical characters. It is said to be used as a cement for joining metal, fastening knife-handles, &c.; and there is little doubt that it might be advantageously employed for a great number of purposes in the arts. Cuttemundoo merits a minute and careful examination; it promises to prove a valuable addition to the India-rubber series; and the Jury have accordingly awarded a Prize Medal to Mr. ELLIOT for its introduction.

Excellent samples of the different forms of caoutchouc usually met with in commerce are shown by LOCKINGTON, BUNN, and Co. (Class XXVIII. 77); and some fine specimens of gutta-percha, both in its rough state as imported and also in the various stages through which it passes in the process of purification, are exhibited by the GUTTA PERCHA COMPANY (Class XXVIII. 85); both these series of specimens, however, are merely shown in illustration of the various uses to which these substances are applied.

The sample of dragon's-blood from Sumatra, called Heraduccun, being of superior quality, was deemed worthy of Honourable Mention.

Amongst the other collections of gums and resins, the specimens shown by J. LOCH, Esq., and contributed by His Highness the RAJAH of TRAVANCORE, are considered worthy of Honourable Mention. Besides these, the turpentine from Churra Poonjee, in the Dacca division; the Bombax resin; the Saul gum, from the *Shorea robusta*, from Beerbhoom and from Bhaugulpore; the Theetske resin, from Arracan; the Kerelu resin, from Assam, contributed by Major HANNAY; the Dammar, from Malacca, Sumatra, Java, and other places deserve notice.

The numerous series of resins, &c., from Sarawak must also not be omitted ; the names of these are as follows :—

1. Melosampang.	10. Urat Mata.	19. Garmyong.
2. Meruka.	11. Liong Sundok.	20. Sulutong.
3. Morkubong.	12. Mata Kuchin.	21. Kandis.
4. Mintangor jenkar.	13. Sarak balachan.	22. Rabae-rior.
5. Klabit.	14. Neranli boya.	23. Gutta percha.
6. Singut.	15. Supok.	24. Taboo.
7. Menliarut.	16. Meng kabang.	25. Gayu.
8. Godoh.	17. Miniak kapur.	26. Bulan yok.
9. Sampang.	18. Rusuh.	27. Gutta bintangor.

In the following list the chief Indian gums and resins, &c., are necessarily placed under one common head, as, without a minute examination, it would not be possible to class them more accurately.

1. Babool gum, gond babool, &c., obtained from the *Acacia arabica*, or babool tree ; an inferior sort of gum arabic from Bengal.

2. Gattie gum, a variety of the babool gum, largely produced in the Deccan, Concan, and Guzerat ; well known in commerce as East Indian gum arabic ; a specimen is also contributed from Bombay.

3. Kheir gum, the produce of *Acacia catechu*, closely resembling the preceding ; from the Rajpootana states.

4. Jumma Jegota (*Acacia leucophlœa*) ; from Vizagapatam.

5. Keekur gond, babool tree (*Vachellia farnesiana*) ; from Bengal ; both closely resembling the babool gum, and consequently varieties of arabic.

6. Wood-apple gum, obtained from the wood-apple, or *Feronia elephantum* ; from Vizagapatam ; a good and useful gum.

7. Margosa gum, from the margosa tree (*Melia azadirachta*) ; from Madura, Tinnevely, and Palamcottah ; inferior.

8. Mallaga jegota, from the *Moringa pterygosperma* ; from Vizagapatam.

9. Pagada jegota (*Mimusops elengi*) ; from Vizagapatam.

10. Tanjada jegota (*Cassia auriculata*) ; from Vizagapatam. These three appear likewise to be soft, with difficulty soluble, and inferior gums.

11. Ballee gond, or spurious tragacanth, obtained from the *Sterculia urens* ; sent from Bombay.

12. Kuteera (*Cochlospermum gossypium*), like the preceding, a sort of inferior tragacanth ; contributed from Meerut.

13. Vateria resin, an excellent resin obtained from the *Vateria indica*, from which it exudes as a balsam in a semi-fluid state, constituting the peynie varnish ; it soon becomes hard when exposed to the air. This resin is shown both in the fluid state and also when solidified ; from Malabar and Canara.

14. Dhoona, or Saul Dammar, a good resin abundantly obtained from the saul tree (*Shorea robusta*), common in the northern parts of Hindostan ; contributed by his highness the MAHARAJAH OF NEPAL, and from Bengal and Bhagulpore, in the Moorshedabad district.

15. Soondroos, or copal ; imported from Africa through Arabia, and often called anime.

16. Guggilam (*Vatica tumbergia*); from Canara and Vizagapatam.
17. Tendoo resin (*Diospyros sp.*); from the Rajpootana states.
18. Gaup resin, obtained from the Gaup tree (*Embryopteris glutinifera*); from Bhagulpore.
19. Mekae-sta Dhoona, or Kerelu resin; from Assam.
20. Odina resin, a resinous substance obtained from the *Odina wodier*; from Calcutta and from Meerut.
21. Nareeda jegota (*Eugenia jambolana*); from Vizagapatam.
22. Olibanum, saleh gond, Loban (*Boswellia thurifera*); from Chota Nagpore, and Patna.
23. Cumbi resin, or Dikamali (*Gardenia lucida*); from Bombay.
24. Dammar (*Dammara orientalis*); from Malacca, Java, Sumatra, and Borneo.
25. Jilladi pulu (*Calotropis gigantea*); from Vizagapatam.
26. Ammoniacum; imported from Arabia.
27. Assafœtida (*Narthax assafœtida*); imported from Persia and Sindh.
28. Bdellium (*Amyris commiphora*, *Balsamodendron agallocha*). Of this two or three varieties are exhibited: the solid gum resin, and an oleo-resin or balsam, said to be obtained from the same tree; the former is frequently met with in commerce, being falsely called myrrh, and sometimes under the name of galbanum.
29. Myrrh; imported from Africa through Arabia, &c.
30. Dragon's-blood; imported from Aden, also from Borneo.
31. Gamboge; from Singapore, from Mysore, Canara, &c.
32. Camboley (*Morus indica*); from Paulghat.
34. Manudi jegota (*Mangifera indica*).
35. Dadinia jegota (*Punica granatum*); from Vizagapatam.
36. Benzoin (*Styrax benzoin*); from Sumatra specimens of a similar resin, also called benzoin, are contributed from Malabar and Canara.
37. Storax; from Rajpootana states.
38. Turpentine (*Pinus khasyana*); from Churra Poonjee, in the Dacca division, and from Ullwar.
39. Mochrus (*Bombax heptaphylla*), a gum; from Calcutta bazaars.
41. Manjegota (*Ficus indica*); from Vizagapatam.
42. Atti jegota (*Ficus racemosa*); from Vizagapatam.
43. Nepalapi pulu (*Jatropha curcas*); from Vizagapatam and Ganjam.
44. Coorg resin, a pale green and very excellent resin; from Coorg, contributed by His Highness the RAJAH of TRAVANCORE. It seems to deserve further inquiry and examination, as it might probably be well adapted for varnishes, &c.

Besides these, a very considerable number of other Indian resins, gums, and gum resins, is included in Dr. ROYLE'S extensive collection of the raw produce of India; amongst these are many of the preceding ones, and also the following:—

45. Galbanum; from Surat.
46. Cherry gum (*Prunus puddum*); from Surat.

47. Sem ke gond, or gota gond (*Bauhinia Vahlia*); from Deyra and Rajpore.
48. Labdanum, or ladun (*Cistus ladaniferus*); from Surat.
49. Mastic, or mustagee (*Pistacia lentiscus*); from Caubul.
50. Scammony, or sukmoonya (*Convolvulus scammonia*); from Surat.
51. Kunnee gond, or jingun ke gond (*Icica resinifera*); from the Khera Pass.
52. Toon ke gond (*Cedrela toona*).
53. Sohunjue ke gond (*Moringa pterygosperma*).

According to Mr. Thomas, the "gum" of Coimbatore is a mixture of various gums and resins; he mentions twenty-four different plants, the natural exudations of which are collected, and he observes that they are said to be nearly all collected promiscuously, and sold in the aggregate as gum; the mass being, of course, very impure; but that, when dissolved in a large quantity of water, and strained through a fine cloth, it yields a solution from which a good and very adhesive gum may be obtained by evaporation. The plants from which these various substances thus associated together are collected, are, according to Dr. Wight—

Vilvey pissin	- - -	Ægle marmelos	- - -	Good arabic.
Avarum pissin	- - -	Cassia auriculata	- - -	Brown and soft.
Vullam pissin	- - -	Feronia elephantum	- - -	Good arabic.
Vel Vaila marum	- - -	Acacia ferruginea	- - -	Inferior.
Vaypum marum	- - -	Melia azadirachta	- - -	Tolerable.
Mah marum	- - -	Mangifera Indica	- - -	Inferior.
Curvaiala marum	- - -	Acacia Arabica	- - -	Inferior.
Ellipie marum	- - -	Bassia longifolia	- - -	Inferior.
Yeliandie marum	- - -	Zizyphus jujuba	- - -	Not a true gum.
Murungoo pissin	- - -	Moringa pterygosperma	- - -	Soft, difficultly soluble.
Kerray vaugay marum	- - -	Acacia odoratissima	- - -	Tolerable.
Vellay nagah marum	- - -	Conocarpus latifolia	- - -	Tolerable.
Choar Kullie marum	- - -	Soymeda febrifuga ?	- - -	Tolerable.
Mullee vemboo	- - -	Melia azadirachta	- - -	Inferior.
Vellay bootallie	- - -	Sterculia urens	- - -	Inferior tragacanth.
Vengay marum	- - -	Pterocarpus Marsupium	- - -	Inferior Kino.
Kodawah porsh	- - -	Chloroxylon Swietenia	- - -	Inferior.
Cat oolugoo marum	- - -	Bombax malabaricum	- - -	Good colour, but inferior.
Carabemboo marum	- - -	Garuga pinnata	- - -	Inferior.
Vunny marum	- - -	Prosopis spicigera	- - -	Good arabic.
Curun Gallie marum	- - -	Acacia sundra	- - -	Very good arabic.
Vidah vullie marum	- - -	Vachellia farnesiana	- - -	Soft, red, inferior.
Wadallee marum	- - -	Acacia catechu	- - -	Inferior.
Peru marum	- - -	Ailanthus excelsa	- - -	A resin.
Woody marum	- - -	Odina Wodier	- - -	Tolerable.
Narvallie marum	- - -	Cordia Rothii	- - -	Inferior.

From this list it is evident how much the value of the good gum must be deteriorated by the inferior gums and resinous matter mixed with it; a little care in the collection, only the better sorts being chosen, would be amply repaid by the increased value of the article.

The very remarkable wood-oils and native varnishes of India, obtained from various species of *Dipterocarpus*, belong properly to the resin series, and may therefore be mentioned here in connection with the balsams and oleo-resins. These

curious substances, though fluid when first obtained, soon harden and solidify ; they constitute the basis of the best Burmese and other eastern varnishes and lacquers. Specimens of the Thetsee, *Melanorrhœa usitatissima*, employed as a lacquer, from Arracan ; of the Thenakthu, also used in Arracan in the manufacture of papier-maché work, and in rendering umbrellas waterproof ; and of the Gurjun, or wood-oil, from various *Dipterocarpi*, from Madura, Tinnevely, Chittagong, Pegu, and Mahurmanee are shown. The Thetsee or varnish-tree of the Burmese, is spread over a wide range of country extending from Muniপুর (lat. 25° N., long. 94° E) to Tavoy (lat. 14° N. long. 97° E.). It attains its greatest size in the valley of Kubbu, distant about 200 miles from the sea-shore. The trees average from 30 to 40 feet high, and have a circumference of from 5 to 11 feet, 4 feet above the ground. A good tree yields about 10 or 12 lbs. of varnish annually, and its value at Prome, on the Irawaddi, is about 10*d.* the pound ; it is used in enormous quantities by the natives. Dr. Wallich states that the natives never experience those deleterious effects from handling the varnish in its liquid state which Europeans generally suffer : in its fresh state it has very little pungency of taste, and is altogether devoid of smell. The natives are very apt to adulterate that brought to market with sesamum oil. The Gurjun-tree, which flourishes in the same districts, and especially in the valley of Kubbu, attains very large dimensions ; Captain Grant describes it as having a straight stem of more than 40 feet to the first branch, and a circumference of 13 feet and upwards. Samples of the empyreumatic oil of teak wood are contributed by W. B. HORSLEY from Palamcottah. Two remarkable oils, apparently analogous to the wood-oils, are contributed from Coorg, but without any information ; one of these, a thick blood-red oil, is stated to be obtained from the *Rottlera tinctoria*.

Interesting specimens of the Calambak or eagle-wood, the true lignum aloes or *Lignum paradisi*, so highly esteemed in the East as a perfume or incense, are shown in the East Indian collection. This remarkable wood, which contains a large quantity of an odoriferous oleo-resin, is called Kayu garu in the Indian Archipelago, and is produced by the *Aloexylum agallochum*, Lour. ; when heated it undergoes a sort of imperfect fusion, and exhales a fragrant and very agreeable odour. Its price in Sumatra is about 30*l.* per cwt. ; inferior specimens are likewise contributed from Malacca. Eagle-wood is also obtained from several other trees, as from the *Aquilaria agallocha* in Silhet. The true eagle-wood is, however, very scarce.

The specimens of African gums and resins from Aden, sent by the BOMBAY COMMITTEE, and exhibited in the East Indian collection, are remarkably fine. The samples shown are varieties of myrrh, olibanum, dragon's-blood, and gum arabic.

The collection of gums and resins exhibited by T. A. PIERIS, of Kandy, is interesting ; unfortunately, it is not accompanied by any botanical or statistical information, which considerably diminishes its practical value. The specimens shown are labelled—

- |                 |                     |
|-----------------|---------------------|
| 1. Diwol gum.   | 7. Othium gum.      |
| 2. Devul gum.   | 8. Kos gum.         |
| 3. Gokhuto gum. | 9. Hick.            |
| 4. Kekuna gum.  | 10. Gamboge.        |
| 5. Dammar.      | 11. Hildummele gum. |
| 6. Kohombe gum. | 12. Cadjic gum.     |

Of these specimens it may be observed, that No. 2 seems to be excellent gum arabic ; No. 7 resembles inferior gum arabic ; and No. 1 appears to be a variety of " Cherry-tree gum ;" Nos. 4, 8, 9, and 11 are resins, and apparently not of any great value ; No. 3 seems to be a kind of gamboge ; No. 10 is gamboge, probably obtained from the *Hebradendron cambogoides* ; and No. 12, though it seems to be a difficultly-soluble kind of gum, like Nos. 1 and 7, is remarkably pure, and of good colour. The Jury deemed this series worthy of a Prize Medal, in conjunction with the collection of oils from Ceylon, also shown by the same exhibitor (see p. 197).

Very few specimens of African gums or resins are shown. A tolerable sample of the gum of *Acacia horrida*, and a fair specimen of mixed gum arabic from the Cape of Good Hope, is exhibited. Mr. WARWICK WESTON exhibits a fair sample of copal from the western coast. There are also shown a fine sample of gum arabic from Ayar and Touat ; a light-coloured resinous substance resembling copal from Abbeakuta ; a black, pitch-like matter from Timbuctoo, called Bekhour or incense ; and a resin used by the natives of Bornou as incense, and called Ommel-harker, or " the mother of blessing."

T. B. DUGGIN (49) exhibits a fine sample of anime, said to be abundantly produced by the Simiri, or Locust-tree, on the river Berbice : this was deemed worthy of Honourable Mention.

A specimen of Hawai gum, a variety of frankincense, from the river Demerara, is shown by J. OUTRIDGE (51), who also shows a sample of indifferent caoutchouc, from the Demerara river (47). G. R. BONYUN (50) exhibits some Karman, a black resinous substance, said to be the inspissated exudation of the Mannee-tree, and used by the fishermen on the river Essequibo, to preserve their nets ; it has, however, the appearance of being an artificial compound, containing wax. A good sample of balsam of copaiba, from the Pomeroon river, Essequibo, is exhibited by J. S. STUTCHBURY (46).

Fine specimens of anime from the Locust-tree (*Hymenæa courbaril*), from Arima, and also of incense (*Trichilia trinitensis*), are shown in the collection of raw produce of Trinidad, sent by his Excellency Lord HARRIS, the Governor (see p. 170).

Several good specimens of resin and gums are shown in the Australian and Van Diemen's Land Collections, including the gums of the black and silver Wattle, *Acacia mollissima* and *dealbata* (296) shown by Lieutenant SMITH, R.N., deemed worthy of Honourable Mention ; and other varieties of gum arabic ; and some fine samples of the Grass-tree gum, or " Black-boy gum," the resin of the *Xanthorrhœa Australis*. The specimens of Australian gums and resins exhibited by the COLONIZATION ASSURANCE CORPORATION are particularly fine ; including several varieties of arabic, or acacia gums, and the *Xanthorrhœa* resins, they form part of the collection for which the Jury have awarded a Prize Medal (see p. 170).

The resins shown by J. MILLIGAN, of Flinders' Island, Bass's Straits, including specimens of the " Black-boy gum" (*Xanthorrhœa* resin, 81) ; the fine pale resin of the Oyster-bay pine (*Callitris Australis*), from the eastern coast of Van Diemen's Land, and the *Acacia mucronata* gum, also from Flinders' Island (254), were likewise deemed worthy of Honourable Mention.

A fine sample of Kauri, or cowree copal, the produce of *Dammara Australis*, a very beautiful resin from New Zealand, exhibited by W. BROWN (16), was deemed

worthy, by the Jury, of a Prize Medal. It is stated that this resin may be obtained in any quantity in the northern parts of New Zealand, ranging from 20 miles south of Auckland to the north cape. A small sample of this resin, exhibited by G. M. MITFORD, was deemed worthy of Honourable Mention.

Some excellent specimens of lac, benjamin, dammer, gutta percha, and caoutchouc, &c., from the Eastern Archipelago, are exhibited by Messrs. W. P. HAMMOND and Co., in the collection of raw produce, for which a Prize Medal has been awarded by the Jury (see p. 170).

Dr. FEUCHTWANGER (United States 469), of New York, has shown a very excellent specimen of bleached shell lac; this was deemed deserving of Honourable Mention.

In the Mexican collection is a sample of a remarkable orange-coloured resin, called Pipitzahuac, but of which no particulars are given.

The Egyptian collection of raw produce, for which, as a whole, a Prize Medal has been awarded by the Jury (see p. 170), contains some good specimens of gum (120, 121). The selected gum of Sennaar is of excellent quality, and was deemed worthy of Honourable Mention.

The purified turpentine shown by J. F. FLEURY, of Bordeaux (214), prepared by a patent process, was found to be excellent, and therefore deemed worthy of Honourable Mention.

A fine sample of copal, from Angola, shown in the Portuguese collection, by F. R. BATALHA (458), was also deemed worthy of Honourable Mention.

An excellent series of specimens of turpentine, and of the resins and volatile oil obtained from it by distillation, is shown by FLORES, CALDERON, and Co., of Burgos (Spain 241): it was deemed deserving of Honourable Mention.

In the Turkish collection, very good samples of the ordinary gums and resins for commerce are shown, including the following:—

1. Gum arabic - -	Egypt.	12. Pine rosin - -	Wallachia.
2. " " - -	Tripoli.	13. " " - -	Tripoli.
3. Gum tragacanth -	Damascus.	14. Mastic - - -	Scio.
4. " " - -	Sparta.	15. " - - -	Koniah.
5. Gum cherry-tree	Damascus.	16. Sandarach - -	Kaissarieh.
6. Caramaniacum -	Koniah.	17. Storax - - -	Smyrna.
7. Pine rosin - -	Asia Minor.	18. " liquid - -	Asia Minor.
8. " " - -	Smyrna.	19. Balm of Mecca -	Mecca.
9. " " - -	Broosa.	20. Labdanum - -	Rhetino.
10. " " - -	Koniah.	21. Libanum - -	Arabia.
11. " " - -	Berkoftcha.	22. Resin (?) - -	Anatolia.

The samples of arabic and of mastic are excellent. It is stated that the resin from Anatolia is used for making the handles of knives, and for similar purposes.

#### STARCH SERIES.

In examining the starch series, or rather the starch and starch-gum or dextrine series, the Jury have only taken notice of those substances prepared especially for manufacturing purposes, or which they conceived might be advantageously employed by manufacturers; they have altogether passed over those forms of starch and farina intended specifically as articles of food, or which, from their cost, or the mode in which they were prepared, would not be suitable for the former purposes.



The specimens of starch from rice, exhibited by Messrs. ORLANDO JONES and Co. (Class III. 128), are remarkably good. Rice contains on an average about 84 per cent. of starch, but, till comparatively a few years ago, no starch was manufactured from it, notwithstanding its low price and the large quantity of starch which exists in it. The reason of this was, that the old process of fermentation, by means of which starch is procured from grain, was not found to be applicable to rice, and hence the latter only became available as a source of starch in 1840, when Mr. O. Jones introduced his new process, for which he obtained a patent. This process consisted in macerating the rice for about 20 hours in a dilute solution of caustic potash, containing about two hundred grains of the alkali in every gallon ; the liquor is then drawn off, the rice dried, reduced to powder by grinding, then a second time digested in a similar alkaline lye for 24 hours, repeatedly agitated : after this it is allowed to settle, and well washed with pure cold water. The Jury awarded a Prize Medal to Mr. O. Jones for his rice starch.

Mr. S. BERGER (Class III. 130), of Bromley, also exhibits starch prepared from rice, which is of similar excellence, though said to be prepared in a different manner. In place of employing a dilute solution of caustic potash to dissolve the "gluten" and other insoluble matters of the grain, Mr. Berger uses a solution of carbonate of soda, containing half-a-pound to the gallon. The rice is steeped in cold water for 48 hours, levigated in a suitable mill, and the pulp thus formed is treated with the solution of carbonate of soda for sixty or seventy hours, being repeatedly stirred ; it is then allowed to settle for some hours, the alkaline liquor is drawn off, and the starch is washed and purified. This process was patented by Mr. Berger, in December 1841. The Jury awarded a Prize Medal to Mr. Berger for his rice starch.

A third series of samples of rice starch, also prepared by a different process, is exhibited by Messrs. J. and J. COLMAN (Class III. 117), who also show good specimens of ordinary wheat starch, and dextrine or British gum. In February 1842, Mr. Colman took out a patent for the manufacture of starch from rice by the action of dilute muriatic acid, which was employed for the same purpose as the caustic potash and carbonate of soda, in the patents of Messrs. O. Jones and Berger. The samples exhibited by Messrs. Colman are excellent, and the Jury consequently awarded to them a Prize Medal.

Some very good specimens of starch and starch gum are exhibited by R. G. TUCKER, of Lenton, near Nottingham (Class III., 121). The former in the state in which it is used by the Nottingham lace-dressers ; the latter as it is obtained by the action of a carefully-graduated temperature in starch ; fit for the use of dyers, who use it to give body and thickness to the colours which they employ in dyeing cotton, woollen cloths, and silk. It is also used by paper-stainers, or printers ; and as a cheap but strong gum in the manufacture of adhesive labels. The specimens shown by Mr. Tucker are excellent, and the Jury awarded to them a Prize Medal.

In the preceding cases account has not merely been taken of the superior excellence of the samples of starch, but, at the same time, the Jury have also taken into consideration the novelty or ingenuity of the process, and other circumstances which appeared to them to demand peculiar notice. The specimens shown by Messrs. BROWN and POLSON, of Paisley (Class III., 123), consisting of several varieties of starch and dextrine from wheat, potato, and sago, are good, and deserve Honourable Mention. The preparation of starch from sago, or rather the purifica-

tion of sago meal, which consists chiefly of starch, is now carried on to a very considerable extent; Messrs. Brown and Polson appear to have been the first to employ chemical means in bleaching or improving the colour of sago meal; and by the introduction of certain improvements in this process they succeeded in rendering the bleached starch more perfectly soluble in water than it is in its ordinary state. The samples exhibited by Messrs. RECKITT and SON, of Hull (Class III., 125), of the same substances, are also deserving of Honourable Mention. The other samples of starch shown in the English Department are all good, and several of them indeed, judged merely for quality alone, are excellent. Some very beautiful starch, prepared from sago, is shown by R. WOTHERSPOON, of Glenfield, near Paisley (Class III., 124). The Jury deem these, and likewise the samples of potato starch shown by E. TUCKER, of Belfast (Class III., 122), each deserving of Honourable Mention.

The Jury also deem worthy of Honourable Mention, the specimens of starch shown by Messrs. SHAND and MUCKART, of Montrose (Class III., 126); and that of A. STENHOUSE, of Perth (Class III., 154).

An excellent series of specimens of starch from various sources is exhibited by Messrs. D. and W. MILLER, of Musselburgh, near Edinburgh (Class III., 127). The Jury considered these, as well as the specimens of starch and dextrine shown by C. COONEY, of Dublin (70), and those of H. C. JENNINGS, of London (Class II., 99), severally deserving of Honourable Mention.

In the collection of the HONOURABLE EAST INDIA COMPANY there are several samples of starch suitable for manufacturing purposes, and there is little doubt that they might be prepared in any quantity, and sent over at a low price, as the Rajah of Vizianagram states that any quantity of excellent arrowroot may be had in the northern Circars for about 4s. 6d. per cwt.

The specimen of Maranta starch, or arrowroot, of Messrs. COCKBURN, of Moorshebadad is particularly fine, and the Jury accordingly awarded to it a Prize Medal.

The Cassava starch, or fecula of the *Jatropha*, exhibited by Messrs. SPEEDE, of Calcutta, was also found to be remarkably good, and the Jury accordingly awarded to it a Prize Medal.

Good specimens of sago, and sago-meal or flour, obtained from the sago palm, *Arenga saccharifera* (*Saguerus Rumphii*), are contributed from Sumatra, Singapore, and Cuttack.

Besides these, good samples of similar kinds of starch are exhibited by T. OXLEY, of Singapore, from various parts of the Indian Archipelago, Borneo, Moluccas, Java, Singapore, &c., and by other individuals from Calcutta, from Assam, from Cuttack, Vizagapatam, Tenasserim provinces, Rhutnagherry, &c.

Some good specimens of starches are also shown in the Ceylon Department, especially arrowroot, and the fecula of the *Jatropha*.

From Western Africa, a fair sample of arrowroot, together with the plant from which it is obtained, is shown by WARWICK WESTON (1).

In the Canadian collection, J. PRENDERGAST (125) exhibits two specimens of starch, apparently prepared from wheat, one being white, and the other coloured blue, for domestic use. These are both very good, and the Jury deemed them worthy of Honourable Mention.

A specimen of starch from potatoes is also shown by BRUNSDEN and SHIPTON, of St. Hilaire (128). This also was deemed worthy of Honourable Mention.

In the excellent collection of raw produce from British Guiana sent over by the ROYAL AGRICULTURAL AND COMMERCIAL SOCIETY of the colony, and for which the Jury have awarded a Prize Medal (see p. 170), there are two specimens of starch which are peculiarly deserving of notice ; these are, starch from the bitter cassava, and arrowroot, prepared by H. T. GARNETT, of Herstellung River, Demerara (31), for this the Jury awarded a Prize Medal ; and for the starch from the sweet cassava, plantain and buck yam, from the eastern coast of Demerara, exhibited by D. SHIER (33—35), the Jury also awarded a Prize Medal.

Very fine samples of arrowroot and other starches, are shown in the collection of Trinidad raw produce, transmitted by the Governor, Lord HARRIS. The samples of cassava or *Jatropha* starch, arrowroot, and Tulima or Tous-les-mois, are excellent, and were considered especially to deserve Honourable Mention. It is stated that the cultivation of the cassava from which this starch is obtained, is found to be very profitable, the yield being from one to two tons per acre.

Two good specimens of arrowroot from Bermuda are shown : the Jury deemed that of — GRAY (1) worthy of Honourable Mention.

Some fine arrowroot from Norfolk Island is exhibited by Sir W. T. DENISON (25), and a very good sample of starch, apparently from wheat, is shown by W. MURRAY, of Hobart Town (18) ; the Jury deemed both of these specimens worthy of Honourable Mention.

The OSWEGO STARCH FACTORY of New York (104), shows some samples of starch manufactured from maize or Indian corn, of superior quality, for which the Jury awarded a Prize Medal.

Some very fine samples of pearl starch are also shown by W. COLEGATE and Co., of New York (301) ; to these likewise, the Jury awarded a Prize Medal for excellence.

An interesting series of flour and starch prepared from maize is contributed by B. B. KIRTLAND, of Greenbush, New York (84). Amongst these samples of the various products obtained from maize, are specimens of oil.

Good specimens of dextrine or starch gum, are shown by S. ENGELMANN, of Karalinenthal, near Prague (Austria 22). The Jury awarded a Prize Medal for these preparations.

Several samples of starch are shown in the Belgian collection. Especially deserving of notice is the starch prepared from maize by C. VAN GEETERUVEN, of Staume (East Flanders, 489). The Jury awarded to this a Prize Medal.

Very good potato starch, prepared from diseased potatoes, is shown by DOCQUIR and PARYS, of St. Josse-ten-Noode, near Brussels (68) ; this was deemed deserving of Honourable Mention.

The samples of white and blue starch manufactured by H. BOCKEN and Co. (73) ; the potato starch of C. VAN BUNNEN, of Bruges (74), and the potato starch of G. BLYCKAERTS,\* of Tirlemont (78), were also good, and the Jury deemed them severally deserving of Honourable Mention.

In the French department, there are several exhibitors of starch and starch gum, derived from different sources ; amongst the specimens most deserving attention is the starch shown by L. RUEZ, of Cambrai (363) ; to this the Jury awarded a Prize Medal.

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\* Awarded also by Jury of Class III.

An excellent series of starches and dextrines, manufactured for the use of calico printers, is shown by J. J. STEINBACH, of Rouen (382); the Jury considered these of superior quality, and accordingly awarded to them a Prize Medal.

A very superior sample of starch is likewise exhibited by BELLEVILLE BROTHERS, of Nancy (1078); for this also the Jury awarded a Prize Medal.

Good samples of well-prepared potato starch are shown by H. LEBLEIS, of Pont l'Abbé, Finistère (570), and by L. LE PAISANT, also of Pont l'Abbé (590). A good specimen of wheat starch is exhibited by VÉZON BROTHERS, of Ligugé, Poitiers (1520), and some well-manufactured starch from wheat and potatoes, are shown by H. BLEUZE, of Paris (1091), and some excellent dextrine by M. AUGAN, also of Paris (12). The Jury deemed these five severally worthy of Honourable Mention.

Starch obtained from a species of *Canna* (*C. discolor*) is shown by M. CHAPEL,\* of Kouba in Algeria (16). This, though exhibited really as an article of food, the Jury deemed worthy of Honourable Mention in connection with the other forms of starch suitable for manufacturing purposes.

A considerable number of specimens of starch, &c., are shown in the collection of the Zollverein states, and several of them are of excellent quality. In particular, the wheat starch manufactured by J. C. HALLER, of Halle (690), is deserving of special commendation, and the Jury accordingly awarded to it a Prize Medal.

The "improved" potato starch manufactured by A. C. WELCKER, of Wallersheim, near Coblenz (331), and said to be extensively used for stiffening muslins, is likewise highly deserving of praise, and the Jury, therefore, awarded a Prize Medal to it.

The Jury also awarded a Prize Medal to A. WERTH and Co., of Bonn (333), for their superior potato starch.

Samples of wheat starch, manufactured by A. T. KRUSE, of Stralsund (19), C. G. KRAMSTA and SONS (128), and by BURRE and KUSTER, of Lübeck (827), were severally deemed worthy of Honourable Mention.

Starches prepared from potatoes by L. VON UECHTRITZ, of Mühlrädltitz, in Silesia, (21), by L. EIPENSCHLEID, of Neuwied (330); and the sago and potato starch of F. WAHL,\* of Neuwied (332), were also deemed each deserving Honourable Mention. Some good samples of potato starch, and starch gum, are also shown by the LOBURG FACTORY at Magdeburg (694).

In the collection from the Netherlands, three exhibitors of starch appear especially deserving of notice. The samples of starch manufactured by C. C. PRINS, of Wormerveer (12), are excellent, and the Jury accordingly awarded to them a Prize Medal.

The specimens of potato starch, and dextrine prepared from it, exhibited by SCHONEVELD and WESTERBAN, of Gouda (13), were also judged superior, and a Prize Medal was accordingly awarded for them.

A capital sample of potato starch is likewise shown by VISSER, NOLET, and Co., of Scheidam (15). This the Jury deemed worthy of Honourable Mention.

Amongst the small series of the natural productions of the Island of St. Domingo, exhibited by Sir R. SCHOMBURGK (see p. 170), is a sample of starch prepared there

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\* Awarded also by Jury of Class III.

from a plant called guayiga, a species of *Zamia*, and which is stated to be abundant. This specimen the Jury deemed worthy of Honourable Mention.

Some good samples of starch are shown by D. G. MIRAT, of Salamanca (128).

Two specimens of starch in the Portuguese Department are found to merit notice, namely, the starch from Estremadura exhibited by M. M. HOLBECHE (454), and the starch from Alemtejo, Evora (453); the Jury deemed both these deserving of Honourable Mention.

In the Russian collections there is a good sample of potato starch exhibited by YURGHENSON, of Marieno, in the Government and district of Novgorod (72): also a specimen of dextrine prepared from potato starch, in the district of Shatzk, Government of Tamboff, exhibited by the Prince V. VOLKONSKY (70); some samples of starch and dextrine manufactured by VERDAN and Co., of Moscow (30), and some excellent wheat starch exhibited by C. ROTERMAN, of Reval (71). The Jury deemed these severally deserving of Honourable Mention.

### SECTION 2.—*Oil Series.*

Notwithstanding the great importance of oil, and the number of purposes to which it is applied in the arts and manufactures, comparatively few English exhibitors have contributed specimens, independent of those sent in illustration of the manufacture of candles, all of which, as already stated, have been referred to Class XXIX. This is certainly remarkable, remembering the large quantities of oil annually imported, and the extensive use of it in the arts of candle and soap making, for burning in lamps, for diminishing friction in machinery of all kinds, and especially for locomotives, in wool-dressing, in the manufacture of paints and varnishes, as an article of food, for medical purposes, &c. Oils are generally divided into the fat or fixed oils, and the essential or volatile oils; the former class being again sub-divided into fixed greasy oils, and drying oils; and lastly, the fixed greasy oils are separated into those which are usually fluid at all ordinary temperatures, and those which are generally solid, the latter being called tallows, butters, or solid oils. The quality of any oil depends in part on the nature and goodness of the seed or nut from which it is expressed; but it is influenced far more by the process employed in its extraction; the value of the oil for many purposes depending on its purity, or the absence of foreign matter derived from the seed, and consequently being greatly influenced by the conditions under which it is expressed, the mode in which the seed is crushed, the kind of press employed, and above all, the temperature at which it is pressed.

Amongst the oils, of which there are a very great number, there are several which are admirably suited for various purposes, but which, nevertheless, on account of their price, depending generally on local circumstances, such as cost of freight, &c., are very little or not at all used by our manufacturers. The knowledge, however, that such oils may at any time be procured in large quantities, is of great practical value, because, not only is it possible that, by the introduction of improved machinery, or by increased facilities of conveyance, their price may be reduced; but the very existence of such substances tends to equalize the market value of those oils now generally employed, and should at any time accidental circumstances cause the price of the latter to advance, these substances would then be most

advantageously introduced, and would probably ere long altogether supersede the oils in the place of which they had been originally imported. Thus the price of tallow is to some extent regulated and kept in check by that of palm and cocoa-nut oil; and should the value of the latter oils at any time rise, there are a number of other solid vegetable oils equally good for all practical purposes, which, with a very little trouble, might be had in almost any quantity. There are, however, some special purposes in which oils are used, for which it would not be so easy to find good substitutes; such, for example, as the lubrication of fine machinery, and the operations of the wool-spinner. It is probable, that amongst the numerous little-known oils of tropical countries, there may be many as well suited for both of these purposes, as those now generally employed; good specimens of new oils are, therefore, always of considerable practical interest. Whilst on the one hand it is desirable to draw the attention of manufacturers and consumers to the numerous foreign and colonial oils not at present imported into this country, it is at the same time also useful to point out how greatly the value of such oils depends on the care bestowed on their preparation, especially as regards cleanness of the seed, and the exclusion of impurity of all sorts, in the process of extracting the oil.

Of the six principal vegetable oils, namely, palm, cocoa-nut, castor, olive, linseed, and rape, the four first are imported in the state of oil only; the two last chiefly as seed; the proportion in which they were imported last year (1850), is shown in the following table; and if to these quantities are added about a million and a-half cwts. of tallow, and about 20,000 tons of whale oil and spermaceti, they will nearly represent the total quantity of oil imported into Great Britain.

	Linseed.	Rape Seed.
	Qrs.	Qrs.
Russia - - - - -	482,813	3,235
Sweden - - - - -	870	-
Norway - - - - -	268	-
Denmark - - - - -	37	3,092
Prussia - - - - -	87,273	645
Hans Towns - - - - -	1,153	2,872
Holland - - - - -	7,734	201
Naples - - - - -	1,476	-
Austrian Territories - - - - -	40	2,480
Greece - - - - -	-	1,637
Wallachia and Moldavia - - - - -	910	1,280
Egypt - - - - -	17,517	-
East Indian Empire - - - - -	26,142	13,126
Miscellaneous - - - - -	262	922
Total - - - - -	626,495	29,490

The quantity of the four principal vegetable oils annually imported into Great Britain is shown by the following table:—

	1848	1849	1850
Palm oil - - -	510,218 cwts.	493,331 cwts.	448,589 cwts.
Cocoa-nut oil - - -	85,463 „	64,452 „	98,040 „
Castor oil - - -	4,588 „	9,681 „	-
Olive oil - - -	10,086 tuns	16,964 tuns	20,783 tuns.

The proportion in which these oils were furnished by various countries in 1849 was:—

	Palm Oil.	Olive Oil.	Castor Oil.
	Cwts.	Tuns.	Cwts.
Western Africa - - -	475,364	1	-
United States - - -	13,349	-	290
Naples and Sicily - - -	14	9,661	-
East Indies - - -	-	-	9,315
Canary Islands - - -	3,719	-	-
Malta - - -	-	2,237	-
Turkish Empire - - -	-	1,712	-
Tuscany - - -	-	832	-
Spain - - -	-	753	-
Brazil - - -	525	-	-
Ionian Islands - - -	-	506	-
Morocco - - -	-	368	-
Madeira - - -	353	-	-
Sardinia - - -	-	333	11
Miscellaneous - - -	7	461	65
Total - - -	493,331	16,864	9,681

An interesting and valuable series of specimens of cotton seed, and the oil and cake obtained from it, after the expression of the oil, is shown by R. BURN, of Edinburgh (Class III., 68). The oil of cotton seed has been made in small quantities for a considerable number of years. In 1785, the Society for the Encouragement of Arts and Commerce, offered a prize for its manufacture on a large scale; but it does not seem to have been then taken up extensively, probably in consequence of the difficulty of purifying it. It has, however, been extracted for some time in Egypt, America, and India. Of late years this oil has attracted a good deal of attention; and means have been devised of purifying it, and removing the dark colour which it possesses in the raw state. Very large quantities of cotton seed are destroyed every year; as far more seed is produced than is required for the next year's crop; this, for the most part, has hitherto been thrown away as useless, or used as manure; its value is now, however, so far acknowledged, that in some places it is collected and exported for the manufacture of oil, and oil-cake. The oil seems to be well worthy of attention. The Jury consider the specimens shown by Mr. Burn, valuable and instructive, especially as they are accompanied by much useful information, and they therefore awarded to him a Prize Medal.

Some very good samples of rape, olive, and almond oil, are exhibited by Messrs. W. BROTHERTON and Co. (23), including specimens of rape-seed, both of English and foreign growth, in its natural state, and as prepared for pressing. The exhibitor has found good rape oil to be better suited than any other oil, for the lubrication of machinery, when properly purified from the mucilage, &c., which it contains in the raw state. Rape-oil is now used extensively for locomotives, for marine engines, and also for burning in lamps. It is stated that a locomotive consumes between 90 and 100 gallons of oil yearly; and the annual consumption of oil by the London and North Western Railway, for this purpose alone, is more than 40,000 gallons. Mr. Brotherton finds, that good English-grown rape yields oil of superior quality to any foreign seed which he has tried; and he consequently recommends its cultivation to agriculturalists; he states that an acre of land yields nearly five quarters of seed, worth at present 50s. per quarter. The inferiority of the oil obtained from Indian or colonial seed, probably depends on the want of sufficient care being paid to the purity and cleanliness of the seed

itself, and not on any real deficiency in the quality of the oil. The Jury deemed these samples worthy of Honourable Mention.

Specimens of purified oil, employed for lubricating machinery, and in perfumery, are shown by F. HILLAS (28). The oils are remarkably well purified, nearly colourless, and apparently devoid of all impurity; the Jury, therefore, awarded a Prize Medal.

Specimens of essential oils, including sweet oil of turpentine, are exhibited by BARKER and Co. (62).

Refined oil, prepared for the use of watch and clock-makers; and suitable for lubricating delicate machinery, is shown by W. A. BREAREY (Class II., 80).

Good samples of linseed and rape oils are contributed by M'GARRY and SONS (Class III., 132).

Fine specimens of various volatile oils, especially the oil of cinnamon leaf, are included in the collection of the LONDON DRUG TRADE (Class II., 117); and a good sample of English otto of roses is exhibited by J. BELL (Class II., 116).

Specimens of clarified oil for machinery, and for burning in lamps, are contributed by W. A. ROSE (27).

Samples of vegetable oils are shown by T. PETERSON (Class III., 66).

A good specimen of bleached linseed oil, for the manufacture of varnish, is exhibited by H. PENNEY (64).

In the collection of ENGLISH'S PATENT CAMPHINE COMPANY (61), already alluded to, there are a number of samples of new and refined oils; these are valuable because they are accompanied by samples of the seeds from which they are extracted. The Jury deemed these specimens worthy of Honourable Mention.

In the extensive collection of LIVERPOOL IMPORTS, there is a valuable series of oils, including amongst the volatile oils,—

1. Aniseed.	7. Citronella.	13. Nutmegs.
2. Bergamotte.	8. Juniper.	14. Orange.
3. Cassia.	9. Lavender.	15. Peppermint.
4. Carraway.	10. Lemons.	16. Rosemary.
5. Cloves.	11. Lemon grass.	17. Rose.
6. Cinnamon.	12. Neroli.	18. Thyme.

The collection of fixed oils consists of—

		1848	1849
		Tuns.	Tuns.
Poppy seed	- Papaver somniferum - - -	-	3
Ground nut	- Arachis hypogæa - - -	80	90
Castor	- Ricinus communis - East and West Indies	5	45
Seed	- - - " " - Lisbon - - -	-	700
Rape	- Brassica napus - Antwerp - - -	6	15
"	- " " - Antwerp - - -	3	5
Olive	- Olea europæa - Manilla - - -	56	8
"	- " " - Barbary - - -	2,785	2,330
"	- " " - Malaga - - -	246	-
"	- " " - Levant - - -	1,243	2,100
"	- " " - Corfu - - -	280	762
"	- " " - Leghorn - - -	-	15
"	- " " - Palermo - - -	2,785	8
"	- " " - Gallipoli - - -	2,420	4,815

The collection of oils exhibited by the HONOURABLE EAST INDIA COMPANY is



very extensive, and contains a large number of highly interesting specimens ; it constitutes, in fact, one of the most important divisions of the very valuable series of Indian raw produce which they exhibit.

Amongst the volatile oils must be particularly specified the attar of roses contributed by H.H. the RAJAH of JEYPORE, H.H. the RAJAH of KOTAH, and H.H. the RAJAH of KISHINGURH in the Rajpootana states ; for these the Jury severally awarded Prize Medals. Very superior attar of roses, and rose-water, are contributed by Messrs. GODFREY, of Ghazeepore ; for these, also, the Jury awarded a Prize Medal.

Besides these species of attar, or oil of roses, a number of other volatile oils are exhibited, many of which are very good ; and also a series of artificial attars, or mixtures of various highly-scented volatile oils, with fixed oils, obtained in the manner sometimes adopted in preparing spurious attar of roses. Oil of aloes-wood is contributed from Nepal, Rajpootana, and Ghazeepore ; and oil of saffron by H.H. the RAJAH of KOTAH, from the Rajpootana states.

Several good specimens of the attar of keora, the odorous principle of the fragrant yellow flowers of the screw pine, or *Pandanus odoratissimus*, are contributed by H. H. the RAJAH of KOTAH—and others. Some excellent attars prepared from various flowers, are also sent by a native perfumer at Benares ; the samples of Jasmine attar, *Jasminum grandiflorum* and *J. sambac* ; the khuskhus attar, obtained from the *Andropogon muricatum*, and the attars of Chumeylee, Beyla, Begla, and Moteya, are especially good ; and were deemed worthy of Honourable Mention.

Grass-seed oil, obtained from the *Andropogon schænanthus* (or *Calamus aromaticus*), accompanied by a portion of the seed, and some of the dried plant itself, are contributed from Malwa by R. N. HAMILTON, resident at Indore ; these were deemed worthy of Honourable Mention.

Specimens of Sirri, or lemon-grass oil (*Andropogon schænanthus* ?) are likewise forwarded from Sumatra. The fragrant volatile oil obtained from various species of andropogon is now extensively imported into England for the use of perfumers ; it is brought from Travancore under the name of oil of geranium.

A series of attars from different plants is sent from Moluccas : but unaccompanied by any information ; they are labelled :—

1. Kodjamas.	4. Pulasare.	7. Tjindor.
2. Ananas.	5. Goelang.	8. Abier.
3. Yailang.	6. Tjoelang.	9. Rampsing.

A good sample of oil of cloves is exhibited by T. KEY, of Madras ; some excellent oils of kayu-pateh, or cajeputi, and macassar, from the Celebes, are shown by SYED OMAR ; and a fine sample of sandal-wood oil, obtained from *Santalum album*, is contributed from Canara.

Good specimens of sandal-wood oil are also contributed from Mangalore and from Coorg.

In connection with the volatile oils, an interesting specimen of the Barus (Borneo) camphor may be mentioned. It is obtained from the *Dryobalanops Câmphora*, in Sumatra, and is chiefly exported to China, where it is very highly valued ; selling at nearly one hundred times the price of common camphor. It is said that the Chinese employ it to mix with, and improve the flavour of the ordinary camphor of

commerce ; this however is highly improbable ; it is most likely valued for its supposed medicinal qualities. Specimens are contributed by the SINGAPORE COMMITTEE, and were deemed worthy of Honourable Mention.

The collection of fixed fat oils is even still more numerous, and includes contributions from various exhibitors, some of whom send specimens of similar oils, but obtained from different localities. The Jury awarded a Prize Medal to Messrs. SAINTE and Co., of Cossipore, near Calcutta, for their samples of refined coconut oil. They also awarded Prize Medals to H.H. the MAHARAJAH RAO SCINDIA, of Gwalior, H.H. the RAJAH of VIZIANAGRAM, Lieut.-Colonel TULLOCH the Commissary-General of Madras, Mr. T. BISHOP of Tanjore, and Professor J. KEY of Madras, for specimens of the fat oils of India. The following are the most important of the oils included in these collections, and in the general series of the HONOURABLE EAST INDIA COMPANY.

1. Sesamum oil.—Three varieties of til, or *Sesamum orientale*, are extensively cultivated throughout India for the sake of the fine oil expressed from their seeds ; these are suffed-til, the white seeded variety ; kala-til, the parti-coloured variety ; and tillee, or black til ; it is from the latter that the sesamum, or gingelly oil of commerce, is obtained. Sesamum seed contains about 45 per cent. of oil ; good samples of this oil are contributed from Vizianagram, Ganjam, Hyderabad, Tanjore, the district of Moorshedabad, and Gwalior. The samples exhibited by H.H. the RAJAH of VIZIANAGRAM are particularly fine ; the value of the Novvooloo Pyaroo, or gingelly seed, is stated to be about 4*l.* per ton in the N. Circars. The samples shown by the COMMISSARY-GENERAL of MADRAS, and by Professor KEY, are also excellent.

2. Ram-til oil.—An oil resembling that of the sesamum obtained from the seed of the *Guizotia oleifera*, a plant introduced from Abyssinia, and common in Bengal. Specimens of this oil from Bombay, Vizagapatam, and Ganjam, are shown. From the latter place there is a sample of the oil obtained from another variety of *Guizotia*, the Valusa mum, or *Guizotia abyssinica*, which is very similar to, if not identical with, the *G. oleifera*. The ram-til, or valisaloo seed, yields about 34 per cent. of oil ; in Vizianagram the oil is used exclusively for burning ; its value there is stated to be about 10*d.* a-gallon. The samples shown are of a dark-brown colour, and evidently impure.

3. Ground-nut oil, obtained from the seed of the Bhoë moong (Moong phulleë), or *Arachis hypogæa*, a plant pretty extensively cultivated in various parts of India ; the seed contains about 44 per cent. of a clear pale yellow oil, which is largely used as food, and for lamps. Samples of this oil are sent from Bombay by T. KEY ; from Malwa, and from Malacca. Two varieties of the ground-nut, or Katjang Tanah, are cultivated in Malacca, the white seed, and the brown seed ; specimens of these, as well as of the Katchary, or Katjang oil from Malacca, and also Java, are exhibited. This plant is much cultivated in Java, in the vicinity of sugar plantations, and the oil-cake is used as manure.

4. Oil of Kossumba, or Koosum-oil, a pale brownish yellow oil, obtained from the seeds of *Carthamus tinctorius*, which contain about 28 per cent. A good sample of this oil, as well as of the carthamus seeds, is sent from Bombay.

5. Shersha, or oil of mustard.—Excellent oil is expressed in various parts of India from the seeds of different species of *Sinapis*, especially from the *Sinapis*

commonly called black mustard, &c. Specimens of mustard oil from *Sinapis toria*, from Meerut ; from black mustard, from Tanjore ; from *Sinapis glauca*, from the Chota Nagpore division ; and mustard seed from Ghazee pore, and various localities, are shown.

6. Castor oil, obtained from the seeds of *Ricinus communis*. Good specimens of this are exhibited, from Tanjore, contributed by Mr. BISHOP ; from Beerbhoom, Bellary, Madura, Tinnevely, and Java. The common jungle lamp oil, of which a sample is also shown from Tanjore by T. BISHOP, is a variety of castor oil.

7. Poppy oil, obtained from the seeds of *Papaver somniferum*. Good specimens are sent from Tanjore, by Mr. BISHOP ; from Calcutta ; and from Bombay. The sample from Tanjore is almost colourless, and deserves special commendation.

8. Croton oil.—Expressed from the seeds of the Narpaula, or *Croton sp.* nearly allied to *C. tiglium* ; samples of this are shown from Vizianagram and Ganjam ; a very good specimen is exhibited by J. KEY.

9. Poon seed oil.—Hoenda, oondee, or Pinnacottay oil. The seeds of the Poonay tree, the *Calophyllum inophyllum*, or Alexandrian laurel, contain a large quantity of oil, which constitutes nearly 60 per cent. of their weight. As commonly prepared, it has a dark greenish colour derived from the colouring matter of the seed. It is perfectly fluid at common temperatures ; but begins to gelatinize when cooled below 50°. Specimens of this oil are exhibited from Palamcottah, from Bombay, from Madura and Tinnevely, Malwa, and by T. BISHOP, from Tanjore.

10. Limbolee oil, obtained from the seeds of *Bergera Koenigii* ; it is of a rich yellow colour, perfectly clear and transparent ; from Bombay.

11. Napala oil : procured from the seeds of the Caatāmunāka, Bhoga cherinda, or *Jatropha Curcas* ; the angular leaved physic nut. A beautiful pale yellow oil, used by the natives in medicine, and as a lamp-oil. Good specimens are contributed by the COMMISSARY-GENERAL of MADRAS ; from Vizianagram and Ganjam ; an inferior sample, called Bhoga Bhirinda, is sent from Beerbhoom.

12. Linseed oil—tissee til.—Contributed, together with samples of linseed, from Moorshedabad, Bombay, Patna.

13. Mulu unnay oil, expressed from the Brumadundoo unnay, the seed of the *Argemone Mexicana*, an oil used in various parts of India for lamps, and in medicine.

14. Cheeroojee oil, obtained from the Tumbi pullum, the fruit of the *Chirongia sapida*, or *Buchanania latifolia*.

15. Kanagn nune, or Kurrunj oil, procured from the seeds of the *Pongamia glabra*, or *Galedupa arborea* ; a honey-brown and almost tasteless oil, fluid at common temperatures, but gelatinizing at 55°. Specimens of the oil are contributed from Vizagapatam and Tannah.

16. Mooneela oil ; Varoo samgaloo Nonæ, obtained from the seed of *Dolichos biflorus* ? exhibited by T. BISHOP, from Tanjore ; a pale yellow clear oil.

17. Caju apple oil ; Moontha maunnerley noonæ ; expressed from the seeds of the kâpâ Māvā, or *Anacardium occidentale* ; contributed by T. BISHOP, from Tanjore.

18 Poonga or Poon (?) oil, from the seeds of *Sapindus emarginatus* ? contributed from Tanjore by T. BISHOP, and by W. B. HORSLEY, from Palamcottah. Mr. Horseley is Honourably Mentioned.

19. Badum noonæ, almond oil ; *Terminalia sp.* from Tanjore.
20. Coodivetty Poondoo oil.—*Allium sp.* from Tanjore.
21. Malkamnee oil, *Celastrus paniculatas ?* from Madras.
22. Nahor nut oil ; contributed by Major HANNAY.
23. Moringa oil ; *Moringa pterygosperma.*
24. Shammanatie oil ; contributed by W. B. HORSLEY, from Palamcottah.
25. Hingun or Hingota.—*Balanites Egyptiaca*, from Bombay.
26. Dessy akhrott, obtained from *Aleurites triloba*, the country walnut, from Bombay.
27. Saul tree seed oil.—*Shorea robusta.*
28. Chendoorookoo oil, from Madura and Tinnevelly.
29. Coorookoo oil, contributed by the COMMISSARY-GENERAL of MADRAS, from Madura and Tinnevelly.
30. Koodree oil.

31. The collection of oils also includes some very interesting vegetable butters and tallows, some of which are almost entirely unknown in Europe. The samples of cocoa-nut oil from Messrs. SAINTE, of Cossipore, have been already alluded to ; besides these, very good samples are contributed by the COMMISSARY-GENERAL of MADRAS, T. BISHOP, from Tanjore ; and by other exhibitors from Malabar, Madura, Tinnevelly, and Sarawak in Borneo.

Three species of *Bassia*, indigenous to India, yield solid oils : and are remarkable for the fact, that they supply at the same time, saccharine matter, spirit, and oil, fit for both food and burning in lamps.

32. Ilpa oil, Eloopei unnay, expressed from the seed of the illupie tree, or *Bassia longifolia*, a tree abundant in the Madras Presidency, and the southern parts of Hindostan generally. The oil is white and solid at common temperatures, fusing at from 70° to 80°. It may be advantageously employed in the manufacture of both candles and soap. Specimens of this oil are contributed by the COMMISSARY-GENERAL of MADRAS and J. KEY, and from Madura and Tinnevelly.

33. Epie oil, or mhowa seed oil ; Ippa noonæ, obtained from the seeds of the mahowa, or *Bassia latifolia*, which is common in most parts of the Bengal Presidency. The oil a good deal resembles that of the illupie tree, and may be used for similar purposes. It is solid at common temperatures, and begins to melt at about 70°. The specimens of this oil shown by T. COPLESTONE, from Mangalore, were deemed worthy of Honourable Mention ; it is also sent from Canara.

34. Phoolwa, or vegetable butter, expressed from the seed of the choorie, or *Bassia butyracea*, a tree, which though far less generally abundant than the *B. longifolia* and *B. latifolia*, is common in certain of the hill districts, especially in the eastern parts of Kemaon ; in the province of Dotee, it is so abundant, that the oil is cheaper than ghee, or butter, and is used to adulterate it ; it is likewise commonly burnt in lamps, for which purpose it is preferred to cocoa-nut oil. It is a white, solid fat, fusible at about 120°, and exhibits very little tendency to become rancid when kept. Specimens of this oil, as prepared for food, are shown from Kemaon.

35. Miniak Tenkawung, a solid oil of a pale greenish colour, a good deal resembling the oils of the *Bassia* in character, though rather more hard, and approaching more in properties to myrtle wax. This is probably the produce of the tallow tree of Java, described by Sir S. Raffles under the name of minyak kawon ; and by

Crawford, as being very common in the western countries of the Archipelago, where it is called kawan. Mr. Crawford supposes it to be produced by a species of *Bassia*. According to Mr. Low, there are several varieties of solid oil commonly used in the islands of the Archipelago, and obtained from the seeds of different species of *Dipterocarpus*. It is a hard yellowish-green coloured substance, brittle, and fusible at about  $93^{\circ}$ , and when fused solidifies at  $86^{\circ}$ . Specimens are contributed by the SINGAPORE LOCAL COMMITTEE. It is very easily bleached, indeed by mere exposure to air and light, it becomes perfectly white; if not too costly, it promises to be a valuable oil.

36. Piney tallow, obtained from the fruit of the peynie marum, paenoe, dammar, or doop tree, *Vateria indica*, a large and quick-growing tree, abundant in Malabar and Canara. A white, solid oil, fusible at a temperature of  $97^{\circ}$ . This oil makes excellent candles, especially when saponified and distilled in the manner now adopted with palm oil, &c.; it has one great advantage over cocoa-nut oil, that the candles made of it, do not give out any suffocating acrid vapours when extinguished, as those made with the latter oil do. Samples are shown by T. COPLESTONE, from Mangalore, and from Malabar and Canara.

37. Cocum oil, or kokum butter, obtained from the seeds of a kind of Mangos-teen, *Garcinia purpurea*, used in various parts of the peninsula to adulterate ghee or butter, and said to be exported to England for the purpose of mixing with bears' grease in the manufacture of pomatum. It is a white, or pale greenish yellow, solid oil, brittle, or rather friable, having a faint, but not unpleasant smell, melting at about  $95^{\circ}$ , and when cooled after fusion, remaining liquid to  $75^{\circ}$ . Samples of this oil are contributed from Bombay.

38. Kali ziri, or khatzum, obtained from the seed of the caat siragum or buckchie, *Vernonia anthelmintica*, a plant common in Guzerat and the Concan Ghats; there is, however, some uncertainty as to the plant from which this excellent oil is obtained, the label on one of the specimens describing it as the produce of the *Salvadora persica*. It is a bright green, solid oil, having a consistence intermediate between that of tallow and wax, fusible at about  $95^{\circ}$ , and easily bleached; it has a peculiar and somewhat aromatic odour. Samples of this oil are sent from Bombay.

39. Neem oil, Vaypum unnay, obtained from the ripe fruit of the Nim, Arishto, Vaypum, or Margosa tree, *Melia Azadirachta*; a large and beautiful tree, by no means uncommon. The oil is pale yellow, and is solid at ordinary temperatures. Specimens are contributed by the COMMISSARY-GENERAL of MADRAS; from Bellary; by T. BISHOP, from Tanjore; and by J. KEY.

40. Gutta Podah; from Billiton; a sort of wax, of a bright green colour, which might probably be advantageously used like the other kinds of vegetable wax, in the manufacture of candles, associated with the more easily fusible fatty substances.

Good specimens of lemon-grass oil from Galle, are shown by G. WINTER; and samples of cinnamon and citron oils, and the oil of the Bengal Quince, or *Ægle Marmelos*, from Ceylon, are also exhibited; the cinnamon oil from Messrs. PARLETT, O'HALLORAN, and Co., of Colombo, is very good. There are likewise some excellent specimens of cocoa-nut oil, intended to illustrate the process of its manufacture, consisting of the copperah, or dried nut, the expressed oil, and the stearine and elaine purified, and obtained separately; for this valuable series a Prize Medal was awarded.

A valuable series of eighteen samples of Ceylon oils is contributed by T. A. PIERIS, of Kandy, the names of these are—

1. Castor.	7. Kekuna.	13. Koola.
2. Rape seed.	8. Makula.	14. Balegorande.
3. Gingelly.	9. Kadjie.	15. Naarawyene.
4. Branjemetry.	10. Kellooraje.	16. Mahakoomare.
5. Siddharte.	11. Rattee.	17. Dummele.
6. Kolestesma.	12. Dorene.	18. Chandenade.

The oils Nos. 5 and 7 are nearly colourless. The value of this collection would have been considerably increased had the specimens been accompanied by any practical information. The Jury awarded a Prize Medal for these oils, together with the series of gums and resins shown by the same exhibitor.

Some fine specimens of Myrtle or berry wax, from the Cape of Good Hope, are exhibited by J. LINDENBERG, of Worcester district (45). This is an excellent material for the manufacture of candles, when employed in conjunction with other solid fats. The Jury awarded a Prize Medal for these specimens.

From Western Africa an interesting collection of oils and oil seeds is contributed by WARWICK WESTON (1), consisting of shea butter, or galam butter, obtained from the fruit of the *Micadenia*, or *Bassia Parkii*, a tree closely resembling the *Bassia latifolia*, and other species indigenous to Hindostan. According to Park, the tree is abundant in Bambara; the oil is solid, of a greyish white colour, and fuses at 97°. Specimens are also shown of Beynie seed and Groundnut (*Arachis hypogæa*), and of the oil expressed from them; and likewise of palm oil, and palm kernel oil, the former excellent. The Jury awarded a Prize Medal for these specimens.

A specimen of the shea butter is also exhibited by Dr. McWILLIAM, from Egga, on the River Niger (5A), which was deemed worthy of Honourable Mention.

A good specimen of Myrtle or candle berry wax, accompanied by candles made from it in the crude unbleached state, and a dried branch of the plant itself, bearing leaves and fruit from New Brunswick, are exhibited by J. CHALMERS; these were deemed worthy of Honourable Mention.

Good samples of cocoa-nut oil are contributed by the ROYAL SOCIETY of NATURAL HISTORY of the Mauritius (4), and by M. MELLON, likewise from the Mauritius (6).

Specimens of laurel oil, from the River Poomeroon, Essequibo, and crab or carapa oil, from the Essequibo river, in British Guiana, are exhibited by J. S. STUTCHBURY (52, 53). The latter is a sort of vegetable butter, being sometimes solid and sometimes half fluid, which is obtained from the seed of the carapa or y andiroba. *Carapa Guianensis*, or *Xylocarpus Carapa*, a large tree, abundant in the forests of Guiana and Acagie. It is said to turn rancid very soon when exposed to the air, but this is probably caused by the presence of impurities arising from the crude and imperfect mode in which it is prepared by the natives, who boil the kernels, leave them in a heap for a few days, then skin them, and lastly reduce them into a paste in a wooden mortar, which is then spread on an inclined board, and exposed to the heat of the sun, so that the oil may melt and gradually trickle down into a vessel placed below to receive it. The Jury awarded a Prize Medal for this specimen.

Another sample of crab or carapa oil is also shown in the collection of Trinidad

raw produce, exhibited by Lord HARRIS (see p. 170), as well as a portion of cocoa-nut oil, of which a considerable quantity is obtained in that island, chiefly on the eastern coast; and a specimen of cacao butter, obtained from the seeds of the *Theobroma Cacao*, a well-known white solid fat, fusible at about 120°.

Some excellent olive oil, the produce of New South Wales, is exhibited by R. HALLET and SONS (5). Independent of its interest as coming from a colony, this oil deserves notice for its clearness, colour, and flavour; it was deemed worthy of Honourable Mention.

A good sample of olive oil from South Australia is also exhibited by the COLONIZATION ASSURANCE CORPORATION, in their series of Western Australian raw produce (see p. 170). They also show some sandal-wood nut oil and tar from Guildford; some distilled oil of the *Leptospermum*, which it is stated may be obtained in any quantity; and a similar oil produced by distillation from the *Eucalyptus piperita*, a powerful solvent of caoutchouc, evidently very similar, if not altogether identical with the oil of Cajeput. The characters of these two oils are very similar, and without some care it is difficult to distinguish them from one another by the odour; the leptospermum oil has a slight tinge of yellow, its specific gravity is 0.9035; the eucalyptus oil is colourless, and has a density of 0.9145. It is probable that these oils might be used with great advantage in the manufacture of varnish, they readily dissolve copal, and when its solution is spread over any surface, the oil soon evaporates, and leaves a hard, brilliant, and uniform coating of the resin; these oils are specially worthy of attention.

A remarkably good sample of oil of peppermint is shown by H. G. and L. B. HOTCHKISS, of Lyons, New York (156); for this the Jury awarded a Prize Medal.

An interesting specimen of maize, or Indian corn oil, is contributed by B. B. KIRTLAND, of Greenbush, New York (84).

An excellent series of samples of Austrian linseed and linseed oil is exhibited by A. STEINBÖCK, of St. Georgia, near Manthausen (103), consisting of Upper Austrian and Moravian seed, together with oil of first and second quality, both raw and prepared for drying, extracted from both sorts of seed. For the superior quality of these oils the Jury awarded a Prize Medal.

Some good Hungarian rape oil, in its crude state, and likewise refined, is shown by C. T. MALVIEUX, of Pesth (102); this was deemed worthy of Honourable Mention.

The chief oils shown in the Belgian collection are of animal origin, but there are also several good vegetable oils. L. E. BISSÉ, of Anderlecht, near Brussels (87), exhibits remarkably fine clear samples of refined vegetable oil: for these the Jury awarded a Prize Medal. Good linseed oil, prepared for the use of painters, and purified colza oil, are contributed by F. VANDERSTRAETEN, of Brussels (84), L. CLAUDE, of Brussels (85) shows extra refined pale rape purified for burning in lamps, as a substitute for sperm; and DEBBAULT-DELACROIX, of Courtrai (92), exhibits some good colza oil, both raw and purified. These three the Jury severally deemed deserving of Honourable Mention.

Some vegetable wax from China is contributed by HER MAJESTY'S CONSUL at Shanghae; this substance, from its high melting point, and other physical characters, has of late attracted a good deal of attention; it is admirably adapted as a material for the manufacture of candles. The Jury, therefore, deemed it worthy of Honourable Mention. A remarkable vegetable wax from Japan is also shown.

Samples of castor oil, lettuce oil, safflower oil, turnip-seed oil, oil of nielle or nigella, linseed oil, and oil of cotton seed, are shown in the Egyptian collection ; the latter is the most remarkable ; the series of Egyptian oils was deemed worthy of Special Mention.

Cotton seed oil in the raw state, and the same refined and bleached by a patent process, are exhibited by DE GÉMINY, of Marseilles, where the manufacture of this oil from Egyptian seed and its purification are now carried on to a considerable extent (1613). For this specimen the Jury awarded a Prize Medal.

Specimens of various volatile oils are shown by HUGHES, junior, of Grasse, Var (881). These oils are prepared by a direct process of distillation, discovered by the exhibitor about a year since, and by means of which the oil is at once obtained in a state of purity, so that no subsequent rectification is required. By this process volatile oils are manufactured for the use of perfumers, in a highly economical manner, and a superior product is obtained both in regard to colour, and likewise in respect to delicacy of odour. The Jury awarded a Prize Medal for these oils.

Specimens of volatile oils prepared for the use of perfumers, are also exhibited by C. D. MÉRO, of Grasse, Var (1356). For these likewise the Jury awarded a Prize Medal.

Samples of very superior bleached oil, for the use of painters and varnish makers, are contributed by E. F. HARO, of Paris (866). The Jury awarded a Prize Medal for these specimens.

Some very interesting specimens of artificial volatile oils and perfumed essences are shown by M. A. C. COLLAS, of Paris (801). The Jury awarded a Prize Medal for these.

Some very good bleached oil, prepared for the use of painters, is shown by DE ROULZ, of Paris (1466) ; this was deemed worthy of Honourable Mention.

A very fine cake of purified camphor is exhibited by W. CONRAD, of Paris (1156) : this was deemed worthy of Honourable Mention.

Purified oil, prepared for the use of watchmakers, for diminishing friction in machinery, and for fire-arms, &c., is shown by F. JOLLY, of Mer, Loire-et-Cher (276).

Oil for lamps and machinery of various sorts, is also exhibited by M. MOREAU (325).

Purified linseed oil, and oil boiled with oxide of lead, are shown by RENAULT, of Bordeaux.

A number of good samples of oils are shown by various exhibitors, in the very interesting collection of the raw produce of Algeria, contributed by the MINISTER OF WAR (see p. 165). In particular, the series shown by CURTET, junior, of Bab-el-Oued (22), deserves notice ; it consists of good specimens of the oil of linseed, sunflower, cameline, sesamum, mardia, castor, olive, colza, mustard and cotton seed, together with the seeds from which they are expressed. The Jury awarded a Prize Medal for this series.

A good collection of oils is also shown by H. J. MERCURIN, of Cheragas (37) including olive oil of 1850, and a series of essential oils, for the use of perfumers, namely—



1. Bigararde.	6. Rose.	11. Petit grain.
2. Citrine.	7. Geranium.	12. Neroli.
3. Melarose.	8. Jasmin.	13. Cedrat.
4. Absinthe.	9. Citron.	14. Bergamotte.
5. Myrthe.	10. Portugal.	

For this also the Jury awarded a Prize Medal.

Fine samples of olive oil, prepared in 1850, are likewise exhibited by J. BORDE, of Philipville, Constantine (9), and E. F. MAFFRE, of Bougie, Constantine (35) : these were each deemed worthy of Honourable Mention.

A series of volatile oils, or essences, are also contributed by P. SIMOUNET (51), consisting of—

1. Sauge.	5. Citron zeste	8. Bigarrarde.
2. Absinthe.	6. Melarose.	9. Neseeri.
3. Verveine.	7. Portugal zeste.	10. Neroli.
4. Citronine.		

Pine-needle oil, a volatile liquid obtained during the desiccation of pine leaves, or needles, in preparing a fibrous material for the use of upholsterers (see p. 244), is exhibited by C. G. FABIAN, of Humboldsaw, near Breslaw (95) ; this was deemed worthy of Honourable Mention.

Purified oil, intended for the use of watchmakers, is exhibited by J. L. F. SCHRAMM, of Dessau (806).

Fair samples of rape seed, and rape oil, from Holland, are shown by A. DE HAAN, of Rotterdam (9) ; these were considered deserving of Honourable Mention.

A large number of exhibitors of olive and other oils is found in the Portuguese collections ; amongst these may be specified fine samples of olive oil from J. L. DE CATHEIROS MENEZES (460-1) ; from ALMEIDA PRAENCA (462-3-4) ; from DE MAUDO (465-6) ; from J. LARCHER (467-8) ; from the Count DE FARROBO (469-70) ; from J. B. PINTO (471-2) ; from ALMEIDA SILVA and Co. (473-4-5-6-7 and 480) ; from J. D. ALBUQUERQUE-MELLO (478-9) ; from the Marquis DE FICALHO (481-2) ; and from the Count DE LINHARES (483-4) ; each of these was deemed worthy of Honourable Mention.

Excellent specimens of several volatile oils, including those of lavender, juniper, rosemary, and lemon, are sent by F. M. C. LEAL (497-500) ; for these the Jury awarded a Prize Medal.

Very good samples of palm and ground-nut (*arachis*) oils, from Angola, are exhibited by F. R. BATALHA (495A) ; these were deemed deserving of Honourable Mention. Fair samples of castor, linseed, and almond oils are likewise shown by V. BURNAY (493), from Estremadura.

From the LINSINSK FOREST INSTITUTE (83), in the government of St. Petersburg, district of Czarskoe sielo, are samples of the empyreumatic volatile oil, obtained by the destructive distillation of birch bark ; this substance is employed in the preparation of Russia leather, and gives it that peculiar and agreeable odour which helps to preserve it from the attacks of insects. This oil has a dark brown or almost black colour, is somewhat thick, and has a specific gravity of 0.939. Its odour is strong, disagreeable, and empyreumatic ; when poured upon paper it forms a brown greasy stain, which, however, soon dries, and after a short time, when the empyreumatic odour is dissipated, there remains only the peculiar and

agreeable scent which belongs to Russia leather. The Jury awarded a Prize Medal for these specimens.

Fine samples of walnut, linseed, coleseed, and castor oils, are exhibited by GIRARDI BROTHERS, of Turin (5). Good olive oil is also shown by the Chevalier MANCU SIMONE, of Sassari (15); and by S. MESINA, of Nuoro (31); and some good linseed oil is contributed by J. CALVI, of Genoa (22). These were severally deemed deserving of Honourable Mention.

In the Spanish collections, an excellent sample of the essential oil of lemons is shown by J. CANALES, of Malaga (242A). For this the Jury awarded a Prize Medal. The manufacture of olive oil in Spain has undergone very considerable improvement during the last few years; in particular, the process for expressing the oil has been rendered more rapid and effectual by the introduction of the hydraulic press, and thus the injurious consequences which resulted from the partial fermentation of the fruit are avoided.

Fine samples are contributed by the province of Almeria (164); from Albuquerque, by C. S. MONTESINOS, of Badajoz (167); from Almadovar del Rio, by the province of CORDOVA (165), being the produce of the wild olive; from the village of Nigüelas, by J. ZAYAS, of Granada (168); from Santa Fe, by A. DIEZ DE RIBERA, of Granada (172); by M. FERNANDEZ, of Malaga (169); and by the province of SEVILLE (171). These were severally deemed worthy of Honourable Mention.

Samples of olive oil are likewise exhibited by the AGRICULTURAL BOARD of VALENCIA, from D. V. TORTOSA, and D. J. CAIRASCOSA (173); by the AGRICULTURAL BOARD of CORDOVA; and by the Count of SOBRADIEL, of Saragossa (174). A specimen of linseed oil, from Lorea, is contributed by D. —, of Murcia (170); and nut oil from Oviedo, by D. S. ALVAREZ CALLEJA (166).

A cake of hard vegetable wax, obtained from a plant indigenous to the northern parts of St. Domingo, is contributed by Sir R. SCHOMBURGK amongst the other raw produce of that island. It is not suited for the manufacture of candles alone, but like the berry wax of the Cape of Good Hope, serves very well to mix with other fatty substances (see p. 197).

A few samples of oils are contributed from Tunis, including, besides some of the common fixed oils, samples of several of the volatile oils used in perfumery especially the oil or otto of roses, and of jasmine, together with a few mixed essences, such as those of quince, orange, benzoin, aloes, &c.

Some good specimens of linseed oil, and of rape oil, both refined and unrefined, are shown by JOSEPH OWEN, of Copenhagen (44); these were deemed worthy of Honourable Mention.

The Turkish collection of raw produce includes a numerous and interesting series of oils, both fixed and volatile, from various localities, the former include the following (see p. 165):—

1. Almond	- -	Damascus.	8: Olive	- -	Adramati.
2. Castor	- -	Asia Minor.	9. ,,	- -	Mentesche.
3. Laurel	- -	Djendgiva.	10. ,,	- -	Tripoli.
4. Linseed	- -	Constantinople.	11. ,,	- -	Erzeroum.
5. Olive	- -	Damascus.	12. Sesamum	- -	Constantinople.
6. ,,	- -	Broosa.	13. ,,	- -	Beyrout.
7. ,,	- -	Candia	14. Sunflower	- -	Moldavia.
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Amongst the volatile oils from Turkey, the oil or attar of roses, and the oil of geranium or andropogon used to mix with and adulterate oil of roses, are specially worthy of mention. The oil of orange flowers is also deserving of notice. The series of Turkish oils shown includes the following:—

1. Almonds, bitter - Sara.	13. Peppermint - - Kezar.
2. Fennel - - Broosa.	14. ,, - - Carlova.
3. Geranium - - Mecca.	15. ,, - - Saida.
4. Laurel - - Salonica.	16. Rosemary - - Smyrna.
5. Lavender - - Broosa.	17. Rose - - Kazemlik.
6. Lemon - - Salonica.	18. Sage - - Elliferm.
7. ,, - - Scio.	19. ,, - - Constantinople.
8. Orange flowers - Constantinople.	20. Sabine - - Broosa.
9. Origanum - - Salonica.	21. Spike - - Broosa.
10. ,, - - Carlova.	22. Turpentine - - Constantinople.
11. ,, - - Kezar.	23. ,, - - Broosa.
12. Peppermint- - Janina.	24. ,, - - Nicomedia.

Good samples of olive oil are exhibited in the Tuscan collection by C. T. ORSETTI, of Lucca, from the hilly districts near that place (31); by RUSCHI BROTHERS, from Calici, near Pisa (32); by D. PACINI, from Buti, near Pisa (33); and by the Chevalier C. A. SARACINI, of Sienna, from Castel-nuovo, Berardenga, near Sienna (34). These were severally deemed worthy of Honourable Mention.

### SECTION III.—*Dyes and Colours.*

The arts of dying and printing in colours have undergone very considerable modifications during the last half-century, and perhaps no manufacturing processes have received more important assistance from the labours of chemists. Dyeing is purely a chemical operation; and consequently it has improved in exact proportion to the advance made in the investigation of those chemical laws which regulate the formation of colour, and the union of colouring matter with the various vegetable and animal substances which come under the operation of the dyer. A vast number of new colouring materials have been discovered or made available, and improved modes have been devised of economically applying those already in use; so that the dyer of the present time employs many substances, of the very existence of which his practical predecessors were wholly ignorant. From the increased use of many of the vegetable colours, and from the improved modes of applying the colouring matters, a demand has naturally sprung up for various dye-stuffs; and at the present time many of the dyeing materials of distant countries are beginning to excite the attention of practical men; for though they have long been acquainted with many of these substances, it is only recently that the progress of the art has rendered their use desirable, or even practicable.

At the present time, by far the greater part of the vegetable dye-stuffs used in Great Britain are derived from foreign countries. The following Table shows the quantity of some of the chief of those substances imported in the years 1848, 1849, and 1850; but it must be remarked that it includes that imported for re-exportation, as well as that retained for home consumption by our manufacturers:—

	1848	1849	1850
	Cwts.	Cwts.	Cwts.
Cochineal - - -	18,380	18,254	22,451
Fustic - - -	154,320	175,840	-
Indigo - - -	59,127	81,332	70,482
Lac dye - - -	4,449	13,585	18,124
Logwood - - -	463,840	479,840	693,800
Madder - - -	220,724	254,722	261,861
Nicaragua wood - - -	47,220	54,020	-
Safflower - - -	8,144	10,452	-
Yellow-berries - - -	5,421	7,761	-

The proportion in which some of the principal dye-stuffs are supplied by different countries is shown in the following Table, which represents the imports for 1849 :—

	Logwood.	Madder.	Fustic.	Indigo.	Lac Dye.	Safflower.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.
East Indian Empire - - -	-	424	-	77,793	13,546	10,308
British Guiana & West Indies	84,120	-	25,140	73	-	-
British North America - - -	4,460	-	420	-	-	-
Malta - - - - -	-	2,246	-	-	-	-
France - - - - -	-	80,568	-	-	-	53
Holland - - - - -	-	31,570	-	-	-	-
Spain - - - - -	-	4,091	-	-	-	-
Naples - - - - -	-	34,632	-	-	-	-
Turkey - - - - -	-	99,701	-	-	-	-
United States - - - - -	44,340	169	15,920	45	39	-
Central America - - - - -	2,520	-	-	2,494	-	-
Mexico - - - - -	144,860	-	13,080	-	-	-
Cuba - - - - -	2,580	-	42,340	14	-	-
New Granada - - - - -	-	-	56,640	317	-	-
Hayti - - - - -	122,320	-	2,560	-	-	-
Honduras - - - - -	72,960	-	14	214	-	-
Brazil - - - - -	-	-	11,800	-	-	-
Chili - - - - -	420	-	-	216	-	-
Venezuela - - - - -	-	-	6,860	3	-	-
Miscellaneous - - - - -	1,260	1,321	1,066	163	-	91
Total - - - - -	479,840	254,722	175,840	81,332	13,585	10,452

The series of dye-stuffs, included in the collection of Liverpool imports, consists of the following :—

		1849	1850
		Tons.	Tons.
Alkanet - - -	Anchusa tinctoria - - -	Smyrna - - -	-
" - - -	" - - -	Hamburg - - -	-
Barwood - - -	Baphia nitida - - -	Sierra Leone - - -	400
Brazil wood - - -	Cæsalpinia Braziliensis - - -	Rio de Janeiro - - -	1800
Brazilletto - - -	" Bahamensis - - -	New Providence - - -	180
Camwood - - -	Baphia nitida - - -	Sierra Leone - - -	180
Flavine - - -	(Yellow dye) - - -	New York - - -	-
Fustic - - -	Maclura tinctoria - - -	St. Domingo - - -	100
" - - -	" - - -	Savanilla - - -	400
" - - -	" - - -	Cuba - - -	300
Garancine - - -	(Madder red) - - -	France - - -	2340
Green ebony - - -	Sacandra ovalifolia - - -	Brazil - - -	36
Indigo - - -	Indigofera tinctoria - - -	Calcutta - - -	10
" - - -	" - - -	Bombay - - -	3
" - - -	" anil - - -	Brazil - - -	-

						1849	1850
						Tons.	Tons.
Logwood - - -	Hæmatoxylon Campechi-	Honduras - - -	- - -	- - -	- - -	1330	1300
	anum.						
" - - -	" "	Tobasco - - -	- - -	- - -	- - -	420	390
" - - -	" "	Campeachy - - -	- - -	- - -	- - -	1700	1860
Madder - - -	Rubia tinctoria - - -	Naples - - -	- - -	- - -	- - -	} 2340	} 2985
" - - -	" "	Seville - - -	- - -	- - -	- - -		
" - - -	" "	Marseilles - - -	- - -	- - -	- - -		
" - - -	" "	Rotterdam - - -	- - -	- - -	- - -		
Munjeet - - -	Rubia cordifolia - - -	Bombay and Calcutta -	- - -	- - -	- - -	405	525
Nicaragua wood -	Cæsalpinia echinata -	Lima - - -	- - -	- - -	- - -	400	1570
Orchella weed -	Roccella - - -	Valparaiso - - -	- - -	- - -	- - -	- -	2
" "	" - - -	Cape de Verd - - -	- - -	- - -	- - -	- -	8
Quercitron bark -	Quercus tinctoria - - -	Philadelphia - - -	- - -	- - -	- - -	296	514
Red Sanders - - -	Pterocarpus santalinus	Calcutta - - -	- - -	- - -	- - -	120	246
Safflower - - -	Carthamus tinctorius -	" " - - -	- - -	- - -	- - -	11	4
" - - -	" "	Bombay - - -	- - -	- - -	- - -	18	12
Sappan - - -	Cæsalpinia sappan -	Calcutta - - -	- - -	- - -	- - -	75	120
Turmeric - - -	Curcuma longa - - -	Bombay and Calcutta -	- - -	- - -	- - -	140	414
Yellow berries -	Rhamnus infectorius -	Levant } - - -	- - -	- - -	- - -	} 113	} 115
" "	" "	Smyrna }	- - -	- - -	- - -		
Young fustic - - -	Rhus cotinus - - -	Zante - - -	- - -	- - -	- - -	276	356

The series of Hull imports includes samples of alkanet root and madder; the yearly average imports being about 60 cwts. of the former, and 18,500 cwts. of the latter.

A numerous and highly instructive collection of dye-stuffs is exhibited by Mr. W. BURCH, of Sewardstone (77), consisting of the different substances employed as dyes, mordants, &c., in dyeing; forming altogether a complete illustration of the operations of the dyer and calico printer, and accompanied by specimens exhibiting the various stages through which silk, wool, and cotton fabrics have to pass in the processes of the dyer.

The arts of dyeing and printing, although involving very different processes of manipulation, are, as regards the chemical basis of their operations, essentially the same. Dyeing consists in staining the whole surface of a fabric with the same colour; which is effected generally by immersing it in a bath, or a series of baths, more or less heated; by which means the fibre becomes penetrated with the colouring matters thus brought in contact with it.

Printing, on the other hand, consists in staining the surface of a piece of cloth in parts, with one or more colours, or, if entirely covered, it is by a variety of colours arranged in patterns. In order to effect this partial staining, and obtain due clearness of outline in the figure, a decoction or solution of the colouring matter, or of a proper metallic solution or mordant, by means of which the colouring matter is to be subsequently fixed, is thickened by mucilage of some kind, usually either gum or starch, in order to prevent its running or spreading beyond the parts intended to be dyed; this mucilage is taken on the surface of the printing blocks, and impressed in proper order on the cloth. It is then allowed to dry, and is afterwards, according to the nature of the colour, either subjected to the action of steam, which merely softens the mucilage and fixes the colouring matter in the cloth without wetting it, or, if a mordant, it is placed in a

warm bath with colouring matter, which becomes fixed only on those parts on which the mordant has been printed, after which the mucilage is readily washed away.

But although the operations of dyeing and printing are thus to some extent different, yet the dye-stuffs or colouring matters used are entirely the same, and are applied to produce the same results; so that, in fact, the art of colour-printing, setting apart pattern designing, may be regarded as a mere modification of the art of dyeing.

In the processes of fixing colouring matters, it is found that there are many substances capable of affording very beautiful, useful, and lasting colours, which have not of themselves alone a sufficient affinity for the fibre, but which nevertheless may be easily combined with it through the agency of certain other substances not in themselves colouring matters, but which have an affinity both for the substance of the fabric and also for the colouring matters, by which means the colouring matters are effectually united with the fibre. These substances, which for the most part are metallic solutions, are termed mordants, and besides their peculiar action in changing the hues of the colouring matters, are the means by which some of the most lasting, and therefore most useful, dyes are attained. The bases of the mordants chiefly used are the oxides of iron, tin, copper, and alumina, in combination with sulphuric, muriatic, nitric, acetic, and other acids. From the great diversity of substances used in the art of dyeing, including metals and metallic compounds, woods, flowers, roots, barks, leaves, fruits, insects, &c., all of which require essentially different treatment, there is necessarily considerable variety in the methods and processes employed; and this is still further increased by the different nature of the substances dyed—such as wool, silk, leather, cotton, flax, and wood.

In the substances of the greatest importance—wool, silk, and cotton—experience shows that the colouring matter which suits the nature of one does not necessarily suit that of another; and indeed, for the most part, the process of dyeing those three substances is so distinct as to have caused the dyers to be generally divided into woollen, silk, and cotton dyers. It is found that, as regards the use of the strong mineral acids, which are employed both to brighten, and, assisted by heat, to fix some colouring matters, an important difference exists between wool, or silk, and cotton. Animal substances will bear uninjured a much greater proportion of acid, and of the two, wool being the coarser fibre, is less easily injured than silk; but both will bear with advantage a proportion of acid which would corrode and destroy the fibre of cotton. It is necessary, therefore, to be very cautious in the use of acids on cotton goods, and the dyeing of a mixed fabric constitutes one of the nicest parts of the art, where a mixture of animal and vegetable fibres has to be printed with perhaps six or eight brilliant colours at the same time.

In illustration of these processes, Mr. Burch shows a complete collection of the various chemical agents employed by the dyer, including acids, alkaline and alkaline salts; metallic salts used both as mordants and in the formation of metallic colours, and a very numerous series of vegetable and animal dye-stuffs. The mode of flock printing, and the manner in which several colours are successfully applied, is also well illustrated. The more important of these substances may be briefly enumerated as follows:—

- |                                       |   |
|---------------------------------------|---|
| 1. Sulphuric acid, or oil of vitriol. | 18. Copper sulphate, or blue vitriol.     |
| 2. Muriatic or hydrochloric acid.     | 19. Ditto chloride, or muriate.           |
| 3. Nitric acid, or aquafortis.        | 20. Ditto nitrate.                        |
| 4. Nitro-muriatic acid.               | 21. Ditto acetate.                        |
| 5. Acetic or pyroligneous acid.       | 22. Lead, nitrate.                        |
| 6. Citric acid.                       | 23. Ditto acetate, or sugar of lead.      |
| 7. Tartaric acid.                     | 24. Zinc sulphate, or white vitriol.      |
| 8. Oxalic acid.                       | 25. Potassa carbonate, or pearlash.       |
| 9. Iron sulphate, or green vitriol.   | 26. Ditto bitartrate, or cream of tartar. |
| 10. Ditto acetate, or iron liquor.    | 27. Potash binoxalate, or salt of sorrel. |
| 11. Ditto nitrate.                    | 28. Ditto ferroproussiate.                |
| 12. Ditto chloride, or muriate.       | 29. Ditto chromate.                       |
| 13. Tin chloride, or muriate.         | 30. Ditto bichromate.                     |
| 14. Ditto ferroproussiate.            | 31. Soda, carbonate.                      |
| 15. Alumina.                          | 32. Ammonia muriate, or sal ammoniac.     |
| 16. Alum.                             | 33. Lime, quick.                          |
| 17. Alumina, acetate.                 | 34. Ditto chloride, or bleaching powder.  |

All these substances are used by the dyer, either in preparing the fibre to receive colouring matter, or as mordants to enable it to combine with the colour, in the direct formation of coloured compounds, to heighten animal or vegetable colours, or as "resists," or "discharges," either serving to prevent certain parts of the fabric to which they have been applied from receiving any colour in the vat, or to discharge or to remove it in places when the whole has been dyed one uniform colour. For this important series a Prize Medal was awarded.

The dye-stuffs exhibited are as follows:—

#### COLOURING MATTERS OR DYE-STUFFS.

1. Logwood, obtained from Campeachy in South America, the wood of the *Hæmatoxyton Campechianum*: it is exhibited, 1st, in the block; 2nd, in the chips as cut up for the dyers' use; 3rd, an aqueous extract of the hematin, or colouring principle; 4th, the extract or hematin in the dry state; 5th, the colouring matter precipitated with iron, with which it forms a black dye; 6th, precipitated with tin, with which it forms a purple dye; 7th, with alum, a purple dye; 8th, with copper, a brown. Specimens are shown of these various colours dyed on cotton, silk, and wool.

2. Peachwood, or Nicaragua wood from Lima, South America; the wood of a *Cæsalpinia*, exhibited in the block, chips, aqueous extract, and the colouring matter precipitated black with iron, red with tin, red with alum, and brown with copper. Specimens of dying on silk, wool, and cotton.

3. Sappanwood, from Siam, the wood of the *Cæsalpinia sappan*, exhibited in the block, chips, aqueous extract, and precipitated dark brown with iron, red with tin and with alum, brown with copper; with dyed samples.

4. Fustic, from Cuba, the wood of the *Rhus cotinus*, exhibited in the block, chips, aqueous extract, and the colouring matter precipitated, olive brown, with iron, yellow with tin, and yellow with alum; with dyed samples.

5. Ebony, the wood of the *Diospyros ebenum*, exhibited in the block, chips, aqueous extract, and the colouring matter precipitated, olive brown with iron, yellow with tin and with alum; with dyed samples.

6. Barwood, from the west coast of Africa; the wood of the *Baphia nitida*(?);

exhibited in the block, chips, aqueous extract, and the colouring matter precipitated, dark brown with iron, red with zinc, red with alum, brown with copper; with dyed samples.

7. Camwood, from Sierra Leone, the wood of the *Baphia nitida*, shown in the block, chips, aqueous extract, and the colouring matter precipitated, black with iron, red with tin, red with alum; with dyed samples.

8. Indigo, from the East Indies, a well known blue colouring matter obtained from the leaves of the *Indigofera tinctoria*. The process of dyeing with indigo, consists in deoxidizing it, or depriving it of a portion of its oxygen, when it assumes a green hue, becomes soluble in water, and then readily enters the pores of the cloth immersed in the indigo vat; when the cloth is properly saturated, it is exposed to the action of the air, and the indigo speedily reabsorbs oxygen, and again assumes its original colour and its stability, or, if united with a yellow colouring matter, the result is a green. It is exhibited in the lump, in powder, in its green deoxidized state dissolved in water, and also in a state of pulp, or minute subdivision, effected by treating it with strong sulphuric acid; in the last case it is not a "fast" dye, but by the first mode of treatment, it is one of the most permanent colours. Samples of indigo dyes are shown.

9. Woad, from France and the north of Europe, a colouring matter analogous to indigo, but of a duller hue, obtained from the leaves of the *Isatis tinctoria*; it is now but little used. Exhibited in the lump.

10. Quercitron bark, from South America, the bark of the *Quercus tinctoria*; it is exhibited in the crusted or ground state, in the aqueous extract, and the colouring matter precipitated, olive-brown with iron, and yellow with alum; dyed samples are shown.

11. Alder bark, the bark of the common alder of Great Britain. *Alnus glutinosa*, shown as chips, as aqueous extract, and the colouring matter precipitated, grey with iron, and pale amber with alum.

12. Catechu, from the East Indies, an extract of the wood of the *Acacia catechu*, containing much tannin; it is shown in lump, and its colouring or tannin matter precipitated, black with iron, brown with copper.

13. Valonia, from Turkey and Asia Minor, the cup or shell of the acorn of the *Quercus agrifolia*; it is exhibited as gathered. Also the aqueous extract and the colouring matter as precipitated, black with iron.

14. Nut-galls, from Turkey, an excrescence growing on the *Quercus infectoria*, which contains a very large quantity of tannin. It is exhibited as gathered. Also the colouring matter precipitated, black with iron.

15. Madder, from France and the north of Europe, the root of the *Rubia tinctoria*. This substance is of great importance in the art of dyeing, furnishing some of the most permanent dyes. It is shown in the root and ground. Also "garancine," or the colouring principle, separated by the action of strong sulphuric acid; the black precipitate formed with iron, and the red precipitate obtained with alum. Madder is the colouring matter used in the Turkey red dye, so celebrated for brilliancy and permanency.

16. Sumach, from Sicily, is a small plant, the *Rhus coriaria*. The sumach is exhibited as ground for the dyer's use; also its black precipitate with iron, yellow with tin, yellow with alum.



17. Weld, grown in Great Britain and the north of Europe, is a small plant, the *Reseda luteola*, a specimen of which is exhibited. It is used as a yellow dye, or as a component of green. Its aqueous extract and yellow precipitate with alum are shown.

18. Persian berries, from the Levant, the berries of the *Rhamnus infectorius*, which afford a yellow dye. They are exhibited as gathered. Also the aqueous extract and the colouring matter precipitated, yellow with alum and with tin.

19. Turmeric, from the East Indies, the root of the *Curcuma longa*. It is exhibited as a root, and in the ground state as used by dyers. It affords of itself, without a mordant, a yellow dye, which is brilliant, but unfortunately not very permanent, samples of which are shown.

21. Orchil (*Roccella tinctoria*), from the Canary Islands, is a lichen, which grows on the rocks by the sea-shore. The plant is of a pale stone-colour, but yields a magnificent purple matter, which fixes in wool and silk without a mordant. It is reddened by acids, and rendered blue by alkalies, thus affording a great variety of tints. Its aqueous purple solution is shown, with samples of dye on silks and wool.

22. Annatto, from South America, an orange colouring matter obtained from the seed of the *Bixa orellana*. The colouring matter is brought to this country in masses enveloped in rushes. It is soluble in alkalies, by which means it is fixed in the cloth. The annatto is exhibited as a mass, with samples of its dyes.

23. Safflower, from Egypt, the Levant, Southern Asia, &c., the dried petals of the *Carthamus tinctoria*, from which is obtained a very beautiful colouring matter, which attaches itself without a mordant, and is extensively used in silk and cotton for a variety of shades of pink, rose, crimson, scarlet, &c., but which, unfortunately, does not possess the power of resisting the action of soap. The safflower as imported is exhibited; also the alkaline extract precipitated a fine rose-colour by an acid, with dyed samples on cotton and silk. This colouring matter is not suitable for wool.

24. Cochineal, from Mexico, is a small insect, a variety of *Coccus*, which lives upon different species of the *Cactus opuntia* or nopal. It affords a fine red colouring matter, which is extensively used on silk and wool, particularly the latter, the whole range of the best red dyes on wool being due to the colouring matter of this insect. The two varieties exhibited are known in commerce as the "black grain" and "silver grain," terms which arose from the fact that, when first imported, this insect was considered to be a seed or grain, and its dyes were spoken of as "grain" colours. The aqueous and ammoniacal extracts of the colouring matter are shown, also the colouring matter precipitated with tin and with alum. It forms very fine and permanent dyes in reds, crimsons, scarlets, &c., samples of which are shown on wool and silk. It is not applicable as a dye for cotton.

25. Lac-dye, from India, the colouring matter of lac, a substance formed on the branches of various trees by the puncture of a small insect, similar to cochineal, the *Coccus lacca*. The resinous matter being separated, forms the shellac of commerce, and the colouring matter, the lac dye, is thus obtained. It is used as a red dye on wool, but its colour is inferior to that from cochineal. The dye is exhibited, with dyed samples.

Having thus briefly enumerated the substances exhibited, it may be observed that the dye samples show merely those colours which result entirely and directly from the substances in connection with which they are placed; and do not, in fact, truly represent the art of dyeing, which frequently depends on a nice mixing of tints, and is effected by the combination of several, perhaps many substances, in order to the attainment of artistic excellence. But in combination with these dyeing materials, and illustrating the subject as a whole, are exhibited samples of skein-dyeing by three London dyers—by Mr. CHABOT on wool, by Mr. REYNOLDS on silk, and Mr. BURCH on cotton; which may be taken as a fair sample of the uses to which the dyers of London put the variety of drugs and substances we have enumerated. In dyeing the skein previously to the threads being woven, Mr. Burch, who shows all his productions in this combination, exhibits also a series of dyes in “fast colours” on Lisle thread, which are used for the cotton-glove manufacture, in which the ordinary dyes are sadly too fugitive; also a series of dyed lace cotton, dressed by a peculiar process to resemble the hard thrown marabout silk, which is extensively used in the manufacture of velvet, gauze ribbons, and other fabrics in which a firmness of texture is desirable.

Some excellent illustrations of the native vegetable dyes of Scotland are shown in Messrs. LAWSON'S valuable collection. These are now nearly all superseded by cheaper and more brilliant dyes of tropical countries.

A very good series of samples of superior orchil, cudbear, and other preparations of lichens is exhibited by Messrs. SMITH and SON (68), accompanied by specimens showing the colours dyed with them. The Jury deemed these dyes of superior excellence, and accordingly awarded a Prize Medal for them.

A highly-complete and instructive series of lichen preparations is exhibited by WOOD and BEDFORD (Class II., 47), including the chief varieties of lichens known in commerce, the colouring matters prepared from them, the different peculiar colouring and other principles contained in them, or obtained from them by chemical processes, and illustrations of the practical uses of lichen dyes to silk, feathers, wool, leather, marble, wood, &c. The chief lichens employed in the manufacture of orchil and cudbear are the following:—

Commercial Name.	Plant.	Whence Imported.
Angola weed - - -	Ramalina furfuracea - - -	Angola.
Mauritius weed - - -	Rocella fuciformis - - -	Mauritius and Madagascar.
Lima weed - - - -	Ditto - - - - -	Lima.
Valparaiso weed - - -	Ditto - - - - -	Valparaiso.
Cape weed - - - -	Rocella tinctoria - - - -	Cape de Verde Islands.
Canary moss - - - -	Parmelia perlata - - - -	Canary Islands.
Tartareus moss - - -	Parmelia tartarea - - - -	Sweden.
Pustulatus moss - - -	Umbilicaria pustulata - - -	„
Velvet moss - - - -	Gyrophora murina - - - -	„

Of these nine lichens, the first grows as a parasite upon trees; all the remainder upon rocks; the first is the richest in colouring matter. The samples of cudbear and orchil shown are numerous, and well illustrate the gradual development of the colour; the whole collection is highly creditable, and the Jury, therefore, awarded a Prize Medal for it.

Specimens of safflower, and good illustrations of its use in dyeing silk, are shown by LONG and REYNOLDS (75); these were deemed deserving of Honourable Mention

Good specimens of several dye-stuffs are exhibited by J. MARSHALL, of Leeds (Class II. 68), including cudbear and orchil, turmeric, and an interesting series of lac-dye. These also were deemed worthy of Honourable Mention.

A sample of chicory woad is exhibited by SAUNDERS and GATCHELL, of Dublin (71). It is stated that this substance, which can be used as a blue dye in the place of real woad, may be profitably grown and sold at about 8*l.* per ton, the price of real woad varying from 20*l.* to 30*l.* per ton.

A large and highly-valuable collection of dye-stuffs is exhibited by the Hon. EAST INDIA COMPANY, including specimens of the well-known dyes of India, and also of a large number of new and little-known substances employed by the natives in different parts of the East Indies. This important series forms part of the collection of raw produce, for which the Jury recommended the award of a Council Medal. In addition, they awarded a Prize Medal to their Highnesses the RAJAHS of KOTAH and of CUTCH, for the various specimens of dye-stuffs which they have contributed to the East Indian collection.

1. Amongst the more important of the well-known Indian dyes, one of the principal is of course indigo, and of this a number of excellent specimens are contributed. The best are those shown by Messrs. MACNAIR, of Babookally, Messrs. ARBUTHNOT, of Cuddapah, and the proprietors of the JORADAH FACTORY; for each of these the Jury awarded a Prize Medal. Very good samples of indigo are also contributed by the RAJAHS of KOTAH and CUTCH, from Kotah and Broach; and also from Sindh, and Madras. A complete and highly-interesting model of an indigo factory, showing all the different processes through which the dye passes in the process of manufacture, is likewise exhibited.

2. Specimens of the Pala or Palar indigo, prepared in some parts of India from the *Wrightia (Nerium) tinctoria*, a plant which flourishes in dry and barren lands, are contributed by Mr. G. T. FISCHER of Salem. It is said that this indigo is occasionally mixed with the ordinary indigo of commerce. The Jury awarded a Prize Medal for these specimens.

3. Fair samples of safflower or Kussoumba, *Carthamus tinctoria*, are contributed by the RAJAH of KOTAH, from Kotah; by W. S. HUDSON, from Assam; from Dacca; from Rohilkund; from the Celebes; and from the neighbourhood of Calcutta. There is probably no dye more easily injured by careless collection than safflower; the great superiority of the Chinese over the ordinary East Indian safflower is chiefly due to the greater care with which the Chinese collect it.

4. Turmeric, *Curcuma longa* is sent from Nepal, by his Highness the MAHARAJAH; from Assam; from the Rajpootana states; from Rohilkund; from Calcutta; from Beerbhoom; from Cuddapah; from Bombay; from Madras; and from Java.

5. Sappan wood, *Cæsalpinia sappan*, contributed from Bengal; from the Tenasserim provinces; and by TAN KIM SENG from Siam, and from the Philippine Islands.

6. Munjeet, Munjuth, or Indian madder, *Rubia munjistha*. This is a valuable dye-stuff, and hitherto not so well appreciated as it deserves, for some of the colours dyed with it are quite as permanent as those dyed with madder, and even more brilliant; its use is, however, gradually increasing, and it is unquestionably

well worthy of the attention of dyers. Good samples are exhibited by Capt. SMITH from Assam; for these the Jury awarded a Prize Medal.

Specimens of Munjeet are also contributed from Nepal by his Highness the MAHARAJAH; from Aden; and from Calcutta.

7. Chay-root, *Oldenlandia umbellata*, a red dye similar to Munjeet, and used to a great extent in the southern parts of Hindostan by the native dyers. This dye is not held in very good estimation in Europe; it seems, however, to deserve a better reputation than it at present possesses. Attention to this dye-stuff was drawn in 1798 by a special minute of the Board of Trade, recommending its importation; but Dr. Bancroft, who made some experiments with a sample of damaged chay-root, considered it inferior to madder, and hence discouraged its further importation. Specimens are contributed by Captain OGILVIE from Masulipatam and from Palamcottah. Samples of the Bulu or Mangkudu wood, and root, much used throughout the Indian Archipelago, are shown from Malacca, Java, and the Celebes.

8. Annotto. The seeds of the *Bixa orellana*, from which this colouring matter is prepared, are contributed from Assam, and from the vicinity of Calcutta.

9. Morinda bark. The bark and root of various species of Morinda are used in different parts of the East Indies, and considered as a valuable red dye. Specimens of the Muddi or Al, *Morinda citrifolia*, are exhibited by the RAJAH of KOTAH from the Rajpootana states; and Ach, or *Morinda tinctoria*, is contributed from Patna. The colours dyed with the Morinda are, for the most part, not brilliant; but the colouring matter is far more permanent than many other red colours are, and with improved management would probably rival that of madder; it would probably therefore be a useful dye-stuff: it appears well worthy the attention of dyers.

10. Lichens. A considerable number of different lichens are shown from various localities, some of which contain a good deal of colouring matter, and might, therefore, be advantageously employed in the manufacture of orchil, cudbear, and other preparations used by dyers. Amongst the specimens exhibited, may be mentioned those from Rohilkund; from Moorshedabad; from Darjeeling, and other parts of the Himalayas; from the Tenasserim provinces; and from Sindh.

11. Mangrove bark. Kaboung, *Rhizophora mangle*, used to dye a chocolate colour, from Arrakan. This was one of the colours introduced by Dr. Bancroft, and for the exclusive use of which he obtained an Act of Parliament.

12. Pulas, Tisso, or Madooga flowers, *Butea frondosa*, used for dyeing red, from Tanna, from the district of Beerbhoom; from Cuttack; and by Captain OGILVIE from the Nizam's country.

13. Hursinghar flowers, *Nyctanthes arbor-tristis*, used as a yellow dye, from the RAJAH of KOTAH, in the states of Rajpootana; and from Cuttack.

14. Ukulbere or usburgh, *Datisca cannabina*, a bark used for dyeing yellow; it contains a bitter principle resembling that of quassia, from Lahore.

15. Marking nut, *Semecarpus anacardium*, from Assam, from Calcutta, and from Rohilkund.

16. Capilla Ringhill, Rerso, Patany, prepared from the dried fruit of the *Rottlera tinctoria*, and used by the natives to dye orange: the colouring matter is apparently of a resinous nature, or at least is accompanied by a large

quantity of resin ; it is a brilliant and tolerably permanent dye ; contributed from Assam, and from Cuttack.

17. Gaju gum, used as a yellow dye, from the Celebes.

18. Gamboge (*Hebradendron gambogoides*). Several excellent specimens are contributed from different localities. A good sample from Siam is exhibited by G. G. NICOL ; and another is shown by Messrs. HAMMOND in their collection of Archipelago produce. Other specimens of gamboge, (*Garcinia tinctoria*,) are contributed from the peninsula of India, by several exhibitors, especially by Dr. CLEGHORN from the forests of Mysore ; for this the Jury awarded a Prize Medal to him.

19. Myrobolans, the fruit of various species of *Terminalia*, containing a considerable quantity of astringent matter, and therefore used in tanning as well as in dyeing ; from Moorshedabad, Calcutta, Rohilkund, Cuttack, Mirzapore, Assam, and the Rajpootana states.

20. *Quercus infectoria* galls, from Calcutta and Chota Nagpore.

21. *Abutilon striatum* ? from Calcutta and from Assam.

22. *Myrica sapida* bark, from Rohilkund.

23. *Wrightia antidysenterica* ? from Patna.

24. Haradah berries (*Terminalia* sp. ?), from the hill tracts of Orissa.

25. Rerro, a purple dye, from Arrakan.

26. Thit-nan-weng, a chocolate dye, from Arrakan.

27. Sagah bark, from Singapore.

28. Ting-njet, bark and wood, used as a dark purple dye, from Arrakan.

29. Thit-tet, wood and bark used to dye red, from Arrakan.

30. Mooshe, from the Rajpootana states.

31. Mucha, from the Rajpootana states.

32. Kayee Kudrang, a yellow dye sent by SEYD OMAR from Malacca.

33. The-dan, a red dye, from Arrakan.

34. Borul, from the Rajpootana states.

35. Bunchong Balu wood, from the Celebes.

36. Muchkee, from the Rajpootana states.

37. Samak bark, from Singapore.

38. Lopisip bark, from the Celebes.

39. Benkita-barrung, produces a dark purple dye, from Borneo.

40. Kayu Oobah, a red dye, from Labuan.

41. Kayu Samuck, from Labuan.

42. Saracundraputtah, (*Cassia fistula*,) from Palamcottah.

43. Puttunghu bark, sent from the Nizam's country by Capt. OGILVIE.

44. Cherenjee bark, from the Nizam's country, sent by Capt. OGILVIE.

45. Avaraputtai, (*Cassia auriculata*,) from Palamcottah.

Of many of these dyes, little or nothing more than the name is known, and the Jury, having no evidence as to their use, are, therefore, wholly unable to express any opinion as to their probable use in this country: they consider the series, however, as highly valuable and important. Several of the dye-stuffs are evidently rich in colour ; most of them may be easily had in large quantities, and at comparatively low prices ; they are, consequently, well worthy of the attention of practical dyers.

Specimens of gamboge, turmeric, myrobolans, and a yellow resinous substance resembling gamboge, called Gaju gum, are contributed from Ceylon.

A sample of lichen, or orchilla weed, from the Cape of Good Hope, is exhibited by C. WATERMEYER (51).

A specimen of cam wood, from the confluence of the Rivers Niger and Tchadda, is shown by Dr. McWILLIAM; and some crude indigo from Abbokutu, is contributed by Dr. BEECHAM (12).

In the collection from British Guiana there is but one dye or colouring material, namely the Lana dye, exhibited by H. A. KOCK (55 B). This substance is obtained from the fruit of the Lana tree (*Genipa Americana*, Linnæus), a tree very abundant throughout the colony, particularly on the banks of the River Berbice; the colour dyed with it is a good bluish black. The colours dyed with the fruit of this tree are remarkably permanent, a fact which has very long been known, though hardly any attempt appears to have been made to introduce it to the notice of European dyers. The Jury deemed this specimen worthy of Honourable Mention.

Samples of fustic (*Rhus cotinus*); logwood (*Hematoxylon Campechianum*); and turmeric, are included in the Trinidad collection of raw produce.

A promising specimen of lichen, or orchilla weed, from the Falkland Islands (*Roccella fuciformis*), is exhibited by G. T. WHITTINGTON.

The various dark-coloured resins of Australia have already been alluded to; the colouring matters of the different species of *Xanthorrhœa*, though not remarkably brilliant, are well worthy of notice. Very fine specimens of some of these resins are exhibited by the COLONIZATION ASSURANCE CORPORATION (see page 182).

Good samples of the *Xanthorrhœa* resins are shown from Flinders' Island, by J. MILLIGAN.

A remarkable colouring material, called blood juice, the produce of a Norfolk Island tree, and said to be used for dyeing calico, and as an indelible marking ink, is contributed by Sir W. DENISON (290). The Jury deemed this substance worthy of Honourable Mention.

Specimens of Hinau (*Elæocarpus Hinau*), a bark used in New Zealand for dyeing black, are exhibited by McVAY; these will be again referred to as a tanning material. The flax and other substances shown in illustration of the use of this bark by the natives in dyeing black are remarkable for the depth and brilliancy of the dye.

Lichen, or orchilla weed, from New Zealand, is contributed by J. A. SMITH (14): this appears to contain a good deal of colouring matter, and was, therefore, deemed worthy of Honourable Mention.

A very fine sample of Alkanet root (*Anchusa tinctoria*) is shown in the Austrian collections.

Specimens of Hungwa, or saffron; turmeric; and a red colour from China, are exhibited by HER MAJESTY'S CONSUL at Shanghai; samples of whi-mei, a green dye; and of the fruit of the *Gardenia radicans*, used to dye yellow, are also shown.

In the Egyptian collection are specimens of indigo, saffron, and sumach.

The specimens of French madder, though not numerous, are of considerable interest and importance. A small series of samples of madder, and of garancine,

as obtained from madder for the use of the dyer, are exhibited by the CHAMBER of COMMERCE at Avignon\* (1049). The Jury awarded a Prize Medal for these specimens.

A good specimen of garancine is also shown by LAZARE and LACROIX, of Avignon (905). This affords a highly-interesting example of the practical application of science to the improvement of a natural product. The exhibitors, finding their madder inferior to that grown in other localities, were led to institute a chemical examination of the soil; it was found to be deficient in lime, an element of all those soils in which the best madder is grown; the land was accordingly well manured with lime, and the result was a marked improvement in the quality of the madder. The Jury awarded a Prize Medal for this specimen.

Some excellent samples of orchil are exhibited by C. MOTTET (932). For these, also, the Jury awarded a Prize Medal.

Madder of very superior quality is likewise shown in the Algerian department of the French collection; in particular, the specimens of G. DE MONTIGNY, of St. Joseph, Oran (38), who also shows a fair sample of saffron, were deemed worthy of commendation, and the Jury accordingly awarded a Prize Medal for them.

The samples of madder exhibited by J. PIGLIA, of Constantine (43), and of DUPRÉ DE ST. MAUR, of Orbul, Oran, were likewise considered very good, and each worthy of Honourable Mention.

A fine specimen of saffron, contributed by DE LUTZOW (34), of Bonn, Constantine, was deemed worthy of Honourable Mention.

A good sample of woad, the blue colouring matter prepared from the *Isatis tinctoria*, and which is probably identical in nature with indigo, is shown by GEISSLER, of Tröchtelborn, near Erfurt. This was deemed worthy of Honourable Mention.

Madder root, from Athens, is contributed by A. MALANDRINUS (3), and from Eubœa, by G. PHILLIPPOS (4).

The colouring matter of safflower, prepared in a concentrated form for the use of dyers, is exhibited by C. JAEGER (Prussia, 469).

Extract of madder, said to be prepared by a new and cheap process, is shown by A. SCHARENBERG, of Neustrelitz (3).

A remarkable yellow resinous substance, somewhat resembling gamboge, and called pipitzahuac, but of which no description is given, is contributed from Mexico.

In the Portuguese collection, several specimens of dyeing materials are shown. The most important are a series of lichens, or orchilla weeds, namely wood orchilla, from Angola, St. Thomas, and Mozambique; and rock orchilla from Angola, Vinnando Minho, Cape Verde Islands, and from Madeira (505 to 508B). These were deemed worthy of favourable notice.

Wood orchilla from the Cape rock, and rock orchilla from the Berlingues Islands, of good quality, is shown by F. R. BATALHA (509 and 509A). Some good samples of sumach are exhibited by M. B. FERREIRA, junior (510). These were deemed severally worthy of Honourable Mention.

\* Awarded also by Jury of Class II.

Two good samples of Russian madder are shown from the GOVERNMENT of DERBENT: this important root is already cultivated to a considerable extent in Russia, but not nearly sufficient to meet the demand, so that large quantities are imported from Holland, and elsewhere, every year. The specimens shown, which are of good quality, are exhibited by KERIM RAGHIM OGLI, of Cubi (87), and by BABAIEFF ARAKEL (86). These were each deemed worthy of Honourable Mention.

Besides these, the Russian collection includes safflower, from Telaff, in Tiflis, exhibited by POPIUS KVAVILOFF (90); saffron, from Baki, in Shemakha, exhibited by SERGIUS AYVAZOFF (91); yellow berries (*Rhamnus infectorius*), from Cubi, in Derbent (92); sumach, from Nookha, in Shemakha (93); and the wood of the *Statice coriaria*, from the GOVERNMENT of STAVROPOL (89).

A considerable number of specimens of dyeing materials from Spain are exhibited; the best are the madder; woad or pastel blue (*Isatis tinctoria*); safflower or alazer (*Carthamus tinctorius*); wild sumach; and weld or gualda (*Reseda luteola*); shown by the AGRICULTURAL BOARD of SARAGOSSA (148). For these the Jury award a Prize Medal. (See page 170.)

Superior samples of madder are likewise contributed by the province of Murcia (86); the province of Valladolid (142), and A. MATESANZ, of Segovia (144). These were severally deemed worthy of Honourable Mention.

Other specimens of madder are shown by the province of Cadiz, who exhibits the wild or indigenous madder from San Lucar (138), by D. ———, of the Canary Islands (141), by D. ———, of Huelva, by D. MATESANZ, of Segovia, from Cuellar (140), by R. SEMOVILLA, of Segovia, from Cuellar (143), and by D. ———, of Zamora (91). Extract of madder, for dyers, is also contributed by J. MARCOS, of Valladolid (147).

Samples of gualda or weld (*Reseda luteola*) are exhibited by J. GISBERT, of Alicante (137), by D. ———, of the Canary Islands (141), by D. ———, of Gerona (79), by D. ———, of Murcia (86), by J. MARTINEZ, of Seville (145), and by D. ———, of Zamora (91).

Two specimens of saffron are shown; namely, by DONA E. CABELLO, of Ciudad Real (139), and by D. ———, of Saragossa (92).

A good sample of Alkanet root (*Anchusa tinctoria*) is contributed by D. ———, of Murcia (86); and a fair sample of sumach, from Torrelobaton, is shown by D. ———, of Valladolid (146).

Three specimens of dye-woods are shown in the collection of Cuba woods, exhibited by the BOTANIC SOCIETY of MADRID (186), these are—

Brazil wood	- - -	Cæsalpinia sp.
Copey	- - -	Clusia rosea, (Lin).
Fustete	- - -	Broussonetia tinctoria, (Kunth).

In the collection from Tunis, are shown three samples of indigo; one of saffron; dried pomegranates, said to be used for dyeing yellow; and a specimen of a dye-stuff named Gämmam.

A very valuable and numerous series of dye-stuffs is exhibited in the Turkish collection, including some of those well known in commerce, and also a few new ones. Samples are shown of—



1. Madder - - - Smyrna.	18. Yellow berries - Wallachia.
2. " - - - Ghiordes.	19. " - - - Koniah.
3. " - - - Amassiah.	20. " - - - Sila A. Minor.
4. " - - - Broosa.	21. Safflower - - - Amassiah.
5. " - - - Monastir.	22. " - - - Sparta.
6. " - - - Bergan.	23. " - - - Smyrna.
7. " - - - Bakir.	24. " - - - Constantinople.
8. " - - - Tripoli.	25. " - - - Moldavia.
9. " - - - Bulak Hissar.	26. Saffron - - - Philipopoli.
10. " - - - Koniah.	27. " - - - Tripoli.
11. " - - - Kukagasch.	28. " - - - Saffranboli.
12. " - - - Cayadjik.	29. Tabach - - - Koniah.
13. Yellow berries - Angora.	30. Sirpik - - - Nish.
14. " - - - Siras.	31. Amteric - - - Tripoli.
15. " - - - Janina.	32. Alkanet - - - Bouldour.
16. " - - - Tokat.	33. " - - - Constantinople.
17. " - - - Kaissarieh.	34. Kina - - - Mecca.

Besides these, a considerable number of samples of galls, valonia, sumach, and other similar substances, used both in dyeing, and also in tanning, are exhibited (see page 220). The substance called Tabach, from Koniah, appears to be the dried petals of a flower; it is a rich violet colour, and merits further examination. Sirpik is said to be used in dyeing yellow.

A good series of samples of madder, both in the form of root, and also reduced to powder, for the use of dyers, is exhibited by the TECHNOLOGICAL INSTITUTE of TUSCANY (47), and forms part of the collection for which the Jury awarded them a Prize Medal. (See page 170.)

#### SECTION IV.—*Tanning Materials.*

Notwithstanding the number of different substances which have from time to time been introduced for the use of tanners, it is nevertheless pretty generally acknowledged that there is nothing superior, or even equal to, good oak bark, and that all attempts to hurry the process beyond a certain point by the use of concentrated solutions of tan, &c., are for the most part failures, as the manufacture of good leather, to a great extent, depends on the process being conducted in a slow and gradual, but at the same time thorough and complete manner. Oak bark is, however, by no means the only astringent bark well suited to the use of the tanner, and in various parts of the world other similar substances are used with very great success; all these tanning materials, though they may not be considered by the English tanner as equal to the best oak bark, are nevertheless of value to him; they may be employed in conjunction with oak bark, or even as a substitute in times of scarcity, or when the price of bark is high; in fact, the very existence of such substances tends to keep down and equalize the price of bark, and prevent it from undergoing those great fluctuations in value which would necessarily occur, were it the only tanning material available to our manufacturers.

The quantity of the chief tanning materials imported in 1849, and the countries from which they were obtained, is shown by the following Table:—

	Tanning Bark, &c.	Terra Japonica.	Sumach.	Valonia.
	Cwts.	Cwts.	Cwts.	Cwts.
Belgium - - - - -	141,392	-	140	-
Holland - - - - -	114,180	-	-	-
East Indian Empire - - - - -	-	169,140	-	-
Naples and Sicily - - - - -	1,166	-	218,380	-
Turkey - - - - -	-	-	-	296,000
America- - - - -	42,318	-	-	-
Australian Territories - - - - -	-	-	29,840	15,820
Morocco - - - - -	27,619	-	-	-
Norway - - - - -	12,784	-	-	-
Spain - - - - -	9,594	-	440	-
Tuscany - - - - -	9,931	-	20	4,320
Australia - - - - -	4,563	-	-	-
Syria - - - - -	-	-	-	4,280
Greece - - - - -	-	-	-	10,480
Miscellaneous - - - - -	5,035	-	2,980	2,520
Total Cwts - - - - -	368,582	169,140	251,800	333,420

A valuable and instructive series of the various tanning materials imported into England, or used by tanners, is exhibited by CURTIS BROTHERS and Co. (126); the following table shows the names of these substances :—

1 to 6. Oak bark - - - - -	Quercus pedunculata - - - - -	England.
7 and 8. " - - - - -	" " - - - - -	Flanders.
9 and 10. Larch bark - - - - -	Pinus larix - - - - -	Scotland.
11. Mimosa bark - - - - -	Acacia sp. - - - - -	New South Wales.
12. Babool bark - - - - -	Acacia Arabica - - - - -	Bengal.
13. Cork-tree bark - - - - -	Quercus suber - - - - -	Laruche.
14. " - - - - -	" " - - - - -	Rabat.
15 and 16. Hemlock bark - - - - -	Abies Canadensis - - - - -	United States.
17. Sumach - - - - -	Rhus coriaria - - - - -	Sicily.
18 and 19. Valonia - - - - -	Quercus ægilops - - - - -	Smyrna.
20. " - - - - -	" " - - - - -	Trieste.
21. " - - - - -	" " - - - - -	Morea.
22. Divi Divi - - - - -	Cæsalpinia coriaria - - - - -	Maracaibo.
23. " - - - - -	" " - - - - -	Rio de la Hache.
24. " - - - - -	" " - - - - -	Savanilla.
25. Myrobolans - - - - -	Terminalia sp. - - - - -	Bengal.
26 and 27. Terra Japonica - - - - -	Nauclea Gambir - - - - -	Singapore.
28. Cutch - - - - -	Acacia catechu, &c. - - - - -	Pegu.
29. Cutch, black - - - - -	" " - - - - -	Calcutta.

The Jury awarded a Prize Medal for this complete and instructive series.

A considerable number of tanning materials are also shown by MESSRS. BEVINGTONS and SONS, as illustrations of the process of tanning generally (Class XVI. 1). The specimens exhibited are small, but valuable, as being shown in conjunction with the prepared leather, and therefore as illustrating the practical application of the several substances : the Jury deemed this series worthy of Honourable Mention.

An instructive and highly useful series of these substances are also shown in the collection of LIVERPOOL IMPORTS ; these are as follows :—

				1848	1849
				Tons.	Tons.
Oak bark	-	Quercus sp.	- Holland ; Belgium	296	514
Cork-tree bark	-	Quercus suber	- Rabat - - -	-	160
Divi Divi	-	Cæsalpinia coriaria	- Maracaibo - - -	-	-
"	-	" "	- Rio de la Hache - - -	-	-
"	-	" "	- Savanilla - - -	-	-
Algarobilla	-	Prosopis pallida	- Valparaiso - - -	-	400
Valonia	-	Quercus Ægilops	- Smyrna - - -	-	-
"	-	"	- Camatena - - -	-	-
Myrobolans	-	Terminalia chebula	- East Indies - - -	185	851
Terra Japonica	-	Acacia catechu	- East Indies - - -	-	-
Cutch	-	"	- Calcutta - - -	-	-
"	-	"	- Singapore - - -	-	-
Kassu	-	Areca catechu	- Ceylon - - -	-	Rare.
Sumach, ground	-	Rhus coriaria	- Trieste - - -	-	-
"	"	"	- Palermo - - -	-	-
"	"	"	- Marseilles - - -	-	-
Sumach, leaves	-	"	- Trieste - - -	-	-

Specimens of oak bark, gambier, myrobolans, sumach, and valonia are included in the collection of HULL IMPORTS; the yearly importation of these substances into the port of Hull is about 2,500 tons.

A fine sample of pure Palermo sumach is exhibited by J. KITCHIN (126A), as ground for the use of tanners and dyers.

Besides the tanning materials already imported, a considerable number of new or little known astringent substances are shown in the East Indian collection, some of which appear well to merit the attention of practical men. Amongst those exhibited are the following:—

1. Terra japonica, kut or cutch, and catechu, the well-known extracts of the *Acacia catechu*, and certain allied plants, from Rutnagherry, Calicut, Moorshedabad, Patna, Calcutta, Rohilkund, &c. Gambier, the extract of the *Nauclea Gambir* from Singapore.

2. Acacia or Babool bark, the bark of *Acacia arabica*, and *A. catechu*, &c., from Madras, Scinde, Shahjehanpore, Rohilkund, and Assam.

3. Mangrove bark, the bark of the *Rhizophora Mangle*, from Arracan, Malabar, and Singapore.

4. Turwar or cassia bark; Avaraputtai, Tangada jigota (*Cassia auriculata*) from Vizagapatam; and Saracondraputtai, *Cassia fistula*, from Madura and Tinnevelly.

5. Saul-tree bark, *Shorea robusta*, from the Saul forests.

6. Pomegranate rind, *Punica granatum*; Darunka pucce, Dadima jegota, from Kemaon, and Vizagapatam; Dalumka khola, from the vicinity of Calcutta.

7. Jamoon bark, *Eugenia jambolana*, from Cuttack, and the Chota Nagpore division.

8. Samak bark, from Singapore.

9. Peal bark, from Cuttack.

10. Dhak gond, pulas, or butea kino, the red astringent exudation of the *Butea frondosa*, from Rajpootana, Cuttack, Vizagapatam, and Meerut.

11. Vangay or gum kino, *Pterocarpus dalbergoides*, from Malabar.

12. Kino, or astringent extract of the *Buchanania latifolia* (?) from the district of Chota Nagpore.

13. Majoophul, or gall-nuts, *Ficus infectoria*, &c., from Chota Nagpore and Rohilkund divisions.

14. Sumrut ool Usc, or tamarisk galls, *Tamarix indica*, from Bombay, and Lahore.

15. Divi Divi, *Cæsalpinia coriaria*, recently introduced from South America, contributed by Dr. FALCONER from the botanical garden at Calcutta.

16. Teree, *Cæsalpinia* sp., contributed by A. SCONCE, from Chittagong.

17. Myrobolans, the dried fruit of various species of *Terminalia*, extensively used both in dyeing and for tanning; *Terminalia belerica*, Baheera bhura (or hurrah), from Mirzapore, Rohilkund, and Calcutta; *Terminalia chebula*, from Rohilkund and Patna. *Terminalia citrina*, from Patna, Moorshedabad, Cuttack, and contributed also from Assam by Captain SMITH. *Terminalia elata*, (?) Marada, from Mirzapore. *Terminalia angustifolia*, humtokee, from Calcutta.

18. Emblic myrobolans, aomla berries, *Phyllanthus emblica*, from Rajpootana

19. Mochrus, *Bombax malabaricum* and *B. heptaphyllum*, from Meerut.

20. Gaub, the fruit of *Diospyros glutinosa*, from Calcutta.

From the Cape of Good Hope M. THALWITZER sends samples of tanning bark (3 and 27), apparently the bark of a *Mimosa*. Deserving of Honourable Mention.

Some good samples of hemlock bark, illustrating its use as a tanning material, are exhibited by J. ALLON of Montreal (100). These the Jury deemed interesting, and deserving of Honourable Mention.

Specimens of the bark of the hog plum tree, *Spondias lutea*, abundant on the banks of the river Berbice, and which is commonly used in British Guiana for tanning, are shown by T. B. DUGGIN (56). A sample of Courida bark, *Avicennia nitida*, a tree very common on the eastern coast of Demerara, likewise used in tanning, is exhibited by D. SHIER (58).

Mimosa bark, bark of the black wattle tree, *Acacia mollissima*, and mimosa extract, the inspissated decoction of the bark, are contributed by T. BUTTON, of Launceston (22, 23). These also were deemed worthy of Honourable Mention. A specimen of the same bark is likewise exhibited by — REES (314), as prepared for the use of tanners, by chopping into small fragments. Kino from the blue-gum, *Eucalyptus globulus*, the stringy-bark, and other *Eucalypti* indigenous to Australia, are contributed by J. MILLIGAN and H. HULL (288), and by the COLONIZATION ASSURANCE CORPORATION.

Several good specimens of New Zealand tanning barks are exhibited by J. M'VAY (5). They are accompanied by hides tanned with the different barks, which are labelled Towai, Tanekaha, and Hinau, the latter being also used in dyeing black. The Jury considered these samples as deserving Honourable Mention.

Samples of New Zealand tanning barks are also shown by TAO NUI, a New Zealand chief (Gillman, 44).

Some good specimens of oak bark from Bruges are exhibited by STRUBBE and BAËY of that city (97). These the Jury deemed worthy of Honourable Mention.

Specimens of oak bark, in the state used by tanners, are shown by the BOARD of AGRICULTURE of the GRAND DUCHY of HESSE DARMSTADT (13).

Good samples of Portuguese sumach are exhibited by MANOEL BAPTISTA MONTEIRO, from Beira guarda, Algaroc, &c. (510, 511, 512, 513).

Bark or rind of the wild pomegranate, *Punica granatum*, and of the wood and leaves of the sumach tree, are contributed from the GOVERNMENT of SHEMAKHA, districts of Shoosha and Mookha, in the Russian empire (88 and 93).

In the collection of raw produce exhibited by the AGRICULTURAL BOARD of SARAGOSSA (148) is a good specimen of wild sumach; a good sample of sumach is likewise contributed from Torrelobaton, by D——— of Valladolid (146).

Specimens of tanning materials are exhibited by ELHAGE ALY ELMAJBOOR, in the collection from Tunis (137). These were deemed worthy of Honourable Mention.

Excellent samples of several important tanning materials, well known in commerce, are shown in the Turkish collection; these include—

1. Oak galls - - -	Kutaya.	17. Valonia - - -	Ushak.
2. " - - -	Smyrna.	18. " - - -	Sparta.
3. " - - -	Damascus.	19. " - - -	Broosa.
4. " - - -	Adana.	20. " - - -	Adana.
5. " - - -	Koniah.	21. " - - -	Dardanelles.
6. " - - -	Constantinople.	22. " - - -	Janina.
7. " - - -	Aidin.	23. " - - -	Kutaya.
8. " - - -	Monastir.	24. " - - -	Koniah.
9. " - - -	Janina.	25. Sumach - - -	Kaissariah.
10. " - - -	Djibba.	26. " - - -	Constantinople.
11. Valonia - - -	Constantinople.	27. " - - -	Koniah.
12. " - - -	Smyrna.	28. " - - -	Damascus.
13. " - - -	Balak Hissar.	29. " - - -	Adana.
14. " - - -	Bigha.	30. " - - -	Moulah.
15. " - - -	Adalia.	31. " - - -	Wallachia.
16. " - - -	Aidin.	32. " - - -	Moldavia.

#### SECTION V.—*Fibrous Substances.*

This division is perhaps one of the most important of the whole series of raw produce, including as it does the materials for several of our most important manufactures—cotton, flax, hemp, and the numerous vegetable fibres employed in conjunction with or as substitutes for those substances. For convenience of arrangement, the subject is divided in the following pages into three distinct heads; the first, including the different varieties of cotton; the second, flax and hemp; and the third, consisting of the various other vegetable fibres.

#### COTTON.

The total quantity of cotton at present annually imported into Great Britain is very nearly 800,000,000 pounds; the proportion in which it is imported from different countries is shown in the following table, which represents the imports of 1849:—



which exist between the various cotton plants of different countries, some botanists admitting the existence of a large number of distinct species of the genus *Gossypium*, whilst others consider them as chiefly varieties of a much smaller number of separate species. According to Dr. Royle, who has most recently investigated the subject, the different varieties of cotton may be classed under four distinct species of *Gossypium* in the following manner:—

1. *Gossypium indicum* or *herbaceum*, the cotton plant of India, China, Arabia, Persia, Asia Minor, and some parts of Africa.

2. *Gossypium arboreum*, a true cotton indigenous to India.

3. *Gossypium barbadense*, the Mexican or West Indian cotton, of which the Sea Island, New Orleans, and Upland Georgian cottons are varieties. It was long since introduced into the Island of Bourbon, and thence into India; hence it acquired the name of Bourbon cotton.

4. *Gossypium peruvianum* or *acuminatum*, which yields the Pernambuco, Peruvian, Maranham, and Brazilian cotton, especially distinguished by its black seeds, which adhere firmly together: this variety also has long since been introduced into India.

The important discovery by MERCER, of the influence of caustic alkali in modifying the fibre of cotton, has been already alluded to. He has shown, that by steeping cotton in a cold solution of caustic soda, the fibre loses its flattened ribbon-like form, and assumes a more or less cylindrical shape. This change gives rise to three remarkable effects—the fibre becomes smaller, it gains in strength, and at the same time it acquires an increased affinity for colouring matter. After a minute and careful examination of these effects, the Jury being convinced of the high practical value of the process, determined to recommend the award of the Council Medal to Mr. MERCER (see p. 167).

The collection of raw cotton exhibited by the HON. EAST INDIA COMPANY is, as might be expected, large and highly interesting. It consists of a series of samples of the indigenous cottons of various parts of the Indian empire, and samples of the cottons raised in the various Government experimental farms during the last thirty years, illustrating the effects produced and the improvements effected by the numerous attempts which have been made during that period to improve the cotton cultivation of India.

In considering the native cultivation of cotton in India, it must be remembered that besides that exported to Europe, very large quantities have every year been raised for home consumption by the native manufacturers, and for exportation to other eastern countries, especially China, the latter alone having, till within the last few years, generally exceeded the entire annual quantity exported to Europe. Thus during the ten years preceding 1833 the quantity of raw cotton exported from India to England was about 250,000,000 of pounds; whilst in the same period the quantity exported from India to China, &c., was about 540,000,000 pounds. On comparing together the average total quantity of cotton imported into Great Britain in the years 1830, 1840, and 1850, from the United States, and from India, it will be found that whilst the former during those three periods has increased in about the ratio of 500,000 bales, 950,000 bales, and 1,200,000 bales, the latter has increased in the ratio of 67,000 bales, 163,000 bales, and 300,000 bales; showing therefore

that, large as the annual increased importation of American cotton into England has been, the increased consumption of East Indian cotton has in proportion augmented even more rapidly.

The chief varieties of native Indian cotton, named according to the districts where they are produced, are the

1. Surat.	7. Berar.	13. Lodom.
2. Broach.	8. Coimbatore.	14. Agra.
3. Dharwar.	9. Compta.	15. Guzerat.
4. Tinnevelly.	10. Nagpore.	16. Cutch.
5. Cuddapah.	11. Belgaum.	17. Concan.
6. Nellore.	12. Dacca.	18. Saugur.

Of all these cottons it may be generally observed, that though in some cases the fibre is beautifully fine, it is invariably short, generally badly cleaned, and too often injured by careless collection, bad packing, and faulty inland transit. It must be borne in mind that these short staple cottons of India cannot be compared with the long staple cottons of the New World; they are, in fact, quite different fibres—they must be treated in a different manner, and their uses are perfectly dissimilar. The question of how far long staple cottons can be advantageously cultivated in India is perfectly distinct from that of improving the production of short staple varieties. The real practical question to be considered is, not whether the East Indian cottons can be made to compete with the long staple American cotton, but whether by care and attention, by judicious cultivation, improved mechanical contrivances, and the application of skill and perseverance, it may not be possible so to improve the common East Indian cotton as to give to it those characters and properties which will render it of more value to the manufacturer, by enabling him to use it even more largely and with greater profit than he is able to do at present.

On examining the samples of the native indigenous cottons of India, the chief causes of their inferiority are evident. No care or skill in the cultivation, of course, will render the fibre of short staple cotton like that of the long staple variety, but in many cases the fault is not the shortness of the fibre; it is, that the cotton has been ruined after it is grown and ripened; either by bad management the staple is broken, or by exposure to the weather, and by the addition of dirt and impurity of all sorts, its value is most materially diminished. The difficulty rests not so much with the cotton as with the cultivator, and with the middleman; the indolent habits and dislike of the former to trouble of any kind stand more in the way of improvement than anything else, whilst the want of proper encouragement to the native to persevere, and, in some cases, the opposition of the Brahmin, combine to prevent any real progress. In those cases where care and attention has been paid, the native cottons sent over are excellent, and there is no doubt that their value will slowly and steadily increase in the English market, if the cotton is sent to market clean, and in the state in which it is gathered.

From the samples of experimental cotton, as illustrations of the various attempts which have been made to introduce the cultivation of American cottons into India, it is obvious that though the introduction of Sea Island and the other long staple American cottons may for the most part be said to have



failed, yet that the cultivation and improvement of the New Orleans cotton in India, which though not the *finest* is certainly the most valuable cotton in the world, has been attended with very considerable success. The experimental cottons grown from New Orleans seed at the Government farm, from 1830 down to the present time, prove most satisfactorily that any quantity of good, sound, useful cotton may be imported from India, and that it only needs time and perseverance to give it a high place in the estimation of our manufacturers. Amongst the best specimens may be noticed the samples taken from the produce of the Government farms at Coimbatore, imported by the 'Beresford' and 'Colonist,' and the samples of Sea Island and New Orleans cotton from the experimental farms in Mysore. The specimens of cotton grown under the directions of Dr. WIGHT (who has done so much to improve and extend the cultivation of cotton in India) are so good that the Jury awarded to him a Prize Medal. The cotton grown at Cuddoor by F. D. MEPPEN is so remarkable for the goodness of its staple, its cleanness, and the careful manner in which it has been handled, that the Jury deemed it worthy of Honourable Mention.

A very promising sample of cotton grown from Pernambuco seed, on Mr. HENTIG'S estate at Sarawak, in Borneo, is exhibited. The staple is pretty long, though a little coarse and uneven; still it is very clean, has a good colour, and there is no doubt it would find a ready market at a fair price. The Jury awarded a Prize Medal for this cotton.

Amongst the good samples of well-cultivated native cottons, those of Mr. G. T. FISCHER, of Salem, may be mentioned: the Jury deemed these samples worthy of Honourable Mention.

A good sample of Pernambuco cotton is exhibited from Tenasserim; the staple is fair, but a little unequal: it is a good useful cotton, and has a healthy colour.

The cotton from New Orleans seed, cultivated at Belgaum, is somewhat degenerated; it is, however, very well cleaned, in good condition, and is a good useful cotton. Some of the samples of American cotton from Dharwar are likewise worthy of commendation.

Besides these, other good samples of cotton are contributed by private individuals; special notice must be taken of the Burmese cotton contributed by Dr. MORTON of Moulmein; the samples of cotton from Bagcheen, near the Chumbul River, exhibited by H. H. the MAHARAJAH JYAJEE RAO SCINDIA, of Gwalior; the cotton contributed by H. H. the RAJAH of KOTAH, from the Rajpootana States; and the cotton from Cutch, contributed by H. H. the RAO of CUTCH.

Mention may here be made of the very beautiful fibre of the simool or silk-cotton tree, *Bombax heptophyllum*, which, owing to the shortness and want of strength of the fibre, combined with its peculiar elasticity, is incapable of being spun like ordinary cotton. It is occasionally in India, more especially in Assam, spun into a very loose and large thread, which is then woven into cloth with a warp of some other fibre, and forms a soft, warm, and very light fabric. The silk-cotton being a very tender fibre, cannot be used with advantage as a stuffing material alone, but it is highly probable that it might be very advantageously used in combination with other substances, not merely for purposes

of upholstery, but even in the manufacture of mixed fabrics, and for various other purposes in the arts. It was suggested, by Dr. Percival in 1787, and by Beckmann in 1793, that this fibre might be advantageously employed as a substitute for beavers' fur in hat-making; and Le Breton states that its importation into some countries was forbidden, for fear that it should be used to adulterate beavers' hair. Practical obstacles were, however, found to interfere with this application, and it appears that they have only recently been overcome.

Specimens of native, Bourbon, and Sea Island cotton, grown at Batticaloa and Jaffna, in Ceylon, are exhibited.

An interesting series of samples of cotton from Malta are exhibited by G. PULIS, of Montebello, including Nankeen cotton, Sea Island cotton, and mastodon cotton; the latter is a fine cotton; it has a very fair staple, both strong and silky.

Very promising specimens of cotton from Port Natal are exhibited by T. BAZLEY (30B) and C. MANUEL, of Cape Town (11). In both cases the staple is good, and it is evidently a fine and valuable cotton, but badly handled. To each of these exhibitors the Jury awarded a Prize Medal.

Samples of cotton from the West Coast of Africa are shown by WARWICK WESTON (1). The staple, though short, is fine, and if well handled this would probably be a useful cotton; it was deemed worthy of Honourable Mention.

A specimen of wild cotton, collected from the banks of the Niger, is contributed by Capt. H. D. TROTTER.

Three samples from Barbadoes, exhibited by A. READE, consisting of Persian or green-seed, common Demerara, and vine or Pernambuco cotton are interesting: the latter very superior: they were deemed worthy of Honourable Mention.

A series of excellent cottons are contributed by different exhibitors from British Guiana. Amongst these may be mentioned fine, strong, and good-coloured Sea Island cotton from Batavia Plantation, on the river Mahaica, Demerara, D. BLAIR (71 and 72); for these the Jury awarded a Prize Medal.

Excellent Sea Island and other cotton is also shown by J. F. BEE (74, 76) from Woodlands Plantation, on the river Mahaica; the staple strong and very good: for these also a Prize Medal was awarded.

Some very good samples of New Orleans and Pernambuco cotton, &c., are contributed by P. HUGHES (74A and B) from Anna Regina Plantation, Essequibo: for these samples Honourable Mention was awarded.

An excellent specimen of uncleaned short staple cotton from the Klein Pouderoyen Plantation, river Demerara, is exhibited by A. D. VAN DER GON NETCHER (73): this was deemed worthy of a Prize Medal.

A good sample of New Orleans cotton grown at Blacknow, Jamaica, by W. FINLAISON (163), was deemed worthy of Honourable Mention.

A remarkably fine specimen of Sea Island cotton is shown in the Trinidad collection. The seeds were imported from Jamaica; the produce is excellent, has a beautiful silky lustre, and is strong: it was considered worthy of Honourable Mention.

Some long, and strong, but rather coarse cotton is shown by the AGRICULTURAL SOCIETY of ST. HELENA; it is in a tolerably clean condition.

Samples of cotton from Maitland, in New South Wales, are contributed by Messrs DUDGEON (11).

The collection of long staple cotton from the United States is, as has already been mentioned, remarkably fine. The samples leave nothing to be desired, either as to staple, handling, or packing. After a minute and careful examination of all the bales, the Jury being desirous of expressing their high appreciation of the degree of perfection to which the cultivation of this important staple has been brought in the United States, decided on recommending the award of the Council Medal to the Government of the United States, in testimony of the great and successful efforts made by the cotton planters of that country (see p. 166); whilst at the same time they determined to award a Prize Medal to each of the eleven following exhibitors, without attempting to draw any distinctions:—

- S. BOND, of Memphis (37).
- W. HAMPTON, of Charleston, S. Carolina (172B).
- G. L. HOLMES, of Memphis, Tennessee (316). “Louis Prolific.”
- J. V. JONES, of Charleston, S. Carolina (172).
- J. R. JONES, of Charleston, S. Carolina (172A).
- D. LAK, of Memphis, Tennessee (330).
- W. W. M'CLEOD, of Charleston, S. Carolina (172E).
- J. B. MERRIWEATHER, of Montgomery, Alabama (164).
- J. NAILOR, of Vicksburg, Missouri (178).
- J. POPE, of Memphis (32). “Dimes Prolific.”
- W. SEABROOK, of Charleston, S. Carolina (172F & 320D).

An instructive collection of small samples of cotton is contributed by TRUESDALE, JACOBS, and Co., of New York: also the collection of ELI RAYNER, of Tennessee; these were deemed worthy of Honourable Mention.

A fine sample of long staple Peruvian cotton, of a good and useful character, is exhibited.

Specimens of uncleaned Chinese cotton (Meenhwa), and the same cleaned (Hwae), are contributed by H. M. CONSUL at SHANGHAE; the cotton has a good colour, and a fine silky lustre, but it is so short that it could only be used for wadding, or to mix with other cottons; it is very well cleaned.

Several good samples of cotton are shown in the Egyptian collection; of these the Mako cotton, first quality, exhibited by ABBAS PASHA (106), and the Sea Island cotton grown by T. W. LARKINS (134), were deemed worthy of Honourable Mention.

Some interesting and promising samples of cotton are contributed from Algiers, demonstrating in a remarkable manner the progress being made in that colony; amongst these, in particular, may be specified the capital Louisiana cotton from M. CHUFFART, of Birmandreïs (17); the Jumel cotton from DUPRÉ DE ST. MAUR, of Orbal, Oran (23); the clean, long, and useful Jumel cotton of 1850, from MORIN, of El Biar (39); and the strong, fine, and well-cleaned cotton from C. PELISSIER, of Kaddous (42): for each of these four the Jury awarded a Prize Medal.

The collection of cottons contributed by A. HARDY, manager of the Hamma Nursery near Algiers (28), is also remarkably good; including Georgia, Louisiana, Jumel, New York, Macedonia, and Nankeen cotton of 1849 and 1850: for this the Jury awarded a Prize Medal.

Other fair samples of cotton are contributed by F. GRIMA of Philippeville, Constantine (26); HALOCHE of Drariah (27); and M. BENES (6); these were deemed worthy of Honourable Mention.

Good cotton cultivated near Lisbon is contributed by A. SA NOGUEIRA (538): this was deemed worthy of Honourable Mention. (539) and (540) are good Brazilian cottons from Algarve; they have a long and strong fibre, but are a little coarse and wild.

In the Russian collection there are two samples of cotton: Bourbon cotton, exhibited by PRINCE NIKO DJIDJIVADZE, from Imeritia (95); and native cotton from the district of Sharoor, government of Erivan, cultivated by ABDOURZAMARAM OGLI (94). These were both considered worthy of Honourable Mention.

A fine sample of cotton is shown by M. HURTELL, from the Society Islands, which was deemed worthy of Honourable Mention.

Raw cotton, the produce of the province of Seville, raised from Sea Island seed on irrigated lands, is exhibited by J. B. VILLARS of Seville (162); it has a fine, long, and strong staple, of a very useful character, and was therefore deemed worthy of Honourable Mention.

A valuable and interesting series of samples of cotton is shown in the TURKISH COLLECTION of raw produce from various parts of that empire. The general character of these cottons is shortness of staple, and that peculiar wild and wiry fibre which is very wasteful in the mill, and which therefore meets with but little approbation generally from our manufacturers. These cottons burn very readily, leave but little ash, and from the peculiar character of their fibre, are remarkably fit for the manufacture of candle-wicks; they are also employed advantageously in the preparation of wadding. The sample of Lana cardic from Koniah (2082) is coarse, short, and wild, resembling some of the native cottons of India; it is, however, well cleaned, as in fact all the Turkish cottons are.—(See p. 165.) The localities from which these specimens are contributed are as follows:—

1. Adana.	7. Damascus.	12. Magnesia.
2. Aidin.	8. Dardanelles.	13. Salonica.
3. Baindir.	9. Drama.	14. Smyrna.
4. Baluk-Hissar.	10. Denizlou.	15. Soubougia.
5. Bigha.	11. Koniah.	16. Thersic, Saida.
6. Cassaba.		

#### FLAX AND HEMP.

The quantity of flax imported into Great Britain has for a considerable number of years been gradually increasing. Twenty years ago the annual importation was about 48,000 tons; ten years since it had increased to about 65,000 tons; and at the present time it is about 80,000 tons. The proportion per cent. of this quantity imported from different countries may be judged of by the following table, calculated on the average imports of the years 1840, 1844, and 1849:—

	1840.		1844.		1849.
Russia - - -	69	-	70	-	74
Prussia - - -	11	-	10	-	10
Holland - - -	9	-	8	-	6·5
Belgium - - -	6·5	-	7	-	4·
France - - -	3·5	-	3·5	-	1·5
Other Countries -	1	-	1·5	-	4·5

During the last few years great efforts have been made to extend and improve the manufacture of this valuable fibre in various parts of the world. The increase under the last head in the preceding table, for 1849, is chiefly due to the importation of flax from Egypt. It must be remembered that, in addition to the above-mentioned quantity of flax annually imported, the manufacturers of England have consumed rather more than a quarter as much again, cultivated in various parts of the British empire, chiefly in Ireland. This proportion has also considerably increased during the last twenty years, and a most marked improvement in the quality of the flax itself has also been produced; a change in great measure to be traced to the persevering and most praiseworthy efforts of the Royal Society for the Promotion and Improvement of Flax in Ireland. The value of flax depends in part on the climate and soil in which it is cultivated, and in part also on the mode in which the fibre is prepared, the care and skill with which the process is conducted, and the constant and vigilant attention which is paid to it through the various stages of the operation. According to its quality its value varies from about 40*l.* to 180*l.* per ton.

Another circumstance which has given a considerable impetus to the cultivation of flax, and is likely to produce ere long even yet more marked effects, is the introduction of the late R. B. Schenck's new process of steeping. Formerly the separation of the fibre from the woody matter of the stem was effected by the process of retting, of which there were three modifications—dew retting, pond retting, and river retting. The stem of the plant consists essentially of two parts, a wooden centre or core, the *shove* or *boon*, and the external fibrous portion, which, when separated from the former, constitutes the flax. These two are cemented together by a glutinous matter, not soluble in water alone, and which must be got rid of by some means before the pure fibre can be separated from the woody shove. The old mode consisted merely in exposing the flax stems to air and moisture under circumstances favourable to fermentation or incipient putrefaction, so that the glutinous matter being destroyed, the fibre could then be easily separated from the shove. Whether this species of fermentation is effected by exposing the flax for some weeks to the action of the dew and rain, spread over meadows—whether it is effected by steeping it in ponds or pits of stagnant water—or, lastly, by sinking it in large wooden frames in the current of a deep and slow-flowing river; there are serious practical difficulties, which have long directed the attention of ingenious men to the possibility of discovering a new and less objectionable mode of preparing flax. During the slow retting of the flax a large quantity of certain putrid vapours is given off; the water, and the very air itself, is poisoned; and this alone is no trifling objection to the process. So serious an objection have these putrid exhalations been found to the use of water-retting, that in some districts

of Belgium, in Hainault and Namur especially, it is forbidden by law, as being dangerous to "public safety and the health of the inhabitants." In Flanders, however, no such laws are in force, and it is there commonly believed that dew-retted flax is of necessity meagre and dry. Many different modifications and peculiar modes of retting are followed in the various flax districts of Belgium, Holland, and France: and in different localities dissimilar modes of retting have long been in use, often involving very considerable variations in principle. Thus at Courtrai the flax crop is dried in the field and stored for some months in barns before it undergoes the process of retting in the river Lys. In the district of Waes it is retted immediately after being gathered, the green stems being at once thrown into pits of stagnant water. As, however, the whole operation in every kind of water-retting depends on the amount of fermentation produced, which must be enough to insure the decomposition of the glutinous matter, but not enough to cause any injury to the fibre, the process is necessarily slow, tedious, and very uncertain, especially towards the close of the operation, as then the flax must be most carefully watched, in order to put a stop to the fermentation as soon as the desired effect is produced. A slight change of temperature, or a few hours' exposure when the fermentation is complete, may produce the most disastrous effects, the fibre being in fact ruined. Dew-retting is of course even slower than water retting, depending as it necessarily does on the nature of the season, being greatly retarded by long-continued dry weather. In the very dry autumn of 1810 it was found impossible to prepare flax by this method, and recourse was obliged to be had to other methods of retting.

During the last half century various attempts have been made to effect the separation of the fibrous from the woody portion of the flax stem by chemical and mechanical means; in several cases the results at first appeared to be very promising, but in every instance it was soon found that there were insuperable practical objections, which more than counterbalanced the advantages. Amongst chemical agents, solutions of sulphuric acid, caustic potash, caustic soda, quick lime, and soft soap, were all in turn tried and discarded; and amongst mechanical processes the ingenious contrivances of Mr. James Lee and Messrs. Hill and Bundy shared the same fate. Mr. Lee having found a means of separating the fibre of flax without water-retting, and the discovery being considered one of very great importance, he obtained a patent for his mechanical process in 1812, with the singular protection of a special Act of Parliament, by virtue of which he was exempted from specifying the particulars of his process during the first seven years of the duration of his patent. In 1817, and therefore before the publication of his specification, Messrs. Hill and Bundy took out their patent for machinery for breaking and preparing raw flax and hemp. The rival claims of these two inventors were investigated in 1817 by a committee of the House of Commons, but whatever may have been the comparative merit of the two processes, in the course of a very few years both were relinquished and forgotten. Since that time various other ingenious mechanical arrangements have been devised, but hitherto they have had very little success.

Schenck's process, for which he obtained a patent in 1846, is undoubtedly a very important improvement; it consists merely in steeping the flax stems in

warm water, heated artificially to the temperature best suited to fermentation. By this simple means the operation is rendered rapid and certain, all uncertainty from fluctuations in the temperature and weather is avoided, and the whole process is entirely under the command of the manufacturer. The temperature best suited for this purpose is about  $80^{\circ}$ , or from  $80^{\circ}$  to nearly  $90^{\circ}$ ; above this point the process proceeds too rapidly, and the fibre is almost sure to be more or less injured. The time required is from about 70 to 90 hours.

From the facts and evidence brought forward by various independent exhibitors, it appears satisfactorily proved that the warm-water steeping increases the per-centage of fibre obtained from the flax stem over that obtained by the old modes of retting by nearly one-fifth; and that, whilst the fineness and spinning qualities of the fibre are increased, the strength is in no way weakened or diminished, unless the process is permitted to proceed too far, an effect which need never happen, from the complete control over it which the manufacturer has throughout. Although there is no doubt as to the practical value of the use of warm water in flax retting, yet the introduction of Schenck's process is far from removing all the difficulties of the flax manufacture; much still remains to be effected, and it is by no means improbable that ere long a yet more perfect process may be devised.

It is interesting to observe that the use of warm water in the preparation of vegetable fibre is not altogether new, it having been long employed by the Malays, and by the natives of Rungpoor, in Bengal. The process adopted at Bencoolen is stated by Dr. Campbell to consist in steeping the stems of the hemp in warm water, in which it is allowed to remain for two days and nights. The old German process called "Molkenröst," sometimes used in preparing the finer sorts of flax, is also to some extent an application of the same principle; in this mode of retting, the flax was steeped for four or five days in a warm mixture of milk and water, and thus the desired degree of fermentation in the flax stems was produced. This operation must be distinguished from the more modern one, in which sour milk was used to give a good colour to linen, a process introduced by the Dutch towards the middle of the last century; the linen was boiled in a weak alkaline lye, and subsequently treated with sour butter-milk for the purpose of aiding in removing the alkali and dissolving the earthy impurities present in the fibre. Occasionally also, salt of sorrel was used for the same purpose, and in 1775, Reuss states, that sulphuric and muriatic acids might be used for the same purpose; but that, being too costly, they had not as yet come into general use. Of course all processes in which boiling, or even hot water, is used, are quite different in their mode of action from those in which only warm water is employed. When boiling water is used, it is with a view of dissolving and removing the useless matters which encrust the fibrous part of the plant; whilst, on the other hand, warm water is used to soften them, and to aid in their putrefaction or decomposition through the agency of fermentation. In 1787, a good deal of interest was excited in Ireland by the publication of a plan for improving the retting of flax by the action of hot water; in this scheme, it was proposed to scald the flax stems in boiling water to soften them, and to remove a portion of the extraneous vegetable matters which they contain; and it was conceived that after this treatment the subsequent retting of the

flax would be more rapid, certain, and manageable; so that time would be saved, the noisome process of pond-retting would be obviated, and the result would be a stronger and whiter fibre. The minute and careful experiments of Hermbstaedt, on the chemical principles involved in the retting of flax, made about the beginning of the present century, threw much light on the whole subject, and to some extent indicated the influence of temperature on the success of the operation.

The entire collection shown by the Royal Society for improving and promoting the growth of flax in Ireland is so highly valuable, and so clearly illustrates the great advances which have already been made, and the important service which this Society has already rendered to the country, that the Jury determined to mark their high appreciation of the Society's labours by the recommendation of the Council Medal.—(See p. 167). Amongst the individual specimens of particular merit may be mentioned the flax exhibited by WHITE of Antrim, PRESTON of Belfast, and ADAMS of Ballyderitt, near Coleraine (49): to each of these three the Jury awarded a Prize Medal.

A very useful and complete series of the principal commercial varieties of flax, hemp, and similar fibrous materials, commonly met with in the English market, is contributed by MESSRS. HUTCHINSON (40). The samples, which are all good, are as follows:—

<i>Flax.</i>		<i>Hemp.</i>	
French flax	Riga flax.	Petersburgh best hemp.	Egyptian hemp.
Flemish do.	English do.	Petersburgh half-clean hemp.	India brown do.
Dutch do.	Egyptian do.	Riga Rein do.	India scum do.
Friesland do.	New Zealand do.	Riga Pass do.	Manilla do.
Archangel do.	Jute.	American do.	Italian do.

For this collection the Jury awarded a Prize Medal.

A numerous series of specimens are contributed by P. CLAUSSEN (105), in illustration of his patent process of making flax-cotton. This process (patented August 1850) consists essentially in boiling the cut and crushed stems of the flax, hemp, or other plant, in a dilute solution of caustic soda, containing about one two-thousandth part of alkali. The fibrous matter is then removed, and plunged into a bath of dilute sulphuric acid containing one five-hundredth part of acid, in which it is boiled for about an hour; it is next transferred into a solution containing about ten per cent. of carbonate of soda; and lastly, when it has remained in the latter for an hour, it is plunged into a weak solution of sulphuric acid, consisting of one part of acid to two hundred or five hundred parts of water; in this it is left for about half an hour, and the process is completed. The effect of these several processes is "to divide and split up" the fibre, in a most remarkable manner, so as completely to alter its character; flax thus treated is converted into a substance very nearly resembling cotton. It is probable that flax-cotton can be advantageously used in the manufacture of mixed fabrics, as it appears capable of being spun with wool, silk, and other fibres. It may therefore, perhaps, hereafter lead to several new and important practical applications. For this ingenious process the Jury awarded a Prize Medal.

The idea of modifying the fibre of flax and hemp, so as to convert it into a



kind of cotton, is by no means new. In 1747, Lilljikeuzes and Palmquist described a mode of converting flax into "cotton" by boiling it for some time in a solution of caustic potash, and subsequently washing it with soap. In 1775, considerable quantities of refuse flax and hemp were converted into "flax-cotton" by Lady Moira, with the aid of T. B. Bailey, of Hope, near Manchester. The full details of the process employed do not appear to have been published, but from Lady Moira's letters in the "Transactions of the Society of Arts for 1775," it appears that the fibre was boiled in an alkaline lye, or a solution of kelp containing carbonate of soda, and subsequently scoured, the result of this was, that "the fibres seem to be set at liberty from each other," after which it may be "carded on cotton cards." It appears that at this time "flax-cotton" was made and sold at threepence a pound; and Lady Moira states that she believes that it takes colours better than flax.\* It is curious to observe the fate of Lady Moira's scheme: she says, "I have no reason to be vain of the samples I have sent you, they merely show that the material of flax-cotton, in able hands, will bear manufacturing, though it is my ill fortune to have it discredited by the artizans who work for me. I had in Dublin, with great difficulty, a gown wove for myself, and three waistcoats, but had not the person who employed a weaver for me particularly wished to oblige me, I could not have got it accomplished; and the getting spun of an ounce of this cotton in Dublin I found impracticable; the absurd alarm that it might injure the trade of foreign cotton had gained ground, and the spinners, for what reason I cannot comprehend, declared themselves such bitter enemies to my scheme, that they would not spin for me. Such is my fate, that what between party in the metropolis and indolence in this place (Ballynahynch), I am not capable of doing my scheme justice. That it should ever injure the trade of foreign cotton is impossible; though long accustomed to behold shoes and stockings looked upon in this part of the world by the generality as quite unnecessary, yet I cannot think but some apparel is requisite; and as the price of wool is so high, and the poverty of the people so great, I did wish to introduce amongst them that invention which I saw might be greatly improved, and turn the refuse of flax into comfortable clothing, and by a process so easy that every industrious wife and child might prepare it." Lady Moira states, that the flax-cotton gowns which she had had made, and which were worn by the members of her own family, were exceedingly durable; and the specimens of these fabrics, as well as of the flax-cotton prepared by her, which are still preserved in the Museum of the Society of Arts, &c., are highly remarkable for their beauty.

Subsequently to this, several attempts were made in Germany to convert flax into a fibre resembling cotton, which could be used, either alone or together with cotton, in the manufacture of cotton goods. In 1777, Baron Meidinger proposed to convert flax into a sort of cotton, by the action of alkaline solutions, &c.; in 1780, a factory was established at Berchtoldsdorf, near Vienna, for the practical working of this process; and similar plans were subsequently brought forward by Kreutzer in 1801, Stadler and Haupfner in 1811, by Sokou in 1816, and by several others. At the factory at Berchtoldsdorf not only was flax converted into cotton but likewise a useful cotton-like fibre was prepared

from tow and refuse flax; and the same is said to have been done by Haag, near Pressburg, in 1788, by Göbel, in 1803, and Segalla in 1811. Whether these various plans failed from the effects of jealousy and opposition, like that which prevented Lady Moira from introducing her "flax-cotton," is unknown, but it does not appear that any of them were long persevered in: it is probable that in most cases the neighbouring manufacturers set themselves against the introduction of flax-cotton; for Beckmann, who speaks of its manufacture near Brunswick, states, that the workpeople determined not to use the new material, though, at the same time he observes, that excellent fustians were made which could not be distinguished from those manufactured with ordinary cotton. The extreme similarity of flax-cotton to ordinary cotton is also remarked by Des Charmes (1799), who states, that if the staple is cut before it is carded, it is not possible to distinguish it from cotton, either in its raw state or when manufactured. The matter was subsequently investigated by Berthollet, by Gay Lussac, and by Giobert, who employed alternately steepings in hot solutions of soap, alkali, and sulphuric or muriatic acid. Berthollet observes that equally fine cotton is obtained from the commonest refuse tow, as from the best flax.

A good sample of well-prepared flax is exhibited by Messrs. CATOR and NELSON (46): it is shown, not on account of superiority of fibre, but as a specimen of manipulation and treatment; it is very creditable, and was deemed worthy of Honourable Mention.

Some good samples of flax are exhibited by G. MASON (34): they are, 1st, flax grown, steeped, and scutched at Yately, North Hants; flax grown in South Hants; flax grown at Cobham, in Surrey; and flax grown at Farnborough. There are likewise samples of flax scutched at Winchester County Gaol, and several specimens of tow; and the whole is illustrated by a series of models of the tools and implements used in the preparation and working of flax. This series was deemed worthy of Honourable Mention.

Some excellent specimens of yellow flax grown at Trimmingham, in Norfolk, by Mr. WARNES,\* and some blue flax grown in Yorkshire; as well as some of the best Courtrai and Lokeren flax from Belgium, are exhibited and contrasted both in the raw and partly manufactured states, by Messrs. HIVES and ATKINSON, of Leeds (45). They are very creditable, and fully entitled to Honourable Mention. (See p. 239.)

Excellent Courtrai flax is also exhibited for best quality and finish, by Messrs. MARSHALL,\* of Leeds (55); these also are well entitled to Honourable Mention, (See p. 239.)

An interesting series of samples of flax prepared by mechanical means alone, is exhibited by M. J. J. DONLAN (43).

A number of good samples of raw and partially-dressed flax are also shown in connection with thread and other manufactured articles: amongst them it will be enough to mention the specimen of Devon and Dorset flax, both watered and heckled, which are contrasted with good Polish and Russian flax in the Bridport series (Class XIV. 73); the golden flax grown at Chiswick, by J. P. BULL; the

\* Awarded a Prize Medal by Jury of Class XIV.

flax from Islay, grown by W. SIMPSON; the flax shown by SADLER, FENTON and Co. (Class XIV., 18), and JAMESON and Co., of Hull (Class XIV. 60); all of which, as well as the samples of flax from West Chinnoek, in Somerset, shown by R. HAYWARD (Class XIV. 44); those from Crewkerne, shown by P. LOVELESS and by J. BROOKS, of Dinnington, are excellent.

Some good samples of hemp, accompanied by cloth manufactured from it in the Himalayas, are shown in the valuable collection of East Indian fibres.

Samples of Canadian flax are exhibited by M. BASTIEN, of St. Rise (70), and of hemp by F. GRICE, of Montreal (71). In both cases the quality of the fibre is good, but its preparation is faulty and objectionable: with a little more care the value of each would be considerably increased: they were both deemed worthy of Honourable Mention.

A good specimen of flax from Van Diemen's Land is exhibited by J. DIXON, of Skelton Castle, Isis (19), and by F. LIPSCOMBE (174): these were both deemed worthy of Honourable Mention.

A few small samples of flax and hemp from the United States are contributed by E. R. DIX, of Vernon, New York (139). They are of fair average quality but not remarkably fine; they were, however, deemed worthy of Honourable Mention.

Fine samples of strong and well-prepared flax are shown from the FLAX SPINNING MILLS of Schönberg, in Moravia (95A), by JACOB BIRNBAUM (95), and from the PATENT FLAX-RETTING ESTABLISHMENT at Ullersdorf, also in Moravia (96), the latter including raw flax, the same water-retted, and heckled flax. A Prize Medal was awarded to each of these three series.

The samples of Belgian flax are, as might be expected, excellent, and well sustain the high and acknowledged reputation which it has long enjoyed. Several of the specimens shown are remarkably strong, fine, and mellow. In particular, the Jury would specify the flax shown by DAVID and DE BOE, of Antwerp (98); DESMEDT and Co., of East Flanders (104); J. B. VAN BOGAERT, of Grimbergen, in East Flanders (107), who also shows some excellent hemp. P. J. VERBEECK, of Grimbergen (113), and J. B. VAN WIELE, also of Grimbergen, in East Flanders (114), who contributes pond-retted flax of 1850. To each of these five the Jury awarded a Prize Medal.

Fine samples of flax are also exhibited by DEGRAEVE-DELFORTORIE, of Gheleuve, West Flanders (90); F. LECLERQ, of Longchamp, Namur (88); F. VERCRUYSSÉ of Dewbyck, near Courtrai (213), and J. C. VAN ACKERE,\* of Wevelghem, in West Flanders (215); these were deemed worthy of Honourable Mention.

Several good specimens of flax in its various stages of preparation are likewise contributed by ROELS and Co., of Lokeren (83); DE M. LAVIOLETTE, of Bruges (96); S. P. VAN HOEY, of Hamme, in East Flanders (106); B. HAESE, of West Flanders (115): and by the FLAX COMPANY of GHENT (230).

Amongst the samples of Belgian hemp, those of F. VERHELST, of Grimbergen, in East Flanders (102); PIERRE JEAN VAN RIET, of Moerzeke, in East Flanders (103); and J. L. GILTA, of Appels, in East Flanders (105), were deemed the best; the Jury awarded a Prize Medal to each of these three.

\* Awarded also by Jury of Class XIV.

In the EGYPTIAN COLLECTION of raw produce, several specimens of flax and hemp are shown. The flax of Faoum (107), that from Menauf (108), and the sample of hemp (152), were deemed worthy of Honourable Mention.

Very superior flax and hemp are contributed by some French exhibitors, especially from the northern part of the country. Amongst the exhibitors of flax, may be specified L. DUMORTIER, of Bourbecque, near Lille (177), who shows flax of the year 1849 retted in the river Lys. F. ROUXEL, of St. Brieux (362); JOUBERT BONNAIRE and Co., of Angers (552), who also show excellent hemp; and E. H. LAILLIER (559); to each of these four the Jury severally awarded a Prize Medal.

Amongst the French exhibitors of hemp, those deserving of special notice are MESSRS. BESNARD, RICHOUX, and GENEST, of Angers (61); LAINÉ LAROCHE, and MAX-RICHARD, of Angers (286); and LECLERC BROTHERS, also of Angers (576); to these three the Jury awarded Prize Medals.

In the Zollverein Collection, the samples particularly deserving notice are those shown by A. RÜFIN, of Rüstern, Liegnitz (34); specimens of flax swingled in the Belgian method by the Baron VON LÜTTWITZ, of Simmenau, near Ippeln (42); and G. MEVISSSEN, of Dülken, near Dusseldorf (557)—to these three the Jury awarded Prize Medals.

The samples of flax contributed by E. F. ELMENDORF,\* of Isselhorst, near Bielefeld (470); KÖNIGS and BUECKLERS, of Dulken, near Dusseldorf (552); A. BRUENGER, of Jöllenbeck, near Bielefeld (559); and C. E. HORNIG, of Brunswick (722); and P. OLLERDISSEN, of Urentrup, near Bielefeld (551)—were severally deemed worthy of Honourable Mention.

A good sample of hemp is exhibited by the LANDWIRTHSCHAFTLICHER VEREIN at Sangerhausen.

Some samples of well-prepared flax are also exhibited from Saxony; those exhibited by C. SOMMER, of Sornzig, near Mügen (1); J. WATTEYNE, of Lichtenberg, near Freiberg (2); and W. GAETZSCHMANN, of Zittau (3)—were deemed worthy of Honourable Mention.

Specimens of flax and hemp, prepared in a peculiar manner, are shown by S. L. SWAAB, of the Hague.

In the Portuguese Collection, there are several specimens of both flax and hemp. The hemp from Catharia, exhibited by the Duke de PALMELLA (530, 1 and 2), shown both in the state of dried stems and partially dressed, was deemed worthy of Honourable Mention.

Several specimens of flax and hemp from Rome are also shown. A sample of Centese hemp, contributed by the CHAMBER of COMMERCE of the city of Cento (9), was deemed worthy of Honourable Mention.

Hemp is also exhibited from Bologna by the Count BIANCONCINI (4), and by MARCO MINGHETTI (10).

A large and important series of samples of flax and hemp is shown in the Russian Collection of raw produce, and several of them are capital specimens. The flax is in considerable variety—from fine and silky, down to coarse and

\* Awarded also by Jury of Class XIV.

wiry ; some of the specimens are a little unequal and irregular. Amongst the best may be mentioned, those of ARDAMATSKY BROTHERS, from the government and district of Novgorod (99) ; E. KARNOVITCH, from the government of Jaroslaff (101) ; and those from VALK, in the district of Vinsk, government of Esthonia (106) ; some of the latter, in particular, are especially fine. The Jury awarded Prize Medals for these three.

Very excellent flax is also exhibited by MICHAEL BABARIKIN, of Kholm, in the government of Pskoff (96) ; from the Farm of GORIGORETZK, in the government of Mohiloff (121) ; CLARKE, MORGAN, and Co., government of Vologda (114) ; S. ZAKHAROFF, of Kholm, in the government of Pskoff (108) ; and KOSMA MILOKROSHETCHNOI, of Pudjoi (110). The samples from these five were deemed worthy of Honourable Mention.

Good specimens of flax are also contributed by JOHN and THEODORE ARDAMATSKY, of Soletz, in the government of Pskoff (97) ; JOHN ARDAMATSKY, of Porkhoff, in the government of Pskoff (98) ; MELNIKOFF, of Melenkoff, in the government of Vladimir (111). THEODORE VANISKOFF, of Soletz, government of Pskoff (112) ; and the VELKOE ESTATE, in the government of Jaroslaff (105).

Amongst the samples of Russian hemp, the best are those exhibited by KRASHENENEKOFF, from the district of Sevsk, government of Orel (100) ; KOSMA FILEMONOFF, of Rilsk, government of Jaroslaff (103) ; and the Prince VOLKHONSKY, from the district of Sevok, government of Orel. For each of these three series a Prize Medal was awarded by the Jury.

Very good samples of flax and hemp are exhibited in the Spanish department of raw produce ; amongst the best are the flax contributed by F. A. VALGOMA of Cacabelos, Leon (98) ; the Province of HUESCA (158) ; and by P. DE LAS HERAS, of Segovia (161). These were deemed worthy of Honourable Mention.

Good specimens of flax are also contributed by J. M. CALDERON, of Grenada (152) ; J. PINAN, of Leon (159) ; flax from Calateras and Vega de Monasterios, by DE LAS HERAS, of Zamora (91) ; flax from Camarzana and Puebla de Sanabria ; and by DE LAS HERAS, of Saragossa ; flax from Borja.

The best samples of Spanish hemp are those exhibited by J. M. CALDERON, of Grenada (152) ; P. MARTINOZ, of Valencia (156) ; and by Count RIPALDA, from Valencia (163). For each of these three the Jury awarded a Prize Medal.

A very excellent specimen of strong, though somewhat coarse hemp, is also shown by A. DIEZ DE RIBERA, of Grenada (172) : this was deemed worthy of Honourable Mention.

Samples of hemp are also contributed by the MUNICIPAL CORPORATION of CASTELLON (153) ; D. de — of Murcia (154) ; D. de — of Saragossa (155).

Some interesting samples of water-retted flax from Angermaland, in the north of Sweden, are exhibited by JOHAN JOHANSSON (21). The flax is of very good quality, though not well manufactured ; it was, however, deemed worthy of Honourable Mention.

In the Turkish Collection, six samples of flax and two of hemp are exhibited ; the latter are from Djanik and Wallachia ; the former from Endemith, Djanik, Unia, Aidin, Drama, and Wallachia.

MISCELLANEOUS FIBRES.

In the various collections of raw produce, a very large number of other fibrous substances, used as substitutes for cotton, flax, and hemp, are shown; some of these are new or but little known, and amongst them are several which, from their valuable properties, seem likely ere long to become important articles of trade, and not merely to form excellent substitutes for the substances already employed in manufactures, but even in some cases to lead to the development of new branches of industry.

An interesting series of hemp, flax, and other fibrous substances is contained in the Liverpool Collection of Imports; these include—

				1849	1850
				Tons.	Tons.
1.	Dutch flax	- - -	Linum usitatissimum - Holland	78	153
2.	Egyptian do.	- - -	" " - Alexandria	-	270
3.	Tow	- - -	" " - Holland	3	3
4.	Hemp	- - -	Cannabis sativa - Canada	-	-
5.	Ditto, Polish Ryne	- - -	" " - Poland	-	-
6.	Ditto, Petersburg	- - -	" " - Russia	-	-
7.	Ditto, white crown	- - -	" " - Marienburg	-	-
8.	Ditto, Italian garden	- - -	" " - Italy	-	-
9.	Hemp, Bombay	- - -	Hibiscus cannabinus - Bombay	129	212
10.	Jute	- - -	Corchorus capsularis - East Indies	8,660	12,216
11.	Sunn	- - -	Crotolaria juncea - East Indies	-	81
12.	Coir rope	- - -	Cocos nucifera - Bombay and Calcutta	470	1,100
13.	Ditto, yarn	- - -	" " - Ditto	200	370
14.	China grass	- - -	Urtica nivea (?) - Canton and Hong Kong	Bales. 150	Bales 320
15.	Picaba	- - -	Attalea funifera - Para	-	300
16.	Manilla hemp	- - -	Musa textilis - Manilla	81	192
17.	Brazil palmetto	- - -	Carnanba Palm - Para	Occasional.	
18.	Brazil jute	- - -	Unknown - Ditto	"	
19.	Spanish moss	- - -	Tillandsia usneoides - Brazil	"	
20.	Vegetable silk	- - -	Chorisa speciosa - Ditto	"	

Samples of flax from Holland, Belgium, France, and Russia are shown in the Hull Collection of Imports, and the quantity of flax imported annually is stated to be about 310,000 cwts. Specimens of hemp also are exhibited from Prussia and Italy, the yearly import of which is about 55,000 cwts.; and samples of East Indian hemp, Manilla hemp, and jute; of the latter about 1,100 cwt. is annually imported.

Amongst fibrous materials, one of the most interesting is the "China-grass," of which a number of specimens are exhibited in various departments of the Building, some of the most complete and valuable series being in the English Gallery.

Although China-grass fibre is comparatively a new material in the hands of our manufacturers, yet it has been known to men of science for a very considerable time; but certain practical difficulties have hitherto prevented it from being usefully and profitably employed. China-grass fibre is obtained from *Urtica nivea*, abundant in China and various parts of the Indian empire, where it has long been used by the natives, who by the simple maceration of the

plants, obtain from them a strong and very useful fibre. Amongst the various fibres examined by Dr. Roxburgh at the commencement of the present century, with a view to the discovery of some cheap and good substitute for hemp, one of the most promising was the Callooe hemp, Kankhura, or Ramy, of the Islands and Malay peninsula; this he found to be the produce of an *Urtica*, to which he gave the name of *U. tenacissima*. The plant was introduced from Bencoolen to Calcutta, in 1803, where it was cultivated for several years in the Botanic Garden, then under the charge of Dr. Roxburgh. A considerable quantity of Callooe hemp having been imported into England in 1814, its practical value was tested by some competent authorities, and as the reports were highly favourable as to its strength, and other valuable qualities, the Society for the Encouragement of Arts and Manufactures awarded a silver medal to Captain Joseph Cotton, of the East India Company, for its introduction. The chief obstacle which interfered, however, with its use, was the difficulty which was found to exist in the preparation of the fibre from the stems of the plants: none of the processes usually adopted with flax or hemp were found to be at all suitable, and the rude, wasteful, and imperfect process employed by the natives in preparing the fibre for the manufacture of twine, thread, and fishing-nets, by the mere process of scraping, was wholly inapplicable on a large scale, and besides gave only a very inferior result. When macerated or retted in water, it was found that the fibre itself was more easily destroyed than the glutinous matter of the stem. It was hoped that the introduction of the machines of Mr. Lee, and of Messrs. Hill, and of Bundy, already referred to (see p. 229), would have obviated this difficulty; but such did not prove to be the case.

During the last forty years various attempts have been made to devise a good and cheap process for preparing the fibre, but hitherto without much success; and consequently, till quite recently, the cost of the fibre was such as to preclude its being brought into the market as a substitute for flax. Recent investigations have shown that the *Urtica tenacissima* and *heterophylla* may be obtained in almost unlimited quantities in various parts of India; and a process which has lately been patented, appears to a very great extent to have removed the practical difficulties which previously stood in the way of its employment by manufacturers, so that in a few years it is probable that the Callooe hemp will constitute an important addition to the fibrous materials employed in the arts.

The process of Messrs. L. W. WRIGHT and Co., for the preparation of China-grass, &c., for which a patent was obtained in 1849, consists essentially in a very ingenious arrangement for boiling the stems in an alkaline solution after they have previously been steeped for 24 hours in cold water, and for 24 hours in water of a temperature of 90°. The fibre is then thoroughly washed with pure water, and finally subjected to the action of a current of high-pressure steam till nearly dry. A very beautiful series of specimens illustrating the preparation of this fibre, the various stages of the process, the bleaching of it, and the uses to which it may be applied both alone and in conjunction with other fibrous materials in the formation of mixed fabrics, is shown by Messrs. Wright (42). For these the Jury awarded a Prize Medal.

Very beautiful samples of China-grass fibre are likewise shown by Messrs. HIVES and ATKINSON\* (45), already mentioned as exhibiting superior samples of flax (p. 233). For these two series the Jury awarded a Prize Medal.

Equally fine specimens are exhibited by Messrs. MARSHALL and Co.,\* of Leeds (55), whose samples of flax have already been spoken of. For these samples also the Jury awarded a Prize Medal.

A valuable and instructive series of samples of New Zealand flax is contributed by E. W. TRENT (41), in illustration of its manufacture and uses. It is stated that the flax is prepared from the leaves of the *Phormium tenax*, without any process of steeping, and by a simple mechanical process, which the exhibitor suggests might be advantageously carried on in New Zealand itself. This series was deemed worthy of Honourable Mention.

Some interesting specimens, showing the native manufacture of New Zealand flax, are likewise exhibited by TAO NUI, a New Zealand chief (44). The flax is prepared for weaving, by soaking it for two days in water, twisting it into hanks, and then beating it with a mallet on a stone. This series was deemed worthy of Honourable Mention.

Good specimens of cocoa-nut fibre are shown in illustration of the various purposes to which it is now extensively applied, by J. BARSHAM (56), and by WILDEY and Co. (Class XXVIII. 40).

In this department of raw produce, as in most others, the East Indian collection is peculiarly rich, a very interesting collection of vegetable fibres being exhibited. The old investigations of Dr. Roxburgh in the beginning of this century, already referred to, are of much value in connection with this subject, and it is remarkable that the value of some of these Indian fibres was well known to him, and that though he repeatedly sent samples of them to this country, they have never received that attention from practical men which they certainly deserved, with the exception of one or two that have long since become considerable articles of import, such as jute, the fibre of the *Corchorus capsularis*, and *C. olitorius*, of which, as has just been stated, more than ten thousand tons are annually imported into Liverpool alone. The following Table shows the comparative strength of several of these East Indian fibres as ascertained by Dr. Roxburgh, but it must be borne in mind that in several instances the fibres had evidently been very rudely and imperfectly prepared: the experiments were made in 1804:—

		Breaking weight.
		lbs.
1.	Hemp (English) - - - -	Cannabis sativa - - - - 105
2.	Murga (Sanseviera) - - - -	Aletris nervosa - - - - 120
3.	Aloe - - - - - - - - - -	Agave Americana? - - - - 110
4.	Ejoo - - - - - - - - - -	Saguerus Rumphii - - - - 96
5.	Donsha - - - - - - - - - -	Æschynomone cannabina - 88
6.	Coir - - - - - - - - - -	Cocos nucifera - - - - - 87
7.	Hemp (Indian) - - - - -	Cannabis sativa - - - - - 74
8.	Woollet comal - - - - -	Abroma Augusta - - - - - 74
9.	- - - - - - - - - -	Bauhinia - - - - - - - - 69
10.	Sunn - - - - - - - - - -	Crotolaria juncea - - - - - 68
11.	Bunghi paat - - - - -	Corchorus olitorius - - - - 68
12.	Ghu nala paat - - - - -	Corchorus capsularis - - - - 67
13.	- - - - - - - - - -	Hibiscus manihot - - - - - 61
14.	Flax (Indian) - - - - -	Linum usitatissimum - - - - 39

\* Awarded also by the Jury of Class XIV.



It is evident, however, that these experiments could not be regarded as giving at all accurate comparative results; they only proved that many of the fibres were very strong, and well merited further trials. In 1808 Dr. Roxburgh made a second series of similar experiments, the results of several of which were as follows:—

		Breaking weight. lbs.
1. Bow-string hemp	- - - - - Asclepias sp.	248
2. Callooe hemp	- - - - - Urtica tenacissima	240
3.	- - - - - Corchorus capsularis	164
4. Sunn	- - - - - Crotalaria juncea	160
5. Hemp (Indian)	- - - - - Cannabis sativa	158
6. Doncha	- - - - - Æschynomyne cannabina	138
7.	- - - - - Hibiscus strictus	128
8. Musta paat	- - - - - Hibiscus cannabinus	115
9. Bungghi paat	- - - - - Corchorus olitorius	113
10. Plantain	- - - - - Musa	79

It is plain that the strength of all these fibres was ascertained under very unfavourable circumstances, and there is no doubt that they would have been found even yet more valuable had they been well and properly prepared. The principal vegetable fibres contributed from India are the following:—

1. Callooe, Rhea, or China-grass, the fibre of *Urtica tenacissima*, and one or two other varieties of *Urtica*, already mentioned as well known in commerce under the name of China-grass. Strictly speaking, it is probable that China-grass and Callooe hemp are the produce of two distinct species of *Urtica*, though the fibre of the two is very similar, and, for all practical purposes, in fact identical. China-grass, as it is most commonly called, is the produce of the *Urtica (Boehmeria) nivea* of Willdenow, whilst the Callooe, Kalmoi, or Rami of Sumatra is obtained from the *Urtica (Boehmeria) tenacissima* of Roxburgh. It is from this latter plant also that the Rhea of Assam is procured. The plants yielding this beautiful fibre are abundant in many parts of the empire, and may be had in almost unlimited quantities. In the form of hemp, and when the fibre is well prepared, it is remarkably strong, and when thoroughly bleached, though the strength is then somewhat diminished, it acquires a most remarkably beautiful white silky lustre. Various specimens of this fibre are contributed from different parts of India; from Calcutta; from Assam by Major HANNAY, BABOO DEONATH, and BABOO LAKENATH; from Rungpore, in the district of Moorshedabad, &c., and from Singapore: these the Jury deemed severally worthy of Honourable Mention. Some interesting samples of the fibre of the *Urtica heterophylla* are contributed by Mr. THOMAS; this plant is abundant in Mysore, and especially in the Neilgherries, flourishing in alpine jungles; unfortunately it is one of the most highly venomous of all the nettle tribe. It is stated that the Todawars prepare the fibre of this plant by boiling the stems in water, after which they readily separate it from the woody parts, and then spin it into a coarse but very strong thread. The Malays simply steep the stems in water for ten or twelve days, after which they are so much softened that the outer fibrous portion is easily peeled off.

2. Yercum nar. The fibres of the *Calotropis (Asclepias) gigantea*, a plant which grows wild abundantly in various parts of the Bengal and Madras Presi-

dencies, and is used by the natives in the manufacture of cord called Lamb-dore or Toondee coir. The fibre is of very remarkable strength: from some recent experiments made by Dr. Wight, its tenacity, as compared with some of the other Indian fibres when made into ropes, is as follows:—

		Breaking weight, lbs.
1. Yercum nar	- - - - Calotropis gigantea	552
2. Janapum	- - - - Crotonaria juncea	407
3. Cutthalay nar	- - - - Agave Americana	362
4. Cotton	- - - - Gossypium herbaceum	346
5. Marool	- - - - Sansevieria zeylanica	316
6. Pooley mungu	- - - - Hibiscus cannabinus	290
7. Coir	- - - - Cocos nucifera	224

Specimens of the Yercum, or fibre of *Asclepias gigantea* (and of the Tongoos, that of the *Asclepias tenacissima*), or bow-string hemp of Rajemahl, are sent from Coimbatore and other districts in the Madras Presidency.

3. Umbaree or Maestee pāt; the fibre of the Palungo or *Hibiscus cannabinus*, a plant common all over India, and cultivated in many parts for the sake of its fibre. The process generally adopted seems to be that of steeping the stems in water till putrefaction commences, when they are taken out, washed, and beaten until the fibre separates from the woody portion of the stem: this fibre is contributed from Madras.

4. Marool, or Moorva; bow-string hemp, obtained from the *Sansevieria Zeylanica*, a plant abundant in the southern parts of the continent of India, sent from Cuttack, Coimbatore, and other districts in the Madras Presidency: a good specimen is exhibited by E. LIMA.

5. Jute or Pāāt, &c., the fibre of various species of *Corchorus*, especially *C. olitorius*, well known in commerce, one variety of it being formerly called Chinese hemp. A number of different samples of this fibre are contributed from Calcutta and from Madras. From Rungpore, in the district of Moorshedabad, samples of three varieties of jute are sent, called Suffed Hemonty Pat, Lall Hemonty Pat, and Lall Petrie Pat.

6. Sunn, Janapum, Indian hemp; the fibre of the *Crotolaria juncea*, likewise well known in commerce. Good samples are contributed from Coimbatore, &c.

7. Dhuncha or Danche, obtained from the *Æschynomene cannabina*, used by the natives of Bengal to make fishing-nets; a remarkably strong though rather harsh fibre, pretty well known in commerce. The plant is commonly cultivated in Bengal: good specimens accompanied by cordage and rope manufactured from it, are exhibited by Messrs. THOMPSON, of Calcutta: these were deemed worthy of Honourable Mention.

8. Coir, the fibrous part of the husk of the cocoa-nut, *Cocos nucifera*, well known in commerce: good samples are sent from Calicut.

9. Nar, or aloe fibre, the produce of the *Agave vivipara* and other allied species. A valuable and strong fibre is prepared in many parts of India from different species of aloe. A very interesting series of these fibres obtained from the large Hill aloe, and the small aloe, illustrating the preparation of the fibre, exhibiting some of the uses to which it is applicable, and showing the facility with which it may be dyed of various colours, is contributed by Dr. HUNTER

of Madras, who has also added many other valuable specimens to the Indian collection of fibrous materials. For these the Jury awarded to him a Prize Medal.

10. Specimens of aloe fibre are contributed from various parts of the Madras Presidency—Madras, Madura, Coimbatore, &c., and from Singapore.

11. Yucca fibre, obtained from *Yucca gloriosa*, is also sent from Madras by Dr. HUNTER.

12. Ejoo or Gommuti, obtained from the *Arenca saccharifera* (*Saguerus Rumphii*) or Gummuttee palm, much esteemed in the Eastern Archipelago for making ropes and cables, in consequence of its extraordinary elasticity and durability in water; unfortunately, the value of this fibre is greatly diminished by its peculiar fragility. Very good samples of this fibre are contributed by TAN KIM SENG, of Singapore: these were deemed worthy of Honourable Mention.

13. Putwa or Mawal fibre, obtained from the *Bauhinia racemosa*, a plant common throughout the lesser hills of India, contributed from Bhaugulpore in the division of Patna.

14. Talli nanas, fibre of the pine apple, *Bromelia ananas*, from various localities. Good samples are exhibited from Madras by F. LIMA, and Dr. HUNTER; from Singapore by Captain H. MAN; from Travancore, &c. Some very beautiful specimens of fibre called "ananas flax" are exhibited from Java by L. WEBER: the real source of this fibre does not seem to be very certain, for though from its name it might be supposed to be pine-apple fibre, it more closely resembles that of the Urticas or Boehmerias already mentioned. It is so remarkably fine that the Jury awarded a Prize Medal to Mr. Weber for it.

15. Plantain fibre and Manilla hemp, obtained from the *Musa textilis* and *M. paradisaica*, contributed from Madras, from Dacca, and by the Rev. M. STORK from Chittagong. Excellent canvas and ropes are shown, made of this fibre, which is extensively used in the Government establishments at Ceylon.

16. Marsdenia fibre, obtained from the *Marsdenia Roylei*, and contributed by his HIGHNESS the MAHARAJAH of NEPAL.

17. Pulas, fibre of the *Butea frondosa*, used for making common cordage, from Beerbhoom in the division of Moorshedabad.

18. Parkinsonia fibre, obtained from the stems of *Parkinsonia aculeata*, introduced from the West Indies, sent by Mr. ALLAN from Madras; said to be well suited for the manufacture of paper.

19. Roxburghia fibre, obtained from the *Roxburghia gloriosoides*.

20. Artocarpus fibre, obtained from an *Artocarpus*: this and the preceding fibre are contributed by Mr. SIMMONS from Assam.

21. Trap fibre, obtained from the bark of the trap tree, a species of *Artocarpus*, contributed from Singapore.

22. Trophis fibre, from the *Trophis aspera*.

23. Daphne bark, the fibrous bark of the *Daphne cannabina*, used in the manufacture of Nepal paper.

Besides these, several other fibrous substances from different parts of India are exhibited, such as the fibres of the Palmyra leaf, *Borassus flabelliformis*, from Madras, the bark of the Sisse tree, contributed by Capt. REYNOLDS, and a series

of vegetable fibres from Arracan, called Theng-ban Shaw, Pathayonshaw, Shaw-phyos, Ngan-tsoung-shaw, Shaw-me, and Ee-gywot-shaw, &c., which are Honourably Mentioned.

Several of the Indian fibres, already mentioned, are also contributed from Ceylon; good samples are shown, both as mere fibres, and also in the various states of thread, rope, and coarse cloths; of coir, aloe flax, and the fibre of the Plantain, Hibiscus, and Sanseveria.

Specimens of aloe fibre are contributed from the Cape of Good Hope, by C. WATERMEYER, of Green Point (17).

Aloe fibre, obtained from the *Agave Americana* and *A. vivipara*, are also sent from Barbadoes.

From St. Vincent samples of the "Mahant" bark in its raw state, the fibrous part in the state in which it is employed in the manufacture of fishing-nets, and samples of lapeto, used also in the manufacture of common cord, and coarse linen for fishing-nets, are exhibited by G. BULLOCK, of St. Vincent.

Several interesting specimens of various fibres are shown in the collection from British Guiana: amongst these are specimens of silk-cotton, obtained from the *Bombax ceiba*, from George Town, Demerara, said to be exported to the United States, and used in the manufacture of hats; exhibited by E. C. ROSS (76A & B).

Plantain fibre, *Musa paradisaica* and *M. sapientum*, from Plantation Vigilance, East Coast, Demerara, exhibited by W. DAVIDSON (77); and from Plantation Klein, Pouderoyen River, Demerara, exhibited by A. D. VAN DER G. NETSCHER (78). It is calculated that about 8 cwt. per acre of this excellent fibre might be obtained; at present very little of it is used. It is worthy of remark, that in some of the first lists of premiums offered by the Society of Arts, about 1762, special attention was drawn to the beautiful fibre of the plantain. "Whereas the stem of the Asiatic and American fruit-bearing plantain affords three sorts of fibrous materials which resemble hemp, hard silk, and cotton, all which have been experimentally found capable of being wrought into various sorts of manufactures, and among others, into cordage, fustians, lawn, knitting, gauze, blonde lace, and excellent candle-wicks, sundry specimens of which manufactures may be seen in the hands of the Register of the Society," &c. This advertisement was continued for several successive years, but as no candidate came forward to claim the offered reward, it was at last discontinued.

Silk-grass fibre, the fibre of the *Agave vivipara*, from Plantation Vigilance, East Coast, Demerara; and Fibiiri fibre, obtained from the Ita palm, *Mauritia flexuosa*, from the River Berbice, are exhibited by T. B. DUGGIN (80 & 81).

Mohoe or Mahoe fibre, *Hibiscus elatus* or *Thespesia populnea*, from Demerara, is exhibited by J. F. BEE (82). It is a very strong but coarse fibre, used for making cordage, coffee bags, &c.

Some good samples of Yucca hemp, together with a leaf of the *Yucca serrulata*, from which it is obtained, and rope and cordage manufactured from it, are shown by J. T. THOMPSON, of Nassau, Bahamas; also specimens of the fibre of the Palmetto, and rope made from it. These were deemed worthy of Honourable Mention.

In the Trinidad collection are some specimens of the fibre of the pineapple, and aloe; and also the fibre of the Mahagua, or Majagua, *Sterculea caribæa*.

Specimens of the leaf and fibre of the *Doryanthes excelsa* are contributed from New South Wales by Sir T. L. MITCHELL (19), as well as some rope made of the latter. These were deemed worthy of Honourable Mention.

Some good samples of New Zealand flax, *Phormium tenax*, are contributed by various exhibitors: amongst others, by TAO NUI, a New Zealand chief (44); New Zealand flax, as prepared by the natives, by Rev. J. COLLINSON (3); J. ROBERTSON (4); J. CARADUS (25); and by TYRREL (1 & 28); New Zealand flax, cleaned and prepared by machinery, exhibited by WHYTLAW and SON (34). Each of these was deemed worthy of Honourable Mention.

A bale of "New Orleans moss" (*Tillandsia usneoides*), prepared as a substitute for horse-hair, &c., as a stuffing material for upholstery purposes, is exhibited by G. HICKS (559). This substance possesses considerable elasticity, and appears to be very well adapted for the above-mentioned purpose; it is stated that it may be had in any quantity, and at a comparatively small price. The Jury awarded a Prize Medal for this fibre, which, though not altogether new in the London market, does not appear so well known as it deserves to be.

A sample of the fibrous husks of the maize, or Indian corn, also used for stuffing mattresses, is shown by F. O. KETTERIDGE, of Mount Vernon, New Hampshire (253). This substance, though not so good as the "New Orleans moss," being much more brittle and less elastic, was deemed worthy of Honourable Mention.

In the Austrian collections, specimens of fibrous wood divided into very thin and slender strips, used instead of straw in the manufacture of a sort of plaited work, are shown by S. TANDLER, of Zinnwald, near Töplitz, in Bohemia (657). A Prize Medal was awarded for this ingenious application.

A specimen of *Cynosurus cristatus* is shown by L. VANDEN ABELE, of Appels, West Flanders; this also was deemed deserving of Honourable Mention.

Samples of China-grass, or nettle fibre, *Urtica (Boehmeria) nivea*, from China, are exhibited by C. M. COPLAND and by Mrs. RAWSON.

A good fibre, prepared from the date palm (132), together with rope, string, nets, and brushes made from the fibres, are contributed from Broulos, Ghizeh, and other places in Egypt.

A useful fibrous material, proposed as a substitute for animal hair, and also for other purposes, obtained from the dwarf palm of Algeria, is exhibited by AVERSENG and Co., of Toulouse, in the Algerian collection (3). The Jury awarded a Prize Medal for the introduction of this substance.

A new fibrous material, proposed for wadding for clothing, and for upholstery work, in stuffing mattresses, &c., is exhibited by C. G. FABIAN, of Humboldsaw, near Breslaw (95). This substance, which is called "pine wool," is prepared from the leaves or needles of pine trees; it is soft and somewhat elastic, though the fibre is very weak, so that it would perhaps soon mat or felt together in mattresses. It has been found to be very cleanly, and peculiarly free from the attacks of insects, and might probably be advantageously employed, mixed with

some stronger and more elastic fibre. The Jury awarded a Prize Medal for this substance.

A good sample of aloe fibre, prepared from the *Agave Americana*, is exhibited by the Marquis de FICALHO (Portugal, 535). This was deemed worthy of Honourable Mention.

Specimens of flax, cotton, pita, or aloe fibre, and mallow fibre, are contributed from Madeira.

A fine and very beautiful fibrous material, called Bejuco, is exhibited from the island of Luzon, by the ECONOMICAL SOCIETY of MANILLA (234); this substance is very strong, and is used in the manufacture of plaited work, and a sort of cloth, remarkable for its strength and softness. The Jury awarded a Prize Medal for it.

Specimens of several of the textile fibres of Cuba are contributed by RAMON DE LA SAGRA (Spain, 157), including the Daguilla or fibrous inner bark of the *Lagetta lintearia*, together with cord made of it; cord and mats made of palm fibres; Magagna, the fibre of the *Paritium elatum*; and the fibre of the *Hibiscus cannabinus*. These were deemed worthy of Honourable Mention.

Samples of a valuable grass, the *Macrochloa tenacissima*, much used for the manufacture of cord, &c., and which might probably be advantageously employed by paper-makers, are exhibited by D. VILLARS, of Huesca (158): this was deemed worthy of Honourable Mention.

Plantain fibre, prepared from the stem of the plantain, *Musa sapientum*, is exhibited by A. VINAS, of Puerto Rico (160); and Pita, the fibre of the wild aloe, *Agave Americana*, is shown by P. DE LAS HERAS, of Murcia.

#### SECTION VI. Cellular Substances.

Comparatively few substances demanding the attention of the Jury are exhibited in this division; they may, in fact, be included under three heads—namely, cork, rice-paper, and amadou or German tinder.

The number of specimens of cork exhibited is very small: the most important series is a small collection shown by T. PEET (132), in illustration of its uses, and the mode in which it is manufactured. This was deemed worthy of Honourable Mention. Samples are likewise shown by B. FRENCH (127).

Specimens of cork wood, a very light wood, in some respects resembling cork, and which might possibly be employed as a substitute for cork in some of its applications, are contributed from British Guiana by G. PONTIFEX and T. B. DUGGIN (102). Several similar light and porous woods, such as the polac of the Archipelago, used for making floats for fishing-nets, are shown in the East Indian collection.

Good samples of French cork, both in the rough state and when cut by De Bossimon's patent machinery, are exhibited by DUPRAT and Co.\* (492). Some fine specimens of Algerine cork are likewise shown in the French Department, in the collection exhibited by the COMMISSION of WOODS and FORESTS (47). These were deemed worthy of Honourable Mention.

One specimen of good Portuguese cork is contributed by D——.

\* This firm was awarded a Prize Medal by Jury of Class XXVIII.

Very good samples of cork are shown in the Spanish collections by J. GUINART,\* of Seville (188), and by the PROVINCE of GERONA\* (189). These were each deemed worthy of Honourable Mention.

Samples of shola, the cellular pith-like stems of the *Æschynomene aspera* (*Hedysarum lagenarium*), from the vicinity of Calcutta, are shown in the East Indian collection. This remarkable substance, which closely resembles in appearance the well-known "rice-paper," well merits attention, and promises to be available for several purposes in the arts. The specimens of shola are accompanied by various illustrations of the uses to which it is applied in India, including life-buoys, boxes, bottle-cases, and hats. From its loosely cellular structure it is a very bad conductor of heat, and this, together with its great lightness, admirably fits it for the manufacture of hats. Shola is also used advantageously for purposes of ornament, and very beautiful models of temples and other eastern buildings are exhibited, which possess all the appearance of ivory, but with even more softness and delicacy of surface. These specimens were deemed worthy of Honourable Mention.

Rice-paper, made from the pith of *Arabis papyrifera*, from China, is likewise shown.

Two good series of specimens of prepared amadou, or German tinder, the leathery base of a fungus (*Boletus igniarius*), are exhibited, namely, in the Austrian collection, by BACHRICH (45A), and in the Zollverein Department, by F. A. BECKER SAPP and Co., of Fredeburg (471). These were each deemed worthy of Honourable Mention.

#### SECTION VII. — *Timber and Ornamental Woods.*

The collection of timber and other woods, taken as a whole, is remarkably complete and interesting; and though, in many instances, it is obviously impossible for the Jury to enter into the consideration of individual woods, or to do more than enumerate the names of the specimens shown, and even difficult in all cases to do that; yet they considered it desirable to prepare as complete a list as possible of the various single collections included in the Exhibition, so as to form, as far as could be done, a catalogue of the chief woods of different countries. The Jury would especially draw attention to the very interesting and valuable collection of East Indian woods, the complete and well-arranged collection of W. W. SAUNDERS; the series of fine specimens shown by Messrs. FAUNTLEROY; the very instructive and excellent specimens exhibited by Messrs. LAWSON, and by the FRENCH MINISTER of WAR in the Algerian collection of raw produce. Highly valuable, also, are the series of Canadian, Australian, and other colonial woods; and the numerous collection of the woods of Cuba, &c. &c.

The total annual importation of timber into Great Britain is nearly two million loads, or one hundred million of cubic feet, entered under the several designations of timber or unsawn wood, deals and planks or sawn wood, teak, staves, and lathwood.

\* Awarded a Prize Medal by the Jury of Class XXVIII.

The following Table shows the countries from which wood was chiefly imported in the year 1849 :—

	Timber.	Deals.	Teak.	Staves.	Lathwood.
Russia - - - -	41,419	173,586	-	325	15,539
Sweden - - - -	28,679	79,843	-	150	1,119
Norway - - - -	28,930	50,805	-	95	103
Prussia - - - -	117,470	35,006	-	19,213	6,169
Hanse Towns - - -	2,441	68	-	1,012	-
Tuscany - - - -	2,299	9	-	-	-
Papal Territories - -	2,106	3	-	-	-
Western Africa - - -	1	-	9,596	-	-
British India - - - -	1	2	17,459	56	-
Australia - - - -	977	540	1	4	-
British N. America - -	578,748	468,572	9	45,614	14,813
British Guiana - - -	4	19	4	103	-
United States - - - -	13,832	839	-	13,309	-
Miscellaneous - - - -	1,002	491	633	36	57
Total loads - - - -	817,909	809,783	27,702	79,917	37,800

Of the chief woods employed in shipbuilding, seven have been acknowledged as first rate by the authorities at Lloyd's, and to this number must now be added an eighth, namely, iron bark, which has, in fact, only been admitted as a first-class wood since the period of opening the Exhibition in May 1851. These eight woods are,—

- |                      |                     |
|----------------------|---------------------|
| 1. English oak       | 5. East Indian teak |
| 2. American live-oak | 6. Green-heart      |
| 3. African oak       | 7. Morra            |
| 4. Morung saul       | 8. Iron-bark        |

The collection of woods from all parts of the world, exhibited by W. W. SAUNDERS (9), is particularly valuable from its extent and arrangement; the woods being all well labelled and classified according to their geographical distribution: the value of this collection is greatly enhanced by the density and weight per cubic foot of each wood being given. The Jury awarded a Prize Medal for this series, the value of which is considerably increased by the following classified catalogue :—



## WOODS, NATIVE OF OR GROWN IN BRITAIN.

NAME.	Place of Growth.	Weight per Cubic Ft.		Specific Gravity.	No. in Catalogue.	REMARKS.
		lbs.	oz.			
Abele. <i>See</i> Populus.						
Abies excelsa (spruce fir) - -	Oxfordshire -	27	2	•434	31	Used for scaffold poles, ladders, common carpentry, &c.
Acacia. <i>See</i> Robinia.						
Acacia (?) - - - -	Mortlake -	47	6	•758	75	
Acer campestre (maple) - -	Oxfordshire -	37	1	•593	84	Used for ornamental work when knotted; it makes the best charcoal; and turns well.
Do. do. - -	Epping - -	37	13	•605	562	Specimen from the lower part of the main stem of a young tree.
Acer pseudo-platanus (sycamore)	Wandsworth -	34	11	•555	598	Used in dry carpentry; turns well; and takes a fine polish.
Æsculus hippocastanum (horse chestnut).	,, - -	24	2	•386	895	Used for inlaying toys, turnery, and dry carpentry.
Do. do.	Epping - -	29	15	•479	540	From the stem of a young and vigorous tree.
Do. do.	Oxfordshire -	24	15	•439	25	
Alder. <i>See</i> Alnus.						
Alnus glutinosa (alder) - -	Oxfordshire -	23	8	•376	45	Used for common turnery work, &c.; and lasts long under water, or buried in the ground.
Do. do. - -	Epping - -	26	2	•418	543	Specimen taken near the ground.
Apple. <i>See</i> Pyrus.						
Arbutus Unedo (Arbutus) -	- -	44	12	•716	50	Hard, close-grained, and occasionally used by turners.
Do. do.	Lakes of Killarney.	45	6	•726	373	
Ash, common. <i>See</i> Fraxinus.						
Do. mountain. <i>See</i> Pyrus.						
Aspen. <i>See</i> Populus.						
Barberry. <i>See</i> Berberis.						
Beech, common. <i>See</i> Fagus.						
Berberis vulgaris (Barberry) -	- -	37	11	•603	83	Used chiefly for dyeing.
Betula alba (common birch) -	Epping - -	34	14	•558	557	Inferior in quality, but much used in the north of England and Scotland for staves for herring-barrels.
Bignonia radicans - - -	Mortlake -	19	3	307	650	
Birch, common. <i>See</i> Betula.						
Blackthorn. <i>See</i> Prunus.						
Carpinus betulus (hornbeam) -	Epping - -	40	5	•645	560	Very tough, and makes excellent cogs for wheels; forms a good charcoal; and is much valued for fuel.
Do. do.	- -	38	0	•608	798	
Castanea vesca (sweet chestnut)	Epping - -	27	6	•438	558	Specimen from the main stem, near the ground.
Do. (chestnut) - -	Cornwall -	36	7	•583	796	Used in ship-building, and is much in repute for posts and rails, hop poles, &c.
Catalpa syringæfolia - - -	Mortlake -	26	4	•420	295	Said to be very durable, and capable of a fine polish.
Cedar of Lebanon. <i>See</i> Cedrus.						
Cedrus Libani (Cedar of Lebanon).	- -	38	13	•621	660	Used for furniture, and sometimes for ornamental joinery work.
Do. do.	Kew Gardens	34	3	•547	76	
Do. (?) (cedar ?) -	- -	36	12	•588	44	
Cerasus vulgaris (May Duke cherry).	Wandsworth.	41	1	•657	47	Cherry-wood is much used for common furniture.
Do. (common cherry)	- -	33	3	•531	86	Excellent for common furniture, and much in repute; works easily, and takes a fine polish.
Do. do.	Epping - -	42	1	•673	555	
Cherry. <i>See</i> Cerasus.						
Chestnut, Horse. <i>See</i> Æsculus.						
Do. Sweet. <i>See</i> Castanea.						
Cork-tree. <i>See</i> Quercus.						

NAME.	Place of Growth.	Weight per Cubic Ft.	Specific Gravity.	No in Cata- logue.	REMARKS.
<i>Corylus Avellana</i> (common nut)	- -	lbs. oz. 36 0	.576	85	The young wood is used for fishing-rods, walking-sticks, &c. &c.
Do. (hazel) - -	Epping - -	36 8	.584	552	
Do. (filbert) - -	Oxfordshire -	35 13	.573	94	
Do. do. - -	Epping - -	37 4	.596	534	
Crab. <i>See</i> <i>Pyrus</i> .					
<i>Cratægus oxyacantha</i> (white-thorn).	Epping - -	45 14	.734	336	Hard, firm, and susceptible of a fine polish.
<i>Cupressus sempervirens</i> - -	Mortlake - -	34 10	.554	657	Fine-grained and fragrant; very durable.
<i>Cytisus Laburnum</i> (common laburnum).	Oxfordshire -	45 9	.729	20	Hard and durable, and much used by turners and joiners.
Do. do.	Wandsworth.				
Damson. <i>See</i> <i>Prunus</i> .					
Elder, common. <i>See</i> <i>Sambucus</i> .					
Elm. <i>See</i> <i>Ulmus</i> .					
<i>Euonymus europæus</i> (lance-wood).	- -	34 0	.544	97	Wood used for skewers, and is hard and fine-grained.
<i>Euonymus</i> (?) - - - -	Wandsworth -	32 6	.518	21	
<i>Fagus sylvatica</i> (common beech)	Epping - -	27 6	.438	559	Specimen from the lower branch of a large tree.
Do. do. - -	Oxfordshire -	41 2	.658	26	Much used for common furniture, for handles of tools, wooden vessels, &c. &c., and when kept dry is durable.
Do. do. - -	Epping - -	39 14	.638	559	
Filbert. <i>See</i> <i>Corylus</i> .					
Fir, Scotch. <i>See</i> <i>Pinus</i> .					
Do. silver. <i>See</i> do.					
Do. spruce. <i>See</i> <i>Abies</i> .					
<i>Fraxinus excelsior</i> (common ash).	Oxfordshire -	36 11	.587	24	Very tough and elastic; is much used by the coachmaker and wheelwright, and for making oars.
Furze. <i>See</i> <i>Ulex</i> .					
Hazel. <i>See</i> <i>Corylus</i> .					
<i>Hedera Helix</i> (Ivy) - - -	- -	29 10	.474	134	
Do. do. - - -	Oxfordshire -	37 12	.604	91	
Holly. <i>See</i> <i>Ilex</i> .					
Hornbeam. <i>See</i> <i>Carpinus</i> .					
Horse-chesnut. <i>See</i> <i>Æsculus</i> .					
<i>Ilex aquifolium</i> (holly) - -	- -	41 9	.665	48	The best white wood for Tunbridge-ware work; turns well, and takes a very fine polish.
Ivy. <i>See</i> <i>Hedera</i> .					
<i>Juglans regia</i> (common walnut)	Sussex - -	41 8	.664	663	Wood of a large branch.
Do. do. - -	„ - -	36 1	.577	664	Specimen taken from the main stem; used for ornamental furniture; much in repute for gunstocks; works easily.
Do. do. - -	- -	36 7	.583	898	From a very old tree.
Do. do. - -	Sussex - -	20 5	-	662	Used for ornamental furniture.
Laburnum. <i>See</i> <i>Cytisus</i> .					
Lancewood. <i>See</i> <i>Euonymus</i> .					
Larch. <i>See</i> <i>Larix</i> .					
<i>Larix europæa</i> (larch) - -	Oxfordshire -	35 0	.560	78	Used in house carpentry and for ship-building; is durable, strong, and tough.
Do. (Scotch larch) - - -	Scotland -	29 4	.468	787	Used in ship-building.
Laurel. <i>See</i> <i>Prunus</i> .					
Lilac. <i>See</i> <i>Syringa</i> .					
Lime. <i>See</i> <i>Tilia</i> .					
<i>Liriodendron tulipifera</i> (tulip tree).	- -	27 2	.434	298	Apparently of little value; attains to a large size.
Locust. <i>See</i> <i>Robinia</i> .					
<i>Magnolia glauca</i> - - -	- -	31 7	.503	296	
<i>Magnolia grandiflora</i> - - -	Putney - -	37 5	.597	302	The tree in the United States grows with a clear stem of 60 to 80 feet high.
Maple. <i>See</i> <i>Acer campestre</i> .					
<i>Morus nigra</i> (common mulberry)	Mortlake -	41 5	.661	654	Sometimes used for furniture, and by turners, but is of little durability.
Mountain ash. <i>See</i> <i>Pyrus</i> .					
Mulberry. <i>See</i> <i>Morus</i> .					
<i>Negundo fraxinifolium</i> - -	Wandsworth -	33 15	.543	659	Rather fine-grained, but of little value.

NAME.	Place of Growth.	Weight per Cubic Ft.	Specific Gravity.	No. in Cata- logue.	REMARKS.
Nut. <i>See</i> Corylus.		lbs. oz.			
Oak. ( <i>See</i> Quercus) - - -	Marden, Kent	50 8	·808	730	Dug out of a deep cutting of the South-Eastern Railway.
Pear. <i>See</i> Pyrus.					
Pine. <i>See</i> Pinus.					
Pinus Picea (silver fir) - -	- -	23 2	·370	46	Used for house carpentry, masts of small vessels, &c.
Do. do. - - -	Wandsworth -	28 7	·455	607	
Pinus sylvestris (pine) - -	Oxfordshire -	24 5	·389	36	Much used for rafters, girders, and house-carpentry.
Do. (Scotch fir) - - -	,,	19 5	·309	43	Much used for house carpentry.
Plane. <i>See</i> Platanus.					
Platanus orientalis (plane) -	Wandsworth -	39 12	·636	96	An inferior wood, but much used in the Levant for furniture, &c.
Do. do. - - -	,,	33 7	·535	601	This wood shews a pretty mottled figure when cut with the ray.
Do. do. - - -	- -	35 9	·569	797	
Platanus sp. (Scotch plane) -	Scotland -	37 6	·598	774	
Plum. <i>See</i> Prunus.					
Pomegranate. <i>See</i> Punica.					
Populus alba (Abele) - - -	- -	27 11	·443	49	A light soft wood, of little value.
Do. (white poplar) - - -	Wandsworth -	25 9	·409	661	
Populus dilatata (Lombardy poplar).	,,	21 13	·349	596	Soft and spongy; rapidly decaying unless kept dry.
Populus tremula (aspen) - -	Epping - -	31 2	·498	556	From the lower part of the main stem; used by turners and for dry carpentry.
Populus sp. (Scotch poplar) -	Scotland -	34 6	·550	778	
Prunus armeniaca (apricot) -	Mortlake -	46 13	·749	309	Hard and fine-grained.
Prunus domestica (damson) -	Wandsworth -	45 8	·728	22	Hard and fine-grained, but not very durable; used for turning, &c.
Do. (Orleans plum) - - -	Oxfordshire -	44 8	·712	23	
Prunus Laurocerasus (laurel) -	- -	46 14	·750	55	Hard and compact, taking a good polish.
Do. do. - - -	Epping - -	42 5	·677	545	Specimen from an old plant.
Prunus spinosa (black thorn) -	Oxfordshire -	43 11	·699	93	Hard, capable of a fine polish, but apt to split.
Punica granatum - - -	Mortlake -	39 4	·628	653	Hard and close-grained.
Pyrus aucuparia (mountain ash)	Yorkshire -	38 6	·614	293	Fine-grained, hard, and takes a good polish; used in turnery, and for musical instruments.
Do. do. - - -	Epping - -	39 8	·632	535	
Pyrus communis (Bergamot pear).	Bermondsey -	38 9	·617	19	Strong, compact, and close grained; used for turning handles to tools, &c., and takes a good black dye.
Do. (pear) - - -	Oxfordshire -	38 10	·618	90	
Do. (garden pear)	Epping - -	40 1	·641	549	Specimen from the upper part of the main stem.
Do. (swan's egg pear)	Wandsworth -	34 9	·553	604	
Do. (wild pear) - - -	Epping - -	39 4	·628	544	Specimen from a young tree cut near the ground.
Do. do. - - -	,,	38 2	·610	551	Specimen from the upper part of the main stem.
Pyrus malus (apple) - - -	Oxfordshire -	36 0	·576	77	
Do. (garden apple) - - -	Epping - -	39 7	·631	548	Specimen from the upper part of the stem.
Do. (crabb) - - -	Oxfordshire -	45 5	·725	82	Specimen from a tree about twenty years old.
Do. do. - - -	Yorkshire -	45 6	·726	297	Hard, close-grained, and strong.
Pyrus Sorbus (service tree) -	Epping - -	46 11	·747	554	Hard, fine-grained, and compact; much in repute by millwrights for cogs, friction rollers, &c.
Pyrus torminalis - - -	Isle of Wight -	42 7	·679	372	Strong and fine-grained; used by turners.
Quercus Ilex (evergreen oak) -	Wandsworth -	47 5	·757	599	Wood very shaky when aged; is durable and strong, and makes an excellent charcoal.
Do. do. - - -	- -	47 4	·756	88	
Do. do. - - -	Surrey - -	40 2	·642	656	
Quercus pedunculata (English oak).	Sussex - -	39 0	·624	104	This oak is much esteemed for ship-building; the strongest and most durable of British woods.
Do. (pollard oak)	Wandsworth -	44 10	·714	504	From an old pollard tree.
Do. (common oak)	Epping - -	40 14	·654	542	Part of a large lower branch.

NAME.	Place of Growth.	Weight per Cubic Ft.	Specific Gravity.	No. in Cata- logue.	REMARKS.
<i>Quercus pedunculata</i> (common oak).	Epping - -	40 11	•651	553	Part of a large branch.
<i>Quercus sessiliflora</i> (Welch oak)	- -	37 11	•603	262	A good wood for ship-building; said to be inferior to the common oak.
<i>Quercus Suber</i> (cork tree)	Botanic Garden, Chelsea.	51 10	•826	503	Heavy and durable, but very apt to split.
<i>Quercus</i> sp. (American oak)	Wandsworth -	42 9	•681	608	Hard and compact.
Do. (bastard oak)	Tackley, Oxon	33 6	•534	30	
Do. (Spanish oak)	Oxfordshire -	43 13	•701	29	Close-grained and apparently a good wood.
<i>Rhamnus alaternus</i> - - -	Mortlake	48 6	•774	652	Hard and close grained.
<i>Rhamnus catharticus</i> - - -	Epping Forest	34 11	•555	539	
<i>Rhamnus frangula</i> - - -	Epping - -	25 8	•408	541	
<i>Robinia Pseud-Acacia</i> (common acacia, locust).	„ - -	44 1	•705	550	Specimen from the upper part of the main stem; much used for treenails in ship-building, and in the United States is much in repute for posts and rails.
Do. do.	Wandsworth -	40 11	•651	600	
Do. do.	Mortlake -	55 6	•886	703	
<i>Salix alba</i> (white willow)	Surrey - -	24 14	•398	658	Used for toys, and by the millwright; is tough, elastic, and durable.
<i>Salix caprea</i> (palm willow)	Oxfordshire -	24 8	•332	799	Tough and elastic; is much used for handles to tools, and makes good hurdles.
<i>Salix fragilis</i> (crack willow)	„ - -	32 0	•392	28	Light, pliant, and tough; is said to be very durable.
<i>Salix</i> —? (black willow)	„ - -	33 8	•512	79	Tough and elastic; well adapted for turning.
			•536	80	
			•474	896	
Sallow. See <i>Salix</i> .					
<i>Sambucus nigra</i> (common elder)	„ - -	34 0	•544	27	
Do. do.	Epping - -	37 11	•603	561	
Scotch fir. See <i>Pinus</i> .					
Service tree. See <i>Pyrus</i> .					
Silver fir. See <i>Pinus</i> .					
Spruce fir. See <i>Abies</i> .					
Sycamore. See <i>Acer</i> .					
<i>Syringa vulgaris</i> (lilac)	Wandsworth -	48 15	•783	606	Very hard and compact.
Do. do.	Surrey - -	48 13	•781	655	
<i>Taxus baccata</i> (yew)	- -	41 9	•665	54	Used for making bows, chains, handles, &c.; the wood is exceedingly durable, very tough, elastic, and fine-grained.
Do. do.	West Grinstead	50 12	•812	801	
<i>Thuja orientalis</i> - - -	Mortlake -	34 14	•558	308	
<i>Tilia europæa</i> (common lime)	Wandsworth -	27 3	•435	597	Used for cutting-blocks, carving, sounding-boards and toys.
<i>Tilia</i> sp. (Scotch lime)	Scotland -	30 5	•485	773	Used for turning and carving.
Tulip tree. See <i>Liriodendron</i> .					
<i>Ulex europæa</i> (furze)	Ilfracombe -	52 8	•840	314	Heavy, hard, and close grained; in the north of Devonshire the stem reaches sometimes 6 inches in diameter.
<i>Ulmus campestris</i> (English elm)	- -	30 9	-	-	Used in ship-building for under-water planking and a variety of other purposes, being very durable when kept wet or buried in the earth.
Do. (English elm)	- -	26 5	•489	317	
Do. do.	- -	-	•421	105	
Do. do.	- -	41 9	•665	779	
Do. (common elm)	Oxfordshire -	34 13	•557	81	
Do. do.	Epping - -	39 7	•631	537	Part of one of the lower branches of a young vigorous tree.
Do. (pollard elm)	West Grinstead	31 13	•509	802	From an old pollard tree.
<i>Ulmus montana</i> (wych elm)	Oxfordshire -	35 14	•574	89	Thought to be better than common elm, and is used in carpentry, ship-building, &c.
Do. do.	Epping - -	36 5	•581	538	
Vine. See <i>Vitis</i> .					
<i>Vitis vinifera</i> (vine)	Wandsworth -	42 11	•683	609	
Walnut. See <i>Juglans</i> .					
Willow. See <i>Salix</i> .					
Yew. See <i>Taxus</i> .					

## WOODS OF EUROPE.

NAME.	Place of Growth.	Weight per Cubic Ft.		Specific Gravity.	No. in Catalogue.	REMARKS.
		lbs.	oz.			
Abies excelsa (Dantzic deal) -	- - -	24	10	•394	114	
Do. do. -	- - -	30	7	•487	115	Specimen of wood of good quality.
Do. do. -	- - -	28	2	•450	116	Ditto.
Do. (spruce fir) -	N. of Europe	17	10	•282	272	Used for common carpentry work.
Do. (spruce) -	- - -	25	13	•413	321	
Arbutus Unedo (Kouramia, Coumaro).	Albania - -	52	0	•832	3	Hard and close-grained; used by turners.
Bay. See Laurus.						
Beech. See Fraxinus.						
Betula alba (Norway birch) -	Norway - -	33	0	•528	341	An inferior wood; occasionally used in ship-building.
Birch. See Betula.						
Box. See Buxus.						
Buxus sempervirens (box) -	Gallicia - -	60	15	•975	670	Used by turners, &c.
Do. do. -	- - -	54	10	•874	34	Much used by turners, and for a number of useful purposes.
Castanea vesca (chesnut) -	Portugal - -	40	13	•653	667	Considered a good wood when not too old.
Castano del Pais - - -	„ - - -	28	11	•459	669	Used in ship-building.
Chesnut. See Castanea.						
Chrysoxylon. See Rhus.						
Citron. See Citrus.						
Citrus aurantium (orange tree)	Albania - -	40	7	•647	15	Fine-grained; used by turners and for ornamental work.
Citrus medica (citron) - -	Greece - -	31	0	•496	291	Fine-grained.
Citrus Limonum (lemon tree) -	Albania* - -	47	9	•761	16	Hard, compact, and close-grained, with much the same character as the orange.
Coumaro. See Arbutus.						
Cupressus sempervirens (Oriental cypress).	Greece - -	36	5	•581	284	A very durable wood.
Daphne. See Laurus.						
Deal, Dantzic. See Abies.						
Deal, Prussian. See Pinus.						
Etia. See Salix.						
Ficus Carica (fig tree) - -	Albania - -	34	8	•552	14	Wood shrinks much in drying; is of little value.
Fig tree. See Ficus.						
Fraxinus —? (beech) - - -	„ - - -	39	0	•624	290	
Ptelia - - - - -	„ - - -	40	1	•641	12	Probably an elm.
Gavro - - - - -	Albania - -	38	14	•622	6	
Juglans regia (Nogal del Pais) -	Portugal - -	35	4	•564	671	Used in ship-building.
Do. (walnut) - - -	France - -	37	13	•605	899	Used for furniture.
Kouramia. See Arbutus.						
Koutsoupia - - - - -	Albania - -	33	8	•536	9	
Laurus nobilis (Bay daphne Gr.)	„ - - -	36	0	•576	7	
Leepa, or Lipa - - - - -	Greece - -	28	13	•461	287	
Lemon tree. See Citrus.						
Melikoukia - - - - -	„ - - -	36	15	•591	285	
Melios. See Ornus.						
Nogal del Pais. See Juglans.						
Oak. See Quercus.						
Olea europæa (wild olive) -	Albania - -	52	14	•847	2	Close-grained, and occasionally beautifully veined; much used for ornamental work.
Orange tree. See Citrus.						
Oriental cypress. See Cupressus						
Ornus europæa (Melios) - - -	„ - - -	47	1	•753	5	The manna-tree; wood compact.
Philike, or feliki - - - -	„ - - -	48	0	•768	289	
Do. - - - - -	„ - - -	52	10	•842	1	Heavy and compact.
Pina del Pais - - - - -	Portugal - -	28	13	•461	673	Used for common carpentry work.
Pine - - - - -	Gallicia - -	33	9	•537	672	Ditto.
Pinus Laricio? (sweet pine) -	Portugal - -	28	15	•463	666	A strong and durable wood.
Pinus sylvestris (Dantzic fir) -	Prussia - -	32	4	•516	271	Used in carpentry work.
Do. (Riga fir) - - - -	„ - - -	37	10	•602	270	Ditto.
Do. (Prussian deal) - - -	- - -	43	6	•674	269	Used for decks of ships and for carpentry work.
Pinus —? - - - - -	Cadiz - - -	38	14	•622	759	A heavy, hard pine.

NAME.	Place of Growth.	Weight per Cubic Ft.	Specific Gravity.	No. in Cata- logue.	REMARKS.
Pournari. <i>See</i> Quercus.		lbs. oz.			
Prunari. do.					
Quercus Cerris (Adriatic oak) -	Trieste - -	37 15	·607	263	A strong and useful wood for ship-building.
Quercus pedunculata (Baltic oak).	Prussia - -	37 12	·604	260	Extensively used in ship-building.
Quercus sessiliflora (East country oak).	- -	40 1	·641	331	Ditto.
Quercus —? (Prunari Pour-nari).	Albania - -	51 13	·829	4	Heavy, but much given to split.
Quercus sp., Adriatic oak (?) -	Trieste - -	54 1	·865	728	Used in ship-building.
Rhus cotinus (Chrysoxylon, young fustic).	Albania - -	38 0	·608	13	Produces a yellow dye.
Ricchi - - - - -	„	52 14	·846	8	Much used for charcoal in Albania.
Roble del Pais - - - -	Portugal - -	64 0	1·024	668	Used in ship-building.
Salix —? (Etia) - - - -	Albania - -	34 15	·559	11	
Do. (Sklythra) - - - -	„	27 8	·440	10	Probably a willow.
Skiua - - - - -	„	48 10	·778	288	
Sklythra. <i>See</i> Salix.					
Spruce fir. <i>See</i> Abies.					
Svedami - - - - -	Greece - -	46 6	·742	286	
Young fustic. <i>See</i> Rhus.					
Zinzifin - - - - -	- -	47 7	·759	301	

## WOODS OF ASIA.

Acacia —? (Popceah) - -	Tavoy - -	23 3	·371	851	A large tree; wood used in house-building, &c.
Do. do. - - - -	„ - -	23 3	·371	803	A very large tree; wood used for posts, bows, and rollers, and for cotton gins.
Ægle marmelos (Bellee) - -	Ceylon - -	49 1	·784	583	
Amboyna. <i>See</i> Pterospermum					
Anacardium latifolium (Bhela)	Gualpara - -	37 0	·592	807	Used for making chests and couches.
Andrachne apetala - - -	India - -	33 14	·542	725	
Angelly wood. <i>See</i> Artocarpus.					
Annah-beng. <i>See</i> Fagræa.					
Artocarpus Chaplasha - -	India - -	34 12	·556	681	
Do. hirsuta (Angelly wood).	Cochin - -	36 14	·590	475	Used in ship-building.
Do. integrifolia (Jack-wood).	Travancore -	35 10	570	377	
Do. —? (Pynyathe, Tanabeng).	Tavoy - -	-	-	832	
Aultoovanchee - - - -	Travancore -	31 6	·502	429	
Auyanny - - - - -	„ - -	32 11	·523	691	
Averrhoa Carambola - - -	India - -	39 11	·635	378	
Bah-nah-thoa - - - - -	Tavoy - -	-	-	859	Used in boat and house-building.
Bellee. <i>See</i> Ægle marmelos.					
Betula Bhojpattra - - - -	Nepal - -	35 5	·565	1035	Wood moderately hard, compact.
Bhela. <i>See</i> Anacardium.					
Bignonia chelonoides - - -	„ - -	42 8	·680	1031	A large tree.
Do. —? (Tathee) - - -	Tavoy - -	49 8	·792	816	A very large tree.
Do. —? (Thuggainee) - -	„ - -	40 4	·644	837	A large tree, used in house-building.
Black ebony. <i>See</i> Diospyrus.					
Booroota. <i>See</i> Swietenia.					
Cadooca Marum - - - - -	Travancore -	38 3	·611	444	
Calophyllum —? (Thurappe, Chopee).	Martaban -	43 0	·688	1072	Used for masts and spars, and for pestles to oil presses.
Cambagum - - - - -	Travancore -	28 11	·459	396	
Camoo - - - - -	- -	36 0	·576	877	
Camphor wood. <i>See</i> Laurus.					
Cannal - - - - -	Travancore -	47 6	·758	403	
Cannao - - - - -	„ - -	58 7	·935	402	
Caragaloo - - - - -	„ - -	33 0	·528	436	
Carapa —? (Taila-oon.) - -	Tavoy - -	36 0	·576	880	Used in house-building.
Careya —? (Kaza) - - - -	Martaban -	46 0	·736	1036	Timber of large size; used for posts, &c.
Do. (Kombo) - - - - -	Gualpara -	42 12	·684	810	Wood hard and strong; used for the stocks of matchlocks.

NAME.	Place of Growth.	Weight per Cubic Ft.		Specific Gravity.	No. in Catalogue.	REMARKS.
		lbs.	oz.			
Caringosha - - - - -	Travancore -	45	5	·725	386	
Carivagah - - - - -	,, -	33	10	·538	410	
Caroogha - - - - -	Travancore -	44	10	·714	438	
Caroo Marum - - - - -	,, -	47	11	·763	405	
Carrintha - - - - -	,, -	34	4	·548	401	
Cassia - - - - -	India -	41	9	·661	698	
Castanea indica - - - - -	,, -	39	0	·624	680	
Castanea tribuloides (Cotoor, Chisee, Makoo Shingali).	Nepal -	62	0	·992	927	Used for large mortars and pestles for grinding corn.
Catunguin - - - - -	Manilla -	42	11	·683	497	Used in ship-building.
Caultoo mooroonga - - - - -	Travancore -	45	14	·734	392	
Cedar - - - - -	India -	25	2	·402	363	
Cedar of Himalaya. <i>See Juniperus.</i>						
Cedrela Toona (Toon, Tunga, Poma, Jeea).	Gualpara -	36	0	·576	1041	Wood very durable, and much used for furniture.
Do. do.	India -	32	9	·521	708	
Chambagum - - - - -	Travancore -	37	11	·603	383	
Chana - - - - -	,, -	20	7	·327	426	
Chasepoo. <i>See Laurus.</i>						
Chikagambhari. <i>See Premma.</i>						
Chinchona gratissima (Tungnusi).	Nipal -	23	0	·368	931	Used for posts and rafters.
Chisee. <i>See Castanea.</i>						
Choomulloo. <i>See Diospyrus.</i>						
Choo-muna. <i>See Xanthophyllum.</i>						
Chopee. <i>See Calophyllum.</i>						
Chorangaree - - - - -	Travancore -	29	11	·475	443	
Cæsalpinea Sapan (Sappan) -	- -	60	14	·974	67	Used for dyeing, and sometimes by the turner.
Coombool - - - - -	Travancore -	31	14	·510	407	
Cotoor. <i>See Castanea.</i>						
Coturnba - - - - -	Ceylon -	23	5	·373	587	Occasionally used in house-building in Ceylon, but not esteemed.
Cou-moo - - - - -	Tavoy -	-	-	-	-	Used in boat and house building.
Cusroo. <i>See Quercus.</i>						
Cynometra polyandra - - - - -	India -	52	10	·842	685	
Cynometra — ? (Maingga) -	Martaban -	48	7	·775	822	A small tree.
Dalbergia lanceolaria (Neddoon, Nedun, Nander-wood).	Ceylon -	45	7	·727	588	Used and valued for house-building in Ceylon.
Dalbergia latifolia (East India ebony).	India -	66	8	1·064	966	
Debool - - - - -	Ceylon -	38	3	·615	579	
Dheyri. <i>See Taxus.</i>						
Diospyrus melanoxylon (black ebony).	- -	61	2	·978	40	Used for turnery work, and for inlaying.
Diospyrus racemosa - - - - -	India -	34	11	·555	687	
Diospyrus — ? (Ryamucha, Choomulloo).	Martaban -	50	3	·803	1071	Used in house-building.
Dipterocarpus — ? (Kunneanphew).	Tavoy -	25	3	·403	871	Grows to a great size ; used for beams and planks.
Domba - - - - -	Ceylon -	33	3	·531	585	Used for the outriggers of canoes.
Dombeya melanoxylon (St. Helena ebony).	St. Helena -	71	9	1·145	716	
East India ebony. <i>See Dalbergia.</i>						
East India rosewood - - - - -	India.				986	
East India teak. <i>See Tectona.</i>						
Ehretia laevis - - - - -	Botanic Garden, Calcutta.				1034	
Ekebergia — ? (Jiyakohi) -	Gualpara -	39	1	·625	958	
Eleocarpus serratus ? (Weraloo)	Ceylon -	33	8	·536	586	
Eriobotrya japonica (Loquat)	India -	46	11	·747	724	
Eugenia malacoensis (Jamboo)	Ceylon -	30	4	·484	577	
Do. do.	,, -	30	14	·494	577	
Excoecaria ? - - - - -	Tavoy.				821	
Fagraea fragrans (Annah-beng)	Martaban -	52	8	·840	1037	Timber large, compact, very hard.
Ficus — ? (Thubboo) - - - - -	Tavoy -	21	0	·336	819	Used in house carpentry.
Gadeboo - - - - -	Ceylon -	21	3	·339	580	Used for making charcoal for gunpowder.

NAME.	Place of Growth.	Weight per Cubic Ft.		Specific Gravity.	No. in Catalogue.	REMARKS.
		lbs.	oz.			
Galloophah - - - - -	Travancore -	53	0	•848	513	
Garcinia — ? (Pulowa) -	Tavoy - - -	45	8	•728	827	A large tree, used for posts.
Garcinia — ? (Purrah wah) -	„ - - -	45	8	•728	865	A strong durable wood.
Ghese. <i>See</i> Quercus.						
Gmelina arborea - - - - -	India - - -	32	3	•515	709	
Do. - - - - -	„ - - -	32	6	•518	718	
Go-na - - - - -	Ceylon - - -	24	8	•392	582	
Gordonia ? (Kaza) - - - - -	Martaban -	37	10	•602	1027	Large timber, used for ordinary building purposes.
Guacua - - - - -	India - - -	41	14	•670	710	
Guava. <i>See</i> Psidium.						
Gundruay - - - - -	„ - - -	34	15	•559	697	Wood with a peculiar odour, resembling that of anise-seed.
Heretiera — ? (Soondree) -	„ - - -	57	15	•927	493	Used in ship-building.
Do. do. - - - - -	„ - - -	49	15	•799	473	
Hibiscus macrophyllus - - -	Tavoy - - -	27	13	•445	806	A middle-sized tree, used for common building purposes.
Do. - - - - -	„ - - -	28	0	•448	826	
Hibiscus ? - - - - -	„ - - -	-	-	-	804	Used for common building purposes ; the bark is made into cordage.
Hopea floribunda (Tantheyra) -	„ - - -	27	11	•443	808	A very large tree.
Hopea odorata (Tengaun, Thaengong). -	Martaban -	38	0	•608	954	Canoes are made of this tree, which produces a valuable resin.
Do. - - - - -	Tanasserim Coast.	40	12	•652	863	Used in boat-building, grows to a large size, and is abundant.
Hune - - - - -	Burma.			-	876	
Indian saul. <i>See</i> Shorea.						
Indian wood - - - - -	- - -	45	6	•726	342	
Iron-wood. <i>See</i> Metrosideros.						
Jack-wood. <i>See</i> Artocarpus.						
Jambo. <i>See</i> Eugenia.						
Jeea. <i>See</i> Cedrela.						
Jeeah - - - - -	India - - -	36	11	•587	713	
Jiyakohi. <i>See</i> Ekebergia.						
Juglans pterococca - - - - -	„ - - -	39	14	•638	695	
Juniperus excelsa (Cedar of Himalaya). -	India - - -	34	7	•551	1039	An excellent light wood.
Kaantha - - - - -	Tavoy - - -	-	-	-	856	Small but valuable timber.
Kain tha-phogee. <i>See</i> Symlocos.						
Kaunzo-kurro - - - - -	„ - - -	43	0	•688	812	Used in boat-building.
Kayzai. <i>See</i> Laurus.						
Kaza. <i>See</i> Careya.						
Kaza. <i>See</i> Gordonia.						
Keahnaun - - - - -	„ - - -			-	837	
Keannan. <i>See</i> Xylocarpus.						
Keaza-Purroun - - - - -	„ - - -			-	947	Used in house-building.
Keetha. <i>See</i> Syndesmis.						
Keoun-lae. <i>See</i> Rottlera.						
Kombo. <i>See</i> Careya.						
Kuddoot-alain - - - - -	„ - - -	53	3	•851	840	Grows to a great size ; used in house-building.
Kuddoot-nee - - - - -	„ - - -	34	0	•554	829	An inferior wood ; used in boat-building.
Do. - - - - -	„ - - -	34	3	•547	864	
Kuenmounee. <i>See</i> Lagerstroemia.						
Kullowa. <i>See</i> Laurus.						
Kuncenee. <i>See</i> Sterculia.						
Kunna. <i>See</i> Pierardia.						
Kunnean-phew. <i>See</i> Diptercarpus.						
Kunneen-keunkee. <i>See</i> Bignonia.						
Kunneen-keunla. <i>See</i> Symlocos.						
Kurrowa. <i>See</i> Laurus.						
Kuzzoo. <i>See</i> Pierardia.						
Lagerstroemia reginae - - -	India - - -	46	8	•744	700	
Lagerstroemia — ? (Kuenmounee, Peema). -	Tavoy - - -	37	9	•601	839	



NAME.	Place of Growth.	Weight per Cubic Ft.		Specific Gravity.	No. in Catalogue.	REMARKS.
		lbs.	oz.			
Laurus camphora? (Camphor-wood).	China - -	35	14	•574	897	A wood emitting an agreeable aromatic odour.
Do. do.						
Laurus —? (Kayzai) - -	Tavoy - -	43	3	•691	809	Used in house carpentry.
Laurus —? (Kullowa, Kurrowa).	„ - -	30	0	•480	942	Produces the sassafras bark and camphor-wood of Martaban.
Do. do.	„ - -	30	0	•480	818	
Laurus —? (Lumpatch, Chasepoo).	Nepal - -	34	0	•544	955	Used in carpenter's work, and for beams.
Laurus —? (Panatha) - -	Tavoy - -	43	0	•688	881	Used in house carpentry.
Laurus —? (Sassafras) - -	India - -	32	12	•524	712	
Laurus —? (Thuggoo) - -	Tavoy - -	-	-	-	951	Used for oars and rudders.
Lolsi. See Taxus.						
Loquat. See Eriobotrya.						
Lumpatch. See Laurus.						
Maikay. See Murraya.						
Maingga. See Cynometra.						
Makoo-shingali. See Castanea.						
Manga chapui - - - -	Manilla - -	41	15	•671	500	Used in ship-building.
Maroother - - - -	Travancore - -	37	7	•599	390	
Maunthaen or Sassafras - -	Tavoy - -	36	10	•586	901	Used in making house furniture.
Maymaka - - - -	India - -	51	12	•828	956	Used for timbers of junks.
May-rang - - - -	Tavoy - -	48	9	•777	1043	Said to be very durable; used for the posts of houses on the banks of rivers.
Megeongee - - - -	„ - -	38	9	•617	945	A very large tree, used in house-building.
Melia Azadirachta - - - -	India - -	46	1	•739	722	
Metrosideros vera (iron-wood)	China - -	53	0	•848	494	Used for anchors by the Chinese.
Mimosa odoratissima - - - -	India - -	45	6	•726	711	
Mimosa polystachya - - - -	Botanic Garden, Calcutta.	32	0	•512	1032	
Mimusops Elengi - - - -	Tavoy - -	46	0	•736	924	A slow-growing tree.
Moluvé or Moloba - - - -	Manilla - -	51	3	•819	499	Used in ship-building.
Moonga Vallah - - - -	Travancore - -	38	5	•613	411	
Mootocorandy - - - -	„ - -	38	13	•621	440	
Morinda citrifolia - - - -	Botanic Garden, Calcutta.	28	10	•458	913	The root yields a red dye.
Morung Saul. See Shorea.						
Munhacadambo - - - -	Travancore - -	38	15	•623	394	
Murraya—? (Maikay) - - - -	- - - -	60	13	•973	847	A strong tough wood.
Myrsine capitellata - - - -	Nepal - -	21	11	•347	911	Said to be compact and hard.
Nander Wood. See Dalbergia.						
Nar, or sacred wood - - - -	Ceylon - -	55	0	•880	584	Used by the natives for building temples and royal palaces; an excellent wood.
Neddoon. See Dalbergia.						
Nedun. See Dalbergia.						
Neeroovalum - - - -	Travancore - -	24	5	•389	423	
Nellee - - - -	Ceylon - -	34	8	•552	589	
Nelty, or Nelly - - - -	Travancore - -	42	5	•677	419	
Nerium tinctorium - - - -	India - -	39	14	•638	692	
Nun Pougoo - - - -	Travancore - -	56	15	•911	379	
Odina Wodier - - - -	India - -	41	0	•656	684	
Osyris peltata (Phaoun) - - - -	Tavoy - -	29	10	•474	813	
Do. - - - -	India - -	30	8	•488	690	
Pah-doubh - - - -	- - - -	60	0	•960	969	
Palaepan. See Sapotea.						
Palah - - - -	Travancore - -	14	9	•230	404	
Palai - - - -	Borneo - -	23	13	•381	368	Used in the construction of canoes.
Palm - - - -	India - -	57	9	•921	705	
Palmist - - - -	„ - -	62	7	•929	52	The wood of one of the palms used for cabinet and marqueterie work.
Panacha - - - -	Travancore - -	44	14	•718	388	
Panatha. See Laurus.						
Peema. See Lagerstrœmia.						
Pen-lay-oun - - - -	- - - -	32	0	•512	887	Affords good crooked timber.
Pen-lay-peen - - - -	Tavoy - -	-	-	-	944	
Peroomarum - - - -	Travancore - -	27	14	•446	418	
Phaoun. See Osyris.						
Pienmahne - - - -	Tavoy - -	-	-	-	861	
Pienmah-pue - - - -	„ - -	-	-	-	853	

NAME.	Place of Growth.	Weight per Cubic Ft.	Specific Gravity.	No. in Cata- logue.	REMARKS.
Pierardia? (Kunna, Kuzzo) -	Tavoy - -	37 12	•604	824	
Pinus dammara - - - -	„ - -	39 0	•627	869	A very large tree used for beams and rafters.
Pinus longifolia - - - -	Nepal - -	- -	-	1070	Excellent timber.
Pinus Webbiana - - - -	„ - -	21 0	•336	905	
Poma. See Cedrela.					
Poomaram - - - - -	Travancore -	29 8	•472	432	
Poomdroo - - - - -	„ - -	28 15	•463	406	
Poonah - - - - -	„ - -	40 13	•653	417	
Poovem - - - - -	„ - -	50 15	•815	399	
Popeeah. See Acacia.					
Pothiree - - - - -	„ - -	35 4	•564	437	
Premna hircina (Chikagamb- hari.	Gualpara -	43 0	•691	878	A strong odour, like that emitted by the musk rat, is given out by this wood; used for musical instruments.
Psidium pomiferum (Guava) -	Travancore -	44 3	•704	382	
Pterocarpus santalinus (Rea sandus).	India - -	46 14	•750	714	
Pterocarpus? (Thoun-kheea) -	Martaban -	51 9	•826	817	
Pterospermum indicum (Am- boyna).	East Indian Islands.	39 10	634	894	Much used for ornamental work.
Pullova. See Garcinia.					
Purrah-wah. See Garcinia.					
Puzzeen-zwa. See Ternstroemia.					
Pynyathe. See Artocarpus.					
Quercus Amherstiana (Tirbbae, Ryakle).	Martaban -	57 10	•922	1047	Used for coarse furniture.
Quercus fenestrata - - - -	India - -	47 0	•752	679	
Quercus lanceaefolia - - - -	„ - -	41 10	•666	678	
Quercus lappacea - - - -	„ - -	51 4	•820	677	
Quercus semecarpifolia (Ghese, Cusroo).	Nepal - -	22 0	•352	836	Wood light, from a large tree.
Red sanders. See Pterocarpus.					
Regal wood - - - - -	Thibet - -	54 6	•870	17	A very beautiful wood; much prized and used by persons of high rank only.
Rhizophora decandra - - - -	India - -	46 0	•736	721	
Rottlera? (Keoun-lae) - - - -	Tavoy - -	37 9	•601	815	A large tree; wood used for rudders, &c.
Ryakle. See Quercus.					
Ryamucha. See Diospyrus.					
Sacred wood. See Nar.					
Saint Helena ebony. See Dom- beya.					
Sandoricum—? (Thittoo) - -	Tavoy - -	28 6	•454	820	Used for furniture.
Santalum album - - - -	India - -	47 13	•765	702	
Sapan. See Cæsalpinia.					
Saphew. See Xanthophyllum.					
Sapotea? (Palaepan) - - - -	Tavoy - -	41 0	•656	811	A very large tree; wood used in building.
Sassafras. See Laurus.					
Satin wood. See Swietenia.					
Scytalia longan - - - - -	India - -	44 8	•712	689	
Scytalia trijuga - - - - -	„ - -	60 0	•960	696	
Scytalia—? - - - - -	„ - -	39 6	•630	715	
Shorea robusta (Indian saul) -	- - - -	52 10	•842	339	A strong and durable wood; in great repute for ship-building.
Do. (Morung saul) - - - -	Nepal - -	43 14	•702	123	
Do. (do.) - - - - -	„ - -	45 14	•734	122	Much used in India for various purposes, where strength and durability are required.
Sonneratia? (Thaumba) - - - -	Tavoy - -	42 0	•672	814	A small tree.
Soondre. See Heretiera.					
Sophora robusta - - - - -	India - -	42 4	•676	688	
Sterculia? (Kuneenee) - - - -	Tavoy - -	- -	-	854	Tree of very large dimensions.
Swietenia chloroxylon (Satin wood, Booroota).	Ceylon - -	51 0	•816	578	Used for furniture, &c.
Swietenia febrifuga - - - -	India - -	54 14	•378	701	
Symplocos floribunda - - - -	Nepal - -	- -	-	917	A large tree.
Symplocos? (Kain-the-phogee)	Tavoy - -	34 7	•551	867	Affords good crooked timber.
Symplocos? (Kunneen-keunkee, Kunneen-keunla).	„ - -	34 4	•548	838	Used for beams, posts, &c.
Syndesma tavoyana (Keetha) -	„ - -	- -	-	855	Used in house-building.

NAME.	Place of Growth.	Weight per Cubic Ft.		Specific Gravity.	No. in Catalogue.	REMARKS.
		lbs.	oz.			
Taaka. <i>See</i> Tectona.						
Taila-oon. <i>See</i> Carapa.						
Tanabang. <i>See</i> Artocarpus.						
Tantheya - - - - -	Tavoy - - -	44	0	.704	858	
Do. <i>See</i> Hopea.						
Tathee. <i>See</i> Bignonia.						
Taxus virgata (Dheyri, Lolsi) -	Nepal - - -	-	-	-	993	Grows to a large size; timber strong and good.
Teak. <i>See</i> Tectona.						
Tectona grandis (Teak, Taaka, Tekka).	Ceylon - - -	47	3	.755	581	One of the best of the Ceylon woods.
Do. do. -	Travancore -	42	8	.680	376	A strong and durable wood; much valued for ship-building.
Do. (East Indian Teak)	Malabar coast	37	14	.606	121	The best kind of teak.
Do. do. -	Moulmein -	31	9	.505	119	
Do. do. -	„ -	32	1	.513	120	This quality of teak is not so good as the Malabar.
Tekka. <i>See</i> Tectona.						
Tengaun. <i>See</i> Hopea.						
Terminalia catappa - - -	Botanic Garden, Calcutta.	30	0	.480	1074	A noble ornamental tree; wood very good.
Terminalia chebula - - -	India - - -	42	10	.682	682	
Terminalia citrina - - -	„ - - -	60	2	.962	683	Very heavy and compact.
Terminalia —? (Thuphauga)	Tavoy - - -	50	5	.805	823	
Ternstroemia —? (Puzzeenzwa).	„ - - -	36	7	.783	830	A rather large tree; used for posts and rafters.
Tetranthera nitida - - -	India - - -	34	4	.548	899	
Teutha - - - - -	Tavoy - - -	54	0	.864	831	
Thaengong. <i>See</i> Hopea.						
Thallaroo - - - - -	Travancore -	44	0	.704	431	
Thambuvoo - - - - -	„ - - -	55	6	.886	581	
Thau-baun-po - - - - -	Tavoy - - -	-	-	-	888	An inferior light wood.
Thau-baun-thau-lay - - -	„ - - -	-	-	-	849	A strong durable wood, but does not saw kindly.
Thaumba. <i>See</i> Sonneratia.						
Thittoo. <i>See</i> Sandoricum.						
Thoun-Kheea. <i>See</i> Pterocarpus.						
Thoun-mynga - - - - -	„ - - -	48	0	.768	884	Used in house-building.
Thubboo. <i>See</i> Ficus.						
Thuggainee. <i>See</i> Bignonia.						
Thuggoo. <i>See</i> Laurus.						
Thuphanga. <i>See</i> Terminalia.						
Thurappe. <i>See</i> Calophyllum.						
Thymboo - - - - -	„ - - -	17	7	.279	860	A strong and durable light wood.
Thymboo, Thau-baun-po - - -	„ - - -	17	3	.275	825	Strong durable light wood, used in boat-building.
Tirbbae. <i>See</i> Quercus.						
Toon. <i>See</i> Cedrela.						
Town-pine - - - - -	„ - - -	28	13	.461	852	Used in boat-building, and much esteemed.
Town suggah - - - - -	„ - - -	-	-	-	943	
Tunga. <i>See</i> Cedrela.						
Tungnusi. <i>See</i> Chinchona.						
Une - - - - -	„ - - -	-	-	-	949	Affords good crooked timber; used for boat-building.
Vallathorashel - - - - -	Travancore -	22	1	.353	415	
Vanava - - - - -	Manilla - - -	42	11	.683	496	Used in ship-building.
Vanneemooringa - - - - -	Travancore -	40	10	.650	400	
Vateria lanceaefolia - - -	India - - -	53	15	.863	694	
Vavoolagoo - - - - -	Travancore -	29	4	.468	397	
Vellilagoo - - - - -	„ - - -	28	8	.456	433	
Velty, or Vetty - - - - -	„ - - -	40	11	.657	416	
Venga - - - - -	„ - - -	47	1	.753	380	
Vinnee - - - - -	„ - - -	15	8	.248	435	
Vinny marum - - - - -	„ - - -	11	3	.179	434	
Vyashanthak - - - - -	„ - - -	41	0	.656	439	
Weraloo. <i>See</i> Eleocarpus.						
White dammar lout - - - - -	India - - -	-	-	-	948	
Xanthophyllum —? (Saphew, Choo-muna).	Martaban -	33	10	.538	1028	

NAME.	Place of Growth.	Weight per Cubic Ft.		Specific Gravity.	No. in Catalogue.	REMARKS.
		lbs.	oz.			
Xylocarpus—? (Keannan)	Tavoy	46	9	•745	868	Used for furniture and in house-building.
Zeethee. See Zizyphus.						
Zizyphus—? (Zeethee)	India	35	11	•571	879	A very light soft wood, forming a good substitute for cork to the entomologist.
—? —? —? —?	Travancore				72	
—? —? —? —?	India	46	0	•736	374	
—? —? —? —?	Travancore	27	14	•446	424	
—? —? —? —?	„	44	6	•710	447	
—? —? —? —?	Arracan	33	9	•537	492	
—? —? —? —?	India	43	5	•693	686	
—? —? —? —?	„	45	4	•724	693	
—? —? —? —?	„	50	5	•805	703	
—? —? —? —?	„	70	1	1•121	704	
—? —? —? —?	„	38	12	•620	706	
—? —? —? —?	„	32	9	•521	707	
—? —? —? —?	„	45	14	•734	717	
—? —? —? —?	„	48	9	•777	719	
—? —? —? —?	„	63	5	1•013	723	
—? —? —? —?	„	38	14	•622	726	
—? —? —? —?	„	37	5	•597	727	
—? —? —? —?	Tavoy				946	Used in house-building.
—? —? —? —?	India	41	0	•656	870	

WOODS OF AFRICA.

African oak	Sierra Leone	51	7	•823	124	Specimen of the best quality.
Do.	„	50	7	•807	125	An excellent wood for ship-building, and extensively imported for this purpose.
Do.	- -	50	0	•800	126	Variety sometimes called "Silver oak."
Do.	Sierra Leone	52	9	•841	258	
Do.	West coast of Africa.	43	11	•699	259	
Do.	- -	50	9	•809	575	
African teak	- -	54	5	•869	369	Much used and esteemed for ship-building; another term for African oak.
Baphia nitida (Bar)	- -	36	7	•583	66	Used for dyeing and turning.
Do. (Cam)	- -	34	13	•577	65	Used for dyeing and for turnery work.
Do. (Cam wood)	Lion Hills				283	Used for dyeing.
Bar. See Baphia.						
Cam wood. See Baphia.						
Columbice	Madagascar	53	1	•849	206	
Fernando Po wood	Fernando Po	30	1	•481	127	Used in ship-building.
Do. do.	„	45	14	•734	128	Ditto.
Oldfieldia Africana. See African oak.						
Red Sanger wood	- -	61	0	•976	100	Heavy and compact.

WOODS OF NORTH AMERICA.

Abies alba (white spruce)	- -	23	13	•381	113	
Abies canadensis (hemlock spruce).	Upper Canada	23	0	•368	204	Used for common carpentry.
Do. (hemlock)	United States	23	0	•368	647	
Acer eriocarpum (soft maple)	Upper Canada	36	14	•590	593	
Acer Negundo (box elder, ash-leaved maple).	United States	24	0	•384	621	
Acer rubrum (red maple)	„	38	5	•613	620	
Acer saccharinum (sugar maple)	„	38	6	•614	619	
Do. do.	„	39	6	•630	618	
Do. (bird's eye maple)	Upper Canada	40	15	•655	594	Used in ornamental work by carpenters and joiners.
Do. (curly maple)	„	36	10	•586	193	Used in common carpentry work.
Do. var. (bird's eye maple).	- -	36	0	•576	330	Used for ornamental work; a peculiar growth of the tree.

NAME.	Place of Growth.	Weight per Cubic Ft.		Specific Gravity.	No. in Catalogue.	REMARKS.
		lbs.	oz.			
Acer —? (hard maple) - -	Upper Canada	39	10	.634	595	
Ash. <i>See</i> Fraxinus.						
Balsam. <i>See</i> Picea.						
Bass wood. <i>See</i> Tilia.						
Beech. <i>See</i> Fagus.						
Betula nigra (black birch) -	- -	35	7	.567	108	Much used for ship-building in Canada and Nova Scotia, but not a durable wood.
Betula —? (birch) - - -	Upper Canada	30	11	.491	199	An inferior wood.
Birch. <i>See</i> Betula.						
Black gum. <i>See</i> Nyssa.						
Box elder. <i>See</i> Acer.						
Butter nut. <i>See</i> Juglans.						
Butter wood - - - -	- -	28	12	.460	564	Used in ship-building.
Button wood. <i>See</i> Platanus.						
Carya amara? (hickory) - -	United States					
Carya porcina (pignut hickory)	United States	49	8	.792	613	The wood is stronger and better than that of any other kind of hickory.
Carya sulcata (shell-bark hickory).	,,	43	2	.690	614	
Carya —? (hickory) - -	- -	47	8	.760	328	
Castanea vesca (chestnut) -	United States	25	4	.404	646	
Cedar. <i>See</i> Larix.						
Do. Pencil. <i>See</i> Juniperus.						
Celtis crassifolia (hack-berry) -	,,	38	6	.614	641	Tough and elastic.
Cerasus virginiana (wild cherry)	,,	32	3	.515	629	
Cercis canadensis (red bud, Judas tree).	,,	33	7	.535	640	Wood close-grained and compact.
Cherry wood. <i>See</i> Prunus.						
Chestnut. <i>See</i> Castanea.						
Coffee tree. <i>See</i> Gymnocladus.						
Cornus florida (dogwood) - -	United States	47	4	.756	639	Hard, close-grained, and strong.
Cupressus disticha (cypress) -	,,	22	13	.365	648	Grows to an immense size.
Cypress. <i>See</i> Cupressus.						
Diospyrus virginiana (persimon)	,,	44	6	.710	645	Hard and close-grained.
Dogwood. <i>See</i> Cornus.						
Elm. <i>See</i> Ulmus.						
Fagus americana (white beech)	United States	42	2	.674	623	Used in dry carpentry.
Fagus ferruginea (beech) - -	Upper Canada	36	9	.585	192	Used in dry carpentry; the wood has a more rufous tint of colour than common beech.
Fraxinus americana (American ash).	- -	35	10	.570	326	Tough and elastic, and much used.
Do. (white ash)	Upper Canada	30	14	.494	202	
Do. do.	,,	33	5	.535	202	
Gleditschia triacanthus (honey locust).	United States	40	6	.646	635	Very hard, and splits with great facility.
Gum tree. <i>See</i> Nyssa.						
Gymnocladus canadensis (coffee tree).	,,	40	7	.647	634	Hard, compact, strong, and tough.
Hack-berry. <i>See</i> Celtis.						
Hackmatack. <i>See</i> Larix.						
Hazel. <i>See</i> Ulmus.						
Hemlock. <i>See</i> Abies.						
Hickory. <i>See</i> Carya.						
Hickory. <i>See</i> Juglans.						
Honey locust. <i>See</i> Gleditschia.						
Iron wood. <i>See</i> Ostrya.						
Judas tree. <i>See</i> Cercis.						
Juglans alba (hickory) - -	Upper Canada	48	2	.770	591	
Juglans cinerea (butter nut) -	,,	23	8	.376	191	
Do. do. - -	,,	22	4	.356	191	
Do. do. - -	- -	26	8	.424	205	
Do. do. - -	- -	30	7	.487	205	
Do. (white walnut)	United States	30	5	.485	627	Specimen from a young tree.
Juglans nigra (black walnut) -	,,	28	15	.463	625	Wood strong, tough, and not liable to split.
Do. do.	Upper Canada	28	11	.459	198	
Juniperus bermudiana (red or pencil cedar).	Bermuda -	34	15	.559	101	Used in ship-building and for making pencils.
Juniperus virginiana (red cedar)	United States	26	10	.426	643	Used for making pencils, but not so good as the Juniperus bermudiana, for this purpose.

NAME.	Place of Growth.	Weight per Cubic Ft.	Specific Gravity.	No. in Cata- logue.	REMARKS.
(pencil cedar)	- -	lbs. oz.			
<i>Larix americana</i> (hackmatack)	- -	25 9	•409	334	A light and durable wood.
Do. do. - -	- -	37 9	•601	350	
Do. do. - -	- -	36 2	•578	349	Much used and esteemed in British North America for ship-building.
Do. (Tamarack)	Upper Canada	23 15	•383	200	A good wood for ship-building purposes.
<i>Larix</i> — ? (Cedar) - -	„	18 6	•294	201	
<i>Larix</i> — ? (Cedar) - -	„	19 10	•314	201	
<i>Liriodendron tulipifera</i> (yellow poplar).	United States	24 3	•387	632	
Live oak. <i>See</i> <i>Quercus</i> .					
Locust. <i>See</i> <i>Robinia</i> .					
Maple. <i>See</i> <i>Acer</i> .					
<i>Morus rubra</i> (red mulberry) -	United States	35 1	•561	642	
Mulberry. <i>See</i> <i>Morus</i> .					
<i>Nyssa multiflora</i> (sour gum, black gum).	„	40 6	•646	638	
Oak. <i>See</i> <i>Quercus</i> .					
<i>Ostrya virginica</i> (iron wood) -	„	48 11	•779	637	
Pawpaw. <i>See</i> <i>Uvaria</i> .					
Persimon. <i>See</i> <i>Diospyrus</i> .					
<i>Picea balsamea</i> (balsam) - -	Upper Canada	19 0	•304	190	Used in carpentry.
Pine. <i>See</i> <i>Pinus</i> .					
<i>Pinus mitis</i> (yellow pine) -	- -	23 8	•376	267	Used in carpentry work.
Do. (American yellow pine).	- -	22 15	•367	112	Used in carpentry.
<i>Pinus resinosa</i> (American red pine).	- -	26 11	•427	110	Ditto.
Do. (red pine) -	United States	28 7	•455	316	A strong wood used in carpentry.
<i>Pinus rigida</i> (pitch pine) - -	South Carolina	32 0	•512	109	A strong and durable wood.
Do. do. - -	- -	42 2	•674	315	Much used in ship-building.
Do. (Virginia pine) -	- -	34 6	•550	266	
<i>Pinus</i> — ? (pine) - -	Upper Canada	22 8	•360	194	Used for the same purposes as common deal.
<i>Platanus occidentalis</i> (button wood, sycamore).	United States	26 8	•424	624	Much used for making bedsteads.
Poplar. <i>See</i> <i>Populus</i> .					
Do. yellow. <i>See</i> <i>Liriodendron</i> .					
<i>Populus</i> — ? (poplar) - -	Upper Canada	20 11	•331	196	
<i>Populus</i> — ? (poplar) - -	„	19 14	•318	196	A light inferior wood.
<i>Prunus</i> — ? (cherry wood) - -	„	29 15	•479	195	
Quebec white oak - -	Canada - -	53 12	•860	780	Used in ship-building.
Do. - - - -	„	54 6	•870	781	Ditto.
<i>Quercus alba</i> (Quebec oak) -	„	33 11	•539	117	Used in ship-building, but not a durable wood.
Do. do. - - -	„	45 5	•725	118	A specimen, showing wood of an inferior quality.
Do. do. - - -	- -	39 5	•629	324	Used in ship-building, but not much in repute.
Do. (oak) - - -	Upper Canada	47 14	•766	590	
Do. (white oak) - -	United States	40 1	•641	610	
Do. do. - - -	Upper Canada	44 4	•708	197	Used in ship-building.
<i>Quercus rubra</i> (red oak) - -	United States	32 2	•514	612	
<i>Quercus tinctoria</i> (black oak) -	„	34 14	•558	611	
<i>Quercus virens</i> (live oak) - -	„	56 4	•900	574	The heaviest and hardest of the oaks.
Do. do. - - -	„	51 11	•827	325	
Red bud. <i>See</i> <i>Cercis</i> .					
<i>Robinia Pseud-Acacia</i> (locust) -	United States	45 8	•728	320	Occasionally used in ship-building, but chiefly for treenails.
Do. do. - - -	„	41 11	•667	644	
Do. (locust, treenail)	- -	41 8	•664	344	Used for treenails in ship-building.
<i>Sassafras officinale</i> (sassafras tree).	United States	37 4	•596	636	Specimens from a young tree.
Sour gum. <i>See</i> <i>Nyssa</i> .					
Spruce. <i>See</i> <i>Abies</i> .					
Sycamore. <i>See</i> <i>Platanus</i> .					
Tamarack. <i>See</i> <i>Larix</i> .					
<i>Tilia americana</i> (bass wood) -	Upper Canada	25 0	•400	203	Even in grain like common lime-wood.
Treenail. <i>See</i> <i>Robinia</i> .					
<i>Ulmus americana</i> (elm) - -	Upper Canada	36 11	•587	592	

NAME.	Place of Growth.	Weight per Cubic Ft.		Specific Gravity.	No. in Catalogue.	REMARKS.
		lbs.	oz.			
<i>Ulmus americana</i> (American rock elm).	- -	36	3	.579	107	Used by ship-builders.
Do. do. - -	- -	36	15	.591	106	Used in ship-building.
Do. (rock elm) - -	- -	37	10	.602	336	Much used in ship-building.
Do. (swamp elm) - -	- -	33	10	.538	322	Used in ship-building, and preferred to English elm.
Do. (white elm) - -	- -	34	5	.549	616	Used by wheelwrights.
<i>Ulmus fulva</i> (red elm) - -	United States	42	8	.680	617	
Do. do. - -	,,	31	2	.498	631	
<i>Ulmus?</i> (wych hazel, Quebec rock elm).	Canada - -	34	2	.546	776	Used in ship-building.
Do. do. - -	,,	43	11	.699	777	Ditto.
Do. do. - -	,,	51	6	.822	775	Ditto.
<i>Uvaria triloba</i> (pawpaw) - -	United States	22	7	.359	649	
Walnut. <i>See Juglans.</i>						

## WOODS OF THE WEST INDIES.

<i>Amerimum ebenas?</i> (Cocus) - -	- -	66	6	1.062	38	Used by turners.
<i>Andira inermis?</i> (Turkey wood)	Cuba - -	45	15	.735	729	A strong, durable wood.
Batuta - - - - -	- -	54	11	.875	33	Heavy and compact.
Brazilletto. <i>See Cæsalpina.</i>						
Broad leaf. <i>See Terminalia.</i>						
<i>Bubroma guazuma</i> (bastard cedar).	Jamaica - -	41	1	.657	744	Tough, but not durable.
Bully tree, bastard. <i>See Bumelia</i>						
Do. black - - - -	Jamaica - -	52	12	.844	749	
<i>Bumelia salicifolia</i> (bastard bully tree).	,, - -	51	9	.825	754	
<i>Bursera gummifera</i> (tropic birch).	,, - -	22	15	.367	734	Used for burning lime; soft, and not durable.
<i>Cæsalpinia brasiliensis</i> (Brazilletto).	,, - -	51	3	.819	51	Used for dyeing and for turning.
Calabash. <i>See Crescentia.</i>						
Cedar. <i>See Cedrela.</i>						
Cedar - - - - -	- -	27	15	.447	364	From the Spanish ship "Gibraltar," built in 1757.
Do. bastard. <i>See Bubroma.</i>						
Do. common - - - -	Santa Martha	38	11	.619	731	Used for common carpentry.
<i>Cedrela odorata</i> (cedar) - -	Jamaica - -	23	8	.376	733	Largely used in Jamaica, for flooring, doors, &c.
<i>Coccoloba uvifera</i> (sea-side grape).	,, - -	51	9	.825	740	Hard, tough, and durable.
Cocus. <i>See Amerimum.</i>						
Cœurbaril. <i>See Hymenæa.</i>						
<i>Crescentia cucurbitina</i> (calabash)	Jamaica - -	35	0	.560	743	Rather soft, but tough and durable.
Dogwood. <i>See Piscidia.</i>						
<i>Eugenia pimenta</i> (pimento) - -	Jamaica - -	60	3	.963	742	Hard, tough, and durable.
<i>Ficus</i> —? (white fig) - -	,, - -	30	7	.487	739	Useless except for fuel.
Fig, red - - - - -	Jamaica - -	25	9	.409	756	
Do. white. <i>See Ficus.</i>						
<i>Guaiacum officinale</i> (lignum vitæ)	- -	71	8	1.144	39	Used in machinery, and by the turner.
<i>Hæmatoxylon campechianum</i> (log-wood).	- -	-	-	-	62	Used for dyeing, and occasionally by turners.
Hard wood - - - - -	Trinidad - -	63	8	1.016	566	Used in ship-building.
Do. - - - - -	Saint Lucia - -	36	15	.591	570	Ditto.
<i>Hibiscus tiliaceus</i> (blue mahoe)	Jamaica - -	36	8	.584	747	Remarkable for toughness.
Hogplum. <i>See Spondias.</i>						
Horseflesh, or Mangrove - -	Jamaica - -	45	15	.735	129	Sometimes used in ship-building.
<i>Hymenæa cœurbaril</i> (Cœurbaril)	- -	60	14	.974	35	Used for ornamental furniture.
<i>Laurus</i> —? (timbersweetwood)	Jamaica - -	44	11	.715	750	
<i>Lignum vitæ.</i> <i>See Guaiacum.</i>						
Logwood. <i>See Hæmatoxylon.</i>						
Mahoe. <i>See Hibiscus.</i>						
Mahogany. <i>See Swietenia.</i>						
Mangrove. <i>See Horseflesh.</i>						

NAME.	Place of Growth.	Weight per Cubic Ft.		Specific Gravity.	No. in Catalogue.	REMARKS.
		lbs.	oz.			
Muss wood - - - - -	Jamaica - -	36	6	·582	751	
Orange, wild - - - - -	,, - -	53	14	·862	748	A hard and durable wood, but not a true Citrus.
Pimento. <i>See</i> Eugenia.						
Piscidia erythrina? (dogwood)	,, - -	54	13	·877	735	Wood hard and durable.
Potato wood - - - - -	,, - -	29	8	·472	752	
Prickly yellow. <i>See</i> Xanthoxylum).						
Sabicu - - - - -	Cuba - -	57	5	·917	674	An excellent wood for beams and planking in ships.
Do. - - - - -	,, - -	64	9	1·033	675	Used in ship-building, and much approved in the Government yards.
Do. - - - - -	,, - -	63	10	1·018	732	Portion of a large beam, which broke merely in falling from a truck.
Seaside Grape. <i>See</i> Coccoloba.						
Shad bark - - - - -	Jamaica - -	41	4	·660	753	
Spondias graveolens (Hogplum)	,, - -	25	11	·411	741	Wood soft and valueless.
Swietenia Mahogany (Bay mahogany).	Honduras - -	26	8	·424	571	Used for furniture and for ship-building, called "Common southern."
Do. do. - - - - -	,, - -	25	13	·413	772	Used in ship-building, called "Common southern."
Do. do. - - - - -	,, - -	42	11	·683	770	Used in ship-building, called "Superior northern."
Do. do. - - - - -	,, - -	31	11	·507	768	Used in ship-building, called "Good northern."
Do. do. - - - - -	,, - -	36	0	·576	769	Used in ship-building, called, "Common northern."
Swietenia Mahogany (Cuba mahogany).	Cuba - -	46	11	·747	458	Specimen from the exterior of the butt of a log.
Do. do. - - - - -	,, - -	49	10	·794	456	Specimen from the exterior of the top of a log.
Do. (Honduras mahogany)	Honduras - -	26	8	·424	466	Specimen from the outside of the butt of a log, quality inferior.
Do. do. - - - - -	,, - -	39	6	·630	468	Ditto.
Do. do. - - - - -	,, - -	26	2	·418	467	Specimen from the interior of the butt of a log, quality inferior.
Do. do. - - - - -	,, - -	35	13	·573	471	Specimen from the interior of the butt of a log, quality good.
Do. do. - - - - -	,, - -	34	11	·555	470	Specimen from the exterior of the butt of a log, quality good.
Do. do. - - - - -	,, - -	44	1	·705	469	Specimen from the interior of the top of a log.
Do. do. - - - - -	,, - -	36	9	·585	460	Specimen from the exterior of the top of a log.
Do. (Spanish mahogany) -	Cuba - -	48	6	·764	32	Much used for furniture.
Terminalia latifolia (broad leaf)	Jamaica - -	35	0	·560	753	
Timber sweetwood. <i>See</i> Laurus.						
Trinidad Mangrove - - - - -	Trinidad - -	61	15	·991	569	Very hard, firm, and close-grained.
Tropic birch. <i>See</i> Bursera.						
Turkey wood. <i>See</i> Andira.						
Vallatah - - - - -	,, - -	58	12	·940	665	Used in ship-building.
Xanthoxylum clava-Herculis (prickly yellow).	,, - -	35	2	·562	757	
Yellow mast - - - - -	,, - -	56	5	·901	745	Hard, but rather brittle.
-----? - - - - -	,, - -	56	2	·898	738	
-----? - - - - -	,, - -	37	11	·603	737	
-----? - - - - -	,, - -	67	3	1·075	736	

## WOODS OF SOUTH AMERICA.

Acapu - - - - -	Para - -	56	8	·904	760	The best wood of the country for standing exposure to the weather ; much used in house carpentry.
Amendoheira - - - - -	Brazil - -	-	-	-	135	
Arandaia - - - - -	,, - -	-	-	-	136	
Arapacu - - - - -	,, - -	-	-	-	138	
Arapetiu semarelo - - - - -	,, - -	-	-	-	137	
Bagre - - - - -	,, - -	-	-	-	139	
Boubixa - - - - -	,, - -	-	-	-	141	



NAME.	Place of Growth.	Weight per Cubic Ft.	Specific Gravity.	No. in Cata- logue.	REMARKS.
Brazil. <i>See</i> <i>Cæsalpina</i> .		lbs. oz.			
Brazilian hard-wood - - -	- - -	58 9	·937	568	Used in ship-building.
Brazilian oak - - - - -	Brazil - - -	51 4	·820	785	Ditto.
Bullet-wood - - - - -	Demerara - - -	58 0	·928	451	
Bupurana - - - - -	Brazil - - -	- - -	-	140	
Cabo dumxada - - - - -	„ - - -	- - -	-	142	
Cabui da vargem - - - - -	„ - - -	- - -	-	144	
Cabui vermelho - - - - -	„ - - -	- - -	-	143	
Cabui vinhatico - - - - -	„ - - -	- - -	-	145	
Canbuatan - - - - -	„ - - -	- - -	-	146	
Canela almeuca - - - - -	„ - - -	- - -	-	476	
Canela Cap <sup>m</sup> . mor - - - - -	„ - - -	- - -	-	487	
Canela capororoça - - - - -	„ - - -	- - -	-	147	
Canela degusmo am <sup>a</sup> . - - - - -	„ - - -	- - -	-	148	
Canela degusmo pr <sup>ta</sup> . - - - - -	„ - - -	- - -	-	149	
Canela Jacu - - - - -	„ - - -	- - -	-	151	
Canela olio vermetha - - - - -	„ - - -	- - -	-	150	
Canela preta da vargem - - - - -	„ - - -	- - -	-	152	
Canela viado - - - - -	„ - - -	- - -	-	479	
Cangeranna asu - - - - -	„ - - -	- - -	-	491	
Cangeranna merin - - - - -	„ - - -	- - -	-	151	
Capororoça da serra - - - - -	„ - - -	- - -	-	154	
Capota depobre - - - - -	„ - - -	- - -	-	488	
Cara suja - - - - -	„ - - -	- - -	-	155	
Catulanhi branio - - - - -	„ - - -	- - -	-	480	
Cedrela? (Cearo) - - - - -	Para - - -	29 3	·467	765	
<i>Cæsalpina echinata</i> (Brazil) - - - - -	- - -	58 13	·941	68	Used for dyeing and for turnery.
Corindiba rrozada - - - - -	Brazil - - -	- - -	-	156	
De Dejeunhecido - - - - -	„ - - -	- - -	-	157	
Demerara wood - - - - -	Demerara - - -	23 13	·381	783	Used in ship-building.
Embiu preto - - - - -	Brazil - - -	- - -	-	158	
Fruta de arara - - - - -	„ - - -	- - -	-	486	
Fruta de papagaio - - - - -	„ - - -	- - -	-	159	
Fruta de ponba - - - - -	„ - - -	- - -	-	160	
Fruta diana - - - - -	„ - - -	- - -	-	477	
Garapeapunha am <sup>a</sup> . - - - - -	„ - - -	- - -	-	161	
Giquita. <i>See</i> <i>Hymenæa</i> .					
Goiti - - - - -	Brazil - - -	- - -	-	162	
Greenheart. <i>See</i> <i>Laurus</i> .					
Guaracaho vermetho. <i>See</i> <i>Inga</i> .					
Gueimado - - - - -	„ - - -	- - -	-	163	
Guiné - - - - -	„ - - -	- - -	-	164	
<i>Hymenæa</i> —? (Giquita) - - - - -	„ - - -	- - -	-	489	
<i>Inga</i> —? (Guaracahi ver- metho). - - - - -	„ - - -	- - -	-	485	
Itanba - - - - -	Para - - -	54 2	·862	767	A fine hard wood.
Jaburandi - - - - -	Brazil - - -	- - -	-	484	
Jacaranda. <i>See</i> <i>Mimosa</i> .					
Jetuaiba vermetha - - - - -	„ - - -	- - -	-	167	
Junduaiba - - - - -	„ - - -	- - -	-	165	
Jutuahiba amarila - - - - -	„ - - -	- - -	-	166	
King-wood - - - - -	„ - - -	43 11	·699	71	Used for turning and ornamental furniture.
<i>Laurus chloroxylon</i> (Green- heart). - - - - -	Guiana - - -	51 15	·831	788	An excellent wood for ship-building.
Do. do. - - - - -	Brazil - - -	56 5	·901	790	Used in ship-building.
Do. do. - - - - -	Guiana - - -	61 13	·989	789	Ditto.
Limoeiro preto - - - - -	Brazil. - - -	- - -	-	168	
Macacáubá - - - - -	Para - - -	43 13	701	766	A hard and handsome wood, used for furni- ture.
Majuba branea - - - - -	Brazil - - -	- - -	-	478	
Malcazado - - - - -	„ - - -	- - -	-	173	
Mantega - - - - -	„ - - -	- - -	-	171	
Marcanaíba - - - - -	„ - - -	- - -	-	172	
Massaranduba - - - - -	Para - - -	69 4	1·108	761	A hard wood of good quality.
Milho cozido - - - - -	Brazil. - - -	- - -	-	170	
<i>Mimosa</i> —? (Rosewood, Jaca- randa). - - - - -	„ - - -	44 14	·718	37	Much used for ornamental furniture.
<i>Mora excelsa</i> (Morra) - - - - -	Demerara - - -	55 12	·892	572	A valuable wood for ship-building.
Do. do. - - - - -	„ - - -	57 15	·927	573	Sometimes called Demerara locust by ship- builders.

NAME.	Place of Growth.	Weight per Cubic Ft.	Specific Gravity.	No. in Cata- logue.	REMARKS.
Mora excelsa (Morra)	Guiana	lbs. 62 oz. 13	1·005	676	A strong and durable wood, much used in ship-building.
Do. do.	"	60 13	·973	782	
Morra. See Mora.					
Muquequeira	Brazil	-	-	169	
Notiga	"	-	-	174	
Oaca	"	-	-	178	
Obapeba asú	"	-	-	176	
Obapeba depedra	"	-	-	177	
Olio caburaiba	"	-	-	482	
Oluranna verm <sup>a</sup>	"	-	-	179	
Orapitin vermelho	"	-	-	180	
Orapóca amarela	"	-	-	483	
Orilo manco	"	-	-	175	
Pao amarella	Para	55 2	·882	764	A fine yellow wood, similar to Canary-wood.
Pao d'arco	"	54 1	·865	763	Used by the Indians for bows, and it is much employed in machinery.
Pao prodrigo	Brazil	-	-	481	
Papante	"	-	-	181	
Pegua vermelho	"	-	-	182	
Piquia	Para	43 15	·703	762	Very tough; used for water-wheels and timbers for boats.
Rosewood. See Mimosa.					
Sabaó vermetho	Brazil	-	-	490	
Santa Maria	"	37 8	·600	323	Occasionally used in ship-building.
Santa-Maria-wood. See South American hard-wood.					
Sardaó	Brazil	-	-	185	
Satin-wood	"	55 5	·885	784	Used in ship-building.
Sibo	Brazil	-	-	184	
Sindiba da folha rredonda	"	-	-	183	
Stink-wood	"	52 11	·843	338	Has a very unpleasant smell.
South American hard-wood, or Santa-Maria-wood.	Brazil	47 14	·764	130	Used in ship-building.
South American hard-wood, or Sucapura.	Brazil	53 4	·852	131	Ditto.
Taxumam	"	-	-	186	
Tinga sui	"	-	-	187	
Ytu	"	-	-	188	
?	Para	83 8	1·336	207	Remarkably heavy and tough.
?	"	48 2	·770	208	
?	Brazil	-	-	210	Used for making sugar-boxes.
?	"	-	-	211	Ditto ditto.
?	"	32 9	·521	213	Ditto ditto.
?	"	-	-	281	
?	Carthagena	25 0	·400	495	Used for boxes and common carpentry purposes.
?	"	-	-	501	Used for packing-cases.

## WOODS OF AUSTRALIA.

Beef wood	-	56 12	·908	356	Used for ornamental furniture.
Black gum, Borkee?	-	56 11	·907	370	Hard and compact.
Blue gum	-	48 3	·771	361	Used in ship-building, and thought to be a strong and durable wood.
Do. See Eucalyptus.					
Borkee. See Black gum.					
Box	-	59 1	·945	360	
Casuarina suberosa	-	36 1	·577	56	
Cedar	-	34 6	·550	357	
Dacrydium Franklinii. See Huon Pine.					
Eucalyptus piperita (blue gum)	-	57 4	·016	332	Used in ship-building; a strong and durable wood.
Eucalyptus resinifera? (gum wood.)	-	52 9	·841	333	Used in ship-building.

NAME.	Place of Growth.	Weight per Cubic Ft.	Specific Gravity.	No. in Catalogue.	REMARKS.
Eucalyptus —? (stringy bark)	- -	lbs oz. 49 4	•788	329	A good wood for making treenails; used in ship-building.
Do. do.	- -	56 5	•901	795	Used in ship-building.
Do. do.	- -	52 3	•835	367	
Eucalyptus (?) - - - -	Swan River -	44 13	•717	472	The "Halifax Packet" is repaired with this wood.
Findersia Australis - - -	- -	32 5	•517	57	
Gum wood. See Eucalyptus.					
Huon River pine. See Dacrydium Franklinii.	Van Diemen's Land.	25 2	•402	352	
Iron bark - - - - -	- -	65 9	1•049	355	A very hard and compact wood.
Lemon - - - - -	- -	30 14	•494	362	
Mahogany - - - - -	- -	60 13	•973	359	
Myrtle - - - - -	- -	36 11	•587	358	
New South Wales cedar - -	- -	29 4	•468	102	Used principally for joinery and furniture.
New South Wales hard wood -	- -	54 9	•873	792	Used in ship-building.
Do. do. - - - - -	- -	54 11	•875	103	Ditto.
Do. do. - - - - -	- -	54 12	•876	791	Ditto.
Remor - - - - -	- -	39 1	•625	366	
Stringy bark. See Eucalyptus.					
Swan River mahogany - - -	- -	42 0	•672	563	
Do. do. - - - - -	- -	44 0	•704	563	
Do. do. - - - - -	- -	42 10	•682	474	
Do. do. - - - - -	- -	43 8	•696	474	Used in ship-building; a strong durable wood.
Trydee - - - - -	- -	44 13	•717	365	
-----? - - - - -	Moreton Bay -	61 1	•961	347	From Mr. Lambert's collection.
-----? - - - - -	- -	31 1	•497	371	

## WOODS OF NEW ZEALAND.

Ake - - - - -	- -	40 4	•644	522	
Ake Ake. See Mohowrangs.					
Boriele. See Ephialtes.					
Cowdie. See Dammara.					
Dacrydium taxifolium? (Kikiteah.)	- -	22 13	•365	351	
Do. (Kahikatea)	- -	31 1	•497	513	
Do. do.	- -	29 11	•475	508	
Dammara australis (New Zealand pine.)	- -	25 3	•403	452	Much valued for masts and spars of vessels.
Do. do.	- -	26 13	•429	454	Specimen showing wood of the best quality.
Do. (Cowdie) -	- -	33 11	•539	353	
Do. (Kowdie) -	- -	35 9	•569	505	
Ephialtes —? (Boriele Pureele)	- -				
Fagus - - - - -	- -	33 3	•531	521	
Kahikatea. See Dacrydium.					
Karigatta, or Manook - -	- -	57 9	•921	520	
Káttár.	- -			532	
Kikiteah. See Dacrydium.					
Kowdie. See Dammara.					
Manook. See Karigatta.					
Mero - - - - -	- -	48 4	•772	523	
Mohowrangs, or Ake Ake - -	- -	63 3	1•011	517	
Mora, or Maire - - - - -	- -	34 5	•549	514	
New Zealand pine. See Dammara.					
Podocarpus totarra (Totara) -	- -	39 5	•629	509	
Do. do. - - - - -	- -	32 10	•522	354	
Pohutukana - - - - -	- -	52 2	•834	506	
Pureele. See Ephialtes.					
Purine - - - - -	- -	52 5	•837	507	
Rawa Rawa? - - - - -	- -	51 7	•823	527	
Rewarewa - - - - -	- -	53 15	•683	515	Wood of good quality; hard, and compact.
Rimu. - - - - -	- -	34 6	•560	511	
Rowai - - - - -	- -	43 13	•701	516	

NAME.	Place of Growth.	Weight per Cubic Ft.		Specific Gravity.	No. in Catalogue.	REMARKS.
		lbs.	oz.			
Tanekaha - - - - -	- -	36	7	·583	512	
Tangi - - - - -	- -	33	14	·542	519	
Tariedy - - - - -	- -	35	12	·572	518	
Totara. <i>See</i> Podocarpus.						
Towha - - - - -	- -	35	4	·564	524	
Touwai - - - - -	- -	43	6	·674	510	

A very beautiful series of about 160 samples of the most useful and ornamental woods from various parts of the world, are shown by Messrs. R. and J. HARRISON (6). The woods are all cut in the form of books, and admirably exhibit the grain and other peculiarities of each specimen. For this collection also the Jury awarded a Prize Medal.

A collection of ornamental foreign woods, and other materials employed in cabinet work, is shown by Messrs. R. FAUNTLEROY and SONS (135). The number of woods about fifty, the specimens being all cut and polished so as to show the grain and colour of the wood to the greatest advantage. Of most of the woods two or three specimens are shown side by side, one in the rough or with the bark on; one in section; and a third cut longitudinally and polished. For this series the Jury awarded a Prize Medal.

A valuable and instructive series of all the principal woods used for turning are shown by Messrs. HOLTZAPFFEL (14), the character of each wood being illustrated by the end of the specimen being turned, so as to show how it works under the tool in the lathe. For this collection the Jury awarded a Prize Medal.

Some remarkably fine specimens of veneering, in walnut and rosewood, are exhibited by Messrs. E. SCOTT and Co. (19). To these the Jury awarded a Prize Medal.

A valuable and extensive collection of sixty-three of the timbers and ornamental woods of England is contributed by S. CROSS (136). This was deemed worthy of Honourable Mention.

The series of Scotch woods shown in Messrs. LAWSON'S collection is interesting on account of the beauty of the specimens, the excellent manner in which they are arranged and shown, and the instructive mode in which the characters and peculiarities of each tree are made evident. The sections of grafts and diseases of trees are peculiarly good. Praise is also due to this as to all other divisions of Messrs. Lawson's collection for the excellent catalogue which accompanies it, and which is full of useful information. The following is the list of the timber, ornamental, and fruit-trees:—

Acer campestre - - -	Field maple.	Caragana arborescens - - -	Siberian pea-tree.
Do. platanoides - - -	Norway maple.	Carpinus betulus - - -	Hornbeam.
Do. pseudo-platanus - - -	Sycamore.	Castanea vesca - - -	Sweet chestnut.
Do. saccharinum - - -	Sugar maple.	Cerasus lusitanica - - -	Portugal laurel.
Do. striatum. - - -	Striped maple.	Do. padus - - -	Bird cherry.
Æsculus hippocastanum - - -	Horse chestnut.	Do. sylvestris - - -	Wild cherry.
Alnus glutinosa - - -	Alder.	Do. vulgaris - - -	Cherry.
Do. incana - - -	Hoary-leaved alder.	Cratægus coccinea - - -	Scarlet thorn.
Amygdalus communis - - -	Almond.	Do. oxyacantha - - -	Hawthorn.
Arbutus unedo - - -	Arbutus.	Do. punctata - - -	Dotted thorn.

<i>Cupressus sempervirens</i>	-	Italian cypress.	<i>Populus alba</i>	- - -	White poplar.
Do. <i>thyoides</i>	- -	White cedar.	Do. <i>nigra</i>	- - -	Black poplar.
<i>Cydonia vulgaris</i>	- - -	Quince.	<i>Prunus domestica</i>	- - -	Plum.
<i>Cytisus alpinus</i>	- - -	Alpine laburnum.	Do. <i>spinosa</i>	- - -	Sloe.
Do. <i>laburnum</i>	- - -	Laburnum.	<i>Pyrus aucuparia</i>	- - -	Mountain ash.
Do. <i>scoparius</i>	- - -	Broom.	Do. <i>communis</i>	- - -	Pear.
<i>Fagus sylvatica</i>	- - -	Beech.	Do. <i>malus</i>	- - -	Apple.
<i>Fraxinus excelsior</i>	- - -	Ash.	<i>Quercus cerris</i>	- - -	Turkey oak.
<i>Ilex aquifolium</i>	- - -	Holly.	Do. <i>coccinea</i>	- - -	Scarlet oak.
<i>Juglans regia</i>	- - -	Walnut.	Do. <i>ilex</i>	- - -	Evergreen oak.
<i>Juniperus virginiana</i>	- - -	Red cedar.	Do. <i>pedunculata</i>	- - -	Common oak.
<i>Mespilus germanica</i>	- - -	Medlar.	Do. <i>sessiliflora</i>	- - -	Do.
<i>Ornus europæa</i>	- - -	Flowering ash.	<i>Robinia pseudo-acacia</i>	- - -	Locust tree.
<i>Pinus canadensis</i>	- - -	Hemlock spruce.	<i>Rhododendron arboreum</i>	- - -	Rhododendron.
Do. <i>abies</i>	- - -	Silver fir.	Do. <i>ponticum</i>	- - -	Pontic do.
Do. <i>balsamea</i>	- - -	American silver fir.	<i>Salix alba</i>	- - -	White willow.
Do. <i>alba</i>	- - -	White spruce.	Do. <i>babylonica</i>	- - -	Weeping willow.
Do. <i>nigra</i>	- - -	Black spruce.	Do. <i>caprea</i>	- - -	Goats' willow.
Do. <i>picea</i>	- - -	Norway spruce.	Do. <i>Forbyana</i>	- - -	Forby's willow.
Do. <i>larix</i>	- - -	Larch.	Do. <i>fragilis</i>	- - -	Crack willow.
Do. <i>microcarpa</i>	- - -	American larch.	Do. <i>Russelliana</i>	- - -	Bedford willow.
Do. <i>pendula</i>	- - -	Weeping larch.	Do. <i>triandra</i>	- - -	Basket willow.
Do. <i>cedrus</i>	- - -	Cedar of Lebanon.	Do. <i>viminalis</i>	- - -	Osier.
Do. <i>sylvestris</i>	- - -	Scotch fir.	<i>Sambucus nigra</i>	- - -	Elder.
Do. <i>laricio</i>	- - -	Corsican pine.	<i>Taxus baccata</i>	- - -	Yew.
Do. <i>laricio austriaca</i>	- - -	Black Austrian pine.	<i>Thuja occidentalis</i>	- - -	Arbor vitæ.
Do. <i>pinaster</i>	- - -	Pinaster.	<i>Ulmus campestris</i>	- - -	Elm.
Do. <i>strobis</i>	- - -	Weymouth pine.	Do. <i>montana</i>	- - -	Wych elm.
Do. <i>cembra</i>	- - -	Swiss stone pine.	<i>Viburnum opulus</i>	- - -	Guelder rose.

The collection of foreign woods included in the Liverpool series of imports is also highly deserving of notice: many of the specimens are unusually fine, and they are all well shown and arranged. (See p. 166.)

Besides these more important collections, various single specimens deserving Honourable Mention are exhibited. Amongst these are some samples of woods grown in Perthshire and Argyleshire by the Marquis of BREADALBANE (134); a sample of Scotch fir grown in Strathavon, from Sir W. MURRAY, Bart. (137); a series of Irish woods exhibited by J. LONG (47); a small collection of Irish woods contributed by J. CLASSON (22). These were severally deemed worthy of Honourable Mention.

Beautiful specimens are exhibited of St. Domingo mahogany from Messrs. GILLQW and Co. (15); and some remarkably handsome oak veneers from an oak grown in Whittlebury Forest, Northamptonshire, are also exhibited by Messrs. GILLQW (Class XXVI., 186); these were severally deemed worthy of Honourable Mention.

A picture-frame exhibited by D. SAMUELS (21A), formed of various common English woods, chiefly oak, elm, and ash, was deemed worthy of Honourable Mention.

Some good specimens of English woods are likewise exhibited by F. C. FITCH (8).

Several specimens of bog wood of different kinds, and from various localities, are shown. Amongst these are slabs of bog oak, yew, and fir from Lord DILLON (138); and bog fir from the Marquis of BREADALBANE (134). These were severally deemed worthy of Honourable Mention.

In connexion with the various collections of wood, attention must be paid to

the different processes for seasoning and preserving it from the influence of the weather, dry rot, and the attacks of insects, boring-worms, &c. These and other causes form very serious obstacles to the use of wood for many purposes, and accordingly a number of plans have from time to time been proposed, having for their object the cheap and effectual preservation of wood. Amongst these schemes, five in particular have attracted especial attention: namely, the plans of Messrs. Kyan, Boucherie, Burnett, Bethell, and Payne. Of these, the first and last are not represented in the Exhibition, and therefore do not come before the Jury, though the machinery employed by Mr. Payne is exhibited, but without any specimen of impregnated or preserved wood.

Sir W. BURNETT exhibits an interesting series of specimens in illustration of his mode of preserving wood, &c., and in proof of its efficacy (7). This process, which consists in impregnating it with a solution of chloride of zinc, was patented in 1836, four years after the date of Kyan's patent, in which a solution of corrosive sublimate was employed for the same purpose. The specimens shown are highly satisfactory, and clearly prove the high preserving power of the solution of zinc. The Jury awarded a Prize Medal for this process.

The specimens shown by Mr. J. BETHELL (21) are likewise highly interesting and satisfactory. The process employed in this case, and for which a patent was obtained in 1838, consists in thoroughly impregnating the wood with oil of tar containing creosote, and a crude solution of acetate of iron, commonly called pyrolignite of iron. The idea of preserving wood by the action of oil of tar, or similar liquids, is by no means new. In 1756, Hales recommended that the planks of ships should be soaked in vegetable oil to prevent the injury to which wood is subject when alternately exposed to wet and dry; and, indeed, many ships were built in which a hollow place was cut in one end of each beam or stern-post, which might be constantly kept filled with train-oil. Amongst other ships so constructed, the "Fame," 74, may be mentioned. When, after some years, this ship was repaired, it was found that, as far as the oil had penetrated—namely, from 12 to 18 inches from the end—the wood was quite sound, whilst the other parts were more or less decayed. In 1805 Mr. Maconochie proposed to saturate with resinous and oily matters inferior woods, and thus render them more lasting. This proposal was practically carried out in 1811 by Mr. Lukin who constructed a peculiar oven for the purpose of thus impregnating wood under the influence of an increased temperature. The scheme, however, had but very partial success, for either the heat was too low and the wood was not thoroughly aired and seasoned, or it was too high and the wood was more or less scorched and burnt. The importance of oil as a preserving agent for wood is also shown by the fact that whalers and other ships employed in the oil trade, the timbers of which become thoroughly saturated with oil or grease, invariably last longer, and are less subject to decay of any sort than other vessels. It is also well known that the staves of old tallow-casks make a more lasting and durable fence than any other sort of wood—an effect entirely due to the protecting influence of the oil with which they have become saturated.

The operation, as conducted by Mr. BETHELL, is carried on in a strong cylindrical vessel connected with a powerful air-pump, so that in the first instance a

vacuum being formed, and subsequently a pressure of several atmospheres applied, the liquid may as much as possible be forced into all the pores of the wood. It is stated that wood thus prepared is not only protected from decay, and from the attacks of insects, but also that it becomes stronger and tougher in consequence of the layer of bituminous matter with which the woody fibre becomes encrusted. Amongst the specimens exhibited are portions of railway sleepers which have been in use for several years, and which are perfectly sound, whilst others from the same situation, but not prepared, are quite destroyed. Portions also of piles which have been four years in the sea in Lowestoft harbour, and which are quite sound, are also shown. This process has been extensively employed in the preparation of railway sleepers for more than ten years, and the result of its application appears in every case to be highly satisfactory where the process has been well and properly conducted. The Jury therefore awarded a Prize Medal for it to Mr. BETHELL. (See p. 326.)

The mere seasoning of wood, though it will not altogether prevent its decay, nevertheless considerably diminishes its tendency to do so, and is of the very utmost importance in many cases. The value of any process for seasoning wood of course to some extent depends on the time required for its completion. A valuable series of specimens is shown by Mr. C. H. NEWTON (20) in illustration of Davison and Symington's patent process for speedily and effectually seasoning wood by exposing it to the influence of a rapid and continuous current of heated air, so that it soon becomes thoroughly dry. The practical value of this process appears to be satisfactorily proved, and the Jury accordingly deemed it worthy of Honourable Mention.

A fine specimen of elm, cut across the grain, and well seasoned by steeping in water and very slow drying, is shown by Sir W. MURRAY, Bart. (137).

A sample of Welsh oak, stated to be seasoned by a new process which renders it better suited to the purposes of the cabinet-maker, is exhibited by W. EVANS (9A).

The collection of East Indian woods exhibited by the HONOURABLE EAST INDIA COMPANY is by far the most extensive series of woods in the whole Exhibition, and constitutes a very valuable part of the great collection of Indian raw produce. It is remarkable for the large number of specimens, the excellence of many of them, and the valuable practical information to be gained by their examination. The collection consists of many hundred specimens, and includes several minor or local collections of great interest. Amongst these are the valuable collections of Drs. ROXBURGH and WALLICH; and extensive series of the woods of the Malay peninsula, Amherst, Tavoy, Tenasserim, Prince of Wales Island, Assam, Cuddapah, Madras, Orissa, &c.

Considering the extent and importance of Dr. Wallich's collection, the Jury would certainly have awarded to him a Medal, had not the fact of his being a member of the Jury precluded them from doing so. They awarded a Prize Medal to Mr. Commissioner BLUNDELL, for a very valuable collection of Amherst woods. They also awarded a Prize Medal to Messrs. ALMEIDA, of Singapore, for fine specimens of Lingoa-wood and Kayu-buka.

The smaller series of woods contributed by Messrs. A. P. ONSLOW, of Ganjam; D. MAYNE, of Cuddapah; WALTER ELLIOT, of Vizagapatam; J. E. CHAPMAN;

Lieut.-Colonel TULLOCH, the COMMISSARY-GENERAL of Madras ; Captain OGILVIE, of Masulipatam ; Captain MAITLAND, and Major BALFOUR, of Madras ; Dr. HUNTER, of Madras ; Dr. WIGHT, of Coimbatore ; Captain MARQUART, of Chittagong ; and J. R. COLVIN, of Moulmein, were also severally deemed worthy of Honourable Mention.

The nature and properties of many of these Indian woods is very little known ; and though, for the most part, it is not probable that it would be found worth while to import them into Europe, yet their importance to India is every year increasing, and must necessarily continue to do so, as the demand for timber in India for railways, and other engineering works, increases. For such uses it is desirable, not only that the wood should be strong and not liable to decay from mere exposure to the weather, but also that it should work freely, and be able to withstand the ravages of the various insects, to the attacks of which wood of all kinds is more or less exposed in tropical countries. It is true that even the most porous and spongy woods may be rendered to some extent capable of resisting all such influences, by being impregnated with various solutions, as in the processes just adverted to, but it is obviously far better, when possible, to select such woods as are naturally saturated with resinous and aromatic substances, as in the latter case all cost of preparation is saved, besides that the preserving matter is far more perfectly disseminated throughout the whole of the wood than can possibly be effected by any artificial process after the tree is felled.

In examining the comparative value of different sorts of wood, it is of the first importance to ascertain the nature of the encrusting matter deposited throughout the cells and tubes of the wood. For all practical purposes those woods appear to be best in which the cells are lined with resinous matter ; those filled with hygroscopic gummy matter are for the most part of less value ; they are seasoned with difficulty, and are always more liable to decay. The best woods are those having a strong fibre, protected from all external influences by a coat of resinous matter, or at least of a matter insoluble in water, and one which does not attract atmospheric moisture.

It is probable, also, that some of the ornamental and other woods of India will become articles of import when their properties and uses are better known and appreciated by our artizans.

Dr. Wallich's collection consists of about 450 specimens, and may be divided into the woods of Nepal, those of Tavoy, those of Gualpara, and those grown near Calcutta.

In the following general list of the woods contributed by the Indian Government, Dr. Wallich's collections are numbered 1, 2, 3, 19, and 23.



## No. I.—WOODS OF NEPAL (DR. WALLICH.)

No.	Name.	Newar.	Porbuttea.	Remarks.
1	<i>Acacia mollis</i> - - -	- -	- -	A large tree ; soft wood.
2	Do. <i>fragrans</i> - - -	- -	- -	
3	Do. <i>do.</i> - - -	Joolchumahl -	- -	Very large tree ; useful wood.
4	<i>Acer lævigatum</i> - - -	Sustendi - -	Cherouni - -	Used in building.
5	Do. <i>sterculiaceum</i> - - -	- -	- -	Very large tree ; soft wood.
6	Do. <i>oblongum</i> - - -	- -	- -	Very large tree ; good wood.
7	<i>Adamia cyanea</i> - - -	Bansook - -	Bansook - -	A shrub.
8	<i>Alnus nepalensis</i> - - -	- -	- -	Pale brown ; a hard wood.
9	<i>Andromeda ovalifolia</i> - - -	Juggoochat -	Angaree - -	A shrub ; soft wood ; used for fuel.
10	Do. <i>formosa</i> - - -	Sheaboge - -	- -	Large tree ; fine grain ; hard wood.
11	Do. <i>cordata</i> - - -	- -	- -	Brown wood.
12	Do.	- -	- -	
13	Do.	- -	- -	
14	<i>Aralia digitata</i> - - -	Leesaong.	- -	
15	Do. <i>nodosa.</i>	- -	- -	
16	Do. - - -	- -	- -	A soft wood ; used for boxes.
17	<i>Bauhinia</i> - - -	- -	Koila.	
18	Do. - - -	- -	- -	A large tree.
19	<i>Berberis pinnatifolia</i> - - -	Milkissee - -	Jumne-munda -	A shrub ; yellow wood.
20	Do. <i>asiatica</i> - - -	Matekissee -	Chitra - -	Do. do.
21	<i>Betula leptostachya</i> - - -	- -	- -	A tree ; good wood.
22	Do. <i>cylindrostachya</i> - - -	- -	- -	Do. wood shaky.
23	Do. <i>Bhojpattra</i> - - -	Bhojpattra -	- -	Do. good wood.
24	<i>Bignonia.</i>	- -	- -	
25	Do. <i>chelonoides</i> - - -	- -	- -	A large tree.
26	<i>Briedelia</i> - - -	- -	- -	Do. hard, fine-grained wood.
27	<i>Brucea napalensis.</i>	- -	- -	A shrub.
28	<i>Buddlia paniculata</i> - - -	Sinna - -	Narumpattu.	Do.
29	<i>Cæsalpinia.</i>	- -	- -	
30	<i>Camellia Kissi</i> - - -	Kisii - -	- -	A tree ; close-grained wood.
31	<i>Capparis</i> - - -	- -	- -	A shrub ; white and hard.
32	Do.	- -	- -	Do.
33	<i>Carpinus viminea</i> - - -	Chukisse - -	Konikath - -	A tree ; good, hard wood.
34	<i>Castanea tribuloides</i> - - -	Cotoor & Chisee Makoo & Shingali	- -	Do. hard and heavy wood.
35	<i>Cedrela hexandra</i> - - -	Toon - -	- -	Do. close and hard ; used for furniture.
36	<i>Celastrus</i> - - -	- -	- -	Soft, but fine-grained.
37	Do. <i>verticillata.</i>	- -	- -	
38	Do.	- -	- -	A tree ; soft, and very fine-grained.
39	<i>Celtis</i> - - -	Koosikma - -	Khori.	
40	<i>Cerasus Puddum</i> - - -	- -	- -	Do. soft wood.
41	<i>Chamærops Martiana.</i>	- -	- -	
42	<i>Champa</i> - - -	- -	- -	Palm tree ; a good soft wood.
43	<i>Cinchona gratissima</i> - - -	Tungnusi - -	Tungnusi - -	A shrub ; a coarse wood ; used for posts.
44	<i>Conyza candicans</i> - - -	Bhoea - -	Phusrae.	
45	<i>Cordia myxa</i> (?)	- -	- -	
46	<i>Coriaria napalensis</i> - - -	Bhojkinsi.	- -	
47	<i>Cornus oblonga</i> - - -	Easee - -	Easee.	Fine hard-grained wood.
48	Do. <i>capitata</i> - - -	- -	- -	Very large tree ; hard wood.
49	<i>Corylus ferox</i> - - -	- -	- -	Light wood.
50	<i>Cotoneaster affinis.</i>	- -	- -	A small tree.
51	Do. <i>obovata.</i>	- -	- -	Do.
52	<i>Cratægus arbutiflora</i> - - -	Roocs - -	- -	Very strong.
53	<i>Cyathea spinulosa.</i>	- -	- -	Fern tree.
54	<i>Dalbergia.</i>	- -	- -	
55	<i>Daphne Gardneri.</i>	- -	- -	A shrub.
56	Do. <i>cannabina.</i>	- -	- -	Do.
57	<i>Diospyros</i> - - -	Tendoo.	- -	
58	<i>Ehretia serrata</i> - - -	Nalshima - -	- -	A tree ; soft, tough wood ; used for posts.
59	Do. <i>macrophylla</i> - - -	Poegulsee - -	- -	Do.
60	<i>Eleagnus</i> - - -	- -	- -	A shrub.
61	Do.	Chusee - -	- -	Do.

No.	Name.	Newar.	Porbuttea.	Remarks.
62	Embelia - - - -	- -	- -	A shrub.
63	Eriobotria elliptica - -	Michul - -	Michul - -	A tree; hard, brown wood, compact.
64	Euonymus - - - -	Veysoor - -	Junghuree - -	A large tree; close-grained wood.
65	Euonymus tingens - -	Kuroori - -	- -	Brown, close-grained, hard.
66	Do. echinata. - -	- -	- -	A small tree.
67	Do. pendula - -	- -	- -	Do.
68	Do. do. - -	- -	- -	Do.
69	Eurya napalensis - -	Earansea - -	Jugnee.	- -
70	Do. variabilis - -	Chickouni - -	Chickouni - -	Brown, compact, hard.
71	Do. - - - -	- -	- -	Do.
72	Fagara floribunda - -	- -	- -	Very coarse.
73	Do. do. - -	- -	- -	- -
74	Ficus - - - -	Doodae-kath - -	Doodae-kath - -	Soft wood; used for gutters.
75	Do. - - - -	Pillaksi - -	Kaffrae - -	Soft, light wood.
76	Do. - - - -	- -	- -	Do.
77	Do. - - - -	- -	- -	- -
78	Do. - - - -	- -	- -	Light wood.
79	Do. - - - -	- -	- -	Tolerably hard.
80	Do. - - - -	- -	- -	Coarse, brown, hard wood.
81	Do. - - - -	- -	- -	A large tree; soft wood.
82	Fraxinus floribunda - -	Dakkuree - -	- -	A tree; like English ash.
83	Frezieria ochroides - -	- -	- -	Brown, close-grained, hard wood.
84	Gardenia florida - -	Eandorkomul-soang.	- -	A shrub.
85	Do. - - - -	- -	- -	Light brown, fine-grained, hard wood.
86	Do. - - - -	Bundhali - -	Bundhali.	- -
87	Gastonia palmata. - -	- -	- -	- -
88	Gordonia integrifolia - -	Goechasse - -	Chillounea.	A tree.
89	Gualtheria fragrantissima - -	Dhoree - -	Dhoseongree.	A shrub.
90	Guarea - - - -	- -	- -	Tolerably hard; pale brown wood.
91	Holboellia latifolia - -	Bagul (T.) - -	- -	A climber.
92	Hovenia dulcis - -	- -	- -	Very large tree; coarse wood.
93	Hydrangea altissima - -	- -	- -	A climber.
94	Do. trigyna. - -	- -	- -	- -
95	Hymenodictyon flaccidum. - -	- -	- -	Do.
96	Ilex dipyrrena - -	Munasi and Gulsima.	Karaput - -	A tree; heavy, hard, fine-grained wood.
97	Jasminum arboreum - -	Anjoo - -	- -	Hard and compact.
98	Do. dispernum. - -	- -	- -	- -
99	Do. chrysanthum - -	- -	- -	White and fine-grained, but brittle.
100	Juglans pterococca - -	- -	- -	Very large tree; coarse brown wood.
101	Justicia Adhatoda - -	Alesi - -	Kath.	- -
102	Laurina - - - -	Tapahaeo.	- -	- -
103	Laurus - - - -	Chasepoo - -	Lumpatch - -	Large tree; useful wood.
104	Do. glandulifera - -	- -	- -	Coarse, soft wood.
105	Do. caudata - -	- -	- -	- -
106	Do. albiflora - -	- -	- -	Large tree.
107	Do. - - - -	Pahela.	- -	- -
108	Do. - - - -	Phetpetta - -	Balukshee - -	Fine brown wood; used chests.
109	Do. - - - -	Chausoma.	- -	- -
110	Do. - - - -	Chikihul-tussipoo	Sami-lumpata.	- -
111	Do. - - - -	Keebula - -	Kalechampoo.	- -
112	Do. - - - -	Pumlasi - -	Khorkula - -	Large tree; strong and durable wood.
113	Do. - - - -	Khulsi.	- -	- -
114	Do. - - - -	Bulooksee - -	Sengoulu & Tijpaut	Excellent wood.
115	Do. - - - -	Phusree - -	Phusree - -	Greyish-brown wood.
116	Do. lanuginosa - -	- -	- -	Hard, light brown wood.
117	Do. (Tetranthera bifaria)	Juttrunga - -	Pahelakath.	- -
118	Leucosceptrum - -	- -	- -	Soft, inferior wood.
119	Leycesteria formosa. - -	- -	- -	- -
120	Ligustrum napalense - -	Billae, or Bancha	Billae or Bancha	Heavy, hard, compact wood.
121	Limonia - - - -	Hakoolnal - -	Kailkat - -	Soft, white, tough; good for turning.

No.	Name.	Newar.	Porbuttea.	Remarks.
122	<i>Limonia crenulata</i> - - -	- - -	- - -	Very hard, yellow wood.
123	<i>Loranthus</i> - - - -	Eca - - -	Lissokatta.	
124	<i>Ludia</i> - - - -	Mulloka - - -	Antheel.	
125	<i>Magnolia insignis</i> - - -	- - -	- - -	A tree; soft, but fine-grained.
126	<i>Melia</i> - - - -	Baksi - - -	Bukaena.	
127	<i>Meliacea</i> (?) - - -	Kangu Kurroo (B)		
128	<i>Menispermum laurifolium</i> .			
129	<i>Michelia Kisopa</i> - - -	Chobsee - - -	Champ, or Chaump	A tree; useful wood.
130	<i>Millingtonia pungens</i> .			
131	<i>Morus laevigata</i> - - -	- - -	- - -	A large tree.
132	<i>Myrica sapida</i> - - -	Kobusi - - -	Kaephul - - -	Like birch-wood.
133	<i>Myrsine semiserrata</i> - - -	Birusee kalikaut	Biresee kalikaut	Hard, handsome wood.
134	<i>Olea glandulifera</i> - - -	- - -	- - -	A large tree; very hard, heavy wood.
135	<i>Oleina</i> - - - -	- - -	- - -	Hard, handsome wood.
136	<i>Osyris napalensis</i> - - -	Shoori - - -	Shoori.	
137	<i>Panax polyacanthus</i> - - -	- - -	- - -	Large tree.
138	Do.	Lubtesee - - -	- - -	Soft, spongy wood.
139	Do.			
140	Do.			
141	Do. <i>pendulus</i> - - -	- - -	- - -	Handsome wood.
142	<i>Photinia dubia</i> - - -	- - -	- - -	Fine-grained, hard wood.
143	Do. <i>integrifolia</i> - - -	- - -	- - -	Coarse brown wood.
144	<i>Phyllanthus Emblica</i> - - -	- - -	- - -	Handsome, hard, brown wood.
145	<i>Pinus excelsa</i> - - -	- - -	- - -	Very compact wood.
146	Do. <i>longifolia</i> - - -	- - -	- - -	Excellent timber.
147	Do. <i>Brunoniana</i> - - -	- - -	- - -	Soft, useless wood.
148	Do. <i>Webbiana</i> .			
149	Do. <i>Deodara</i> - - -	- - -	- - -	Fragrant wood.
150	<i>Podalyria napalensis</i> - - -	Portugalla - - -	Oosihn.	
151	<i>Podocarpus macrophylla</i>	Goonsi.		
152	<i>Polygonum</i> - - - -	Tauntue - - -	Tuknee - - -	Used only for fire-wood.
153	<i>Polypodium giganteum</i>	- - -	- - -	Fern tree.
154	<i>Premna</i> - - - -	Toomulse.		
155	<i>Prunus glaucifolia</i> - - -	Rainpulee - - -	- - -	A large tree.
156	Do. <i>adenophylla</i> - - -	- - -	- - -	Do.
157	Do. <i>ferruginea</i> .			
158	<i>Psychotria rotata</i> - - -	- - -	- - -	Fine-grained, hard, brown wood.
159	<i>Pyrus indica</i> (?) - - -	Passy - - -	Mehul - - -	Fine-grained; compact, brown wood.
160	Do. <i>vestita</i> - - -	- - -	- - -	Soft wood.
161	Do. <i>foliolosa</i> .			
162	Do. <i>ursina</i> .			
163	<i>Quercus spicata</i> - - -	- - -	- - -	A very large tree; good wood.
164	Do. <i>semecarpifolia</i> - - -	Ghese & Cusroo	- - -	Do.
165	Do. <i>lamellosa</i> - - -	Shulsee & Phrarat	- - -	Very hard, and good wood.
166	Do.	Gomulsee - - -	Bunaroo - - -	Soft wood.
167	Do. <i>lanata</i> - - -	- - -	- - -	A very large tree.
168	Do. <i>lamellata</i> .			
169	Do. <i>polyantha</i> - - -	Soosi-Singhah.		
170	<i>Rhamnea</i> - - - -	- - -	- - -	A large climber.
171	<i>Rhamnus virgatus</i> - - -	- - -	- - -	Very hard and heavy wood.
172	<i>Rhododendron arboreum</i> - - -	Tuggoo - - -	Bhorans - - -	Good wood; used for gun-stocks.
173	Do. do. (white)	Teuggoo Tuggoo	Saphed Bhorans	A large tree; hard, brown wood.
174	Do. <i>campanulatum</i>	Teotosa - - -	Cheriala - - -	A large tree.
175	<i>Rhus Bukki-amela</i> - - -	Subuchunsee - - -	Bukki-amela - - -	A large tree; good timber.
176	Do. (?) - - -	Guarnusi - - -	Dubdubca (?) - - -	Very light, soft wood.
177	Do. <i>succedaneum</i> - - -	- - -	- - -	A large tree.
178	Do. <i>juglandifolium</i> - - -	Chose - - -	Bhalaco - - -	Reddish-brown wood.
179	<i>Rondeletia cana</i> - - -	- - -	- - -	Close-grained, reddish wood.
180	Do. <i>coriacea</i> - - -	Julsi - - -	Kongeea.	
181	<i>Röttlera</i> - - - -	Teeta-Kath - - -	Labtesee.	
182	Do. <i>tinctoria</i> - - -	- - -	- - -	Small and inferior timber.
183	Do. ( <i>tinctoria</i> ?) - - -	- - -	- - -	Hard, fine-grained, brown wood.
184	Do. <i>arborea</i> - - -	- - -	- - -	Coarse, soft wood.
185	<i>Rubus Gouriphul</i> - - -	Eesi - - -	Escaloo.	

No.	Name.	Newar.	Porbuttea.	Remarks.
186	<i>Sabia parvifolia</i> - - -	Mhasoosee - - -	Mhasoosee.	
187	<i>Salix</i> - - - - -	Bhoelasi - - -	Bhoelasi.	
188	Do. <i>Babylonica</i> - - -	Tissee & Bhosee	Tissee & Bhosee	Very large tree.
189	Do. do.	- - -	- - -	
190	<i>Schoepfia fragrans</i> - - -	- - -	- - -	A shrub; coarse, light, soft wood.
191	<i>Securidaca reniformis</i> - - -	- - -	- - -	A soft, white wood.
192	<i>Smilax</i> - - - - -	Doduan - - -	Doduan.	
193	<i>Sphaerocarya edulis</i> - - -	Lushpoo, Ael, or Ealmarisee.	Bun Amb - - -	A handsome wood; used for posts and fuel.
194	<i>Sphaerosame fragrans</i> - - -	- - -	- - -	A coarse, soft wood.
195	<i>Spondias axillaris</i> - - -	Lupshe - - -	- - -	A tree.
196	Do. do.	Sillaephul - - -	- - -	Do.
197	<i>Symplocos</i> - - - - -	Gooki - - -	- - -	Inferior wood.
198	Do. <i>floribunda</i> - - -	- - -	- - -	A large tree; fine-grained wood.
199	Do. (?) - - - - -	Paunlah - - -	Kalikath - - -	A large tree; soft, white, compact wood.
200	Do. - - - - -	Bulsima.	- - -	
201	Do. (?) - - - - -	- - -	- - -	A large tree; pale brown, hardish wood.
202	Do. <i>pulcherrima</i> - - -	- - -	- - -	A small tree.
203	Do. <i>lucida</i> - - - - -	- - -	- - -	Hard, fine-grained wood.
204	<i>Taxus virgata</i> - - - - -	Lolsi - - - - -	Dheyri - - -	A large tree; good and strong timber.
205	<i>Ternstroemia napalensis</i> - - -	- - -	- - -	Soft and spongy wood.
206	<i>Tetradium</i> (?) <i>cymosum</i> .	- - -	- - -	
207	Do. (?) - - - - -	- - -	- - -	A very large tree.
208	<i>Thunbergia coccinea</i> .	- - -	- - -	
209	<i>Turpinia pomifera</i> - - -	Phurasee & Signa	- - -	A large tree; light soft wood.
210	<i>Uncaria pilosa</i> .	- - -	- - -	
211	<i>Urtica</i> - - - - -	Jeonagkun - - -	Latasishnoo.	
212	Do. <i>salicifolia</i> .	- - -	- - -	
213	<i>Viburnum</i> (?) - - - - -	Loshima.	- - -	
214	Do. <i>erubescens</i> - - -	- - -	- - -	A middle-sized tree.
215	<i>Vitis</i> - - - - -	- - -	- - -	Spongy, coarse wood.
216	<i>Wightia gigantea</i> - - -	- - -	- - -	A large climber.
217	<i>Ziziphus incurva</i> - - -	Kadubusi - - -	Harobaer - - -	A good wood.
218	_____ - - - - -	Choorosi - - -	- - -	Very fine wood.
219	_____ - - - - -	Joolshima.	- - -	
220	_____ - - - - -	Khura - - -	- - -	Useless wood.
221	_____ - - - - -	Kujulsee - - -	Kujulsee - - -	Strong, good wood.
222	_____ - - - - -	Kurani - - -	Birouni.	
223	_____ - - - - -	Mucuna - - -	- - -	A climber.

The wood of several species of *Briedelia* forms excellent timber. The Assama, *Briedelia montana*, is common in Canara, where it attains great size, and, for building purposes, seems little if at all inferior to teak; it is said to resist the action of water quite as well.

No. 2.—WOODS OF GUALPARA (DR. WALLICH).

<i>Acacia odoratissima</i> - - -	Jatikorai - - -	Hard wood; used for furniture.
Do. <i>marginata</i> - - -	Korni - - -	Yields good planks.
<i>Alstonia scholaris</i> - - -	Chatiyani - - -	Used for common furniture.
Do. <i>antidysenterica</i> - - -	Dudkhuri - - -	A large tree.
<i>Anacardium latifolium</i> - - -	Bhela - - -	Used for chests, couches, &c.
<i>Andrachne trifoliata</i> - - -	Uriam - - -	Used for common furniture.
<i>Antidesma</i> - - - - -	Boro-helock - - -	Ditto.
<i>Aquilaria agallochum</i> - - -	Aggur - - -	Contains a volatile oil.
<i>Artocarpus chama</i> - - -	Kangtali chama - - -	An immense tree; used for canoes.
<i>Bautrinia sutra</i> - - - - -	Tukra - - -	A close-grained, soft, tough, yellow wood.
Do. <i>bacuria</i> - - - - -	Bakuri - - -	An open-grained, soft, tough wood.
<i>Bhiza moya</i> - - - - -	Moj - - -	A close-grained, hard wood.
<i>Bignonia calais</i> - - - - -	Kolai-beng - - -	Used for fuel only.
<i>Briedelia stipularis</i> - - -	Kohi - - -	Close, hard, tough wood.

<i>Butea frondosa</i>	- - - -	Potash	- - -	Open, soft, tough wood; used for common furniture.
<i>Callicarpa arborea</i>	- - -	Khoja	- - -	Used for mortars, pestles, and common furniture.
<i>Calyptranthes</i>	- - - -	Jam	- - -	Used for common planks.
Do.	- - - -	Saljam	- - -	A close, tough, hard wood.
<i>Careya</i>	- - - -	Kombo	- - -	Close, hard, strong, tough wood.
<i>Cassia fistula</i>	- - - -	Sonalu	- - -	Ditto; used for ploughs.
<i>Castanea</i>	- - - -	Golsinggur	- - -	Excellent hard, tough timber.
Do.	- - - -	Nikari	- - -	Excellent timber; used for canoes and furniture.
Do.	- - - -	Kangta Singgur	- - -	Somewhat inferior to preceding.
<i>Cedrela Toona</i>	- - - -	Toon, or Tungd	- - -	Brown, aromatic wood, rather brittle; used for furniture.
<i>Chrysophyllum acuminatum</i>	- - - -	Pithogarkh	- - -	A white, tough wood; used for furniture.
<i>Croton oblongifolium</i>	- - - -	Parokupi	- - -	A close-grained, rather brittle wood; used for common furniture.
Do. do.	- - - -	Lalpatuja	- - -	Hard, close-grained; used for canoes.
<i>Dalbergia momsita</i>	- - - -	- - -	- - -	Close, hard, tough wood; used for common furniture.
<i>Decadia spicata</i>	- - - -	Bongyera	- - -	Ditto.
<i>Dillenia pilosa</i>	- - - -	Daine-oksi	- - -	Open, but hard and tough; used for canoes.
Do. pentagyna	- - - -	Oksi	- - -	Ditto, but closer wood.
Do. speciosa	- - - -	- - -	- - -	Close and hard, but rather brittle.
<i>Ekebergia</i>	- - - -	Jiyakohi	- - -	Valuable wood, like mahogany.
<i>Fagara rhetza</i>	- - - -	Bajarmondi	- - -	Close, hard, tough, good wood.
<i>Ficus undulata</i>	- - - -	Bakhalpani	- - -	Open, soft, rather tough wood; used for canoes.
<i>Ficus oppositifolia</i>	- - - -	Khoskadumor	- - -	Soft, open, brittle wood.
<i>Gordonia</i>	- - - -	Bonjam	- - -	Useful for turning.
<i>Gmelina arborea</i>	- - - -	Gambhari	- - -	Light and durable wood; used for turning.
<i>Jambolifera pedunculata</i>	- - - -	Holkholi	- - -	Used for gun-stocks.
<i>Lagerstroemia parviflora</i>	- - - -	Sida	- - -	A large tree; close, tough, good wood.
Do. reginæ	- - - -	Jarul	- - -	Ditto; excellent wood.
<i>Laurus salicifolia</i>	- - - -	Horisongher	- - -	Used for common furniture.
Do. champa	- - - -	Kurka champa	- - -	Ditto.
Meliacea	- - - -	Tokor	- - -	A large tree; used for planks, canoes, and common furniture.
<i>Mimusops</i> (?)	- - - -	Chalpata	- - -	Used for coarse furniture.
<i>Myginda</i>	- - - -	Silapoma	- - -	Ditto.
<i>Myristica</i>	- - - -	Jheruya	- - -	Ditto.
<i>Nauclea cadamba</i>	- - - -	Kodom	- - -	A noble tree, yellow wood; used for common furniture.
<i>Nerium tomentosum</i>	- - - -	Adhkuri	- - -	Used for furniture.
Do. antidysentericum	- - - -	Dudkhuri	- - -	Ditto, and for turning.
<i>Phyllanthus</i> (?)	- - - -	Horinhara	- - -	Used for coarse furniture.
<i>Premna hircina</i>	- - - -	Chikagambhori	- - -	A large tree; the wood has a very peculiar aromatic odour.
Do. flavescens	- - - -	Bukdholi	- - -	Very inferior to the preceding.
<i>Quercus</i>	- - - -	Tima	- - -	Used for coarse furniture.
<i>Rhamnus</i>	- - - -	Bangla	- - -	Used for chests, stools, &c.
<i>Rhamnus</i>	- - - -	Premna (?)	- - -	Used for chests, canoes, &c.
Sapindacea	- - - -	Dophari	- - -	Used for coarse furniture.
<i>Schinus niara</i>	- - - -	Niyor	- - -	A hard, close-grained, rather brittle wood; preferred for furniture.
<i>Spondias amara</i>	- - - -	Amra	- - -	Not used.
<i>Sterculia</i>	- - - -	Bahelli	- - -	Used for canoes.
Do. urens	- - - -	Odlu	- - -	Ditto, rope made from the bark.
<i>Stravadium acutangulum</i>	- - - -	Hendol	- - -	Poor wood, but much used.
<i>Terminalia bellerica</i>	- - - -	Bauri	- - -	Used for canoes.
Do. moluccana	- - - -	Joynal	- - -	Light and durable timber; used in boat-building.
Do. hilka	- - - -	Hilkha	- - -	Used for canoes and furniture.
<i>Tetranthera caduca</i>	- - - -	Pangch-Petiya	- - -	Used for common carpentry.
Do. do.	- - - -	Haola	- - -	Close, soft wood; used for coarse furniture.

Tetranthera paromonja	- - -	Paromuja	- - -	Close, soft wood; used for coarse furniture.
Do. dorodmeda	- - -	Vagnal	- - -	Ditto.
Tornex japonica	- - -	Uluyaohama	- - -	Used for small canoes.
Trophis (?) aspera	- - -	Saora	- - -	Used for joiners' work.
Uvaria suberosa	- - -	Bandookola	- - -	A soft, close-grained, brittle wood; used for planks, posts, beams, &c.
Vangueria edulis	- - -	Moyen	- - -	Used for coarse furniture; a small tree.
Vernonia	- - -	Magor	- - -	Ditto.
Vitex acuminata	- - -	Angchhui	- - -	A very close, hard, brittle wood; used for mortars, oil-mills, &c.
Do. babula	- - -	Babla	- - -	A close, soft, tough wood; used for common furniture, &c.
Do. leucoxydon	- - -	Bhodiya	- - -	Used for making ploughs.
—————	- - -	Chotagotadhora.		
—————	- - -	Chung	- - -	A large tree; close, tough wood; used for furniture.
—————	- - -	Kalajiya	- - -	Wood not used.
—————	- - -	Nikari	- - -	Used for canoes and furniture.

Chatiyar or Sativeen, *Alstonia scholaris*, grows to a large size in the forests of Canara, the wood is white and compact, and well adapted for turning purposes.

The Jarrol or Jarul, *Lagerstrœmia Reginae*. This tree grows to a great size in the Chittagong district, though the forests are now to a great extent cleared of the best variety. It is considered an excellent wood for ship-building, it is tough, has the character of standing well in water, and is much used for beams, rafters, and boards.

The Gomar or Gambhari, *Gmelina arborea*, is abundant in the Morung and Chittagong forests. It is a weak wood, but is in great estimation for picture-frames, sounding-boards, organ-pipes, venetian-blinds, and all sorts of light work in which shrinkage is to be avoided. Its specific gravity is 0.466; its strength, according to Captain Baker, compared to teak, as 499 to 869.

Toon, *Cedrela Toona*, is a somewhat coarse-grained wood, but very extensively used throughout India for furniture and interior carpenters' work.

No. 3.—WOODS FROM CALCUTTA (DR. WALLICH).

*From the Botanical Gardens.*

Cassia nodosa	- - -	A very large tree.	Mimosa polystachya.
Celtis australis	- - -	Jeebun.	Morinda citrifolia.
Chaulmoogra odorata	- - -	Ditto.	Morus mauritiana.
Clerodendron phlomidis.			Nauclea undulata.
Coccoloba uvifera.			Premna spinosa - Guniaru.
Ehretia laevis.			Scytalia longan.
Garcinia paniculata.			Do. litchi.
Gardenia latifolia.			Sonneratia apetala - Keeorora
Do. lucida.			Spondias acuminata - - A large tree.
Ludia spinosa			Sterculia augustifolia.
Mimosa capensis.			Terminalia catappa - - A noble tree; good wood.
Do. odoratissima.	- - -	A large tree; excellent timber.	Urtica pulcherrina.

A very fine specimen of mahogany, grown in the Botanic Garden at Calcutta, is also exhibited, showing that excellent "Spanish mahogany" may be raised in the East Indies. This is a matter of some importance, for although there are many woods in India which rival the mahogany in beauty, there is hardly any known wood which combines all the valuable qualities of the latter, uniting at the same time a rich colour, a fine grain, and the character of working kindly and freely under the tool.

## No. 4.—WOODS FROM SERAMPORE, NEAR CALCUTTA. (J. MARSHMAN.)

Adenanthera pavonina.	Dillenia pentagyna.	Gmelina arborea. Gomar wood.
Dalbergia latifolia.	Careya sphaerica.	Mimusops hexandrus.
Do. ougeinensis.	Cinchona gratissima.	Putranjiva Roxburghii.
Do. sp.	Erythrina ovalifolia.	Robinia macrophylla.
Diospyros montana.	Eugenia polypetala.	Santalum album. Sandal wood.
Do. sapota.		

These specimens are from Dr. Carey's Botanic Garden near Calcutta. The blackwood or rosewood sit-sâl (*Dalbergia latifolia*) grows to a very large size on the Malabar coast. It is a close-grained, greenish, black wood, beautifully marked with lighter-coloured veins. It is a heavy, close-grained wood, and is much used in the manufacture of furniture, as it takes a very high polish. For engineering purposes, and especially for gun carriages, it is very valuable, and in consequence large forests of it have been formed in waste places in the North West provinces of Hindustan.

Sandal wood (*Santalum album*) is well known and esteemed, on account of its peculiar perfume. It is used in cabinet-work, for fans, beads, ornaments, and all sorts of carved fancy-work. The bark of this tree contains a beautiful red colouring matter, which, however, does not appear to be practically made use of.

## No. 5.—WOODS OF THE NORTHERN CIRCARS. (W. ELLIOTT and A. P. ONSLOW.)

Cumba.	Tangada; Auvarai marum; Cassia auriculata.	Tabica.
Goomoodoo.	Paya.	Tellavoolemara.
Unkoodoo.	Annon.	Nullavoolemara; Diospyros chloroxylon.
Undoaroo.	Togaru; Morinda citrifolia.	Velture; Mimosa cinerea.
Iscarawsee.	Borrooga; Bombax sp.	Nulla muddi; Pentaptera tomentosa.
Ghantha.	Induga; Thaethanmorum; Strychnos potatorum.	Tella muddi; Pentaptera glabra.
Goompana; Odina wodier.	Nuckaroo; Cordia myxa.	
Ganara.		
Wood apple; Krocet; Feronia elephantum.		

## No. 6.—WOODS OF ORISSA.

Abher ebony, or Kendoo manjau.	Sissoo; Yekereachava kurra; Dalbergia sissoo.	Tadah.
Bandanum, or Bundum.	Dammer wood; Geoglama kurra.	Somedah; Sornida kurra; Swietenia febrifuga.
Kungrah.	Red wood; Panevapah wood; Maha nambo.	Yegasch; Peak salvo; Pterocarpus marsupium.
Toomekachava; Kakatulu; Diospyros eboneaster.	Goomoodoo.	Bokkum; Caesalpinia sappan.

## No. 7.—WOODS OF CUDDEPAH (D. MAYNE).

Acacia Arabica -	Nalla tooma; Siah kekur; Karoo.	Cordia Myxa - -	Sunna creakoe; Chota gonee; Sina naru villam.
Aegle Marmelos -	Velum.	Do. - -	Ooroo perukee; Sahra gonei; Peroo nancee villam.
Alangium hexapetalum	Woodooya; Akola.	Dalbergia arborea -	Kanoogoo; Kung; Poon-gum.
Bassia longifolia -	Yessa; Mohi ka jar; Yelloopai.	Diospyros ebenaster -	Kadum berriya.
Bergera Koenigii -	Kurri pakoo; Kurie pah; Kurie vipin.	Erythroxyton areolatium.	
Borassus flabelliformis	Thatu kurra; Tar; Panung-kutta.	Eugenia jambolana.	
Butea frondosa -	Palau samoo; Pinmass; Palan marum.	Feronia elephantum -	Veluga kurra; Korveet vella marum.
Canthium parviflorum		Do. do. -	Konda vallarpaga; Junglee; Korveet kaloo.
Chloroxyton Swietenia	Hurugulu.	Ficus religiosa -	Rancee; Peepal; Arasa.
Do. dupada -	Chadacalu.		

<i>Ficus glomerata</i>	- Medec; Gol leer; Altee maram.	Chindaca; Soorjsiah Katoo valay.
Do. <i>infectoria</i>	- Jovee; Kall alun.	Korivee; Korivee; Korvee.
<i>Hibiscus populneus</i>	- Paris kajhar; Poorsum marum.	Dhourah; Dhowar.
<i>Mimosa cinerea</i>	- Vellatorroo; Wardil; Vidatil.	Duntha; Bekul.
Do. <i>suma</i>	- Jammee; Vaunee.	Gopee.
Do. <i>ferruginea</i>	- Tella toorna; Keckursafaed; Vil villum.	Goothee; Gootheecree.
<i>Phyllanthus emblica</i>	- Oosarica; Amlah; Toopoonellee.	Gengaramin kurra (tulip tree).
Do. do. (black)	Nulla oosarica; Siah amla; Nelee kadambo.	Jany Janee.
<i>Pterocarpus santalinus</i>	Chendanum; Chandasoorkh; Segapoo chendanum.	Konda crookce; Jungly gorei.
<i>Sapindus rubiginosa</i>	- Koopoodoo; Reeh; Manee poongum.	Kondapala; Khernee kulakree.
<i>Shorea robusta</i>	- Yepai; Yepa aussence; Saul.	Keernee; Khernee.
<i>Spondias mangifera</i>	- Konda marindee; Jungle arm; Katoo maitlarum.	Mahal; Mohul.
<i>Strychnos nux-vomica</i>	Mooshtee; Bachla; Mooltee.	Muskaka jhar; Muske' ka thar.
Do. <i>potatorum</i>	Chilla ginga; Chill bingore; Naumbore; Naronbal; Taitan.	Narva; Narvikelahree.
<i>Swietenia febrifuga</i>	- Somee; Some'ka ther; Semmarum.	Nameluddoojoo; Jungle shaumbaloo.
<i>Tamarindus indica</i>	- Chinta kurra; Nulee; Pooleya marum.	Neroodee; Chinna neroodee.
<i>Terminalia alata</i>	- Muddee; Maroodum; Jungle kameng.	Poda; Pallas.
<i>Terminalia chebula</i>	- Karaka; Kharurna; Kadookaee.	Peak saul; yengasee; yagasee.
<i>Terminalia belerica</i>	- Thandra; Tandra; Tanee.	Polkee (black); Nulla polkee; Siah polkee.
<i>Tetranthera monopetala</i>	Mara manaidee; Jungle rai; Dorrake waste.	Polkee (white); Tella polkee; Suffai polkee.
<i>Vangueria spinosa</i>	- Pedda munga; Bangaree kulakree.	Pedda tapasee; Baree tapasee.
<i>Wrightia antidysenterica</i>	Palavardnee; Palava renoo; Veppallai.	Pedda neeroodee; Barra neeroodee.
<i>Zizyphus jujuba</i>	- Pedda rajjoo; Sooa bur.	Rudra kadapa; Roodra kurpah.
Do. do.	- Pala rajjoo; Dordhea bur; Yelandis.	Swam; Swamoo kurra.
	Auray; Aree.	Sarapappoo; Chara; Cheronjee kaghar sarai.
	Beekce; Bikee; Biklee.	Soonkasoola; Sunkesarke-lakree; Vadee narainin.
	Beet cadapa; Beet kurpa.	Vadusa; Warsa.
	Bunka thada; Baktra.	Yalama; Yelama; Dhaura.
	Checkranee; Chickranee; Seckram.	Yerra polkee; Nulla polkee; Sagharee kala kree.
		Yeumaddy; Euamaddee; Eumuddee.

The Saul or Sâl, *Shorea robusta*, belonging to the family of *Dipterocarpea*, is perhaps the most valuable and extensively used of all the timber trees of India. It is a heavy, close-grained, light-brown wood. From the bad and careless manner in which trees are felled, and from the injudicious mode in which the timber is squared, its value is often considerably diminished. The Saul timber brought down to Calcutta is seldom more than 30 feet in length. Its specific gravity varies from 0.92 to 1.182, and in strength and tenacity it is considerably superior to the best teak. From Captain Baker's excellent experiments, it appears that, compared with teak, its strength is about as 1121 to 869. From Major H. Campbell's valuable experiments, unseasoned Saul broke with a weight of 1308 lbs., seasoned Saul with 1319 lbs., and teak wood with 1091 lbs. It is unquestionably the most useful known Indian timber for



engineering purposes; as a building wood, unless very well seasoned, it is somewhat apt to shrink.

Kadum berriya, *Diospyros ebenaster*, a variety of Coromandel or Calamander, a striped wood, having a light-brown colour; it is a handsome furniture wood, which turns well, and is admirably adapted for veneering, and all sorts of cabinet-work.

Hurugulu, *Chloroxylon Swietenia*, yields the beautiful wood used for veneering and other cabinet-work, commonly called Satin-wood: the tree never grows to a large size.

Chinta kurra, *Tamarindus indica*, is a strong and handsome wood, used for furniture, for washermen's boards, and in the manufacture of oil and sugar mills.

Palan or Pallas, *Butea frondosa*. The wood of this beautiful and useful tree is hardly distinguishable from teak, the timber is large, but it is almost always knotted and gnarled.

No. 8.—WOODS FROM MADRAS—(The COMMISSARY-GENERAL and Captain MAITLAND.)

1. Atta; Anthen marum.
2. Ansena; Pterocarpus sp.
3. Chittagong wood; Aglay; Chickrassia tabularis.
4. Ervombalu wood; Hoombilly marum; Feriola buxifolia.
5. Mango wood; Am; Mang cuttai, Mangifera indica.
6. Noonah.
7. Paris kajhar; Poorsum marum; Hibiscus populneus.
8. Peddawk wood.
9. Pala; pala kurou; Paulai marum; Mimusops hexandra.
10. Rosewood; sissou; Eatty marum; Dalbergia.
11. Satin-wood; billa kurra; Chloroxylon Swietenia.
12. Saul; tapai; aussena; Shorea robusta.
13. Trincomalee wood; Berrya Ammonilla.
14. Teak; jarkoo; jake marum; saywan; Tectona grandis.
15. Woodia; oathay marum; Odina Wodier.

Chittagong wood, *Chickrassia tabularis*: the wood of this tree is white, tough, and close-grained; it is, however, but little used.

No. 9.—WOODS OF TRAVANCORE—(Col. FRITH.)

NAME.	Colour.	Specific Gravity.	
1. Ahguilb - - -	Light yellow	0·674	Very abundant; used for furniture.
2. Attoo vunjee - - -	Amber colour	0·480	Very cheap; used for firewood.
3. Aranellah - - -	Dark brown-	0·645	For building common houses.
4. Chinny - - -	Rather dark-	0·515	{ From 8 to 16 feet in circumference; used for building canoes.
5. Cherrotimba - - -	Dark - - -	0·843	{ About 3 feet in circumference; used for house building, tools, &c.
6. Cherro tanny - - -	Light - - -	-	Firewood.
7. Carcemaradoo - - -	Dark brown	-	{ 2 to 6 feet in circumference; used for carts and building.
8. Chorocadamboo- - -	Yellow - - -	0·529	Used for packing-cases.
9. Chitta linny - - -	Red - - -	0·847	1 to 1½ feet circumference, used for furniture.
10. Cherro vunjee - - -	Brown- - -	0·644	Used for firewood.
11. Cherro nalampella - - -	Light brown	0·483	For making canoes.
12. Cherro canny - - -	„	-	Only for firewood.

NAME.	Colour.	Specific Gravity.	
13. Cundalahpallah -	- Bamboo -	-	For making sandals.
14. Channy marrom-	- Brown -	-	For building common houses.
15. Channy vengah -	- Light yellow -	-	1 to 6 feet in circumference ; house building.
16. Carrimarriddy -	- Dark -	-	{ 1 to 4 feet in circumference ; used by wheelwrights.
17. Cherropoona -	- " -	-	Building houses.
18. Conjah marrom -	- Red -	-	Furniture, &c.
19. Conjee marrom -	- Light red -	0.650	" "
20. Cahannee -	- Brown -	-	Used for oil mills, &c.
21. Dhannee -	- Dark -	0.733	{ Very strong, but knotty ; used for common buildings.
22. Ellahneel -	- Light red -	0.779	{ A small tree ; used for temples, pagodas, and for furniture.
23. Eramboo -	- Dark brown -	-	For common houses.
24. Jackwood -	- Yellow -	0.554	{ 2 to 10 feet in circumference ; used for furniture, &c.
25. Kullentake -	- Brown -	0.749	Buildings, wheelwrights' work, &c.
26. Karanchilly -	- Dark -	0.519	Buildings, and small boats.
27. Kye attee -	- Ash colour -	0.972	Carts and buildings.
28. Kanjarum, or nux mica -	- " -	0.796	For making cots.
29. Kar-itty, or black wood	- Black -	0.948	{ 2 to 4 feet in circumference ; strong wood ; used for furniture.
30. Kanj arom -	- Ash colour -	-	Used for common buildings.
31. Manja cadamba -	- Yellow -	-	Used for packing cases.
32. Moolu venga -	- Copper colour -	0.831	Used for common buildings.
33. Masoodah -	- Ash colour -	-	2 to 8 feet in circumference ; used for building.
34. Myle Ella -	- " -	-	Used for carts, building, &c.
35. Mally velly ravah	- Light brown -	0.664	For building houses only.
36. Munjaddy -	- Purple -	0.667	" "
37. Myle Ellah -	- Light green -	0.896	" "
38. Manny marootha	- Flesh colour -	-	For carts, and building houses.
39. Magadamboom -	- White -	0.462	Used for light work generally.
40. Munny martha -	- Brown -	0.607	{ 1 to 6 feet in circumference ; used for furniture.
41. Manja cadamboo	- Light yellow -	-	Used for packing-cases.
42. Muttalla -	- Brown -	-	Used for light work.
43. Neelahampallah -	- Light brown -	-	Used for house-building, ceilings, &c.
44. Nanamboo -	- Brown -	-	Used for common buildings.
45. Neelumpallah -	- Light brown -	-	Used for light work.
46. Nurmanjee -	- Bamboo -	-	" "
47. Nurmarithy -	- Brown -	0.615	Building common houses.
48. Nulampallah -	- Dark brown -	-	{ 2 to 4 feet in circumference, and 30 feet long, used for common houses, and carts.
49. Odoorah venga -	- " -	0.853	{ 4 feet in circumference, and 40 feet long ; a strong good wood, used for wheels, gun-carriages, &c.
50. Oddysaga -	- " -	-	Used for common building purposes.
51. Oddamarrom -	- Dark -	-	{ 3 feet in circumference, used for tent-pegs, mallets, &c. ; very strong wood.
52. Paul teak -	- Brown -	0.739	Used for furniture, gun-carriages, &c.
53. Poon -	- " -	0.623	{ 2 to 4 feet in circumference, and 80 feet long ; used for masts.
54. Pongah -	- " -	0.988	For building houses.
55. Pooly etty -	- Black -	0.858	{ 2 to 8 feet in circumference ; strong wood ; used for furniture.
56. Poddy vaga -	- Brown -	0.400	{ 4 to 10 feet in circumference, 40 feet long ; strong, never splits : used by wheelwrights.

NAME.	Colour.	Specific Gravity.	
57. Ponghu - - -	Brown -	0·960	3 feet in circumference ; used for building.
58. Thevahdarum, or cedar wood - - -	Flesh colour -	0·457	{ 2 to 8 feet in circumference ; used for palanquins, cabin fittings, furniture, &c.
59. Tharanchilly - - -	Bamboo -	-	{ 5 to 8 feet in circumference ; used for canoes only.
60. Tekkeer attoovye anjelly - - -	Brown- -	0·528	{ 4 to 6 feet in circumference ; for house and ship building.
61. Tharunjulla - - -	Pamboo -	0·576	Used for common buildings.
62. Tambagum - - -	Brown -	0·910	{ 5 feet in circumference ; very strong wood ; used for houses, blocks, &c.
63. Venpalla - - -	Ash colour -	-	Only used for carved figures, sandals, &c.
64. Vatanboo - - -	Brown- -	0·434	Only used for firewood.
65. Vatanboo - - -	Light brown -	-	{ 2 feet in circumference ; used for railings, fences, &c.
66. Varoodah - - -	Yellow -	0·855	Used for building houses.
67. Velha ahguill - - -	Light brown -	-	{ 2 to 4 feet in circumference ; used for furniture.
68. Veytty - - -	" -	-	Used for making carts, ceilings, &c.
69. Veimboo - - -	Flesh colour -	0·483	{ 2 to 4 feet in circumference ; used for tables, &c.
70. Vella ahguill - - -	White -	0·602	{ 2 feet in circumference, 50 feet long ; used for furniture.
71. Vella carduntha- - -	Brown- -	-	{ 3 to 6 feet in circumference, 40 feet long ; strong wood, used for furniture.
72. Vety marron - - -	Purple- -	0·623	Used only for firewood.
73. Vataloo - - -	" -	-	" "
74. Vety taddy - - -	Brown- -	0·635	" "
75. Vanpuggalah - - -	Light yellow -	0·604	Used for light work.
76. Vutty marithy - - -	Brown- -	0·595	Building common houses.
77. Vuddamba - - -	" -	0·750	" "
78. Vally canjarum - - -	" -	0·703	" "
79. Vellaneermaradoo - - -	Light yellow -	0·573	Used for furniture.
80. Vellallava - - -	Brown -	-	Used for light work.
81. Yuttamba - - -	" -	-	Used for building houses, and light work.

These woods, as well as the collections from Palamcottah (No. 11), from Paulghaut (No. 12), from Tinevelly (No. 13), from Canara (No. 14), and from Penang (No. 30), were selected and sent over by the late Col. FRITH : they are exhibited by Lieut.-Col. BONNER, military storekeeper of the Hon. East India Company. The specific gravities have been calculated from comparatively imperfect data, and therefore can only be regarded as rough approximations.

No. 10.—WOODS OF HINDOSTAN.—(Dr. ROXBURGH.)

	Weight per cubic foot.			Weight per cubic foot.	
	lbs.	ozs.		lbs.	ozs.
1. Artocarpus Chaplasha - - -	34	12	12. Jeah - - -	36	11
2. Averrhoa Carambola- - -	39	11	13. Lagerstrœmia Reginae - - -	46	8
3. Castanea indica - - -	39	0	14. Loquat - - -	46	11
4. Cedrela Toona - - -	32	9	15. Melia Azadirachta - - -	46	1
5. Cynometra polyandra - - -	52	10	16. Acacia odoratissima - - -	45	6
6. Diospyros racemosa - - -	34	11	17. Nerium tinctorium - - -	39	4
7. Dombeya melanoxylon - - -	71	9	18. Odina Wodier - - -	41	0
8. Engelhardtia pterocarpa - - -	39	14	19. Osyris peltata - - -	30	8
9. Gmelina arborea - - -	32	3	20. Palm - - -	57	9
10. Guacua - - -	41	14	21. Quercus fenestrata - - -	47	0
11. Gundruy- - -	34	15	22. ——— lancifolia - - -	41	10

		Weight per cubic foot.				Weight per cubic foot.					
		lbs.	ozs.			lbs.	ozs.				
23.	<i>Quercus lappacea</i>	-	-	51	4	29.	<i>Sophora robusta</i>	-	-	42	4
24.	Red Sanders	-	-	46	14	30.	<i>Swietenia febrifuga</i>	-	-	54	14
25.	<i>Santalum album</i>	-	-	47	13	31.	<i>Terminalia Chebula</i>	-	-	42	10
26.	Sassafras	-	-	32	12	32.	————— <i>citrina</i>	-	-	60	2
27.	<i>Scytalia</i>	-	-	44	8	33.	<i>Tetranthera nitida</i>	-	-	34	4
28.	————— <i>trijuga</i>	-	-	60	0	34.	<i>Vateria lancifolia</i>	-	-	53	15

Specimens of the wood of the Indian cedar, *Cedrus Deodara*, and of the cypress, *Cupressus torulosa*, from the Himalayas, are shown by Dr. ROYLE; the former, recently introduced into this country as a beautiful ornamental tree, appears to promise well as a useful timber tree; the wood works well and freely.

No. 11.—WOODS OF PALAM-COTTAH.—(Col. FRITH.)

NAME.	Colour.	Specific Gravity.	
1. Ebony	- - - Very dark	-	{ Heavy and brittle, very hard, makes beautiful furniture.
2. Eroompooley	- - Red	-	Used for building and for common carts.
3. Mountain teak	- - Light-	0·849	Used for shafts, &c.
4. Oonay	- - Brown	1·001	Used for shafts, staves, splinter-bars, &c.
5. Portia, or Poovarsay	- Rather dark	-	Used for gun-stocks, and wheelwrights' work.
6. Palava	- - Light brown	0·647	Used for musket-stocks.
7. Sclavauga	- - Dark	-	{ Used for wheelwrights' work, spikes, &c., and for making cots.
8. „	- - White	-	Not of much use; sap-wood.
9. Toomoosora	- - Dark	-	{ Very tough; used for spokes, staves, felloes, &c.
10. Tamarind	- - „	1·382	{ Heart-wood, very hard and tough; used for tent-pegs and for furniture.
11. „	- - White	-	Young wood; of little use.

No. 12.—WOODS OF PAULGHAUT JUNGLE.—(Col. FRITH.)

1. Ab Eney	- - Brown	-	A large tree; used for furniture.
2. Beimboo	- - Yellow	-	{ A large tree; used for building and for furniture.
3. Bentek	- - Light-	0·591	{ Inferior; used for building, and common carts.
4. Cedar-	- - Reddish	0·507	{ A large tree, wood aromatic; used for furniture.
5. Cedar-root	- - „	-	{ Very aromatic; used for ornamental furniture.
6. Cautovanga	- - Dark	-	Very strong; used for wheelwrights' work.
7. Chadachey-	- - Light brown	-	A small tree; used for buildings and carts.
8. Eroopoottoo irvolly	- Brown	0·861	Used for buildings and bullock-yokes.
9. Ittee veittee	- - Black-	-	A small tree; used for furniture.
10. Kullen teak	- - Dark	-	The best teak; very strong and large.
11. Kurroovalagom	- - Light brown	0·704	A small tree; used for naves of wheels.
12. Kurroomardoo	- - Dark	-	Strong wood; used for wheelwrights' work.
13. Kuroongaalee	- - „	-	A heavy and hard wood; used for furniture.
14. Muroodoo-	- - Light-	-	A small tree; used for buildings.
15. Nova	- - White	-	Used for shafts, cart-poles, &c.
16. Oome teak	- - Dark brown	-	Third-rate teak.
17. Oodoogoo	- - Red	-	A large tree; used for ploughs and building.
18. Portia	- - Brown	-	A small tree; used for musket-stocks.
19. Teak	- - Light-	0·852	Second-rate teak.
20. Vangay	- - Light brown	0·788	A small tree; used for beams and carts.

## No. 13.—WOODS OF TINNEVELLY.—(Col. FRITH.)

NAME.	Colour.	Specific Gravity.	
1. Arrava ponpathera	- Light brown	-	Used for building, handspikes, tools, &c.
2. Auttee - -	- Red - -	-	Used for furniture.
3. Augeneepelah - -	- Brown - -	0.484	General work.
4. Cangoo - -	- Whity brown	-	Handspikes and wheelwrights' work.
5. Eloopay - -	- Red - -	-	Building in general.
6. Hill teak - -	- Light brown	-	General purposes.
7. Karootauley - -	- Black- -	-	Fancy work.
8. Koongheelyurn - -	- Light brown	-	Used for building purposes ; yields dammer.
9. Kotamaram - -	- Brown - -	0.723	Building in general.
10. Mookersey - -	- Red - -	-	" "
11. Munjet Kerddumpah-	Light straw	-	" "
12. Mathgirie vambou -	- Whity brown	-	{ A strong light wood ; used for general purposes.
13. Marootho - -	- " - -	-	Building in general.
14. Mathgirie vambou, old	Red - -	-	A strong light wood.
15. Naungoo - -	- " - -	1.009	{ Used for building, wheelwrights' work, handspikes.
16. Nuffell - -	- " - -	0.717	Building in general.
17. Nelly - -	- Light brown	-	" "
18. Nurryveroosoo - -	- Whity brown	-	" "
19. Nagakunny - -	- " - -	-	" "
20. Oonnay - -	- " - -	0.928	{ A strong wood, used for wheelwrights' work, handspikes.
21. Oosulay - -	- Light brown	0.832	Building in general.
22. Polava - -	- " - -	-	Musket-stocks, and building purposes.
23. Paulay - -	- Deep straw	-	Fancy work.
24. Pooversoo - -	- Red - -	0.860	Used for making bandies.
25. Ponpathera - -	- Whity brown	0.683	Used for building purposes.
26. Poonnay - -	- Deep straw	-	" " "
27. Poovey - -	- Light brown	0.840	" " "
28. Paselay - -	- Whity brown	-	Used for furniture.
29. Sammerm - -	- Red - -	-	Furniture of any description.
30. Sarakontay - -	- Whity brown	-	Building in general.
31. Sampayapaulay - -	- Light brown	0.792	Building purposes.
32. Thothakutty - -	- Red - -	-	Furniture of every description.
33. Thunnaka - -	- Whity brown	-	Making trunks.
34. Thokay - -	- Red - -	0.950	Building purposes.
35. Vangay - -	- Light brown	-	Wheelwrights' work.
36. Vakauley - -	- " - -	-	Building in general.
37. Vambou - -	- Light straw	0.795	" "
38. Vankay - -	- Light brown	0.888	" "
39. Veroosoo - -	- Whity brown	-	" "
40. Vakanatty - -	- " - -	-	" "
41. Vemmary - -	- Brown - -	0.786	" "

## No. 14.—WOODS OF COIMBATORE.—(Dr. WIGHT.)

1. Acacia amara - -	- - -	-	Woonga marum.
2. " leucophlœa - -	- - -	-	Velan marum. Vel vaila.
3. " odoratissima - -	- - -	-	Caroo vangai marum. Curry vangay.
4. " speciosa - -	- - -	-	Vel vangay marum.
5. " Sundra - -	- - -	-	Caroongaly marum. Currengally.
6. Ailanthus excelsa - -	- - -	-	Peroo marum. Pethawkoo kurra.
7. Balanites Ægyptiaca - -	- - -	-	Nunjoonda marum.

8.	<i>Bignonia xylocarpa</i>	- - -	Vadungoorany marum. Vaducoornie.
9.	<i>Briedelia spinosa</i>	- - -	Morlloovanai marum. Moolloo vangay.
10.	<i>Capparis grandis</i>	- - -	Vellai toarattie.
11.	„ <i>divaricata</i> (?)	- - -	Toarathe marum.
12.	<i>Chrytea collina</i>	- - -	Woodoogoo marum.
13.	<i>Cocos nucifera</i>	- - -	Nasel thenna marum. Gollana kurra.
14.	<i>Conocarpus latifolia</i>	- - -	Vella naga marum. Tella narudoo kurra.
15.	<i>Cratœva Roxburghii</i>	- - -	Marvolinga marum.
16.	<i>Dalbergia latifolia</i>	- - -	Irrooppoottoo marum (black wood).
17.	„ <i>paniculata</i>	- - -	Putchalia marum.
18.	<i>Dillenia pentagyna</i>	- - -	Pinnai marum. Ponna kurra.
19.	<i>Erythrina Indica</i>	- - -	Moorookoo marum.
20.	<i>Euphorbia nereifolia</i>	- - -	Yellai kullie.
21.	„ <i>tirucalli</i>	- - -	Katti. Katti milk.
22.	<i>Eugenia caryophyllifolia</i>	- - -	Nawel marum. Naridon kurra.
23.	<i>Ficus indica</i>	- - -	Allum vildo.
24.	„ <i>tsiela</i>	- - -	Eichie marum.
25.	<i>Grewia tilicefolia</i>	- - -	Sadaichie marum.
26.	<i>Hymenodictyon utile</i>	- - -	Paroonjoly marum.
27.	<i>Inga dulcis</i>	- - -	Cadookapooly marum. Cookapuly.
28.	„ <i>xylocarpa</i>	- - -	Irroovaloo marum. Erovaloo.
29.	<i>Morinda citrifolia</i>	- - -	Munjul paouttai. Munjay paoullay.
30.	<i>Nauclea cordifolia</i>	- - -	Mangul cadumbai marum.
31.	„ <i>parviflora</i>	- - -	Neer cadumbai marum.
32.	<i>Odina Wodier</i>	- - -	Annaikarai marum.
33.	<i>Phoenix sylvestris</i>	- - -	Etcha marum.
34.	<i>Prosopis spicigera</i>	- - -	Parumbai marum.
35.	<i>Pterocarpus marsupium</i>	- - -	Vana kurra.
36.	<i>Salvadora persica</i>	- - -	Coku marum.
37.	<i>Terminalia Belerica</i>	- - -	Vellai murdoo.
38.	„ <i>Chebula</i>	- - -	Pilla maroodoo.
39.	„ <i>glabra</i>	- - -	Kurai maroodoo marum.
40.	<i>Ulmus integrifolia</i>	- - -	Ayah marum.
41.	<i>Zizyphus yelundai</i> ?	- - -	Kurkutta marum.
42.	- - -	- - -	Camoogoo marum (Camoogoo wood).

Nur cadumbai marum, *Nauclea parviflora*, is rather common in the forests of Canara, especially below the Ghauts ; it is valued as yielding excellent flooring planks.

Only two specimens of wood are contributed from Bombay, namely, teak, and a variety of olive, lately identified by Dr. Stocks ; the latter appears to be a good and valuable wood for some sorts of work.

No. 15.—WOODS OF CANARA.—(Col. FRITH.)

NAME.	Colour.	Specific Gravity.	
1. Black wood	- - Black	- - -	{ A very large tree, used for ornamental furniture.
2. Bannapoo	- - Light	- - -	
3. Bengah	- - Rather dark	- - -	„ „
4. Bow	- - Dark	- - -	„ „
5. Bobhee	- - Light	- - -	Used for building purposes.
6. Bengah	- - Rather light	- - -	„ „
7. Beety	- - Black	- - -	Used for furniture.
8. Bhoguy	- - Light	- - -	Used for house and boat building.

NAME.	Colour.	Specific Gravity.	
9. Bellah - - -	Light brown - -	- -	{ From 2 feet to 3 feet in diameter, 10 feet to 24 feet in length; used for house building.
10. Bhoguy - - -	Dark brown - -	1.107	{ Strong and heavy; used in house and boat building.
11. Billanundy - - -	Brown - -	- -	House building.
12. Colasumpoghey - - -	White - -	- -	{ 5 feet in circumference, from 20 feet to 30 feet in length; used for common buildings.
13. Hebalsoo - - -	Yellowish - -	- -	{ Yields beams of 2 feet square, and 20 feet long; used in house and boat building.
14. Halsoo - - -	Yellow - -	- -	Used in building, and for furniture.
15. Hoonvalloo - - -	Brown - -	- -	{ 1 foot to 2 feet in circumference, 10 feet to 20 feet long; used for common purposes.
16. Hedeeh - - -	Light - -	- -	{ Used for making combs and similar light work.
17. Honeh - - -	Brown - -	- -	{ 8 feet in circumference, 20 feet long; used in house and boat building.
18. Holahonuka - - -	Light - -	- -	{ 3 feet to 4 feet in circumference, 30 feet long; used for beams in building.
19. Jack - - -	" - -	- -	A very large tree; used for furniture.
20. Jumbek - - -	Brown - -	- -	{ 4 feet to 6 feet in circumference, 30 feet long; used for building and furniture.
21. " - - -	Brownish - -	- -	{ 1 foot in circumference, 20 feet long; used for beams of houses.
22. Kalabagy - - -	Light - -	- -	House building.
23. Kundully - - -	Yellow - -	- -	" "
24. Marraveh - - -	Darkish - -	0.820	{ A heavy wood; used for beams and posts.
25. Madthy - - -	Light brown - -	- -	{ Used for house and boat building, and for furniture.
26. " - - -	Dark - -	- -	{ 3 feet in circumference, 40 feet long; used for beams of houses.
27. Sagwany - - -	Brown - -	- -	Third sort of teak.
28. " - - -	" - -	- -	Finest sort of teak.
29. Teeravah - - -	Light - -	- -	Not strong; used for light work.

## No. 16.—WOODS OF MALABAR FORESTS.—(J. E. CHAPMAN.)

- |  |   |
|--|---|
| 1. Jamboo; a very heavy wood.          | 11. Pood goossa                                   |
| 2. Kad kud.                            | 12. Ruccuh korurah; a very straight-grained wood. |
| 3. Kelaho.                             | 13. Satannah; a light, soft, close wood.          |
| 4. Koompoly.                           | 14. Sarrah.                                       |
| 5. Kendel; a heavy, strong, dark wood. | 15. Seerass.                                      |
| 6. Kunganee.                           | 16. Sood beebo.                                   |
| 7. Kursing.                            | 17. Sawrec; a white, soft wood, very light.       |
| 8. Kumdee.                             | 18. Teh pully.                                    |
| 9. Marlee; a very heavy brown wood.    |   |
| 10. Ombah.                             |   |

Jamboo, or Jambu, *Mimosa xylocarpa*. This tree grows to a large size: on account of its strength and toughness, it is much valued for house-building.

Mairtee, *Pentaptera coriacea*, a very common tree both above and below the Ghauts. The wood is very durable, and is therefore used in house, ship, and boat building.

These woods were collected, in 1846, by Dr. Gibson, Conservator of Forests in the Bombay Presidency, for Mr. Chapman, in connection with the projected "Great Indian Peninsula Railway." Previous to the appointment of Dr. Gibson, the forests in this presidency, particularly those south of Bombay and between the western Ghauts and the Indian Ocean, were almost entirely left to the management of the natives in their immediate neighbourhood; the consequence of this was, that as the country under British rule became more settled, and as the population in those districts increased, the forests were gradually destroyed, the timber being cut down in the most reckless and wasteful manner, and a considerable quantity of it burnt, for the mere purpose of affording ashes for manure. Regulations have now, however, been adopted, under the superintendence of Dr. Gibson, for the preservation and maintenance of forests, so that, for the future, the thoughtless and inconsiderate destruction of them will be prevented. At present, the Government and mercantile yards of Bombay are chiefly supplied with timber from the Concan, to the north of the latitude of Bombay. In the Deccan the supply of timber of any size is very limited; it has, therefore, for the most part, to be brought from a distance, and the expense and difficulties of transit present serious obstacles to its employment in buildings of all descriptions. Mr. Chapman states, that a short time since, when Viccajee Merjee, Esq., an enterprising Parsee capitalist, built a house at Hyderabad, he was obliged to have all the principal beams carried up from Bombay, a distance of more than 500 miles; and at the present time, most of the timber of the country is greatly diminished in value, being of necessity cut down, and reduced to shapes and sizes most convenient for land-carriage. From Dr. Gibson's reports it appears that the forests of Soonda and Canara, if properly managed, will, in a few years, afford a large and regular supply of first-rate timber.

#### No. 17.—WOODS OF ROHILKUND.

These are from the districts of Bareilly and Phillibheet —

- |                                 |  |
|---------------------------------|--|
| 1. <i>Acacia Arabica</i> .      | 12. Mulberry                                 |
| 2. „ catechu.                   | 13. <i>Melia Azadirachta</i> ; neem or nimb. |
| 3. <i>Bassia latifolia</i> .    | 14. <i>Acacia serissa</i> .                  |
| 4. <i>Bombax heptaphyllum</i> . | 15. <i>Nauclea parvifolia</i> .              |
| 5. <i>Calyptroanthra</i> sp.    | 16. „ cordifolia.                            |
| 6. <i>Cedrela</i> sp.           | 17. <i>Phyllanthus Emblica</i> .             |
| 7. Chowlace (?)                 | 11. Rohunee (?)                              |
| 8. <i>Dalbergia sissoo</i> .    | 19. <i>Shorea robusta</i> .                  |
| 9. Goshun (?)                   | 20. <i>Urseina</i> (?)                       |
| 10. <i>Grewia</i> .             | 21. <i>Wrightia mollissima</i> .             |
| 11. Khumar (?)                  |  |

The Sissoo wood, *Dalbergia Sissoo*, somewhat resembles the finer sorts of teak, but it is tougher, and more elastic. It usually grows to a height of about 30 feet, but is generally more or less crooked, and therefore not suited for beams, though highly valued by the ship-builders of Bengal. The wood is said to harden with age. When fresh, its specific gravity is 0.691, when seasoned 0.764; and according to Captain Baker, compared with teak, its strength is as 1030 to 869. It has a light greyish brown colour, with darker coloured veins, and when examined with



a lens, the pores of the wood are found to be nearly filled with dry resinous matter.

Neem wood, *Melia Azadirachta*, a large tree, which is used for making carved images, as it is not liable to the attack of insects.

#### No. 18.—WOODS OF ASSAM.

These woods, grown in the forests of the province of Assam, are contributed by Mr. MARTIN, Major HANNAY and Captain REID:—

- |  |   |
|--|---|
| 1. Acacia.                               | 10. Nadosur (?)                               |
| 2. Agar.                                 | 11. Nahoo ( <i>Casuarina equisetifolia</i> ?) |
| 3. Babue.                                | 12. Oak, hingoree.                            |
| 4. Cattul.                               | 13. Poma ( <i>Cedrela Toona</i> ).            |
| 5. Cham ( <i>Artocarpus chama</i> ).     | 14. Ratta.                                    |
| 6. Dalbergia Sissoo.                     | 15. Shullock.                                 |
| 7. Hindoo palm-toan (?)                  | 16. Saul.                                     |
| 8. Korai ( <i>Acacia marginata</i> ) (?) | 17. <i>Terminalia bhota</i> (?)               |
| 9. <i>Laurus Sassafras</i> , Goondsora.  | 18. Top sopa.                                 |

#### No. 19.—WOODS OF TAVOY.—(Dr. WALLICH.)

- | Burmese.                                   |   |
|--|---|
| 1. Acacia - - -                            | Popeeah - - - Very large tree, used for posts and rollers.    |
| 2. " - - -                                 | Paingadoo.  |
| 3. <i>Anacardium</i> - - -                 | Thubbamboo - - - A large tree, used in boat-building.         |
| 4. <i>Artocarpus</i> - - -                 | Thouenben - - - Ditto, ditto.                                 |
| 5. " - - -                                 | - - - A large tree.   |
| 6. " - - -                                 | Pynyathe or tannaburg Wood not used.                          |
| 7. <i>Bignonia</i> - - -                   | Thathee - - - A very large tree.                              |
| 8. " (?) - - -                             | Thuggainee - - - A large tree, used in building.              |
| 9. " - - -                                 | Lainbha - - - A middle-sized tree.                            |
| 10. <i>Calophyllum</i> - - -               | Turra-pee - - - Used for masts, &c.                           |
| 11. <i>Carapa</i> - - -                    | Taila-oon - - - Used in building.                             |
| 12. <i>Careya</i> - - -                    | Kaga - - - Large timber tree.                                 |
| 13. <i>Castanea martabanica</i> - - -      | Norne or Zitha.   |
| 14. <i>Cerbera Manghas</i> - - -           | Kullooa - - - Wood not used.                                  |
| 15. <i>Dillenia</i> - - -                  | Zimboon - - - Used in building.                               |
| 16. <i>Dipterocarpus grandiflora</i> - - - | Ain or aintha - - - An immense tree.                          |
| 17. " - - -                                | Kunnean-phin - - - Used as timber.                            |
| 18. <i>Euphorbiacea</i> - - -              | Yamala - - - Used for frames of lacquered ware.               |
| 19. <i>Eurya</i> - - -                     | Thaun - - - Used for fuel only.                               |
| 20. <i>Excoecaria</i> (?) - - -            | Thurrotha.  |
| 21. <i>Ficus</i> - - -                     | Thubboo - - - Used in house-carpentry.                        |
| 22. " - - -                                | Thuppan - - - Large tree; wood not used.                      |
| 23. <i>Garcinia</i> - - -                  | Pullowa - - - Large tree, used for posts, &c.                 |
| 24. <i>Grewia</i> - - -                    | Miaya.  |
| 25. <i>Heritiera Fomes</i> - - -           | Kunnazoo - - - { Very large tree: very hard and durable wood. |
| 26. <i>Hibiscus macrophyllus</i> - - -     | - - - Used in building.                                       |
| 27. " " (?) - - -                          | - - - Ditto.  |
| 28. <i>Hopea floribunda</i> - - -          | Tantheya - - - A very large tree.                             |
| 29. <i>Lagerstrœmia</i> - - -              | Kuenmounce or puma. Used in building.                         |
| 30. <i>Laurus</i> - - -                    | Kullowa or kurrowa.   |
| 31. " - - -                                | Panatha - - - Used in house-carpentry.                        |
| 32. " - - -                                | Maythen - - - A large tree, good useful wood, much used.      |

			Burmese.		
33.	Laurus	- - -	Keemna	- - -	Small tree, used for posts.
34.	"	- - -	Thuggoo	- - -	Used for oars, &c.
35.	"	- - -	Thitya	- - -	Very large tree, used in building, &c.
36.	"	- - -	Kayzai	- - -	Used in house-carpentry.
37.	Mimusops	- - -	Thubbae	- - -	Used in ship-building.
38.	"	Elengi.			
39.	Murraya	- - -	Maikay	- - -	{ A tough close-grained wood, used for handles.
40.	Myristica	- - -	Thounsanga	- - -	A large tree, used in boat-building.
41.	"	- - -	Koathoe or Kunneen	- - -	A large tree, used in flooring houses.
42.	Osyris peltata	- - -	Phaoun.		
43.	Pierardia (?)	- - -	Kunna or Kuzzo.		
44.	Pinus Dammara	- - -	- - -	- - -	A very large tree, used in building.
45.	Pterocarpus (?)	- - -	Puddow	- - -	A large tree, used for furniture, &c.
46.	Rottlera	- - -	Mimasko.		
47.	"	- - -	Keoun-lae	- - -	A large tree, used for rudders, &c.
48.	Sandoricum	- - -	Thittooo	- - -	Used for furniture.
49.	Sapotea (?)	- - -	Palaepean	- - -	A very large tree, used in building.
50.	Sonneratia (?)	- - -	Thaamma	- - -	A small tree.
51.	Sterculia (?)	- - -	Kununu	- - -	An enormous tree.
52.	"	- - -	Thikadoo.		
53.	Symplocos (?)	- - -	Kain-tha-phogee	- - -	Used in boat-building.
54.	Syndesmis Tavoyana	- - -	Ku-tha	- - -	{ A very large tree, used for building, boxes, &c.
55.	"		{ Kunnun Keunkee Kunnun Keunla	- - -	} Used for beams, posts, &c.
56.	Terminalia	- - -	Thuphanga.		
57.	Ternstroemia	- - -	Puzzeen zwa	- - -	A large tree, used in building.
58.	Uvaria	- - -	Thubbor	- - -	A large tree, used for boat-building.
59.	Wrightia antidysenterica	- - -	Lathou	- - -	Small tree, not used.
60.	Xylocarpus	- - -	Keannan	- - -	Very durable timber.
61.	Zizyphus	- - -	Zeethee	- - -	Hard and durable wood.
62.	—————?	- - -	Ahnaun	- - -	{ Strong and very durable timber, used in ship-building.
63.	—————?	- - -	Bah-nah-thoa	- - -	Useful timber.
64.	—————?	- - -	Con-moo	- - -	{ Good timber, used for building houses and boats.
65.	—————?	- - -	Kaantha	- - -	Small but valuable wood.
66.	—————?	- - -	Kaungo-kurro	- - -	{ A heavy but durable wood, used in boat-building: specific gravity, 0.960.
67.	—————?	- - -	Keahnaun	- - -	Strong crooked wood, used for gun-stocks.
68.	—————?	- - -	Kuddoot-alain	- - -	Large tree, used in house and ship-building.
69.	—————?	- - -	Kuddoot-nu	- - -	Inferior wood, used in boat-building.
70.	—————?	- - -	Kummi.		
71.	—————?	- - -	Mainaban	- - -	Used for bows, lances, beams, rafters, &c.
72.	—————?	- - -	May-klin	- - -	Used for rudders and anchors.
73.	—————?	- - -	May-maka	- - -	Used in ship-building.
74.	—————?	- - -	May-rang	- - -	Said to be very durable.
75.	—————?	- - -	May-tobek	- - -	{ Used for the bottoms of ships; preferred to teak.
76.	—————?	- - -	Megeonge	- - -	A large tree used in building.
77.	—————?	- - -	Penlay-peen	- - -	Used in building.
78.	—————?	- - -	Pienmahne	- - -	Yields very strong knee-timber.
79.	—————?	- - -	Pienmah-pue.		
80.	—————?	- - -	Tantheya.		
81.	—————?	- - -	Tauguet-nu.		

Burmese.			
82	_____?	- - -	Teutha.
83	_____?	- - -	Thauga-et-thittoo - Inferior wood.
84	_____?	- - -	Thau-baun-po - Inferior wood, used for common canoes,
85	_____?	- - -	Thau-baun-thau-lay - Very flexible wood.
86	_____?	- - -	Theyah - - - Inferior wood.
87	_____?	- - -	Thounmynga - - - Used in building.
88	_____?	- - -	Thymbro - - - { Good strong durable wood, used in boat- building.
89	_____?	- - -	Town pine - - - Good wood, used in boat-building.

No. 20.—WOODS OF TAVOY.—(Mr. Commissioner BLUNDELL.)

1.	Aman	- - - - -	A small tree ; used for building.
2.	Bep-than	- - - - -	Used for building.
3.	Bep-won	- - - - -	Ditto.
4.	Bhan-bhway	- - - - -	Used for house-posts ; like sisso.
5.	Bha-ta-ka	- - - - -	Used for common carpentry.
6.	Daup-yan	- - - - -	Used for building.
7.	Eng-beng	- - - - -	Strong wood ; used for common carpentry.
8.	Kad-wot-nu	- - Cedrela (?)	{ Used for house and ship-building ; large lumber, 40 to 70 feet ; specific gravity 1.060.
9.	Kanna-tso	- - - - -	A very tough close-grained wood.
10.	Ka-nyeng-kyaung-khyay	- - - - -	{ Used for boat, ship, and house building ; yields an oil ; not attacked by insects.
11.	„ „	- - - - -	Ditto, ditto, rather shaky.
12.	Ka-nyeng-pyan	- - - - -	A heavy grey wood ; used for hand-pikes.
13.	Katso	- - - - -	Like Toon ; used in building, &c.
14.	Kaung-thmoo-ysep-say	- - - - -	A rough, strong wood ; used for posts, &c.
15.	Keng thep-guyung-ywept	- - - - -	A light, inferior wood ; used in building.
16.	Kengthep-pheoot-kyay	- - - - -	A sound small wood ; used in building.
17.	Khamoung-nee	- - - - -	Heavy wood, not attacked by insects.
18.	Khamoung-pyion	- - - - -	Small-sized, compact, yellowish-grey wood.
19.	Kharaway-nu	- - - - -	{ Porous, heavy, strong wood, not attacked by in- sects.
20.	Kouk-ko	- - - - -	Employed for bottoms of boats.
21.	Kyay-tsay-gyu-khyay	- - - - -	{ A heavy, compact, dark wood ; suitable for gun- stocks.
22.	Kyay-tsay-bayoun	- - - - -	Ditto, ditto ; useful for common carpentry.
23.	Kyep-yo	- - - - -	A kind of teak.
24.	Kywon-bo	- - - - -	A soft wood like the nauclea.
25.	Kywon-ma	- - - - -	Ditto, ditto, a variety.
26.	Lienman	- - - - -	{ A small tree ; heavy, close-grained, light-coloured wood, like terminalia.
27.	Mala-ka	- - - - -	Small-sized, strong wood ; useful for handles.
28.	Ma-yam	- - - - -	An indestructible, strong, heavy, dark red wood.
29.	Mee-kyaung-kyay	- - - - -	A heavy wood, not attacked by insects.
30.	Meep-thua-ban	- - - - -	{ A small-sized, compact, grey wood ; used for han- dles, &c.
31.	Miaup-bout	- - - - -	Used for furniture, &c.
32.	Mya-kamaun	- - - - -	{ A valuable strong black wood ; used for knife- handles.
33.	Myeng-ta-bep	- - - - -	A strong, blueish-grey wood ; adapted for handles.
34.	Ngoo-beng	- - - - -	A strong wood ; used for posts and planking.
35.	Noalee-lyeng	- - - - -	{ A close-grained, strong, heavy wood ; useful for handles.
36.	Pan-loun	- - - - -	A close-grained red wood ; used for building.
37.	Pantheet-ya	- - - - -	{ A good white, rough wood ; useful for boat- building.

38. Patseng-tsway	-	-	-	-	Small-sized, strong wood.
39. Patseng-ngo	-	-	-	-	{ A superior high-coloured, aromatic wood, like mahogany.
40. Peng-lay-byun	-	-	-	-	Small-sized tough wood.
41. Peng-lay-oun	-	-	-	-	Strong, rough, red wood, like <i>Mimosa seripa</i> .
42. Peng-lay-kaboay	-	-	-	-	{ A heavy small-sized wood, suitable for hand-pikes, handles, &c.
43. Pee-daup	-	-	-	Mimosa.	
44. Pinnay	-	-	-	Artocarpus	- Strong, close-grained, yellow wood.
45. Pyaung-pyion	-	-	-	-	A compact, heavy, yellow wood.
46. Pyeng-khado	-	-	-	-	Small-sized, heavy, close-grained, red wood.
47. Tag-nyeng	-	-	-	-	A useful furniture wood.
48. Takeep-nee	-	-	-	-	{ A very strong, close-grained, heavy, light-coloured wood.
49. Tha-bhan	-	-	-	-	Used for canoes.
50. Thabyay-nee	-	-	-	-	{ A strong, close-grained, brownish-grey wood ; used for house-posts.
51. Tha-byoo	-	-	-	-	A heavy, close-grained wood.
52. Theet-ta-gyee	-	-	-	-	Suitable for common carpentry.
53. Theet-ya-han	-	-	-	-	A close-grained teak ; used for posts.
54. Theet-ya-nee	-	-	-	-	A close-grained, brown wood, rather shaky.
55. Theet-ya-pyiou	-	-	-	-	A heavy, strong wood.
56. Thiem	-	-	-	-	A serviceable timber.
57. Thingan-kyaup	-	-	-	-	{ A close-grained, heavy, strong wood ; used in ship and house building, for carts, &c.
58. Thmeng-ba	-	-	-	-	Like red jarrool, used for posts and cotton-rollers.
59. Thmeng-tshout	-	-	-	-	{ A small, heavy, coarse, brown wood ; used for door-frames and boat-beams.
60. Toung-bhaut	-	-	-	-	{ Rough, knotty wood ; used for knife and spear handles.
61. Toung-bhien	-	-	-	-	{ A light, porous wood ; used for common carpentry.
62. Toung-byeng	-	-	-	-	A kind of red Saul.
63. Toung-byion	-	-	-	-	A close-grained, brown, shaky wood.
64. Toung-kha-ray	-	-	-	-	Red Jarrool ; used in boat-building.
65. Tseng byioun	-	-	-	-	{ A compact, greyish-brown wood, suitable for common carpentry.
66. Tsoay-dan	-	-	-	-	Used for gun-stocks.
67. Wonthay-khyay	-	-	-	-	A small, strong, compact, yellowish-white wood.
68. Yau-ma-lay	-	-	-	-	{ A strong, heavy, rough, white wood, used for house-posts.
69. Zoo-lat	-	-	-	-	A small, heavy, compact, yellowish-white wood.

## No. 21.—WOODS OF AMHERST.—(Mr. Commissioner BLUNDELL.)

1. Anan	-	-	-	-	{ A yellowish-white, heavy, durable wood ; used in constructing temples ; specific gravity 1.312.
2. Ban-boay	-	-	Mimosa	-	{ A strong and useful wood ; used for posts in building houses.
3. Ban-kha	-	-	-	-	{ A grey-coloured wood ; used for posts in building houses.
4. Bahai-bya	-	-	Lagerstroemia	-	Used for house posts.
5. Bep-tban	-	-	-	-	{ A good wood ; used for making handles to spears and swords.
6. Bhyeng-tseng	-	-	-	-	{ A close-grained, compact, grey wood, seems not to be attacked by insects.
7. Bijion	-	-	-	-	{ A heavy, close-grained, compact, grey wood ; used for house posts, rafters, &c.
8. Daup-yat	-	-	-	-	{ A beautiful yellowish-white, compact wood, but shaky ; used for rafters.

9.	Dien-neeang	-	-	-	-	{ A strong, hard, close-grained, brown wood; used for rice mortars.
10.	Eng	-	-	-	-	{ A strong, heavy, grey wood; used in boat-building, for piles, beams, &c.
11.	Eng-gyeng	-	-	-	-	A useful wood, but shaky; used for posts.
12.	Gan-gan	-	-	-	-	{ A very tough, strong, hard, red wood; suitable for machinery.
13.	Gyo	-	-	-	-	{ A close-grained, compact wood; used for ploughs, handspikes, posts, &c.
14.	Ka-thut-nee	-	-	-	-	{ A heavy, hard, grey wood; used for boats, posts, and carts; liable to attacks of insects.
15.	Kha-boung	-	-	-	-	A small tree, but the wood is very strong.
16.	Kiep-dep	-	-	Shorea (?)	-	Used for posts, &c.
17.	Kiep-maup	-	-	-	-	Superior wood; used for wheel spokes.
18.	Kiep-yo	-	-	-	-	{ A small tree; heavy, good wood; used for rafters, posts, &c.
19.	Koup-ha	-	-	Nauclea (?)	-	A light, soft wood; used for carving images, &c.
20.	Kya-nan	-	-	-	-	{ A very hard, close-grained, dark red wood; used for musket stocks, spear handles, &c.
21.	Kya-zoo	-	-	-	-	A very heavy wood.
22.	Kyway-thoay	-	-	Acacia (?)	-	A strong, solid wood; used for posts and rafters.
23.	Kywon	-	-	-	-	A kind of teak.
24.	"	-	-	-	-	A kind of teak; used for posts, rafters, oars, &c.
25.	Kywon-gaung-noay	-	-	-	-	{ A compact, heavy, tough, yellowish-white wood; used for posts and rafters.
26.	Lammay	-	-	-	-	A light, red wood; not attacked by insects.
27.	Laphyan	-	-	-	-	A heavy, solid wood; soon destroyed by insects.
28.	Lien	-	-	-	-	{ A valuable, compact, heavy, homogeneous, deep brown wood; not attacked by insects; used for house posts and rafters.
29.	Liep-yo	-	-	-	-	{ Small, but compact and heavy; used for carpenters' tools.
30.	Lip-dwat	-	-	Nauclea (?)	-	{ A fine-grained white wood, turns well; used for spear and sword handles.
31.	Maga-neng	-	-	-	-	{ A close-grained wood; used for boats, carts, paddles, oars, posts, &c.
32.	Mala-ka	-	-	-	-	{ Small, but compact and heavy; used for carpenters' tools.
33.	Ma-thloa	-	-	Artocarpus (?)	-	Used for house posts.
34.	Ming-ba	-	-	Shorea (?)	-	Used for house posts, rafters, &c.
35.	Morna-kha	-	-	-	-	{ A close and compact, but softish, red wood; used for turning.
36.	Moutha-ma	-	-	-	-	A fine-grained, compact, red wood, but shaky.
37.	Myaun-ngo	-	-	-	-	Used for rafters.
38.	Myaup-loaut	-	-	Cedrela	-	A kind of toon.
39.	Mya-ya	-	-	-	-	{ A hard, close-grained, durable wood; not attacked by insects.
40.	Myeng-kha	-	-	Acacia	-	-
41.	Na-kyeen	-	-	Heriteria	-	{ Very strong and tough; used in making carts, carriages, &c., and for fuel.
42.	Nao	-	-	-	-	{ A brown, solid wood, not attacked by insects; used in building houses.
43.	Neet-gnyoo	-	-	Mimosa (?)	-	A useful, strong, heavy, red wood.
44.	Nga-soay	-	-	-	-	{ A very heavy, solid, red wood; used for posts and rafters.
45.	Nyaung-lan	-	-	Shorea	-	Used in boat building, and for posts and rafters.
46.	Oun-thuay	-	-	-	-	A white, soft wood, of little value.
47.	Pad-dan	-	-	-	-	Used for musical instruments.
48.	Pa-ngan	-	-	Gmelina	-	{ Compact, white wood; used for boats and musical instruments.

49. Pa-ra-wa	-	-	-	-	{ A hard, red wood; not attacked by insects; used for spears and arrows.
50. Peng-lay-oun	-	-	-	-	{ A very valuable, close, heavy, red wood; used for spear handles.
51. Pinnai	-	-	Artocarpus (?)	-	A close, handsome, yellow wood.
52. Povin-guyet	-	-	Lagerstrœmia	-	A good useful wood; used for posts and rafters.
53. Pyeen-ma	-	-	Shorea (?)	-	{ A capital wood; used for carts, boats, oars, posts, rafters, &c.; specific gravity 0·920.
54. Raung-thmoo	-	-	-	-	Used for house posts.
55. San-labet	-	-	-	-	{ A good, heavy, white wood; not attacked by insects; used in building.
56. Seet-seen	-	-	-	-	{ A valuable, heavy, compact, red wood; used in building temples.
57. Taup-sha	-	-	-	-	Shaky wood; used in carpentry.
58. Teng-khat	-	-	-	-	{ A heavy, white, compact wood, turns well; used for rice mortars.
59. Thab-ban	-	-	-	-	{ A heavy wood; used in boat building; timber sometimes 70 feet long; specific gravity 0·814.
60. Tha-bwot-gyee	-	-	-	-	A good, heavy, useful wood.
61. Tha-byion	-	-	Eugenia (?)	-	A useful timber tree.
62. Tha-khwot	-	-	-	-	Used for sandals.
63. Thammai	-	-	-	-	A strong, handsome wood, like box.
64. Than-kya	-	-	-	-	Wood like saul-wood.
65. Tha-nat	-	-	-	-	A kind of grey teak.
66. Than-kya	-	-	-	-	Resembles saul.
67. Than-that	-	-	-	-	Resembles saul, a capital wood.
68. Thanna-dan	-	-	-	-	{ A reddish-brown, heavy, strong wood, but somewhat shaky.
69. Theng-gan	-	-	-	-	{ An excellent compact wood; used for carts, boats, house building, &c.; and considered superior to teak; specific gravity 0·911.
70. Thep-yeng	-	-	-	-	A fine-grained wood.
71. Theet-phyion	-	-	Mimosa (?)	-	A fine, white wood; used for fan handles.
72. Theet-to	-	-	-	-	{ A dark-coloured, hard, heavy wood; used in making carts, boat building, &c.
73. Theet-ya	-	-	-	-	{ A fine strong, tough, brown wood; used for rice-mortars, or pounders.
74. Thiem	-	-	-	-	Used in house building and carpentry.
75. Toung-bien	-	-	-	-	{ A strong, heavy wood; used for carts and boat building.
76. Toung-thau-gyee	-	-	-	-	A hard, compact, dark-brown wood.
77. Toung-tha-byion	-	-	Mimosa	-	A strong, red, heavy wood; used in building.
78. Tseet	-	-	-	-	Used for house posts, and in boat building.
79. Tsekka-doun	-	-	-	-	{ Used for house posts, and in boat building; but very shaky.
81. Tshan-tshay	-	-	-	-	{ A useful wood; but shaky, and liable to attacks of insects.
80. Tshaup-yo	-	-	-	-	{ A heavy, very strong, white wood; but liable to attacks of insects.
82. Tshwai-lwai	-	-	-	-	{ A hard, red wood, suitable for cabinet work; used for musket stocks.
83. Tshiet-khyeen	-	-	-	-	Used for house posts.
84. Tsoay-dan	-	-	-	-	{ Hard, heavy, tough wood; used for wheels, musket stocks, &c.
85. Tswot-ba-lwot	-	-	-	-	Like the wood of Lagerstrœmia.
86. Yammandy	-	-	-	-	{ A good and valuable wood; used for carving images.
87. Yeng-taip	-	-	-	-	{ A strong useful wood; used for common carpentry.

88. Yetha-byay	- - - - -	{ A strong, useful wood; used for common carpentry.
89. Yoga-theet	- - - - -	Used for carved images; the bark used as soap.
90. Zee-byion	- - - - -	{ A close, compact wood, but rather shaky; not attacked by insects.
91. Zeng-bywom	- - - - -	A useful wood, employed in building.

## No. 22.—WOODS OF TENASSERIM.

1. Bauhinia, or mountain ebony.	15. Laurus, sp., sassafras wood.
2. Calophyllum sp.	16. Lagerstrœmia Reginæ; jarrool, or jamoung.
3. Careya arborea, C. sphærica, bambooce.	17. Lagerstrœmia macrocarpa; pyen ma, or jarrool.
4. Cyrtophyllum fragrans. Anan.	18. Mergui, red wood.
5. Dalbergia latifolia, or lana wood.	19. Pinus Latteri.
6. Diospyros, sp.	20. Pterocarpus Wallichii, Pterocarpus Indica, podauck.
7. Erythrina.	21. Rose-wood.
8. Fagræa fragrans.	22. Sterculia fœtida.
9. Grewia, sp.	23. Sandal-wood (wild).
10. Hopea odorata, or thengan.	24. Thanaka.
11. Heretiera minor, or soondra.	25. Tectona grandis.
12. Inditte, or ebony.	26. Vitex arborea.
13. Inga xylocarpa, pyangadian.	
14. Kazaret.	

The Soondra is a very tough and elastic wood, commonly used for boat-building, &c.; it is, however, a very perishable wood, and shrinks a good deal in seasoning; specific gravity 1·002 to 1·086. From Major H. Campbell's valuable experiments on the strength of Indian timber, this is evidently a very strong wood; out of 27 woods which he examined, he found the Soondra to be the strongest.

Anan, a tree belonging to the nux-vomica tribe, one of the hardest and most compact woods known.

Podauck, a leguminous tree, commonly called rose-wood, a very beautiful, compact, and hard timber, resembles the Andaman wood.

Thengan, *Hopea odorata*, an enormous tree of the *Dipterocarpeæ*, or Saul tribe; a very strong but coarse-grained wood, used for making canoes; immense quantities of good dammer, or resin, are obtained from this tree.

Pyangadean, a tree belonging to the Acacia tribe, commonly called iron wood in the Arracan provinces; a very hard, dense, and durable wood.

## No. 23.—WOODS OF MARTABAN.—(DR. WALLICH.)

1. Calophyllum	- -	Thurappe	- -	A large tree; used for masts and spars.
2. Careya	- -	Kaza	- -	A large tree; used for posts, &c.
3. Cynometra	- -	Maingga	- -	A small tree.
4. Diospyros (?)	- -	Ryamucha	- -	Used in house-building.
5. Elæocarpus	- -	- -	- -	{ Very large timber; used for masts and house posts.
6. Fagræa fragrans	- -	Annah-beng	- -	{ Compact, hard, yellow, and very beautiful wood; little used.
7. Gordonia (?)	- -	Kaza	- -	Large common timber.
8. Hopea odorata	- -	Tengaun	- -	An immense tree.
9. Meenaban	- -	- -	- -	A durable pliant wood.
10. Pongamia atropurpurea	Lagun	- -	- -	A noble tree; used in boat and house building.

11. *Quercus Amherstiana* Tirbbac - - A large tree; used in boat-building.  
 12. *Tectona grandis* - - - Teak wood.  
 13. *Terminalia bialata*.  
 14. *Xanthophyllum* - - Saphew - - A very large tree; used for posts and rafters.

## No. 24.—WOODS OF ARRAKAN.

- |                     |                   |
|---------------------|-------------------|
| 1. Bhaman.          | 8. Therock.       |
| 2. Kyandewel teing. | 9. Thekuddo.      |
| 3. Moo-tso-ma.      | 10. Thorat-soing. |
| 4. Parawa.          | 11. Thenganet.    |
| 5. Pyawa tulli.     | 12. Iswanhyee.    |
| 6. Pyanany.         | 13. Inwroot.      |
| 7. Pyaing.          |                   |

## No. 25.—WOODS OF CHITTAGONG.—(Capt. MARQUART.)

1. *Conocarpus*—Buthna.
2. *Diospyros melanoxylon*.
3. *Dypterocarpus*—sargetiah.
4. *Acacia*, sp.—koom koyre.
5. *Swietenia chickrassia*.—Chuckrassee.

## No. 26.—WOODS OF MIRZAPORE.—(BENARES.)

1. *Dipterocarpus*—Bigeedar.
2. *Diospyros*—Abnoos.
3. *Conocarpus*—Sickroa.
4. *Pentaptera glabra*—Asan.
5. *Phyllanthus emblica*—Amorah.
6. *Terminalia Bellerica*—Ruheera.
7. ,, ,, safed mooslee.
9. ,, ,, hurrah.

Some fine planks of teak, from Rangoon, nearly  $3\frac{1}{2}$  feet wide, are exhibited by Mr. McDOWELL; these were deemed deserving of Honourable Mention. Teak is a light-brown, porous, and quick-growing wood; it derives much of its value from the aromatic, oily substance with which it is more or less saturated in the fresh state. A very interesting series of examples of teak wood, formed by Mr. SEPPINGS, of Calcutta, are contributed from the Naval Department of the Hon. East India Company: it consists of 72 specimens from various localities, and the weight of each per cubic foot has been carefully ascertained. From the experiments of Major H. Campbell, it appears that the density of teak wood varies from 0.594 to 0.876, according to its quality and the mode in which it is seasoned; whilst Captain Baker found it to vary from 0.631 to 0.792. It is evident, however, from the following table, which shows the results of Mr. Sepping's experiments, that the specific gravity of teak varies considerably more, not only between the wood of different forests, but even in different parts of the same beam.



## No. 27.—SPECIMENS OF TEAK.—From the Woods of MOULMEIN.

No.	Place in which the Tree was Cut.	Number of Years Cut.	Girth of the Tree when roughly Trimmed.	Specific Gravity of two Samples.
			Ft. in.	
1	Kyoon Gyoung - - - -	3	9 0	0·708 0·731
2	Kyat Gyoung - - - -	3	8 0	0·650 0·758
3	Maioa Gyong - - - -	4	8 0	0·678 0·750
4	Mote Somahmen - - - -	2	9 0	0·785 0·777
5	Gwen Gye - - - -	6	8 0	0·690 0·630
6	Shwaibo Hat - - - -	4	7 6	0·651 0·769
7	Kid Yai Tsuk - - - -	4	6 6	0·772 0·819
8	Mayan ben Tsuk - - - -	5	7 6	0·742 0·743
9	Sakat Kyoung - - - -	5	8 0	0·732 0·649
10	Dallee Kyoung Eastside - - - -	5	9 0	0·757 0·822
11	Makarau Kyoung - - - -	6	7 0	0·787 0·796
12	Ah, Tak Kia Yeen - - - -	7	9 0	0·767 0·704
13	Nat Kyoung - - - -	4	7 0	0·800 0·686
14	Paidaree Kyoung - - - -	3	6 0	0·649 0·739
15	Gwen Galai - - - -	3	6 6	0·742 0·706
16	Gwen Gye Kya Yar Tsuk - - - -	3	8 6	0·733 0·748
17	Mala Kyoung - - - -	4	8 0	0·594 0·595
18	Pra Gye - - - -	5	7 5	0·687 0·603
19	Kyoung Galai - - - -	5	7 6	0·602 0·765
20	Meetakeel - - - -	4	8 6	0·608 0·707
21	Paulow Kyoung - - - -	3	6 0	0·600 0·827
22	Meeboring Kyoung - - - -	3	5 6	0·745 0·686
23	Mapa Kyoung - - - -	3	6 6	0·625 0·775
24	Deedo Kyoung - - - -	4	7 0	0·654 0·663
25	Pakan Kyoung - - - -	4	6 0	0·756 0·745
26	Ouck Boweng - - - -	5	5 6	0·658 0·692
27	Thengyan Nee Kyoung - - - -	4	7 0	0·766 0·583
28	Mee Byan Kyoung - - - -	5	8 0	0·690 0·739
29	Pah Biei - - - -	4	7 6	0·748 0·597
30	Akau Onweng Toung - - - -	4	6 6	0·599 0·681
31	Meezoum Kyoung - - - -	4	6 0	0·680 0·721
32	Swaiboung Kyoung - - - -	3	5 6	0·772 0·812
33	Pan Daw - - - -	3	7 6	0·737 0·610
34	Karen Kyoung - - - -	3	8 0	0·736 0·768
35	Thoung Keen Dauguent Seek - - - -	4	6 6	0·708 1·056
36	Kaulow - - - -	-	7 0	0·761 0·652
	Maximum - - - -	-	-	1·056
	Average - - - -	-	-	0·711
	Minimum - - - -	-	-	0·583

## No. 28.—WOODS OF MALAY.—From SINGAPORE.

This collection consists of about one hundred specimens, many having no labels; those marked are as follows:—

1. Angsanah.	12. Aranji.	23. Medansi Konit.
2. Biliong.	13. „ Klat.	24. Polai wood.
3. „ Wangi.	14. Kayu Brombong.	25. Peragah.
4. Bras Bras.	15. Kledang.	26. Ranggalas.
5. Bitangor wood.	16. Lakah wood.	27. Simpoh Ryah.
6. Changis.	17. Leban.	28. „ brekit.
7. Glam.	18. Meosbon.	29. Slumar.
8. Jambu-ayer-utan.	19. Medansi Miniak.	30. Tanpang.
9. Kayau Arang.	20. „ Buah Yeah.	31. Tampinis.
10. Kamuning.	21. „ Tandoh.	32. Timbusu.
11. Krautai.	22. „ Kitanahan.	

Of these the Bintangor wood is the most used, especially in ship-building, serving for planks, masts, spars, &c.; it grows in the greatest abundance round

Singapore, and is largely exported to the Mauritius, California, &c. The Glam tree furnishes a paper-like bark, used in caulking the seams of vessels. The wood of the Polai tree, which is used to make floats for fishing-nets, is a very remarkable light white wood, and might probably be imported, and used with advantage as a substitute for cork, and some similar substances.

## No. 29.—WOODS OF PRINCE OF WALES ISLAND.

These are all stated to be furniture woods.

1. Angsena, or Senna Bay-mah.	7. Clove tree.	14. Kamuning.
2. Balah Bungah.	8. Cocoa-nut tree root.	15. Mirlimoh.
3. Balach.	9. Duriam (wild).	16. Pinang wood.
4. Baloh.	10. Eboch-tree root.	17. Ranggalas.
5. Baloh Bungah.	11. Ebony.	18. Siam wood.
6. Betel-nut tree root.	12. Guava wood.	19. Timbusi.
	13. Ibool wood.	

## No. 30.—WOODS OF PENANG.—(Col. FRITH.)

NAME.	Colour.	Specific Gravity.	Remarks.
1. Brantey - -	Light brown	- -	An inferior weak wood; used for building.
2. Bunho - -	"	- -	A large tree; occasionally used for building.
3. Bintagon - -	"	- -	A large tree; used for masts.
4. Curupas - -	Dark red	- -	Used for beams of houses.
5. Cooran - -	Light brown	- -	Used for planks for building.
6. Chiujeritt - -	Brown	1.165	A small tree; used for furniture.
7. Cumpas - -	Light brown	- -	A large tree; used only for planks.
8. Cawa-Arang - -	Pale brown	- -	{ A very large tree; used for furniture and ornamental work.
9. Canis - -	"	- -	" " used for door-frames.
10. Chiuracy - -	Brown	1.081	Used for beams; does not work kindly.
11. Cawa-Arang - -	Light brown	- -	Only used for furniture.
12. Cocoa-nut - -	Brown	- -	Cut perpendicularly.
13. China red wood - -	Red	- -	Only used for furniture.
14. Ceylon ebony - -	Black	- -	Used for inlaying, and ornamental furniture.
15. Damarlout - -	Brown	- -	Used for building, and general purposes.
16. Dunorhung - -	"	1.235	Used by the Chinese, for carved images.
17. Drum - -	Light brown	- -	A very small tree; used for ornamental furniture.
18. Hama Raja - -	"	- -	" " little used.
19. Maddang Kamenhir - -	- -	- -	Used by the Chinese for making boxes.
20. Miraban - -	Light red	- -	Much used for ship-building, furniture, &c.
21. Maddang Tandack - -	Dark brown	- -	Not used at all.
22. Maskaw - -	Light brown	1.016	Used for palankeens, carriages, furniture, &c.
23. Mankudu - -	Brown	- -	A specie of Damaslout; much used for beams.
24. Maliler - -	White	- -	{ A small tree; used for work-boxes, and ornamental work.
25. Maribot - -	Purple	0.939	{ A very large tree, difficult to work; used for furniture.
26. Mandara - -	Pale red	0.939	A small tree; used for ornamental furniture.
27. Nebong - -	Dark	- -	A tall and thin, but straight tree; used for railings.
28. Papisrang - -	Pale brown	- -	{ 6 to 9 feet in circumference, 40 feet long; not good for beams; chiefly used for furniture.
29. Pasa Linja - -	Light brown	- -	A large tree; used only for planks; soon decays.
30. Pala - -	"	- -	A tall thin tree; used for planks.
31. Pinang Back - -	Brown	- -	A large tree; used for beams.
32. Pala Utan - -	Light brown	- -	A large tree; only used for planks.

NAME.	Colour.	Specific Gravity.	Remarks.
33. Papisrang -	- Purple -	- - -	A strong wood ; used for beams.
34. Penang teak	- Brown -	- - -	A scarce tree, now.
35. „ Jack	- Yellow -	- - -	Used only for ornamental furniture.
36. Rangha-as -	- Light brown -	- - -	Used for furniture.
37. Rokam -	- Light red -	- - -	Used for boxes and furniture.
38. Red wood -	- Red -	- 1.000	In general use for furniture.
39. Sankuang -	- Pale brown -	- - -	Used only for ornamental work.
40. Satin wood -	- Straw -	- - -	A beautiful wood for ornamental furniture, &c.
41. Siam ebony	- Black -	- - -	Used only for ornamental furniture, inlaying, &c.
42. Teak - -	- Brown -	- - -	In general use.
43. Tampinnis -	- Light red -	- - -	{ A fruit tree ; used for ornamental furniture, billiard cues, &c.
44. Tija - -	- Light brown -	- - -	Used for furniture, boxes, &c.
45. (No name.)-	- Purple -	- - -	Not durable : used for all sorts of rough work.

### No. 31.—WOODS OF THE INDIAN ARCHIPELAGO.

Extensive collections of woods from Borneo, New Guinea, and several other of the Archipelago islands, are contributed ; including sandal-wood from Timor, and Lingoa, or Amboyna wood, from Ceram, in the Moluccas. This wood, which is very durable, and takes a high polish, was imported from the Moluccas in considerable quantities at the time when the latter were British possessions ; it is very abundant, and may be had in any quantity. Very large circular slabs are obtained from the lower part of the tree by taking advantage of the spurs, or lateral growths ; they are sometimes as large as nine feet in diameter. A circular disk of wood thus obtained, nearly seven feet in diameter, as well as some other specimens, are exhibited by Messrs. ALMEIDA, of Singapore, and were deemed deserving of a Prize Medal by the Jury. Specimens are also shown of the Kayu-Buka, which is brought from Ceram, New Guinea, Arru, and the other islands of the Moluccas, to Singapore ; it is a knotty excrescence which forms on the stems of the Lingoa tree, and is much esteemed as a fancy wood for cabinet-work ; of late years its estimation seems to have decreased in Europe, but it is still much valued by the Chinese. The following is a list of the woods from Labuan :—

	Height. Feet.	Diameter. Feet.	Remarks.
1. Dadarru - - -	30	2	
2. Gabar Buto - - -	about 60	3	
3. Jati china - - -	60	1½	
4. Kalim pupa tandok -	12 to 15	1½	
5. Kayu Aru - - -	about 60	3	
6. „ Arang - - -	- -	- -	Grows to a large size in Borneo.
7. „ Arru - - -	30	2	
8. „ Benatore bukit - -	70	3	
9. „ Bencoola - - -	about 60	3	
10. „ Badak utan - - -	- -	- -	A fruit tree.
11. „ Bidarru - - -	30	1½	A scented tree.
12. „ Impas - - -	40	2½	
13. „ Gading - - -	25 to 30	1	
14. „ Jamber - - -	30	2	
15. „ Kandis Dahan - -	30	2	A fruit tree.
16. „ Kalam Pappa - -	30	2	
17. „ Karye - - -	20	1½	
18. „ Kapur Rangin - -	90 to 100	4 to 5	
19. „ Kuing - - -	70	3	
20. „ Kapur - - -	90 to 120	5	

			Height. Feet.	Diameter. Feet.	Remarks.
21.	Kayu	Koningutan	- - - 40	2½	
22.	"	Kamuning	- - - - -	0½	
23.	"	Limau	- - - - -	0½	
24.	"	Laoh	- - - - -	- -	A small tree.
25.	"	Leda Karbau	- - - about 60	3	
26.	"	Malam	- - - "	3	
27.	"	Nasi Nasi	- - - 40	2	
28.	"	Oobah	- - - 40	1½	Bark used to dye red.
29.	"	Plye (root).			
30.	"	Palah palawan	- - - 30	1½	
31.	"	Petong	- - - "	"	
32.	"	Rsak	- - - 40	2½	
33.	"	Rangas	- - - 30	1½	Used for common furniture.
34.	"	Sampilou	- - - 60	1½	
35.	"	Senang annumbukit	- - - 90	4	The fruit yields an oil.
36.	"	Samuck	- - - 30	2	Used for dyeing.
37.	"	Senang Awan	- - - 90 to 120	5 to 6	
38.	"	Sarogan	- - - 25	1	
39.	"	Tampui pyah	- - - - -	- -	A fruit tree.
40.	"	Tioro	- - - 30 to 35	3	
41.	"	Tobah tobahutan	- - - 30	3	
42.	"	Taratang	- - - 20 to 30	2	
43.	"	Urat Mata	- - - 90 to 100	3 to 4	
44.	Madang	sisik	- - - 50	2½	
45.	"	lada	- - - 30	2	
46.	Nibong	binar	- - - 90	- -	A species of palm.
47.	"	sabarani	- - - 90	- -	" "
48.	Samala		- - - 50	2½	
49.	Saryiah		- - - 50	3	

Although in the preceding lists of woods exhibited by the Honourable East India Company some of the woods are enumerated more than once, being contributed from different localities; yet taken as a whole, the entire collection is of the highest interest and importance. As many of the specimens sent over are of a large size, means will be afforded of ascertaining the density, elasticity, strength, and other properties of the several woods, and thus much valuable practical information may be obtained.

A collection of forty-eight specimens of woods from Ceylon is exhibited in the Colonial Department, consisting of timbers used in house-building, and for purposes of construction, and of ornamental or furniture woods. The following is a list of these woods:—

#### WOODS OF CEYLON.

1. Ahoo (19) - - - A soft, though fine, but not very close-grained, light wood.
2. Alooboa (39) - - - A rather soft, coarse, open-grained, but not very light wood.
3. Cahamilile (66) - - - A very hard, fine, close, even-grained, heavy wood.
4. Calamender (2) - - - An exceedingly hard, fine, close-grained, heavy wood, of a pale reddish hue; with the heart and isolated elongate patches of an intense black. This specimen is inscribed at the back "Hoamidina."
5. Ceylon Teak (61) - - - A rather hard, fine, close-grained, and somewhat heavy wood.
6. Cochin Teak (70) - - - A rather hard, though somewhat coarse and open-grained, moderately heavy wood, of a lighter hue, rather coarser texture, and considerably more ponderous than the Moolmein teak.
7. Cocoa-nut (75) - - -
8. Dombe (63) - - - A soft, coarse, open-grained, light wood, bearing a strong resemblance to inferior Honduras mahogany, takes a good polish, and presents a pretty curled pattern; but judging from this specimen, which is much worm-eaten, it cannot be a very durable wood, at all events in its native country.
9. Drapore (31) - - - A hard, fine, rather close-grained, somewhat heavy wood.
10. Ebony - - - A beautiful specimen of a well-known wood.

11. Flower Batten (76) - A very hard, fine, close-grained, heavy wood. Its polished surface shows a pleasing mottled pattern.
12. Galmendora (68) - A rather hard, very fine, but not close-grained, heavy wood.
13. Godepere (25) - A rather hard, fine, close-grained, heavy wood.
14. Goorakieme (14) - A soft, fine, but open-grained, light wood.
15. Hadiwicke (26) - A moderately hard, fine, close-grained, rather heavy wood.
16. Hall (28) - A very soft, coarse, open-grained, light wood, evidently adapted only for very inferior work, and where durability is not required.
17. Halmendora (67) - A hard, fine, close-grained, heavy wood.
18. Halmilile (43) - A rather soft, though fine, but not very close-grained, heavy wood.
19. Hampalede (36) - A rather soft, fine, though open-grained, heavy wood.
20. Hick (57) - A very hard, fine, close, very uniformly grained, heavy wood, in colour resembling pencil-cedar.
21. Horre (74) - A hard, though coarse, open-grained, heavy wood.
22. Hounkieriler (15) - A soft, fine, but open-grained, rather heavy wood.
23. Kadoll, (13) - A rather hard, fine, close-grained, heavy wood. Specimen much worm-eaten.
24. Kadombairia (3) - A rather hard, fine, close-grained, somewhat light wood; its surface curiously veined.
25. Kadoomba (42) - A soft, though fine, close-grained, and rather light wood.
26. Kattukende (27) - A hard, fine, rather close-grained, heavy wood.
27. Kirepalle (23) - A very soft, coarse, open-grained, light wood.
28. Koan (12) - A very hard, fine close-grained, heavy wood.
29. Koesor Jack (6) - A moderately hard, but rather coarse and open-grained, though heavy wood, of a beautiful saffron yellow colour; emits a peculiar, but by no means unpleasant odour.
30. Kuretia (29) - A hard, fine, close-grained, heavy wood.
31. Meeanmilile (60) - A very hard, fine, close-grained, heavy wood.
32. Millele (5) - Probably specifically identical with Sapoomilile, with which it coincides in every respect. [Vide No. 43.]
33. Moolmein Teak (64).
34. Naa (72) - A very hard, fine, close-grained, and very ponderous wood.
35. Namede (34) - A rather hard, very fine, close-grained, heavy wood.
36. Nendoon (48) - Hard, though coarse, open-grained, heavy wood.
37. Obbairia (55) - Hard, rather fine, and generally close-grained, presenting however many open cells; heavy.
38. Palmira (71) - A species of palm.
39. Paloo (65) - A hard, fine, close-grained, heavy wood: heart-wood deep red-brown, recent layers reddish-yellow; its compact, even structure indicates that it is admirably adapted for turnery work.
40. Patta Dell (62) - A soft, coarse, open-grained, light wood.
41. Pelan (54) - A very hard, fine, close-grained, heavy wood.
42. Sapoo (53) - A soft, firm, but rather open, though even-grained, light wood.
43. Sapoomilile (77) - A soft, rather coarse, open-grained, light wood.
44. Sattin (69) - A hard, fine, close-grained, heavy wood.
45. Sooriye (73) - A hard, though somewhat coarse and open-grained, heavy wood, of a deep chesnut colour.
46. Tamarind (4) - An exceedingly hard, fine, close-grained, very heavy wood.
47. Tarine (35) - A hard, fine, close-grained, rather heavy wood, much resembling English birch.
48. Wanedile (37) - A rather hard, fine, close, even-grained, heavy wood.

Several interesting specimens of timber and other woods are contributed from South Africa and the Cape of Good Hope. One specimen, in particular, deserves special notice; it is called Red Ebony, from Natal, and is contributed by C. J. BUSK (60). It is a hard, heavy, very close-grained, red wood, admirably adapted for turning and the finer sorts of cabinet-work; approximating, in fact, in character somewhat to ivory. This wood appears to be new, and it is unquestionably a valuable addition to the hard ornamental woods already known; the Jury accordingly awarded a Prize Medal for it.

A valuable small collection of the woods of the Cape of Good Hope, is exhibited from the MORAVIAN MISSION at Gnathendal (44); it consists of thirty specimens, and was deemed worthy of Honourable Mention. The following Table contains a list of these woods, their sizes, and the uses to which they are applied in the colony.

## LIST OF THIRTY SPECIMENS OF WOODS FROM THE MORAVIAN MISSION, CAPE OF GOOD HOPE.

NAMES.		Botanical Names.	General Height without Branches.	Diameter.	Quality.	Uses.
1.	Alder, red -	-	-	-	-	-
2.	Ald e, white -	Roode els -	15 to 25 ft.	2 to 3 ft.	Hard and tough	Waggon work.
3.	Ash -	Witte els -	10 12	2 3	Tough and soft -	Planks.
4.	Assagay wood -	Essen hout -	20	1 2	Tough -	'
5.	Beech -	Hassagai hout -	20 40	3	Very tough -	Waggon work.
6.	Black bark -	Benken hout -	15 25	2	Tough -	Waggon wheels.
7.	Black wood -	Zwart bast -	12	1	Hard and very tough	{ For poles; excellent for wooden screws.
8.	Candle wood -	Zivart hout -	20	1 2½	Hard and tough	Waggon work.
9.	Gomassie -	Kaars hout -	12	1	Close	General work.
10.	Iron wood -	Kamassie hout -	12 15	1 ft. 9 in.	Hard and close	Veneering and tools.
11.	Keur -	Zivante yzer hout -	25 45	4 ft.	Very hard	Ploughs and axles.
12.	Olive wood -	Olyf hout -	20	1 to 1½ ft.	Light and soft	Spars and rafters.
13.	Pear, red -	Rood peer -	6 10	1	Very hard	For furniture.
14.	Pear, white -	Wit peer -	20 30	3	Hard and tough	Axles and waggon poles.
15.	Pear, hard -	Hard peer -	15 20	2 3	'	Principally for fellies.
16.	Red wood -	Rood hout -	12 15	1 2	'	Axles and waggon poles.
17.	Saddle wood -	Lepel hout -	10 15	1 2	Close and tough	Not much used.
18.	Sabree -	-	12	1	Light and soft	Waggon work.
19.	Saffron -	Saffraan hout -	10 15	1 2	Close	Coopers' work.
20.	Silk bark -	Zyde bast -	10 12	7 to 9 in.	{ Tough and close; the bark tough like silk }	{ Fellies and general work; bark for tanning.
21.	Smalblad -	-	10	7 in.	Tough -	Carriage poles.
22.	Sneeze wood -	Nieshout -	15	1 to 2 ft.	Very hard	Not much used, firewood.
23.	Spek wood -	-	10 15	2 3	Tough and soft	Very handsome for furniture.
24.	Stink wood -	Stink hout -	20 35	3 5	Hard and tough	Planks.
25.	Thorn -	Doorn boom -	8 10	1 3	Hard and tough	Furniture and waggon work.
26.	Vlier -	-	10	7 in.	'	Gum, bark for tanning, fire-wood.
27.	White wood -	Whit hout -	15 20	1 to 2 ft.	Light and soft -	Chairs, table feet.
28.	Yellow wood -	Geel hout -	20 50	2 7	Not unlike deal	Spars, rafters, &c.
29.						Balks, beams, planks.
30.						

A second series of Cape woods, including a number not in the Gnathendal collection, and valuable because the specimens are shown in the bark, is exhibited by

NAMES.		Botanical Names.	General Height, without Branches.	Diameter.
1.	Alder, klip - - -	Klip els - - -	Plectronia - - -	10 to 15 ft. 1 to 2 ft.
2.	Alder, red - - -	Rooode els - - -	Cunonia capensis - - -	15 20 2 3
3.	Alder, white - - -	Witte els - - -	Weinmannia trifoliata - - -	10 12 2 3
4.	Ash - - -	Essen hout - - -	Ekebergia capensis - - -	19 20 1 3
5.	Assagay - - -	Hassagay hout - - -	Curtisia faginea - - -	20 30 2 3
6.	Bastard safran - - -	Bastard S. hout - - -	Mystroxyton - - -	- - - -
7.	Beech - - -	Beuken hout - - -	- - -	15 20 2 4
8.	- - -	Blaauw bosch - - -	Royena lucida? - - -	5 12 6 8 in.
9.	Black bark - - -	Zwart bast - - -	Royena villosa - - -	10 12 12
10.	Black wood - - -	Zwart hout - - -	Royena - - -	- - - -
11.	Cedar - - -	Sapru hout - - -	Callitris Ecklonii - - -	10 25 1 4 ft.
12.	Chesnut, wild - - -	Wilde kastanje - - -	Calodendron capense - - -	15 30 3 4
13.	Cross thorn - - -	Kruis doorn - - -	Plectronia ventosa - - -	5 8 3 9 in.
14.	- - -	Daay bosch - - -	Rhus tomentosa - - -	5 10 1 8
15.	Elder, wild - - -	Wilde vlier - - -	Chilianthus arboreus - - -	8 7
16.	- - -	Gnutsam - - -	- - -	- - - -
17.	Gornasie - - -	Kornassie hout - - -	Gonioma Kamassi - - -	12 15 1 9
18.	Granate, wild - - -	Buffel hoorn - - -	Burchellia capensis - - -	5 10 2 5
19.	Horsepis - - -	Paarde pis - - -	Hippobromus alatus - - -	5 10 12
20.	Iron wood, white - - -	Witte yzer hout - - -	Asaphes undulata - - -	20 30 2 3 ft.
21.	Iron wood, black - - -	Zwart yzer hout - - -	Olea undulata - - -	15 20 2 3
22.	Kooboo - - -	Koeboe - - -	Mytroxyton Kuba - - -	5 8 1 2
23.	- - -	Kuurboom - - -	Virgilia capensis - - -	10 15 1 7 in.
24.	Milk wood - - -	Melk hout - - -	Sideroxyton inerme - - -	5 10 1 3 ft.
25.	- - -	Ningroe - - -	- - -	- - - -
26.	Noentigara - - -	- - -	Euclea - - -	- - - -
27.	Olive, black - - -	Zwarte olyven hout - - -	Olea verrucosa - - -	6 10 18 in.
28.	Olive, white - - -	Witte olyven hout - - -	- - -	15 20 2 3 ft.
29.	- - -	Onderbosch - - -	Trichocladus orinitus - - -	5 10 1 3
30.	Pandle wood. - - -	Kaars hout - - -	Celastrus rostratus - - -	10 15 12 in.
31.	Pear, hard - - -	Hard peer - - -	Olinia cymosa - - -	15 20 2 3 ft.
32.	Pear, white - - -	Witte peer - - -	Imbricaria olovata - - -	15 20 2 3
33.	Quarry bush - - -	Bosch quarry - - -	Euclea undulata - - -	6 8 6 10 in.
34.	Redwood - - -	Rooode hout - - -	Diporidium arboreum - - -	12 15 1 2 ft.
35.	Sage, wild - - -	Wilde saly - - -	Tarchonanthus camphoratus - - -	6 10 3 5 in.
36.	Safran - - -	Safraan hout - - -	Crocoxyton excelsum - - -	10 15 1 2 ft.
37.	Silk bark - - -	Sey bast - - -	Celastrus mucronatus - - -	7 12 7 9 in.
38.	Stink wood - - -	Stink hout - - -	Oreodaphne bullata - - -	26 30 3 5 ft.
39.	Tamboukie wood - - -	- - -	- - -	- - - -
40.	White wood - - -	Witte hout - - -	Virgilia - - -	10 12 1 8 in.
41.	- - -	Wolve doon - - -	Celastrus? - - -	7 12 3 10
42.	Yellow wood - - -	Gul hout - - -	Podocarpus taxus latifolia - - -	20 50 2 5 ft.
43.	Yellow wood - - -	Gul hout - - -	Podocarpus taxus elongatus - - -	15 20 2 4

A specimen of teak wood, from the Western Coast of Africa, a valuable timber, well known and valued by ship-builders, is shown by WARWICK WESTON (1).

Very remarkable specimens of the chief varieties of Canadian timber are exhibited, especially the collection shown by the CENTRAL COMMISSION of MONTREAL, for which the Jury awarded a Prize Medal. (See p. 170.) It includes excellent specimens of the following woods.

H. DUMBLETON, of George District ; this was likewise deemed worthy of Honourable Mention. The following is a list of the woods :—

QUALITY.	USES.	LOCALITY.
Hard and close - - - -	Waggon work.	
Hard and tough - - - -	Planks, and fellies of wheels -	{ Ravines and water-courses throughout Cape Colony.
Tough and soft - - - -	Planks, furniture - - - -	Moist ravines in eastern parts.
Tough and soft - - - -	Planks for furniture - - - -	Forests of the eastern province.
Hard and very tough - - - -	Much preferred for waggons -	{ Moist stony places in forests throughout South Africa.
Hard - - - - -	Waggon work.	
Soft and tough - - - -	Very useful for waggon work -	Forests throughout Cape Colony.
Hard and tough - - - -	Furniture and tools - - - -	Shady places in ravines in Cape Colony.
Hard and very tough - - - -	Waggon-poles, tools, &c. - - -	{ Moist shady parts in the forests of Cape Colony.
Tough and hard - - - -	Furniture and tools.	
Light, short, and resinous - - - -	{ Coopers' work, water-wheels, and roofing planks, &c. - - - }	High rocky places in the Cedar mountains.
Soft and light - - - -	Beams, planks, &c. - - - -	{ Ravines in forests of the eastern part of Cape Colony, and Magalisberg.
Hard and tough - - - -	Waggon-poles, spars, &c. - - -	Ravines in forests of Cape Colony.
Very tough - - - - -	{ Waggon work ; bark used by tanners - - - - }	Forests in the Cape Colony.
Hard and tough - - - -	Furniture - - - - -	Edges of rivers in the Cape Colony.
Tough.		
Hard and close - - - -	For veneers, tools, &c. - - -	{ Forests of the Neisna river and others of the eastern districts.
Fine-grained, hard, and tough - - - -	Very good for cabinet work -	Grootvaders bosh, and eastern forests.
Hard and tough - - - -	Waggon work - - - - -	Eastern parts of Cape Colony.
Very hard and tough - - - -	„ „ - - - - -	Makalisberg. Krakkakammer.
„ „ - - - - -	„ „ - - - - -	Forests in the east of Cape Colony.
Hard and short-grained - - - -	„ „ - - - - -	„ „ „
Soft and light - - - -	Building roofs - - - - -	Rivulets in the eastern parts.
Hard, white, very tough - - - -	Waggon work ; boat building -	Stony places throughout the Colony.
Hard and heavy.		
Hard and close.		
Very hard and tough - - - -	Waggon work, furniture - - -	Rocky places all over South Africa.
Hard and tough - - - -	Waggon work, poles, &c. - - -	
Very tough and durable - - - -	Waggon work, roofs, &c. - - -	Under high trees, all over South Africa.
Very hard and heavy - - - -	Waggon work, &c. - - - -	Water-courses and ravines.
Hard and tough - - - -	Waggon work - - - - -	Stony and moist parts of Cape Colony.
„ „ - - - - -	„ „ - - - - -	Olifant's hock ; Zizikamma.
Hard and short - - - -	Waggon work ; berries eatable -	Eastern parts of Cape Colony.
„ „ - - - - -	Furniture, tools, &c. - - - -	
Hard and heavy - - - -	Cabinet work - - - - -	Ravines throughout the Cape Colony.
Hard and close - - - -	{ Waggon work ; bark used for tanning - - - - }	Eastern parts of Cape Colony.
Tough and close - - - -	Spars and poles - - - - -	Woody ravines, all over Cape Colony.
Hard and tough - - - -	{ Much used for furniture, gun-stocks, &c. - - - - }	Many parts of Cape Colony.
Hard and heavy - - - -	Used as an emetic - - - - -	Port Natal.
Light and soft - - - -	Rafters, &c., in house building.	
Hard and tough - - - -	Waggon work, tools - - - - -	Shady moist ravines in Cape Colony.
Light and short-grained - - - -	Much used in house building -	Eastern parts of Cape Colony.
Soft and light - - - -	„ „ „ - - - - -	Forests of George District.

WOODS OF CANADA.

- |                   |                   |                    |
|-------------------|-------------------|--------------------|
| 1. Ash, curled.   | 8. Iron wood.     | 15. Pine, yellow.  |
| 2. Birch, white.  | 9. Maple, soft.   | 16. „ white.       |
| 3. Butter-nut.    | 10. „ hard.       | 17. Spruce.        |
| 4. Bass wood.     | 11. „ bird's-eye. | 18. Tamarack.      |
| 5. Cedar, pencil. | 12. Oak, red.     | 19. Walnut, black. |
| 6. Elm.           | 13. „ white.      |                    |
| 7. Elm, red rock. | 14. Pine, red.    |                    |



The butter-nut, and black walnut are excellent furniture woods, and hardly seem to be so well known or appreciated as they deserve. Very fine specimens of butter-nut birch, pine, cherry, curled black walnut, and maple, both curled and bird's-eye, are exhibited by Messrs. REED and MEAKINS of Montreal (75); these were also judged worthy of a Prize Medal by the Jury.

Fine specimens are also shown of curled black walnut by — FISHER, of Simcoe (78); of bird's-eye maple, by J. EGAN of Ottawa (74); of black walnut, by J. HENSON, of Dawn (79); and of soft maple and chesnut, by J. and F. PARISAULT, of St. Martin (76 and 77). The Jury deemed each of these deserving of Honourable Mention.

Small samples of a few woods from New Brunswick are shown; namely, bird's-eye and curly maple, black birch, and the candleberry myrtle.

A few woods are contributed from Nova Scotia; including curled and bird's-eye maple, birch, and white and grey oak.

A valuable and very interesting collection of timber and other woods from British Guiana, is contributed by several independent exhibitors. The Jury awarded Prize Medals to J. OUTRIDGE (84, 84 A, 85, 85 B, 85 C, 87, 88, 89, 91, 92, 97, 98, 104 to 115, 117 D, E, F, G, H, &c.); and to J. S. STUCHBURY (85 A, 116, 117 B, &c.), for their collections of woods; and they deemed the specimens shown by A. BUCHANAN (86, 90, 95, 96), T. B. DUGGIN (90 B, 99, 100, 101, 102), T. FAUCET (93, 94), G. PONTIFEX (102 B.), and J. F. BEE (103, 105, 116, 117, &c.), severally deserving of Honourable Mention.

The latter also exhibits a numerous series of small samples of the chief woods of Guiana (156).

#### WOODS OF BRITISH GUIANA.

1. Black greenheart. [85*b*, 85*c*.] Shows a diameter of 11½ inches. In bark. A very hard, fine, close-grained, heavy wood. Duramen deep brown; recent layers narrow, pale ochre yellow.  
The timber of this tree is used for ship-building, planks, &c., and is considered more durable than the common greenheart. The specimens sent are from a tree supposed to be about 50 years old.
2. Blackheart [111, 111*a*] . Shows a diameter of 4 inches. In bark. A soft, light wood; from the river Demerara.  
This is a good wood for house frames, and for making furniture. It will square from 6 to 7 inches, from 20 to 30 feet long.
3. Bully - tree (*Mimusops* *sp.*?) [91, 91*a*.] Shows a diameter of 12 inches. In bark. A fine close-grained, moderately hard, and rather heavy wood; from the River Demerara.  
The tree yielding this wood is supposed to be a species of *Mimusops*. It is found throughout the colony, but most abundantly in the county of Berbice. It is of great size, and squares from 20 to 30 inches, and may be obtained from 20 to 30 feet long. The weather has little effect upon it, and it is employed for house-frames, posts, floors, &c. The upper portion of the trunk and branches are manufactured into shingles, wheel-spokes, palings, &c.
4. Cabacalli [112, 112*a*] . Shows a diameter of 4½ inches. In bark. A fine, close-grained, moderately hard, and rather heavy wood; from the river Demerara.

- This wood is impregnated with a bitter principle, which defends it against worms; it lasts well under water, and is much used for planking colony craft. It must, however, be fastened with copper nails. It will square from 12 to 16 inches, or even more, from 40 to 45 feet long.
5. Camara, or tonkin-bean (*Dipteryx odorata*, Willd). [95, 95a.] Shows a diameter of 20 inches. In bark. A fine close-grained hard, and very heavy wood; from the river Essequibo. This wood is obtained from *Dipteryx odorata*, Willd.: the tree which produces the well-known tonkin bean. It is hard, tough, and durable in an eminent degree, and it is said that a portion of its timber, 1 inch square, and of a given length, bears 100 lbs. more weight than any other timber in Guiana of the same dimensions. It is therefore peculiarly well adapted for any purpose where resistance to great pressure is the object, and for shafts, mill-wheels, or cogs. It will square from 18 to 20 inches, from 40 to 50 feet long. This tree is, however, not very plentiful in this colony.
6. Coffee tree (*Coffea Arabica*). [116, 116a.] Shows a diameter of 3 inches. A fine, close-grained, hard, heavy wood, of a beautiful cream white throughout, and having the appearance of box, both in structure and growth; from Canal No. 2, river Demerara.
7. Cork-wood (*Pterocarpus Draco*, Linn.; *P. suberosus*, Pers.) [102, 102a.] Shows a diameter of 5 inches. In bark. An exceedingly light and soft, though fine even-grained wood; from the river Berbice.
8. Cork-wood [102b.] - A curious excrescence, styled in the label "an abutment of the foregoing." In form, very like rough cork; about an inch in thickness throughout, enveloped in a thin hard bark. The wood is much softer than in 102 and 102a, and would doubtless afford an excellent substitute for cork, for entomological purposes; from Troolie Island in the river Essequibo. An abutment from near the root of the tree. This wood is supposed to be obtained from *Pterocarpus Draco*, Linn., or *P. suberosus*, Pers., and is chiefly used as floats for fishing nets.
9. Courida (*Avicennia nitida*, Jac.) [103, 103a.] Shows a diameter of 5½ inches. In bark. An open-grained, moderately soft, and rather light wood; from Plantation Woodlands, river Mahaica. This wood is obtained from *Avicennia nitida*, Jacq., a tree of surprising rapidity of growth. These specimens are from a tree five years old. The wood is perishable when exposed to the atmosphere, but is very durable under ground, and is therefore used as foundations for buildings.
10. Coutaballi [110, 110a] - Shows a diameter of 5 inches. In bark. A very fine, close-grained, hard, heavy wood; from the river Demerara. The tree which yields this timber grows upon sand hills; the wood is very hard and durable, if not exposed to the weather; it is plentiful, and principally used for house frames, and will square 12 inches, from 30 to 40 feet long.
11. Crab-wood (*Xylocarpus carapa*, Spreng.; *Carapa Guianensis*, Aubl.) [108, 108a.] Shows a diameter of 7½ inches. In bark. A tolerably hard, even-grained, rather light wood. In great repute, and largely used in the colony for interior work; from the river Demerara. This wood is obtained from *Xylocarpus carapa*, Spreng., or *Carapa Guianensis*, Aubl., the seeds of which yield the crab oil. It is a light wood, and takes a high polish, and is used for masts and spars, flooring, partitions, and doors of houses.

There are two varieties, the red and white. These specimens are the white. It squares from 14 to 16 inches, from 40 to 60 feet long.

12. Determa [107, 107a] - Shows a diameter of 6 inches. In bark. A rather hard, but not very close or even-grained wood. The most valuable of the British Guiana woods for ship building purposes, where it is used chiefly for the bottoms of vessels; grows to a much larger size than represented in the present specimen; from the river Demerara.

This wood is used for masts, booms, and planking for colonial craft; and as insects do not infest it, it is well adapted for chests, wardrobes, &c. It will square from 14 to 16 inches, from 40 to 60 feet in length.

13. Greenheart (*Nectandra Rodiaei*, Benth.) [85, 85a.] Shows a diameter of 12 inches. In bark. A very hard, heavy, fine, but not even-grained wood. Duramen deep brown, recent layers broad pale yellow; from the River Demerara.

The Greenheart tree is very abundant, and its timbers, squaring from 18 to 24 inches, can be procured from 60 to 70 feet long. It is a fine-grained hard wood, well adapted for the planking of vessels, house-frames, wharves, bridges, and other purposes where great strength and durability are required. Mr. Manifold, engineer of the Demerara Railway, states that this is the best timber for resisting tensile and compressive strains, and is therefore well adapted for kelsons for ships and beams of all kinds.

14. Hackia, or Lignum vitæ (*Guaiacum officinale*, Linn. ?) [98, 98a.] Diameter 15 inches; from the river Demerara.

This wood, known in the colony as *lignum vitæ*, is said to be obtained from *Guaiacum officinale*, Linn.; but this seems doubtful, as the tree producing the wood attains a height of from 50 to 60 feet, and squares 16 to 18 inches, whilst the *Guaiacum officinale* is described as a comparatively small tree, about 4 or 5 inches in diameter. It is used for mill-cogs, and shafts. The specimens sent are from a tree supposed to be about 40 years old.

15. Hooboballi. [89, 89a.] Shows a diameter of 15 inches. In bark. A fine, close-grained, hard, heavy wood. Duramen deep red chesnut; alburnum nut brown; from the river Demerara.

This wood is very close and fine-grained, is easily worked, takes a high polish, and is much used in the colony for furniture. It may be had from 15 to 20 inches square, 40 to 70 feet long. The specimens sent are from a tree supposed to be about 20 years old.

16. Hyawaballi. [117j, 117k.] Shows a diameter of 8 inches. In bark. A fine, close-grained, hard, heavy wood; from the river Demerara.

This tree is scarce. This wood, known as zebra wood, is used for furniture. The specimens sent are from a tree supposed to be about 25 years old.

17. Hyawa (*Icica heptaphylla*, Aubl. [101, 101a.] Shows a diameter of 5 inches. In bark. A light, though rather fine close-grained white wood; from the river Berbice.

This wood is obtained from the *Icica heptaphylla*, Aubl., or Incense tree, yielding the gum hyawa.

18. Itaballi (*Vochysia Guianensis*, Aubl.) [117f, 117g.] Shows a diameter of 11 inches. In bark. An open-grained, light, and rather soft wood; from the river Demerara.

The tree which produces this wood is *Vochysia Guianensis*, Aubl., and is used by the Indians for making corials.

19. Itikiribouraballi (*Macharium Schomburgkii*, Benth. ?) [104, 104a]. Shows a diameter of 12 inches. In bark. A close-grained, hard, heavy wood; duramen, bright chesnut; alburnum broad, white; from river Demerara.  
This wood is supposed to be obtained from *Macharium Schomburgkii*, Benth. The trunk grows to the length of from 30 to 40 feet, and squares from 12 to 16 inches. It is used chiefly for cabinet work.
20. Kakarilly. [87, 87a.] Shows a diameter of 10 inches. In bark. A fine, close even-grained wood, hard and heavy. Duramen deep red brown; alburnum broad, pale, dirty yellow; from the river Demerara.  
This wood is very plentiful, and it has been proved that it is more durable than greenheart in salt water, as it possesses the quality of resisting the depredations of the sea-worm and barnacle. It may be had from 6 to 14 inches square. The specimens sent are supposed to be about 20 years old.
21. Lana (*Genipa Americana*, Linn.) [99, 99a]. Shows a diameter of 6 inches. Centre traversed by a longitudinal cylindrical furrow, containing in transverse section a hard granulated pith. Wood fine, close-grained, moderately hard, rather heavy. Bark, bearing a strong resemblance to that of the common birch; from the river Berbice.  
This wood is obtained from *Genipa Americana*, Linn.: the fruit of which yields the Indian pigment known as Lana dye. The tree is very high, and the trunk will frequently square from 14 to 18 inches. The wood is close-grained, and is not liable to split.
21. Koquerettaballi. [109, 109a]. Shows a diameter of 4½ inches. In bark. A very close-grained, hard, heavy wood; from the river Demerara.  
This wood forms excellent rafters, and beams for cottages. It grows from 20 to 30 feet long, and from 4 to 6 inches in diameter.
22. Letter-wood (*Brosimum Aubletii*, Poep., *Piratinera guianensis* Aubl.) Called by the Indians Bourra Courra. 20 inch × 4 × 1½. Fine, close-grained, hard, and rather heavy; a beautiful wood of a bright red chesnut colour, with small rhomboidal black patches, mostly isolated, though occasionally concurrent. Used for ornamental purposes, especially for picture frames; several walking sticks of this wood, from the colony, are exhibited, *vide* No. 148. Unfortunately it never attains a large size; from the river Corentyne.  
This is obtained from *Brosimum Aubletii*, Poep., or *Piratinera guianensis*, Aubl., and is one of the costliest woods which Guiana possesses. It is of a beautiful brown colour with black spots, which have been compared to hieroglyphics; the spotted part being peculiar to the heart, which is seldom more than 12 to 15 inches in circumference. It is adapted for cabinet work of small size and for veneering only. From its extreme hardness it is difficult to work, and therefore little used.
23. Marisiballi. [117r, 117s.] Shows a diameter of 8 inches. In bark. An exceedingly close-grained, hard, heavy wood; from the river Demerara.  
This tree is plentiful, and is used chiefly for spars. It will square from 13 to 14 inches, from 30 to 40 feet in length. The specimens sent are from a tree supposed to be about 20 years old.

24. Mammee apple tree  
(*Mammea Americana*,  
Linn.) [100, 100a.] Shows a diameter of 7 inches. A wood very like that of the English pear tree. In bark; from the river Berbice.  
This wood is obtained from the *Mammea Americana*, Linn., which produces a Mammee apple, or wild apricot of South America.
25. Mora (*Mora excelsa*,  
Benth.) [84, 84a.] Shows a diameter of 12 inches. In bark. A hard, heavy, close, but not even-grained, wood; from the river Demerara. The tree producing this wood frequently reaches a height of upwards of 100 feet. It grows abundantly on barren sand reefs. It is tough, close, and cross-grained, and is peculiarly adapted for ships' timbers and planks, for which purpose it is extensively used. The trunk of this tree, when of the height of from 40 to 50 feet, will square from 18 to 20 inches, but when grown to that size it is generally faulty. The specimens sent are from a tree supposed to be from 30 to 40 years old.
26. Purpleheart (*Copaifera  
pubiflora* or *bracteata*).  
[86, 86a.] Shows a diameter of 14 inches. In bark. A hard and ponderous, though open-grained wood. Duramen, in longitudinal section, bright claret; in transverse section, deep brown purple; recent layers narrow, pale yellow; from the river Essequibo.  
The purpleheart yields a timber possessing great strength, durability, and elasticity, and is described by Dr. Lindley as "invaluable for resisting the shock of artillery discharges," on which account it is employed for mortar beds. It is used for windmill shafts, rollers, and machinery.
27. Saka, or Bastard Purpleheart. [117d, 11e.] Shows a diameter of 11 inches. In bark. A fine, close-grained, hard, heavy wood. Heart-wood bright purple, recent layers narrow, dirty white; in brightness of colour it excels the real purpleheart; from the river Demerara. Used for furniture.
28. Saouari (*Caryocar tomentosum*, Dec.; *Pekea tuberculosa*, Aubl.) [96, 96a.] Not in bark, diameter doubtful, certainly exceeding 18 inches. A coarse open-grained, hard, heavy wood; from the river Essequibo.  
This wood is obtained from *Caryocar tomentosum*, Dec., or *Pekea tuberculosa*, Aubl.; the tree which yields the delicious nut known as the Saouari, or Sewarri nut. It greatly resembles in its properties the Mora, being excellent for ship-building, mill timbers, and plank, and may be had from 16 to 20 inches square, from 20 to 40 feet long.
29. Silverballi, Yellow (*Nectandra* sp. ?) [92, 92a.] A rather soft, open-grained, light wood; from the river Demerara.  
This wood is supposed to be derived from a species of *Nectandra*. It is light and floats, and contains a bitter principle, which protects it from the attacks of worms. Hence it is much used for the outside planking of colony craft: it is also used for booms and masts. It grows to a great size, but then it is often hollow. It will, however, square sound from 10 to 14 inches, from 40 to 50 feet long.
30. Silverballi Brown [93.] A fine close-grained, moderately hard, and rather heavy wood. Portion of the planking of a drogher. This specimen formed part of the outside planking of a drogher employed in the conveyance of produce in this colony, and is known to have been exposed to the action of salt water during a period of 20 years.

31. Silverballi, Brown. [94.] Although bearing a similar label to the foregoing, its specific identity therewith is doubtful; it differs in colour, is more open-grained, and much lighter. It is, however, possible that this specimen may represent the alburnum, and 93 the duramen of the same tree; if so, it must attain a very large size.
- Portion of the planking of a punt. This specimen formed part of the bottom of a punt, known to have been used in the Demerara river for a period of 30 years and upwards.
- 31.\*Silbadani. [117l, 117m.] Shows a diameter of 7 inches. In bark. A fine, close-grained, moderately hard, and rather heavy wood; bark smooth, much resembling that of common beech; from the river Demerara.
- This wood is used for furniture. The specimens sent are from a tree supposed to be about 20 years old.
32. Simiri, or Locust tree. Shows a diameter of 19½ inches. In bark. A rather open-grained, though hard, heavy wood; from the river Demerara.  
(*Hymenæa Courbaril*, L.)  
[117n, 117o.] The tree producing this wood is *Hymenæa Courbaril*, Linn., and is plentiful in various parts of the colony. It often attains a height of from 60 to 80 feet, with a trunk from 7 to 8 feet in diameter. The wood is hard and compact, and its durability recommends it for mill-rollers and similar purposes. The Indians make "woodskins" out of the bark. The specimens sent are from a tree supposed to be about 100 years old.
33. Suradanni [106, 106a] - Shows a diameter of 9 inches. In bark. A moderately hard, rather heavy, but not even-grained wood. Alburnum not perceptibly lighter in colour than the duramen; from the river Demerara.
- It is much used for timbers, rails, and covering boards for colony craft, and for naves and felloes of wheels; it is also made into canoes by the Indians. It will square from 14 to 18 inches, from 30 to 40 feet long.
34. Tacouba, or Heart of Wallaba. [90b.] From the river Berbice. This wood is the heart of the upper portion of the trunks of Wallaba trees which have been felled in the forests, and from which the sapwood has decayed. These are much used as paling posts and for other out-door purposes, being found to be so durable as to be almost imperishable. They are about to be used as sleepers on the Demerara Railway, for which purpose it is supposed they will prove to be peculiarly well adapted. The defect of Wallaba and of its Tacouba, is its inability to bear great lateral strain; it should not therefore be used for beams longer than 12 feet.
35. Tiger-wood. [117, 117a] 8½ inch × 5 inch × 2 inch. Shows heart wood only. A fine, close, even-grained very hard, and ponderous wood, of a bright red chesnut colour, remarkable for its isolated lunate black spots, which, however, sometimes assume an irregular form; susceptible of a high polish; from the river Demerara.

In the printed Catalogue accompanying the collection, this wood is stated to be the heart wood of the Itikiribouraballi; on comparing it with the specimens of the latter, Nos. 104 and 104a, it is manifest that the two woods are totally distinct. Mr. Bee, to whom the circumstance was pointed out, confirmed this fact, observing that the specimens of Tiger-wood

- now under consideration, were cut from a tree undoubtedly specifically distinct from that which yields the Itikiribouraballi.
36. Tooroo. [115, 115a] - A species of palm; from the river Demerara.  
It grows to the height of from 50 to 70 feet. Its woody outside is used by the cabinet makers for inlaid work, walking sticks, billiard cues, &c.
37. Torch-wood. [114] - Supposed to be obtained from a species of *Amyris*, or *Icica*. When beaten so as to separate the fibres, the branches are used as torches by the Indians.
38. Towraneroo, or Bastard Bully tree. [117p, 117q.] Shows a diameter of 10 inches. In bark. A fine, close, even-grained, hard, heavy wood; from the river Demerara. It is very plentiful, and is used for framing-timber, spokes, &c. It will square 25 inches, from 40 to 50 feet long. The specimens sent are from a tree supposed to be about 50 years old.
39. Wadaduri, or Monkey-pot tree (*Lecythis grandiflora*, Aubl.) [117h, 117i.] Shows a diameter of 10 inches. In bark. A close-grained, tolerably hard and heavy wood, presenting, however, numerous open cells; heart-wood bright amber yellow, recent layers narrow, white; from the river Demerara. The tree which produces this timber is the *Lecythis grandiflora*, Aubl., and is plentiful. The wood is used for furniture, staves, &c. The specimens sent are from a tree supposed to be about 25 years old.
40. Wamara, or brown ebony. [88, 88a.] Shows a diameter of 12 inches. In bark. A remarkably fine close-grained, hard, heavy wood. Heart-wood of a beautiful deep Vandyke brown; recent layers broad (3 inches), dirty yellow. From the river Demerara. This wood is hard and cross-grained, consequently not apt to split; it would therefore answer various purposes in naval architecture. It may be had from 6 to 12 inches square, and from 40 to 60 feet long. The Indians make war-clubs of it. The specimens sent are from a tree supposed to be about 20 years old.
41. Wallaba (*Eperua falcata*, Aubl.) [90, 90a.] Shows a diameter of 9 inches. In bark. Wood hard and heavy, though rather open-grained. Duramen bright red brown; recent layers narrow, pale reddish-yellow. From the river Essequibo. This wood is produced from a tree very abundant throughout the colony. It is hard, splits freely, and is very durable from being impregnated with a resinous oil. It is used for house-frames, palings, shingles, staves, &c. It has been ascertained that a roof well shingled with this wood will last upwards of 40 years. It may be had from 15 to 20 inches square, from 30 to 40 feet long.
42. Warracoeri, or white cedar (*Icica altissima*, Aubl.) [105, 105a, 105b, 105c.] Shows a diameter of 7 inches. In bark. An open-grained, soft, light, white wood; from river Demerara, and from river Mahaica, east sea coast, Demerara. This wood is obtained from *Icica altissima*, Aubl. It is light, easily worked, and very aromatic. Sir Robert Schomburgk states that one of his canoes, 42 feet long, and 5½ feet wide, was made from a tree of this species. It is used for oars and paddles, and for boards for inside work of houses. During the American war it was used for staves of sugar hogsheads.

43. Yaruri, or paddle-wood (*Aspidosperma excelsum*, Benth.) [97, 97a, 97b]. In bark. A very hard, close-grained, light wood, of eccentric growth; from the river Demerara. This wood is obtained from *Aspidosperma excelsum*, Benth. The whole tree, from 5 to 6 feet in diameter, and to the first branches, about 50 feet in height, has the appearance of being fluted, or as if it consisted of a fasciculus of numerous slender trees. The fluted projections of the trunk are used by the Indians for the construction of their paddles. The wood is light, elastic, and very strong, and preferred to any other for cotton gin-rollers.
44. Yarri-yarri, or Lance-wood (*Duguetia quitarensis*, Lindl.) [113, 113a]. Specimen affording no clue to diameter. A light, yet fine, close-grained, and tolerably hard wood; from the river Demerara. This tree is stated by Schomburgk to be *Duguetia quitarensis*, Lindl., a slender tree found in tolerable abundance in the interior of the colony. The wood possesses much toughness and elasticity, and is used for gig shafts, and when small, for whip handles and fishing rods. The Indians make their arrow points of it. It grows from 4 to 6 inches diameter at the lower end, and from 15 to 20 feet long.

A table made of the ornamental woods of Guiana, and containing 82 different woods, is also exhibited; the specimens being of course small, and covered with varnish, it is not possible to identify more than a very few of them; the following is a list of them, and contains a large number not mentioned in the preceding list of larger specimens.

- |                       |                                     |                         |
|-----------------------|-------------------------------------|-------------------------|
| 1. Armiosi.           | 29. Hooboballi.                     | 56. Pritti.             |
| 2. Assepoca.          | 30. Hyawaballi.                     | 57. Red cedar.          |
| 3. Akaraki.           | 31. Hiaballi.                       | 58. Rosewood.           |
| 4. Arawica.           | 32. Hya hya.                        | 59. Sand Mora.          |
| 5. Acouri broot.      | 33. Hackia.                         | 60. Saouri.             |
| 6. Brown silverballi. | 34. Itikiribouraballi.              | 61. Simaruba.           |
| 7. Bannia.            | 35. Kretti, or bastard silverballi. | 62. Suradanni.          |
| 8. Bartavalli.        | 36. Kurara.                         | 63. Saka.               |
| 9. Bangro, or ebony.  | 37. Kakaralli.                      | 64. Siri dani.          |
| 10. Bully tree.       | 38. Kartaballi.                     | 65. Silberdani.         |
| 11. Crab wood.        | 39. Kamacusack.                     | 66. Turiballi.          |
| 12. Contaballi.       | 40. Keria.                          | 67. Tatabo.             |
| 13. Caraharri.        | 41. Kamakasa.                       | 68. Tabiecushi.         |
| 14. Ceffre.           | 42. Kucahara.                       | 69. Towraneroo.         |
| 15. Canuballi.        | 43. Kimaasamasa.                    | 70. White cedar.        |
| 16. Cabacalli.        | 44. Kurahara.                       | 71. Waiki.              |
| 17. Curbacalli.       | 45. Kuracurara.                     | 72. Wamara.             |
| 18. Calabash.         | 46. Kopassa.                        | 73. Wadaduri.           |
| 19. Cabbage tree.     | 47. Lana.                           | 74. Wild orange.        |
| 20. Canella.          | 48. Locust.                         | 75. Washiba.            |
| 21. Ducalaballi.      | 49. Logwood.                        | 76. Wara couri.         |
| 22. Determa.          | 50. Letter wood.                    | 77. Wallaba.            |
| 23. Ducalli.          | 51. Light silverballi.              | 78. Waremia.            |
| 24. Gomarrow.         | 52. Masaranuni.                     | 79. Yellow silverballi. |
| 25. Guava.            | 53. Murwaana.                       | 80. Youra balli.        |
| 26. Greenheart.       | 54. Mora.                           | 81. Yerara.             |
| 27. Huwassi.          | 55. Purpleheart.                    | 82. Yarri yarri.        |



A fine series of the woods of Bahama is included in the collection of raw produce from that colony. The specimens contributed by Messrs. Baines were deemed worthy of Honourable Mention.

## WOODS OF BAHAMA.

1. Cedar - - - - Is used principally in house-building, for door and window frames, piazza posts, sills, girders, &c. It grows on several of the Bahama Islands ; but is found in greatest abundance on Andros Island ; and its size, when full-grown, is from 16 to 20 feet in length, and 1 foot in diameter ; it is generally cut 10 to 16 feet in length, and from 5 to 8 inches square : the branches are used for boats' timbers. This is one of the most durable of the Bahamian woods. A soft, fine, close-grained, rather light wood, possessing the pink hue, and emitting the fragrant odour of the common pencil cedar.
2. Cedar - - - - This wood is used principally for picture frames, and other ornamented articles of cabinet-work ; there is no difference between it and No 1, except its curled and shaded appearance, which is said to be obtained by its growth in a very rocky soil.
3. Horseflesh mahogany Is principally used in house-building, the branches and crooked trees for ships' timbers ; it is a very durable wood, and grows on several of the Bahama Islands, but is found of large size, and in greater quantities at Andros Island, where it grows to about 20 feet in length, and 2 feet in diameter ; it is, however, seldom brought out of the woods of that size, for the want of proper means of conveyance. A hard, fine-grained wood, heavy, and exhibiting numerous open cells.
4. Dogwood - - - The principal uses made of this wood are for felloes of wheels, and ships' timbers ; from its toughness and other properties, it is better adapted to the former purpose than any other of the Bahamian woods. The tree does not attain any considerable size, and is generally crooked. A rather soft, open-grained, light, but evidently very tough, wood.
5. Stopper-wood - - Used principally for piles to wharfs, and for wheel spokes ; it is a very strong and durable wood ; it grows from 12 to 16 feet long, and from 6 to 8 inches in diameter ; it is found on all the Bahamian islands. An exceedingly hard, fine, close-grained, very heavy wood.
6. Lignum-vitæ - - This wood grows on several of the Bahama Islands, and is generally exported to Europe and America, where it is used for sheaves to blocks, &c. The principal use made of it in the Bahamas is for hinges and fastenings for houses situated by the sea-shore, or in the vicinity of salt ponds on the out islands, where, from the quick corrosion of iron, hinges, &c., of that metal, are seldom used.
7. Bahama satin-wood - This wood, commonly called yellow wood, grows abundantly on Andros Island, and others of the Bahamian group : it grows to a large size. A hard, fine, close-grained wood, showing on its polished surface a beautifully rippled pattern.
8. Bahama satin-wood - Specimen of a deeper colour, showing a pretty mottled pattern.
9. Bahama mahogany - This wood, commonly called "Madeira," grows abundantly on Andros Island, and others of the Bahamas group, is not exceeded in durability by any of the Bahama woods, it grows of a large size, but is generally cut of small dimensions, for the want of proper roads, and other means of conveyance ; it is principally used for bedsteads, &c., and the crooked trees and

branches for ships' timbers. A hard, fine, and rather close-grained, moderately heavy wood of a fine rich colour equal to that of Spanish mahogany, although probably too hard to be well adapted for the purposes to which this latter is usually applied.

10. Crab-wood - - Mostly used for picture-frames, walking-sticks, and small ornamented cabinet-work, it seldom grows larger than from 3 to 4 inches in diameter. A rather hard, fine, close-grained, moderately heavy wood; heart-wood of a beautiful veined Vandyke brown, its external edge bright black; alburnum of a pure white.

A small collection of the woods of South America is exhibited by — DEACON. The specimens are very small, and amount to 39 in number; they include the calabash, ramwood, ebony, mahogany, sanden, green-heart, box, fustic, rosewood, Brazilletto, and various palms, &c.

#### WOODS OF TRINIDAD.

Some very beautiful specimens of ornamental and other woods are shown in the excellent collection of the raw produce of Trinidad, contributed by His Excellency Lord HARRIS, the Governor (see p. 170). They are as follows:—

1. *Achras balata*, L. (balata or valata). A timber extensively used and much esteemed; diameter from 2 to 6 feet.
2. *Achras* (zapotilla or zapodilla).
3. *Achras*, sp. (acoma or mastic). A timber held in high estimation, as indeed are all the woods derived from the present family of trees. It varies in diameter from 2 to 4 feet.
4. *Acrocomia sclerocarpa* (gru gru). Yields beautiful veneers. A palm.
5. *Astrocaryum aculeatum* (gri gri). Also appertaining to the order Palmæ, and affording excellent veneers for ornamental purposes.
6. *Brosimum guianense* (letter-wood). The tree which yields this beautiful wood never attains a large size; its recent layers are of an uniform yellowish-white colour. The heart-wood only is used.
7. *Bucida Buceras* (olivia). A coarse-grained, strong wood; principally employed for making shingles; its diameter ranges from 2 to 4 feet.
8. *Carapa guianensis* (carapa). Bears a considerable resemblance to cedar, and is extensively used and much esteemed; diameter from 2 to 3 feet.
9. *Cedrela odorata* (West India cedar). A very useful and ornamental timber, from 3 to 12 feet in diameter.
10. *Cocos nucifera* (cocoa-nut). The cocoa-nut palm.
11. *Copaifera officinalis* (copai). A beautiful and durable wood.
12. *Cordia*, sp. (sepe) - - A light wood, resembling English elm, impregnated with a bitter principle, which preserves it from the attack of insects, and much valued; diameter from 1 to 2 feet.
13. *Crescentia Cujete* (calabash). A very strong, tough wood, used in boat-building, and for various other purposes, where these qualities are required: is very abundant, and ranges in diameter from 1 to 2 feet.
14. *Dalbergia*, sp. (roble).
15. *Geoffroya inermis* (l'angeline). A strong, hard wood, extensively used for naves of wheels, &c.
16. Grey mangrove.

- |   |  |
|---|--|
| 17. Guaiacum officinale (guaiacum),             | Bois lizard.   |
| 18. Hæmatoxylon campechianum (log-wood).        |  |
| 19. Hymenæa courbaril (courbaril).              | West India locust ; an abundant and valuable timber ; diameter 2 to 6 feet.  |
| 20. Lecythis Idatimon (agua-tagaro).            |  |
| 21. Mimosa juliflora (yoke savan).              | A very hard and useful wood.   |
| 22. Morus tinctoria (fustic, or bois d'orange). |  |
| 23. Paltivia - - - -                            |  |
| 24. Purple-heart - - - -                        | An abundant and useful timber, 2 to 4 feet in diameter.  |
| 25. Rhopala montana (agua-tapana).              | A very durable and curious wood, susceptible of a fine polish, 18 inches to 3 feet in diameter.  |
| 26. Sideroxylon sp. ? (iron-wood, or bois gri). |  |
| 27. Swietenia mahogani (mahogany).              |  |
| 28. Tapana - - - -                              | Esteemed for felloes of wheels, and for other purposes where strength and toughness are required.  |
| 29. Tecoma poui (green poui)                    | These trees, belonging to the natural order Bignoniaceæ, furnish the hardest and most durable of woods ; their timber takes a fine polish, and has a peculiar colour ; they furnish the favourite timbers of the colony, are very abundant, and of large size, 3 to 4 feet diameter, and proportionably lofty. |
| 30. Tecoma serratifolia (grey poui).            |  |
| 31. Tecoma sp. (black poui)-                    |  |
| 32. Yoke - - - -                                | A handsome wood, resembling mahogany, usually 2 to 3 feet diameter.  |

A very fine large specimen of cedrela wood, or West Indian cedar (*Cedrela odorata*), from Trinidad, is exhibited by T. Y. C. BURNETT ; this was deemed worthy of Honourable Mention.

The collection of Australian and Van Diemen's Land woods is extensive and very interesting, many of the woods being new, and some of them of remarkable beauty.

Amongst the specimens from New South Wales, must be mentioned the samples of Briggalo, or Bricklow, probably a variety of *Acacia*, exhibited by J. G. BIDWELL (1); and two small collections, contributed by Messrs. DAY (2), and by W. FRANCIS ; the latter being intended as samples of woods suitable for railway sleepers, and similar engineering purposes. Messrs. Day's series consists of—

- |                          |                   |
|--------------------------|-------------------|
| 1. Black butt.           | 5. Colonial ash.  |
| 2. Box.                  | 6. Iron bark.     |
| 3. Beef-oak (casuarina). | 7. Myrtle, white. |
| 4. Cedar.                | 8. Sycamore.      |

Mr. W. FRANCIS's collection, and that of Messrs. DAY, were deemed worthy of Honourable Mention. Mr. Francis' collection contains—

- |                                 |                                    |
|---------------------------------|------------------------------------|
| 1. Australian box.              | 7. Flooded gum (eucalyptus, sp.)   |
| 2. " turf-wood.                 | 8. Iron bark, grey.                |
| 3. " mahogany (Eucalyptus, sp.) | 9. Iron bark, red.                 |
| 4. Blue gum.                    | 10. Swamp oak (Casuarina, sp.)     |
| 5. Black butt.                  | 11. Stringy bark (Eucalyptus, sp.) |
| 6. Forest-oak (Casuarina, sp.)  |                                    |

In the interesting and valuable collection of the COLONIZATION ASSURANCE COMPANY, already alluded to (see p. 170), are some fine specimens of the woods of the country, including some remarkable pieces of Eucalyptus wood. It is however stated, that owing to the period of the year when they were collected, the short time which could be devoted to their preparation, and the want of proper saws, &c., the specimens sent are not to be considered as fairly representing the woods of this part of the country. The woods sent are—

WOODS OF WESTERN AUSTRALIA.

1. Banksia, sp. - - - Abundant throughout the colony ; a very ornamental wood ; the specimen sent is from Guildford.
2. Cypress - - - Abundant on Garden Island, Rottnest, and also in some places on the mainland.
3. Jam-wood - - - A species of Acacia, commonly called raspberry-jam wood, in consequence of its peculiar odour, resembling raspberries. It grows abundantly throughout the settled districts ; it is well adapted for turning, and as it takes a very high polish, is suitable for all sorts of cabinet-work.
4. Jarrah (Eucalyptus, sp.) This excellent wood, considered to be admirably adapted for ship-building, and indeed for all other purposes, as it withstands the attacks of the white ant, and the teredo, &c., can be obtained in any quantity ; it may be had in planks, 8 feet wide. The plank exhibited was cut by W. P. Clifton, and is more than 4 feet wide.
5. Morrell (Eucalyptus, sp.) Said to be a most excellent wood, both for cabinet-work and for trenails. It is abundant in some parts, about 60 miles from the sea-shore ; grows to a great height, and attains a diameter of more than 3 feet. For the manufacture of spokes, and other wheelwright's work, it is excellent.
6. Red ebony (?) - - - Said to be very abundant at Sharks' Bay, and along the sea-coast ; this wood is very different from the red ebony exhibited from Port Natal.
7. Red gum (Eucalyptus resinifera). The tree is very abundant throughout the colony, and the wood is admirably adapted for wheelwright's work.
8. Salmon bark (Eucalyptus, sp.) A good durable wood, much used for farming implements. It is tolerably abundant in York district, and grows to a considerable size.
9. Sandal-wood - - - Abundant in the settled districts beyond the Darling range, at a distance of about fifty miles from the sea-coast. It has lately been discovered, of a very superior quality, on the coast at Sharks' Bay.
10. Satin-wood - - - Occurs in the island of Rottnest.
11. Shea oak (Casuarina) - Very abundant.
12. Tuart (Eucalyptus, sp.) - A noble timber ; tolerably abundant on the coast, and said to be well adapted for ship-building and general purposes. The plank exhibited is more than 3 feet wide, and is contributed by W. P. Clifton, of Bunbury. Planks, some 10 feet wide, may be obtained.
13. York gum (Eucalyptus, sp.) Excrescences formed on the stem of this and also of some other Eucalypti, similar to the Kaya boku of the Lingoa wood, and like it, well adapted for fancy cabinet-work. It is stated that the exhibitors had hoped to have procured and sent a plank of the Blue gum (Eucalyptus globulus) from the Deep river, 14 feet in width, but were unable to do so, for want of saws of sufficient size.

A very remarkable and interesting collection of the woods of Van Diemen's Land is formed by the contributions of His Excellency Sir W. T. DENISON, Messrs. FOWLER, WHITESIDES, MCNAUGHTEN, HADDEN, BROWNRIGG, and HOOD. To each of these the Jury severally awarded a Prize Medal; the specimens shown are as follows:—

BROWNRIGG (107).—Musk-wood.

Sir W. T. DENISON.—Blue gum, stringy bark, black wood, sassafras, myrtle, musk-wood, cedar, celery pine, rose-wood, dog-wood, Norfolk Island pine, white oak, iron-wood, and maple.

FOWLER (82 to 89), of Maria Island.—Dog-wood, musk-wood, he-oak, and Tasmanian iron-wood.

Capt. W. C. HADDEN (103).—Musk-wood.

R. V. HOOD (111 to 120).—Silver wattle, musk-wood, black-wood, Huon pine, and myrtle.

MCNAUGHTEN, of Hobart Town.—Musk-wood.

J. MILLIGAN.—Richea-wood, pink-wood, and Oyster-bay pine.

WHITESIDES (91 to 93), of Hobart Town.—Black-wood, myrtle-wood, and musk-wood.

A remarkably large section of iron-wood is exhibited by EUSTON and MILLIGAN (105); specimens of the Tolosa tree, honeysuckle, and she-oak, by H. HULL (208); of oak, myrtle, cherry, and honeysuckle, by the Rev. E. FREEMAN, of Brown's River (210); of blue gum and maple, by — QUINN, of Hobart Town (94); and of Norfolk Island pine, by Lieut. AKERS, R.E. Each of these was deemed worthy of Honourable Mention.

These various woods are arranged in the following Table. One of the most remarkable of the specimens shown is the blue gum exhibited by Sir W. DENISON; it consists of two pieces, one a section of the tree just above the surface of the ground, and about 6 feet in diameter; the second a section of the same tree, 134 feet from the preceding one, and which measures about 2½ feet across.

#### WOODS OF VAN DIEMEN'S LAND.

- |  |   |
|--|---|
| 1. Black-wood ( <i>Acacia melanoxylon</i> ). | A very hard, close-grained, dark, and richly-veined wood; it is well adapted for cabinet-work of all sorts, and may be had in any quantity, and of large size. The beauty of this fine wood is admirably shown in some of the articles of furniture exhibited, in which its dark hue is well contrasted with the equally beautiful light wood of the Huon pine.   |
| 2. Blue gum ( <i>Eucalyptus globulus</i> ).  | An enormous tree; it is said to be equal to oak for ship-building, and may be obtained in beams of any dimension, up to 200 feet in length. It appears somewhat premature to speak very decidedly of the value of this comparatively new wood; but, from the practical results already obtained, it certainly promises to be a most important material for the ship-builder. A blue gum-tree near Tobosa, on the northern aspect of Mount Wellington range, measured upwards of 30 feet in diameter at the base; and this is by no means unusually large for the trees of this species. According to the Rev. Mr. Ewing, a swamp gum-tree has been measured 102 feet in circumference, at 3 feet from the ground. |

3. Cedar, or Pencil pine (Arthrotaxis selaginoides ?) It grows in the mountain ravines and gorges, and in the high table land about 34,000 feet above the level of the sea.
4. Celery pine (Phyllocladus aspleniifolia). A handsome tree, which grows in the cold and moist parts of Van Diemen's Land, and attains a height of 150 feet. The wood is close-grained, and beautifully white; it is well adapted for household purposes.
5. Cherry (Exocarpus cupressiformis). A small graceful tree with lively green foliage; thinly scattered on the eastern side of the colony. It is useful as a cabinet wood, and forms good ornamental veneers.
6. Dog-wood (Bedfordia, sp.) This tree attains to considerable size in Maria Island; the wood is exceedingly richly and beautifully marked, and it is consequently an excellent cabinet wood, well adapted for all sorts of ornamental work.
7. Honeysuckle (Banksia australis). A low shrubby tree; the wood is handsome, and useful for cabinet-work, and for veneering. The bark is employed in tanning.
8. Huon Pine (Dacrydium Franklinii). A most remarkably beautiful light-coloured wood, singularly marked with dark spots, especially towards the lower part of the stem: admirable for ornamental furniture.
9. He-oak (Casuarina stricta). A low tree, of no great beauty or value, which grows upon the open grounds.
10. Iron-wood (Notilia ligustrina). A tree which rarely attains a greater diameter than 12 to 14 inches; the specimen exhibited, however, is nearly 2 feet. The wood is very hard and dense, and has been consequently made into sheaves for ships' blocks.
11. Iron-wood of Norfolk Island (Olea apetala). Said to be the most durable of all the Norfolk Island woods.
12. Maple of Norfolk Island.
13. Musk-wood (Eurybia argophylla). A comparatively small tree, which grows only in dense forests, and close damp situations. The wood is close-grained, very beautifully marked, especially at the lower part of the butt, and takes a fine polish. It is most admirably adapted for veneering and other cabinet-work.
14. Myrtle (Fagus Cunninghamii). This tree forms dense forests in parts which extend for many miles; the tree sometimes attains a girth of 30, or even 40 feet, and a proportionate height. The wood is hard, very close-grained, and has a fresh pink or red colour. The lower part of the stem is often very beautifully veined, rendering it excellent for cabinet-work; it takes a beautiful polish.
15. Pine, Oyster-bay (Callitris australis). Grows only on the eastern coast. The wood is used for internal fittings in houses, and for agricultural implements.
16. Pine, Norfolk Island (Araucaria excelsa). Very transparent in thin pieces; a good wood for turning.
17. Pink-wood (Carpodontos lucida.) Grows chiefly on the western side of the island, in the dense myrtle forests. It attains a height of 100 to 150 feet, with a clear straight stem. The wood is fine-grained, and very hard; it has been used for the sheaves of ship blocks.
18. Richea-wood (Richea pandanifolia). Grows only in the dense moist forests, on the western side of the island; attains a height of 30 or 40 feet, and a diameter of 10 inches.
19. Rose-wood, or Zebra-wood (Acacia, sp.) Said to be plentiful in Lake country, and about Marlborough.
20. Sassafras-wood (Atherosperma moschatum). A moderate-sized tree; very abundant. The wood is soft, even, and close-grained; well adapted for internal building, flooring-boards, cabin-fittings, &c.; it turns well.

21. She-oak, or Beef-wood (Casuarina quadrivalvis). A hard and beautifully-marked cabinet-wood; it takes a high polish.
22. Silver wattle (Acacia dealbata).
23. Stringy-bark (Eucalyptus robusta). An enormous tree; very abundant. A stringy-bark tree, near the Cam river, on the north-west coast, measures 200 feet to the first limb, and has been calculated to contain in the trunk alone 225 tons of timber. The wood is rather coarser than that of the blue-gum, and is chiefly used for house and ship-building, and for fencing; it is especially esteemed for tre-nails.
24. White-wood (Pittosporum bicolor). Seldom acquires a greater diameter than a foot. The wood has a remarkably close even grain, and might therefore, perhaps, be employed by wood engravers. It is used by the natives for their "waddies," or war-clubs.
25. White oak of Norfolk Island (Hibiscus Patersonii).

A valuable little collection of the woods of New Zealand is contributed by TAO NUI, a native chief (44). For these the Jury awarded a Prize Medal.

Two small collections of the woods of New Zealand are exhibited by J. JOHNSON (21), and by W. FOX. These were deemed worthy of Honourable Mention.

The collection of American woods is by no means numerous, it consists of two separate series, and a few isolated specimens; the one, that contributed by R. J. PELL, of New York (115), consists of 167 specimens; unfortunately however, many of these are cut from small branches or young trees, and do not therefore well show the characters of the wood; it was, nevertheless, deemed worthy of Honourable Mention.

#### WOODS OF AMERICA.

- |                              |   |   |   |   |                     |
|------------------------------|---|---|---|---|---------------------|
| 1. Acer striatum             | - | - | - | - | Moose wood.         |
| 2. Acer                      | - | - | - | - | Bird's-eye maple.   |
| 3. Abies canadensis          | - | - | - | - | Hemlock spruce.     |
| 4. Acer eriocarpum           | - | - | - | - | White maple.        |
| 5. Acer saccharinum          | - | - | - | - | Sugar maple.        |
| 6. Boxwood.                  |   |   |   |   |                     |
| 7. Blue dogwood.             |   |   |   |   |                     |
| 8. Betula populifolia        | - | - | - | - | White birch.        |
| 9. Cupressus juniperus       | - | - | - | - | Cypress cedar.      |
| 10. Castanea vesca           | - | - | - | - | American chesnut.   |
| 11. Cerasus virginiana       | - | - | - | - | Wild cherry.        |
| 12. Carya tomentosa          | - | - | - | - | Common hickory.     |
| 13. Diospyros                | - | - | - | - | Persimon.           |
| 14. Tagus ferruginea         | - | - | - | - | Red beech.          |
| 15. Gleditsia triacanthus    | - | - | - | - | Sweet locust.       |
| 16. Horseflesh-wood.         |   |   |   |   |                     |
| 17. Ilex opaca               | - | - | - | - | Holly.              |
| 18. Juniperus Sabina         | - | - | - | - | Cedar.              |
| 19. Juglans nigra            | - | - | - | - | Black walnut.       |
| 20. Juglans squamosa         | - | - | - | - | Shell-bark hickory. |
| 21. Juniperus virginiana     | - | - | - | - | Red cedar.          |
| 22. Laurus sassafras         | - | - | - | - | Sassafras.          |
| 23. Liquidambar styracifluar | - | - | - | - | Gum tree.           |
| 24. Liriodendron tulipifera  | - | - | - | - | Tulip tree.         |

25. <i>Ornus rotundifolia</i>	-	-	-	Manna ash.
26. <i>Pinus mitis</i>	-	-	-	Yellow pine.
27. <i>Pinus Strobus.</i>				
28. <i>Pinus rubra</i>	-	-	-	Red pine.
29. <i>Platanus occidentalis</i>	-	-	-	Plane tree.
30. <i>Quercus palustris</i>	-	-	-	Pine oak.
31. <i>Quercus alba</i>	-	-	-	White oak.
32. <i>Quercus Prinos monticola</i>	-	-	-	Rock chesnut oak.
33. <i>Quercus Prinos acuminata</i>	-	-	-	Yellow oak.
34. <i>Quercus virens</i>	-	-	-	Live oak.
35. <i>Swietenia</i>	-	-	-	
36. <i>Thuia occidentalis</i>	-	-	-	White cedar.
37. <i>Tilia americana</i>	-	-	-	Bass wood.
38. <i>Ulmus rubra</i>	-	-	-	Red elm.

## SPECIMENS IN BARK.

1. <i>Ailanthus.</i>				
2. <i>Acer saccharinum</i>	-	-	-	Sugar maple.
3. <i>Acer rubrum</i>	-	-	-	Scarlet maple.
4. <i>Alnus serrulata</i>	-	-	-	Common alder.
5. <i>Acer Negundo</i>	-	-	-	Box elder.
6. <i>Amygdalus Persica</i>	-	-	-	Peach.
7. <i>Acer grandidentatum</i>	-	-	-	Mountain maple.
8. <i>Acer rubrum</i>	-	-	-	Scarlet maple.
9. <i>Æsculus rubicunda</i>	-	-	-	Red flowering chesnut.
10. <i>Alnus serrulata</i>	-	-	-	Hazel-leaved alder.
11. <i>Abies</i>	-	-	-	Hemlock.
12. <i>Acer eriocarpum</i>	-	-	-	White maple.
13. <i>Alnus glauca</i>	-	-	-	Black alder.
14. <i>Abies nigra</i>	-	-	-	Black spruce.
15. <i>Acacia.</i>				
16. <i>Betula lenta</i>	-	-	-	Black birch.
17. <i>Betula papyracea</i>	-	-	-	Canoe birch.
18. <i>Betula rubra</i>	-	-	-	Red birch.
19. <i>Betula populifolia</i>	-	-	-	White birch.
20. Blue dogwood.				
21. <i>Carya microcarpa</i>	-	-	-	Nutmeg hickory.
22. <i>Castanea vesca</i>	-	-	-	American chesnut.
23. <i>Cerasus virginiana</i>	-	-	-	Wild cherry.
24. <i>Cornus alba</i>	-	-	-	White dogwood.
25. <i>Carya pecan</i>	-	-	-	Pecan-nut hickory.
26. <i>Carya porcina</i>	-	-	-	Bitter-nut hickory.
27. <i>Carpinus</i>	-	-	-	Hornbeam.
28. <i>Castanea alnifolia-</i>	-	-	-	Dwarf chesnut.
29. <i>Corylus avellana</i>	-	-	-	Hazle.
30. <i>Carya pecan</i>	-	-	-	Pecan-nut hickory.
31. <i>Cratægus coccinea</i>	-	-	-	Scarlet thorn.
32. <i>Castanea alnifolia</i>	-	-	-	Red flowering chesnut.
33. <i>Cratægus populifolia</i>	-	-	-	Washington thorn.
34. <i>Carya microcarpa</i>	-	-	-	Small-fruited hickory.
35. <i>Carpinus Ostrya</i>	-	-	-	Iron wood.
36. <i>Carya porcina</i>	-	-	-	Pig-nut hickory.
37. <i>Cytisus</i>	-	-	-	Laburnum.
38. <i>Cerasus borealis</i>	-	-	-	Red cherry.
39. <i>Carya amara</i>	-	-	-	Butter-nut hickory.
40. <i>Carpinus</i>	-	-	-	Hornbeam.



41.	<i>Celtis crassifolia</i>	-	-	-	-	Hackberry.
42.	<i>Cereis</i>	-	-	-	-	Judas tree.
43.	<i>Fraxinus</i>	-	-	-	-	White ash.
44.	<i>Fraxinus sambucifolia</i>	-	-	-	-	Black ash.
45.	<i>Fagus ferruginea</i>	-	-	-	-	Red beech.
46.	<i>Fraxinus</i>	-	-	-	-	Common ash.
47.	<i>Fagus sylvestris</i>	-	-	-	-	White beech.
48.	<i>Fraxinus viridis</i>	-	-	-	-	Green ash.
49.	<i>Fraxinus acuminata</i>	-	-	-	-	Witch elm.
50.	<i>Fraxinus</i>	-	-	-	-	White ash.
51.	<i>Hibiscus syriacus</i>	-	-	-	-	<i>Althæa frutex.</i>
52.	<i>Imperialis.</i>					
53.	<i>Juniperus occidentalis</i>	-	-	-	-	Juniper.
54.	<i>Juniperus rubra</i>	-	-	-	-	Red cedar.
55.	<i>Juglans castanea</i>	-	-	-	-	Butter nut.
56.	<i>Juglans nigra</i>	-	-	-	-	Black walnut.
57.	<i>Laurus benzoin</i>	-	-	-	-	Spice-wood.
58.	<i>Laurus sassafras</i>	-	-	-	-	Sassafras.
59.	Lady apple.					
60.	<i>Larix americana</i>	-	-	-	-	Black larch.
61.	<i>Larix rubra</i>	-	-	-	-	Red larch.
62.	<i>Liquidambar styraciflua</i>	-	-	-	-	Gum tree.
63.	<i>Liriodendron tulipifera</i>	-	-	-	-	Tulip tree.
64.	<i>Morus alba</i>	-	-	-	-	White mulberry.
65.	<i>Morus nigra</i>	-	-	-	-	Black mulberry.
66.	<i>Morus rubra</i>	-	-	-	-	Red mulberry.
67.	<i>Morus</i>	-	-	-	-	Mulberry.
68.	<i>Maclura aurantiaca</i>	-	-	-	-	Osage orange.
69.	<i>Magnolia glauca.</i>					
70.	<i>Magnolia grandiflora.</i>					
71.	<i>Magnolia acuminata</i>	-	-	-	-	Cucumber magnolia
72.	<i>Malus</i>	-	-	-	-	Apple.
73.	<i>Nyssa biflora</i>	-	-	-	-	Pepperidge.
74.	<i>Nyssa capitata</i>	-	-	-	-	Sour tupelo.
75.	<i>Ornus rotundifolia</i>	-	-	-	-	Manna ash.
76.	<i>Punica granatum</i>	-	-	-	-	Pomegranate.
77.	<i>Populus argentea</i>	-	-	-	-	Cotton tree.
78.	<i>Populus tremuloides</i>	-	-	-	-	Aspen poplar.
79.	<i>Populus angulata</i>	-	-	-	-	Common poplar.
80.	<i>Populus alba</i>	-	-	-	-	White poplar.
81.	<i>Populus balsamifera</i>	-	-	-	-	Balsam poplar.
82.	<i>Platanus occidentalis</i>	-	-	-	-	Plane tree.
83.	Pearmain apple.					
84.	<i>Pinus mitis</i>	-	-	-	-	Yellow pine.
85.	<i>Pinus Strobus</i>	-	-	-	-	White pine.
86.	<i>Pinus ruspestris</i>	-	-	-	-	Grey pine.
87.	<i>Pinus australis</i>	-	-	-	-	Long-leaved pine.
88.	<i>Prunus americana</i>	-	-	-	-	Wild plum.
89.	<i>Prunus domestica</i>	-	-	-	-	Plum.
90.	<i>Prunus Armeniaca</i>	-	-	-	-	Apricot.
91.	<i>Prunus cerasus</i>	-	-	-	-	Cherry plum.
92.	<i>Pyrus vivulans</i>	-	-	-	-	Crab apple.
93.	<i>Pyrus communis</i>	-	-	-	-	Pear.
94.	<i>Pyrus Cydonia</i>	-	-	-	-	Quince.
95.	<i>Philadelphus syringa</i>	-	-	-	-	Lilac.
96.	<i>Quercus ferruginea</i>	-	-	-	-	Black oak.

97.	<i>Quercus Prinos monticola</i>	-	-	-	Rock-chesnut oak.
98.	<i>Quercus olivæformis</i>	-	-	-	Mossy-cup oak.
99.	<i>Quercus Phellos</i>	-	-	-	Willow oak.
100.	<i>Quercus Prinos acuminata</i>	-	-	-	Yellow oak.
101.	<i>Quercus Prinos discolor</i>	-	-	-	Swamp white oak.
102.	<i>Quercus palustris</i>	-	-	-	Pine oak.
103.	<i>Quercus rubra</i>	-	-	-	Red oak.
104.	<i>Quercus Phellos</i>	-	-	-	Willow oak.
105.	<i>Quercus ambigua</i>	-	-	-	Grey oak.
106.	<i>Quercus Banisteri</i>	-	-	-	Bean oak.
107.	<i>Quercus alba</i>	-	-	-	White oak.
108.	<i>Quercus heterophylla</i>	-	-	-	Bartram oak.
109.	<i>Rhus</i>	-	-	-	Sumach.
110.	<i>Rhamnus maritima</i>	-	-	-	Buckthorn.
111.	<i>Rhus rubra</i>	-	-	-	Red sumach.
112.	<i>Robinia Pseudacacia</i>	-	-	-	Yellow locust.
113.	<i>Salix alba</i>	-	-	-	White willow.
114.	<i>Salix lucida</i>	-	-	-	Shining willow.
115.	<i>Salix lutea</i>	-	-	-	Yellow willow.
116.	<i>Salix triandra</i>	-	-	-	Basket willow.
117.	<i>Salix nigra</i>	-	-	-	Black willow.
118.	<i>Sorbus Aucuparia</i>	-	-	-	Mountain ash.
119.	<i>Salix vitellina</i>	-	-	-	Common willow.
120.	Summer queen apple.				
121.	Silver abeille.				
122.	Spitzenburgh apple.				
123.	<i>Sambucus</i>	-	-	-	Elder.
124.	<i>Tilia alba</i>	-	-	-	White lime tree.
125.	<i>Thuia occidentalis</i>	-	-	-	White cedar.
126.	<i>Ulmus rubra</i>	-	-	-	Red elm.
127.	<i>Ulmus alba</i>	-	-	-	White elm.
128.	<i>Vitis vinifera</i>	-	-	-	Grape vine.
129.	<i>Viburnum</i> .				

The second collection, that exhibited by the Rev. Z. THOMPSON, of Burlington (241), consists of better-selected specimens of the woods of Vermont, and is accompanied by a good series of descriptive labels, reprinted from his own useful work on the "Natural History of Vermont," conveying a good deal of valuable local as well as scientific information: for this collection the Jury awarded a Prize Medal.

WOODS OF VERMONT.

1.	<i>Acer rubrum</i>	-	-	-	Red maple.
2.	<i>Acer saccharinum</i>	-	-	-	Sugar maple.
3.	<i>Betula excelsa</i>	-	-	-	Yellow birch.
4.	<i>Carya squamosa</i>	-	-	-	Shell-bark hickory.
5.	<i>Cerasus serotina</i>	-	-	-	Black cherry.
6.	<i>Fagus ferruginea</i>	-	-	-	Red beech.
7.	<i>Fraxinus acuminata</i>	-	-	-	White ash.
8.	„ <i>pubescens</i>	-	-	-	Red ash.
9.	„ <i>sambucifolia</i>	-	-	-	Black ash.
10.	<i>Juglans cinerea</i>	-	-	-	Butter-nut.
11.	<i>Juniperus virginiana</i>	-	-	-	Red cedar.
12.	<i>Ostrya virginica</i>	-	-	-	Iron-wood.
13.	<i>Pinus balsamea</i>	-	-	-	Silver or balsam fir.
14.	„ <i>canadensis</i>	-	-	-	Hemlock.

15.	<i>Pinus nigra</i>	-	-	-	-	Double spruce.
16.	„ <i>resinosa</i>	-	-	-	-	Norway pine.
17.	„ <i>Strobus</i>	-	-	-	-	White pine.
18.	<i>Platanus occidentalis</i>	-	-	-	-	Button-wood, or sycamore.
19.	<i>Robinia Pseudacacia</i>	-	-	-	-	Locust-wood.
20.	<i>Thuja occidentalis</i>	-	-	-	-	White cedar, or arbor vitæ.
21.	<i>Tilia americana</i>	-	-	-	-	Bass-wood, or lime-tree.
22.	<i>Ulmus americana</i>	-	-	-	-	White elm.
23.	„ <i>fulva</i>	-	-	-	-	Red or slippery elm.

A few good specimens of the chief woods of Maryland are also exhibited by the MARYLAND COMMITTEE, consisting of ash, beech, cedar, cherry, hickory, holly, locust, maple, mulberry, oak, pine, poplar, and walnut: these were deemed worthy of Honourable Mention. (See p. 170.)

Specimens of Palmetto cedar, live oak, and a few other woods are exhibited by E. B. BELL, of Charleston, South Carolina (176): these also were deemed worthy of Honourable Mention. It is hardly necessary to advert to the importance of the wood of the live oak, *Quercus virens*, its value as a ship timber being universally known and recognised.

#### WOODS OF AMERICA.

1.	<i>Acer eriocarpum</i>	-	-	-	-	White maple.
2.	„ <i>saccharinum</i>	-	-	-	-	Sugar maple.
3.	<i>Carya tomentosa</i>	-	-	-	-	Common hickory.
4.	<i>Diospyros</i> , sp.	-	-	-	-	Persimon.
5.	<i>Fagus ferruginea</i>	-	-	-	-	Red beech.
6.	<i>Gleditschia triacanthos</i>	-	-	-	-	Sweet locust.
7.	Horse-flesh					
8.	<i>Ilex opaca</i> .					
9.	<i>Juglans nigra</i>	-	-	-	-	Black walnut.
10.	<i>Juniperus Sabina</i>	-	-	-	-	Cedar.
11.	„ <i>virginiana</i>	-	-	-	-	Red cedar.
12.	<i>Pinus Strobus</i>	-	-	-	-	White pine.
13.	<i>Quercus alba</i>	-	-	-	-	„ oak.
14.	„ <i>Prinos acuminata</i>	-	-	-	-	Yellow oak.
15.	„ „ <i>monticola</i>	-	-	-	-	Rock chesnut oak.
16.	„ <i>virens</i>	-	-	-	-	Live oak.

A sample of sweet gum-wood is contributed by J. B. DE SAUSSURE, of Charleston (176A).

The only specimens of wood exhibited in the Austrian collection are a series of pine planks, *Abies taxifolia*, as prepared for the uses of musical instrument makers, chiefly for sounding-boards, shown by D. BIENERT and SON of Maderhäusen (143). The wood of this tree is remarkably homogeneous, and when fairly grown, is peculiarly free from knots, or irregularities of any kind; it possesses in an eminent degree those qualities which are essential for sounding-boards. A section of a tree more than 3 feet in diameter is shown, in which upwards of 470 concentric rings, or circles, can be counted; from this it is presumed that the tree must have been nearly five centuries old. These specimens were deemed worthy of Honourable Mention.

A numerous collection of the woods of China is exhibited by the Rev. Dr. PARKER. It is much to be regretted, that these specimens are so small as scarcely

to show the characters of the woods ; many of the specimens have no labels, and of those which have, a considerable number are evidently incorrectly named : the following is a list of the labels:—

## WOODS OF CHINA.

- |                      |                              |  |   |
|----------------------|------------------------------|--|---|
| 1. Canton rosewood.  |                              |  |   |
| 2. Chan muh - -      | Pine-wood.                   |  |   |
| 3. Chang muh - -     | Camphor-wood.                |  |   |
| 4. Chau muh          |                              |  |   |
| 5. Chung tu - -      | - -                          |  | An inferior kind of pine.                             |
| 6. Ebony             |                              |  |   |
| 7. Hwang jung muh -  | Yellow Dryandra.             |  |   |
| 8. „ muh - -         | Yellow-wood.                 |  |   |
| 9. Hwa Nien - -      | Averrhoa Carambola.          |  |   |
| 10. Isz King muh-    | Thorn-wood.                  |  |   |
| 11. Kan muh - -      | - -                          |  | Wood of the Coolie orange.                            |
| 12. Kau muh - -      | - -                          |  |   |
| 13. Kuin tien kuh -  | - -                          |  | A fine wood for cabinet-work.                         |
| 14. Kih now muh -    | - -                          |  |   |
| 15. Kung muh - -     | Tallow tree ?                |  |   |
| 16. Kwang lang - -   | Dryandra, sp. - -            |  | Used for rhills of sedans.                            |
| 17. Lew muh - -      | Willow.                      |  |   |
| 18. Lung yen muh -   | Dimocarpus jungyen.          |  |   |
| 19. Lan muh - -      | Canarium Pimela - -          |  | Wood of the Chinese olive.                            |
| 20. Ma me muh - -    | - -                          |  | A resinous pine.                                      |
| 21. Mango-tree wood. |                              |  |   |
| 22. Mei muh - -      | Apricot-wood.                |  |   |
| 23. Muh mien - -     | Bombax Ceiba - -             |  | Wood of the cotton-wood tree.                         |
| 24. Nan-chi muh-     | - -                          |  | A fine wood from Cochin China.                        |
| 25. Oil-wood.        |                              |  |   |
| 26. Pah muh - -      | Cedar ?                      |  |   |
| 27. Plum-wood - -    | - -                          |  | Used for cutting blocks for books<br>(rather coarse). |
| 28. Pride of India - | Melia Azaderachta.           |  |   |
| 29. Red-wood.        |                              |  |   |
| 30. Rose-wood - -    | - -                          |  | From Siam.  |
| 31. Sandal-wood.     |                              |  |   |
| 32. Sang muh - -     | Mulberry.                    |  |   |
| 33. Satin-wood.      |                              |  |   |
| 34. Shan cha - -     | Wild tea - -                 |  | A lofty tree.   |
| 35. „ che.           |                              |  |   |
| 36. „ muh - -        | Pride of India               |  |   |
| 37. Sha tea muh - -  | - -                          |  | A kind of willow.                                     |
| 38. Shui sha muh -   | - -                          |  | Used for coffins.                                     |
| 39. Siang iz muh-    | Maple.                       |  |   |
| 40. Sung muh - -     | Fir.                         |  |   |
| 41. Tan hiang muh -  | Sandal-wood.                 |  |   |
| 42. Tau kwa san -    | Peach flower. Pride of India |  | Called China mahogany, at Canton.                     |
| 43. Tsung muh - -    | Fir - -                      |  | Used for fuel and boxes.                              |
| 44. Tu muh - -       | Pine - -                     |  | Used for furniture.                                   |
| 45. Varnish-wood -   | Cannaium alba.               |  |   |
| 46. Woo tung - -     | Dryandra cordifolia - -      |  | Wood used for musical instruments.                    |
| 47. Wu tung muh -    | „ „                          |  |   |
| 48. Ying muh - -     | Knot-wood, or Amboyna-wood   |  |   |
| 49. Ying - -         | - -                          |  | Sapwood of a kind of beech.                           |
| 50. Yung muh - -     | - -                          |  | Wood of the bastard banian.                           |

Fine specimens of the chief woods of Egypt are shown in the collection of Egyptian raw produce; the specimens are very good, and their interest is still further increased by their being accompanied by some of the agricultural and other implements made from them. The woods shown are:—

- |                  |                                  |
|------------------|----------------------------------|
| 1. Acacia.       | 5. Doum palm. Cucifera Thebaica. |
| 2. Alizier wood. | 6. Ebony of Sennar.              |
| 3. Azaderak.     | 7. Sweet palm.                   |
| 4. Date.         | 8. Sycamore. Ficus sycamorus.    |

The Bois de Nabh, a hard dark-coloured wood, resembling ebony, appears likely to be useful. The acacia wood also seems to be a useful durable wood.

A highly-valuable collection of the woods of Algeria is shown in the Algerian department of the French collections (see p. 165). These specimens are remarkable for their beauty, and for the good and instructive manner in which they are exhibited. Some of them are rather small, but in all cases they are characteristic and well selected. Some of the woods are comparatively new to this country.

- |   |   |
|---|---|
| 1. Thuya-articulé, an evergreen tree.           | Thuja articulata, Desf. ? $6 \times 5 \times 2$ . Close grain, hard, heart-wood (duramen), bright chesnut coloured, resinous; recent layers (alburnum) cream-yellow. This wood is supposed by some to be the sandal-wood of the ancients. |
| 2. Pin pinier, an evergreen tree.               | Pinus Pinea, $6 \times 2\frac{1}{2} \times 1\frac{1}{2}$ . Specimen from a young tree, in bark; a resinous wood.  |
| 3. Grand cyprès d'Italie, an evergreen tree.    | Cupressus, sp. ? $6 \times 3\frac{1}{2} \times 2\frac{1}{2}$ ; in bark; a resinous wood.  |
| 4. Ricin, a deciduous tree.                     | Paliurus ? $6 \times 4 \times 2\frac{1}{2}$ ; an exceedingly soft, light, weak wood; in bark. (Palma Christi, or Christ's thorn).   |
| 5. Jujubier sative - -                          | Ziziphus, sp. $6 \times 5 \times 2$ . An exceedingly close, fine-grained wood, heavy; heart bright red chesnut, recent layers pale ochreous; in bark.   |
| 6. Aune, a deciduous tree.                      | Alnus, $6 \times 9 \times 2$ ; a light, though fine, and close-grained, soft weak wood, of an uniform reddish-yellow throughout; in bark.   |
| 7. Pin maritime, an evergreen tree.             | Pinus maritima ? $6 \times 8 \times 2$ , in bark; a resinous wood.  |
| 8. Saule fragile, a deciduous tree.             | Salix fragilis ? $6 \times 1\frac{1}{2} \times 1\frac{1}{2}$ , in bark; a soft and weak wood.   |
| 9. Génévrier Phénicien -                        | Juniperus Phœnicea ? $8 \times 5 \times 2$ . This specimen was cut from a portion of a tree having a diameter of about 9 inches only; in bark; from Zeralda.  |
| 10. Grand cyprès - -                            | Cupressus, sp., $9\frac{1}{2} \times 4 \times 2$ , from a tree 1 metre in diameter; from the environs of Bledah.  |
| 11. Sumac Therèza - -                           | Rhus, sp., $9\frac{1}{2} \times 4 \times 2$ . Wood heavy; its longitudinal section exhibits numerous open cells; in bark.   |
| 12. Jujubier des lotophages, a deciduous tree.  | Ziziphus, sp., $6 \times 1 \times 1$ ; in bark; a hard wood.  |
| 13. Phillyréa, a deciduous tree.                | Phillyrea, sp., $6 \times 5\frac{1}{2} \times 2$ ; a close-grained, hard, and heavy wood.   |
| 14. Lentisque commun -                          | Pistacia, sp., $8 \times 5 \times 2\frac{1}{2}$ ; a hard, heavy wood; from Mazafran.  |
| 15. Chêne-zeen - - -                            | ———— ? $8 \times 5\frac{1}{2} \times 2$ ; a tree, a metre in diameter, from Edough.   |
| 16. Grand bruyère arborescente, evergreen tree. | ———— ? $6\frac{1}{2} \times 2 \times 2$ . Wood fine, close-grained, hard. (Tree-like heath.)  |

17. Cédre, an evergreen tree. *Cupressus*, sp.,  $6 \times 6 \times 2$ ; in bark; resinous wood.
18. Figuier sauvage, bois tendre à feuilles caduques, a deciduous tree. *Ficus carica*,  $6 \times 6 \times 2$ ; a soft and weak wood.
19. Pistachier - térébinthe, a deciduous tree. *Pistacia terebinthus*,  $8 \times 6\frac{1}{2} \times 2$ . Wood close-grained, hard, heavy, and resinous.
20. Cytise - - - - *Cytisus*, sp.,  $9 \times 2\frac{1}{2} \times 1\frac{1}{2}$ . Wood fine and close-grained, hard, heavy; heart chesnut; recent layers narrowly white.
21. Tamaris, evergreen tree. *Tamarix*.  $6 \times 6\frac{1}{2} \times 2\frac{1}{2}$  in bark; a resinous wood.
22. Saule-marceau, deciduous tree. *Salix*, sp.,  $6 \times 6 \times 2$ ; a fine-grained, soft, and weak wood; light wood, in bark.
23. Térébinthe, ou le faux pistachier. ——— ? a large tree, 1.3 metre in diameter.
24. Caroubier - - - *Cereis siliquastrum*,  $8 \times 7 \times 1$ , in bark; a tree, 9 inches in diameter, from Monzaia.
25. Olivier sauvage - - *Olea*, sp.,  $6 \times 6 \times 2$ . in bark; a tree, 10 inches in diameter, from Monzaia.
26. Sorbier cormier, a deciduous tree. *Sorbus torminalis*,  $6 \times 6\frac{1}{2} \times 2\frac{1}{2}$ ; shows a diameter of about 11 inches; in bark; a hard wood.
27. Arbousier, an evergreen tree. *Arbutus*, sp.,  $6 \times 7 \times 2$ ; shows a diameter of about 12 inches; in bark; a hard wood.
28. Arbousier - - - *Arbutus*, sp.,  $13 \times 8\frac{1}{2} \times 1$ ; bark on both longitudinal edges; a tree, 10 inches in diameter, from Monzaia.
29. Cerisier sauvage, a deciduous tree. *Prunus*, sp.,  $6 \times 6 \times 2$ , in bark.
30. Erable Napolitain, a deciduous tree. *Acer*, sp.,  $6 \times 4 \times 2$ , in bark; shows a diameter of about 5 inches only; a hard wood.
31. Laurier-rose, a deciduous tree. *Nerium Oleander*,  $8 \times 3\frac{1}{2} \times 2$ ; fine and close grain, hard, though light; shows a diameter of about 6 inches; in bark.
32. Lierre, evergreen tree - *Hedera*, sp., showing diameter of about  $3\frac{1}{2}$  inches; a very light, soft, weak, open-grained wood.
33. Pin d'Alep, evergreen tree. *Pinus*, sp.,  $6 \times 5 \times 2\frac{1}{2}$ ; shows a diameter of about 8 inches; in bark; a resinous wood.
34. Myrthe, evergreen tree. *Myrtus*, sp.,  $6 \times 3 \times 2$ ; a fine, close, even-grained wood, hard and ponderous; in bark.
35. Prunehier sauvage, a deciduous tree. *Prunus*, sp.,  $6 \times 3 \times 1\frac{1}{2}$ ; a fine, close-grained, hard, and rather heavy wood; in bark.
37. Genévrier-à-feuilles de cèdre, an evergreen tree. *Juniperus*,  $6 \times 3\frac{1}{2} \times 2$ ; shows a diameter of about 4 inches. *Alburnum* pure white, *duramen* dark chesnut; in bark; a resinous wood.
38. Houx, an evergreen tree. *Ilex*, sp.  $6 \times 3 \times 2$ , in bark; shows a diameter of about 4 inches; a hard wood.
39. Laurier-sauce, an evergreen tree. *Laurus*, sp.  $6 \times 5 \times 2$ ; a light, soft, weak, open-grained wood; in bark.
40. Sumac des corroyeurs, an evergreen tree. ——— ?  $6 \times 2 \times 1\frac{1}{2}$ ; moderately hard, though light, weak, and open-grained; in bark.
41. Aubépine, a deciduous tree. *Cratægus*, sp.  $6 \times 6 \times 2$ ; a fine, close-grained, hard, and rather heavy wood; in bark.
42. Nerprun alaterne, an evergreen tree. *Rhamnus alaternus*,  $6 \times 5 \times 2$ . A hard, and heavy, though open-grained wood; *alburnum* fine citron-yellow; *duramen* dark red-brown; in bark; shows a diameter of about 6 inches.
43. Citronnier, an evergreen tree. *Citrus limonium*,  $6 \times 2\frac{1}{2} \times 1\frac{1}{2}$ ; shows a diameter of about  $3\frac{1}{2}$  inches; in bark; a hard wood.
44. Oranger, an evergreen tree. *Citrus aurantium*,  $6 \times 5 \times 2$ ; shows a diameter of about 10 inches; in bark; a hard wood.

45. Blanc d'Hollande, a deciduous tree. ———— ?  $6 \times 7 \times 2\frac{1}{2}$ ; a light, soft, weak, and open-grained wood; shows a diameter of about 11 inches; in bark.
46. Chêne à gland doux - Quercus, sp.
47. Chêne liège - - - Quercus suber.
48. Chêne vert - - - Quercus ilex.
49. Micocoulier - - - Celtis.
50. Frêne - - - Fraxinus.
51. Orme - - - Ulmus.
52. Mûrier blanc - - Morus alba.
53. Jujubier domestique - Ziziphus.

A numerous series of small specimens of the woods of the Upper Pyrenees, suitable for cabinet-work, is also exhibited (St. UBERY, 1495). They are valuable chiefly as showing the grain and character of the different woods, when polished and varnished, and as employed by cabinet-makers. The Jury awarded a Prize Medal for this collection.

Specimens of acacia wood, as employed for machinery, are exhibited by MOUSILLAC-AMAND of La Réole (933): these were deemed worthy of Honourable Mention.

Some very interesting specimens of preserved wood are shown by I. A. BOUCHERIE (1104), in illustration of his process of protecting timber from decay, dry-rot, and the attacks of insects.

The remarkable experiments of Dr. Boucherie, on the absorption of saline and other solutions by trees, are well known, and excited very general interest about ten years since. He has for a long time been engaged in an extended and minute series of experiments on wood, the object of which was to ascertain the substance best fitted to preserve timber from decay, and to discover the most economical mode of practically applying it on the large scale. The peculiar feature of Dr. Boucherie's original process, consisted in the mode in which he availed himself of the vital power of the tree; for following up the suggestions of Hales, Duhamel, and others, he arrived at the conclusion that it is far easier to impregnate wood with any solution, when the plant is still full of its own natural juices, and when freshly cut down, than it is when the vessels have begun to contract, and a considerable portion of the natural humidity of the wood has evaporated. In the first instance, indeed, he endeavoured to impregnate the wood of the tree whilst still in a growing state, causing it to suck up various solutions, by means of the absorbing power of the leaves themselves; a process which, however, for various practical reasons, he subsequently abandoned; and, at the present time he adopts a cheap, simple, and effective process for impregnating the felled timber with the preserving liquid, designated in France, "trait de scie, et la cuisse foulante." The trunk of the newly-felled tree is cut into a length suitable for two railway sleepers; it is then very nearly divided across, just in the centre, by means of a saw, so as to form a channel, or small reservoir, in the very centre of the log, by means of which the preserving liquid may pass, right and left, towards either end; the opening of the saw-cut is then carefully closed all round, and a small flexible tube being introduced into the upper part, serves to convey into the cut the preserving liquid, which, as it is laid on through the flexible tubes, under the pressure of a column of some feet in height, is rapidly disseminated throughout the entire substance of the wood. The preserving liquid which Dr. Boucherie employs,

and which from his numerous experiments he considers the best, is a solution of sulphate of copper. When he desires to increase the hardness of the wood, he uses a solution of pyrolignite of iron; and when his object is to render it flexible, elastic, and at the same time incombustible, he employs a solution of chloride of calcium. By the above-mentioned process, Dr. Boucherie has prepared many thousands of railway sleepers with sulphate of copper, some of which have been down on the Great Northern Railway of France for five years, and are at the present time perfectly sound; whilst similar ones, not prepared, which have been on the same line, are completely destroyed. The Jury, appreciating the very long and laborious series of experiments made by Dr. BOUCHERIE, and satisfied with the successful issue to which he has now brought them, awarded him a Prize Medal for the process.

Specimens of wood for sounding-boards of musical instruments are exhibited by J. HENSTEH, of Lindberg, near Linsel, in Bavaria (76): these were deemed worthy of Honourable Mention.

A collection of woods, extremely well-selected and arranged, is exhibited by Professor NÖRDLINGER, of Hohenheim, Stuttgard (11). These specimens are exceedingly well prepared, so as to show all the chief characters of each wood: though small, each sample is left in the bark, and good microscopic sections accompany each wood. As a small collection it is admirable, and the Jury accordingly awarded a Prize Medal for it.

A comparatively small number of Portuguese woods only are exhibited; and with one exception, none of them are of very great importance. The Marquis de LOULÉ (553 to 578) contributes a small collection of 24 specimens, consisting of pine, plum, filbert, wild olive, chesnut, wild pine, elm, mulberry, olive, beech, ash, cherry, cypress, carib-wood, cork-tree, holm, poplar, oak, plantain, white acacia, walnut, orange, box, and cratægus. For these the Jury awarded a Prize Medal.

Other specimens of the ordinary woods are contributed from the Royal Arsenal, and from the Ceira Forests, by A. P. F. VAZ and by the Marquis of FICALHO.

Three specimens of wood from Angola and Goa are shown, namely, Tacula-wood from Angola, and teak-wood and sico-wood from Goa. The former, exhibited by the GOVERNOR of ANGOLA, 1850 (590), is a very remarkably beautiful wood, one which may fairly be called one of the most handsome cabinet woods known. The Jury accordingly awarded a Prize Medal for this specimen.

A very small number only of Russian woods are shown; a good series of the chief timber trees of the Governments of Grodno, Minsk, and Volhynia, are exhibited by A. KAUFMANN (117). For these the Jury awarded a Prize Medal.

Specimens of Rhododendron-wood, and plane-tree wood are shown from Ozoorget by the GOVERNMENT of COOTAIS (118), and of walnut and beech-wood, from Djarobelocan by the GOVERNMENT of TIFLIS (119). These were each deemed worthy of Honourable Mention.

No Spanish woods are exhibited; but in the Spanish department there are two interesting and extensive collections of the woods of Cuba, and the Philippine Islands. The series of the woods of Cuba, used for building, furniture, &c., is 225 in number, and is exhibited by the CABINET BOTANICAL GARDEN of MADRID (186);



the specimens are all cut into the form of books, so as to show the structure of the wood in different sections, and varnished so as to bring out the colour and grain; the latter circumstance, however, though useful in showing the beauty of the wood, renders it rather more difficult to judge of the characters. This collection was formed by D. RAMON DE LA SAGRA, and the woods are described in his large work on Cuba; the following list contains only those woods, the botanical names of which have been made out. For this collection the Jury awarded a Prize Medal.

## WOODS OF CUBA.

- |                                 |   |                              |             |   |  |
|---------------------------------|---|------------------------------|-------------|---|--|
| 1. Abey macho -                 | - | Jacaranda Sagræana.          | D. C.       | - | { A hard wood, the leaves eaten by cattle.                         |
| 2. Abey hembra -                | - | Pœppigia excelsa.            | Rich.       | - | { A hard wood, the leaves eaten by cattle.                         |
| 3. Acana -                      | - | Sideroxylum pallidum.        | Spr.        | - | { Very dense wood, the fruit eaten by animals, especially by pigs. |
| 4. Agracejo -                   | - | Ardisia cubana.              | Alph. D. C. | - | Hard wood.   |
| 5. Agracejo carbonero           | - | Excœcaria?                   | -           | - | Hard wood.   |
| 6. Aguedita -                   | - | Picramnia pentandra.         | Sw.         | - | Hard wood.   |
| 7. Almendro -                   | - | Laplacea Curtyana.           | Rich.       | - | Hard wood.   |
| 8. Almendro silvestre           | - | Dipholis salicifolia.        | Alph. D. C. | - | Hard wood.   |
| 9. Ararà -                      | - | Bucida Buceras.              | Lin.        | - | -  |
| 10. Arbol del cuerno            | - | Acacia cornigera.            | Lin.        | - | -  |
| 11. Ateje hembra -              | - | Cordia Valenzuelana.         | Rich.       | - | { A hard wood, the fruit eaten by animals, especially by pigs.     |
| 12. Ayua amarilla -             | - | { Zanthoxylum bombacifolium. |             |   |  |
|                                 |   | { Rich.                      |             |   |  |
| 13. Ayua macho -                | - | Z. lanceolatum.              | Poiret.     | - | Yields gum or resin.   |
| 14. Ayua hembra -               | - | Z. juglandifolium.           | D. C.       | - | Yields gum or resin.   |
| 15. Azucarero de mon-<br>taña - | - | { Icaica Edwigia.            | Rich.       | - | Yields gum or resin.   |
| 16. Bagà -                      | - | Anona palustris.             | Lin.        | - | { Fruit eaten by animals, especially by pigs.                      |
| 17. Baria -                     | - | Cordia gerascanthoïdes.      | Kunth.      | - | Hard wood.   |
| 18. Bijaguara -                 | - | Colubrina ferruginea.        | Brong.      | - | Hard wood.   |
| 19. Boniato amarillo -          | - | Nectandra boniato.           | Rich.       | - | { Both leaves and fruit eaten by cattle.                           |
| 20. Boniato blanco -            | - | Oreodaphne? alba.            | Rich.       | - | { Both leaves and fruit eaten by cattle.                           |
| 21. Brasil -                    | - | { Cæsalpinia bijuga.         | Sw.         | - | } A dye-wood.  |
|                                 |   | { C. horrida.                | Rich.       | - |  |
| 22. Brasilete colorado          | - | Cæsalpinia crista.           | Lin.        | - | A dye-wood.  |
| 23. Bucàre -                    | - | Erythrina umbrosa.           | Kunth.      | - | Leaves eaten by cattle.  |
| 24. Cabo de hacha -             | - | Trichilia spondioides.       | Jacq.       | - | Hard wood.   |
| 25. Caja -                      | - | Schmidelia nervosa.          | Rich.       | - | Hard wood.   |
| 26. Caimito -                   | - | Chrysophyllum Cainito.       | Lin.        | - | Very dense wood, fruit eatable.                                    |
| 27. Caimitillo -                | - | C. microphyllum.             | D. C.       | - | Very dense wood, fruit eatable.                                    |
| 28. Canela blanca -             | - | Canella alba.                | Murray.     | - |  |
| 29. Caoba -                     | - | Swietenia Mahogani.          | Lin.        | - | Hard wood.   |
| 30. Carne de doncella           | - | Byrsonema lucida.            | Kunth.      | - | Very dense wood.   |
| 31. Cedro -                     | - | Cedrela odorata.             | Lin.        | - |  |
| 32. Ceiba -                     | - | Eriodendron anfractuosum.    | D. C.       | - |  |
| 33. Ceibon de arrego -          | - | Pachira emarginata.          | Rich.       | - |  |
| 34. Chicharron -                | - | Chicharronia intermedia.     | Rich.       | - | Very dense wood.   |
| 35. Cigua -                     | - | Nectandra cigua.             | Rich.       | - | Fruit eaten by animals.  |
| 36. Ciguaraya -                 | - | Trichilia havanensis.        | Jacq.       | - | Hard wood.   |

37. Ciruelo	- -	<i>Spondias purpurea.</i> Lin.	-	{ Yields a gum or resin, fruit eaten by animals.
38. Cocuyo	- -	<i>Bumelia nigra.</i> Sw.	- -	Very dense wood.
39. Copal	- -	<i>Icica copal.</i> Rich.	- -	Yields a gum or resin.
40. Copey	- -	<i>Clusia rosea.</i> Lin.	- -	A dye wood.
41. Cordoban	- -	<i>Miconia pyramidalis.</i> D. C.		
42. Cuaba amarilla	-	<i>Amyris maritima.</i> Jacq.		
43. Cuaba blanca	-	<i>A. sylvatica.</i> Jacq.		
44. Cuajani	- -	<i>Cerasus occidentalis.</i> Loiseleur		Very dense wood.
Cúrbana, V. Canella blanca.				
45. Dagàme	- -	<i>Calycophyllum candidissimum</i>	-	Very dense wood.
46. Daguilla	- -	{ <i>Lagetta lintearia.</i> Juss. - - <i>L. Valenzuelana.</i> Rich. - -	- -	{ Bark yields a fibre.
47. Ebano	- -	<i>Diospyros (?)</i>	- -	Very dense wood.
48. Encina	- -	<i>Quercus (?)</i>	- -	Hard wood, fruit eaten by animals.
49. Frijolillo	- -	<i>Lonchocarpus latifolius.</i> Kunth		Very dense wood, fruit eatable.
50. Fustete	- -	<i>Broussonetia tinctoria.</i> Kunth		Dye wood.
51. Gia blanca	- -	<i>Casearia alba.</i> Rich.		
52. Gia brava	- -	<i>C. ramiflora.</i> Vahl.		
53. Goao	- -	<i>Commocladia dentata.</i> Jacq.	-	Very dense wood.
54. Goao de costa	- -	<i>Rhus Metopium.</i> Lin.	- -	Very dense wood.
55. Granadillo	- -	<i>Brya Ebenus.</i> D. C.	- -	Very dense wood.
56. Guacima amarilla	-	<i>Luhea platypetala.</i> Rich.	-	Hard wood.
57. Guacima baria	-	<i>Xylopia Cubensis.</i> Rich.	-	Dense wood, fruit eaten by animals.
58. Guacimilla	- -	{ <i>Celtis macrophylla.</i> Kunth. - - <i>C. lævigata.</i> Wild - -	- -	{ Fruit eaten by animals, especially by pigs.
59. Guacimilla de costa		<i>Prockia Crucis.</i> Lin.		
60. Guaguaci	- -	{ <i>Lætia apetala.</i> Jacq. - - <i>L. longifolia.</i> Rich. - - <i>L. crenata.</i> Rich. - -	- -	{ Hard wood, yields a gum or resin.
61. Guamà	- -	<i>Lonchocarpus sericeus.</i> Kunth.		Bark used for tanning.
62. Guamà de costa	- -	<i>Malvaceæ (?)</i>	- -	Bark used for tanning.
63. Guana	- -	<i>Malvaceæ (?)</i>		
64. Guara	- -	{ <i>Cupania glabra.</i> Sw. - - <i>C. tomentosa.</i> Sw. - - <i>C. crenata.</i> <i>C. triquetra.</i> Rich. - -	- -	{ Hard wood, fruit eaten by animals.
65. Guara colorada	-	<i>Cupania macrophylla.</i> Rich.	-	Hard wood, fruit eaten by animals.
66. Guavico	- -	<i>Xylopia obtusifolia.</i> Rich.	-	Very dense wood.
67. Guayabo agrio Guayabo silvestre Guayabo cotorrero	- } - } - }	<i>Psidium pomiferum.</i> Lin.	-	{ Hard wood, bark used for tanning, fruit eaten by animals.
68. Guayabillo	- -	<i>Eugenia guayabillo.</i> Rich.		
69. Guayacan	- -	<i>Guaiacum officinale</i> Lin.	-	Very dense wood.
70. Guayacancillo	- -	<i>Guaiacum verticale.</i> Ortega	-	Very dense wood.
71. Guimbà, V. Guavico		- - -		Very dense wood.
72. Guira cimarrona	-	<i>Crescentia acuminata.</i> Kunth.		
73. Guira eriolla	-	<i>Crescentia Cujete.</i> Lin.		
74. Hueso	- -	<i>Drypetes alba.</i> Poit	- -	{ Very dense wood, leaves eaten by animals.
75. Jaboncillo	- -	<i>Sapindus Saponaria.</i> Lin.		
76. Jagua	- -	<i>Genipa americana.</i> Lin.	- -	Fruit eaten by animals.
77. Jaguey hembra	-	<i>Ficus (?)</i>	- -	Bark used for tanning.
78. Jaguey macho	-	<i>Ficus populnea.</i> Wild	- -	Bark used for tanning.
79. Jibà	- -	{ <i>Erythroxylo m brevipes.</i> D. C. <i>E. obtusum.</i> D. C. <i>E. havanense.</i> Jacq. <i>E. alaternifolium.</i> <i>E. rufum.</i> Rich.		
Jiqui, V. Cocuyo	-	- - -		Very dense wood.

80. Jobo - - - Spondias lutea. Lin. - - Yields a gum or resin.
81. Jocuma - - - Dipholis salicifolia. Alph. D.C. { Very dense wood, fruit eaten by animals.
82. Jùcaro - - - Bucida capitata. Vahl. - - Very dense wood.
83. Laurel amarillo, V. Boniato amarillo
84. Laurel blanco - Oreodaphne ? alba. Rich. - Hard wood.
85. Laurel de cuabal - Anona bullata. Rich. - - Fruit eaten by animals.
86. Lengua de vaca - Ægiphyla martinicensis. Lin.  
Leviza, V. Laurel }  
blanco - - - } Hard wood.
87. Lloron - - - Malanea lucida. Rich. - -
88. Maboá - - - Cameraria latifolia. Jacq. - Very dense wood.
89. Macurige - - - Cupania oppositifolia. Rich. - Hard wood, fruit eaten by animals.
90. Maco - - - Drypetes glauca. Vahl. - - Hard wood.
91. Majagua - - - Paritium elatum. Rich. - - Hard wood, bark used for tanning.  
Majagua de Cuba. }  
V. Guamá - - - } Bark used for tanning.
92. Majagua macho - Belotia grewiaefolia. Rich. - Bark used for tanning.
93. Malagueta - - { Eugenia pimenta. D. C.  
E. valenzuelana. Rich.
94. Manajù - - - Malpighia (?) - - - - Hard wood, yields a coloured resin.
95. Mangle blanco - Avicennia tomentosa. Jacq. - Bark used for tanning.
96. Mangle colorado - Rhizophora Mangle. Lin.
97. Moruro - - - Acacia arborea. Wild. - - { Very dense wood, leaves eaten by cattle.
98. Moruro de costa - Acacia litoralis. Rich. - - { Very dense wood, bark used for tanning.
99. Mora - - - Morus celtidifolia (?). Kunth
100. Nogàl - - - Juglans cinerea. Lin. - - Hard wood, fruit eaten by animals.
101. Ocuje - - - Calophyllum Càlaba. Jacq. - { Hard wood, yields a gum or resin ; fruit eatable.
102. Palo blanco - - - Simaruba glauca. D. C.  
Palo cachimba. V. Vibona.  
Palo de Caja. V. Caja.  
Palo carbonero. V. Agracejo carbonero.  
Palo santo. V. Guayacan.
103. Peralejo - - - Malpighia (?) - - - - { Hard wood, bark used for tanning ; fruit eaten by animals.
104. Pico de gallo- - Cynometra cubensis Rich. - Very dense wood.  
Pimienta. V. Malagueta.
105. Pino - - - Pinus occidentalis. Sw. - - Fruit eaten by animals.
106. Quiebra hacha - Copaifera hymenæfolia. Moric. { Very dense wood, fruit eaten by animals.
107. Ramon- - - Trophis americana. Lin. - - Leaves eaten by animals.
108. Raspa lengua - Casearia hirsuta. Sw. - - { Hard wood, both leaves and fruit eaten by animals.
109. Roble amarillo - Cytharexylum caudatum. Lin. Hard wood.
110. Roble blanco - Tecoma leucoxylon. Mart. - Hard wood, leaves eaten by animals.
111. Roble guayo - - Ehretia bourreria. Lin. - - Hard wood, leaves eaten by animals.
112. Roble negro - - }  
113. Roble prieto- - } Ehretia tinifolia. Lin. - - Hard wood.

114. Sabcù - - -	Acacia formosa.	Kunth - -	{ Very dense wood, leaves eaten by animals.
Sangre de doncella. V. Carne de doncella.			
115. Sapote - - -	Sapota Achras.	Mill - -	{ Very dense wood, fruit eaten by animals.
116. Sapote de culebra-	Lucuma serpentaria.	Kunth - -	{ Very dense wood, fruit eaten by animals.
117. Sapote negro - -	Diospyros laurifolia.	Rich. - -	{ Very dense wood, fruit eaten by animals.
118. Torcido - - -	Mouriria Valenzuela.	Rich. - -	The leaves eaten by animals.
Tengue. V. Moruro - - - - -			
119. Ubero de playa - -	Coccoloba uvifera.	Jacq.	
120. Vaca-buey - - -	Curatella americana.	Lin.	
121. Vibona - - -	Erithalis pentagonia.	D. C. - -	The leaves eaten by animals.
122. Vigueta de Naranjo	Ilex Cassine.	Aiton - -	Hard wood.
123. Viriji - - -	Eugenia ferruginea.	Rich. - -	Hard wood.
124. Yaba - - -	Andira inermis.	Kunth. - -	{ Fruit eaten by animals, especially by pigs.
125. Yagruma macho - -	Panax undulata.	Aub. - -	{ Both leaves and fruit eaten by animals.
126. Yaimiqui. V. Carne de doncella.			
127. Yaicuage - - -	Hypelate paniculata.	Cambes.	Hard wood.
128. Yaiti - - -	Excœcaria lucida.	Sw. - -	Very dense wood.
129. Yamào - - -	Guarea trichiloides.	Lin. - -	{ Hard wood, both leaves and fruit eatable.
130. Yana - - - { Ximenia americana. Lin. Conocarpus erecta. Kunth.			
131. Yanilla - - -	Schmidelia Cominia.	Sw. - -	Hard wood, leaves eaten by animals.
132. Yaya - - - { Uvaria neglecta. Rich. - - Oxandra virgata. Rich. - - } Hard wood.			
133. Yaya cimarrona - -	Mouriria myrtiloides.	Poiret.	
134. Yayajabico - - { Columbrina reclinata. Brong. Erithalis fruticosa. Lin. - } Hard wood.			

The series of woods of the Philippine Islands, exhibited by the **ECONOMICAL SOCIETY** of Manilla, consists of 213 specimens. It is very much to be regretted that this collection is unaccompanied by any list, or catalogue, which would have very greatly increased its value. It was, however, deemed worthy of Honourable Mention.

Specimens of St. Domingo mahogany and satin-wood, are contributed by Sir R. SCHOMBURGK, H. M. Consul to the Dominican Republic; these form part of the series of raw produce of that country, for which the Jury awarded a Prize Medal (see page 170).

A few specimens of timber from Tabarca are shown in the collection of Tunis raw produce.

A valuable series of some of the chief woods of Turkey are exhibited; the specimens are large and capital, but they are shown in the rough, so that the nature and characters of each wood can scarcely be distinguished; the following are the chief woods shown—

## WOODS OF TURKEY.

1. Ardij aradji	-	Fagus sylvatica	-	-	Used for ship building and for wheels.
2. Armood aradji	-	Pyrus communis	-	-	Common furniture wood.
3. Baaz guurgang	-	Carpinus betulus	-	-	Fire-wood ; rough work.
4. Djinnak aradji	-	Acer Pseudo-platanus	-	-	Furniture wood.
5. Djinnar aradji	-	Fraxinus excelsior	-	-	Furniture and house work.
6. Djumaar aradji	-	Acer, sp.	-	-	Used for furniture.
7. Ehkläel aradji	-	Sorbus domestica	-	-	Used for grafting.
8. Guurgang aradji	-	Fagus, sp.	-	-	Fire-wood only.
9. Hklamoorng aradji	-	Tilia vulgaris	-	-	Used for carving and fine work.
10. Jeeviz aradji	-	Juglans regia	-	-	Furniture wood.
11. Kawak aradji	-	Populus nigra	-	-	Used for house building.
12. Karrär aradji	-	Ulmus excelsa	-	-	Used for common carpentry.
13. Keerasje	-	Prunus cerasus	-	-	Furniture wood.
14. Maatsché aradji	-	Quercus rubra	-	-	Useful timber.
15. Pfundook aradji	-	Corylus Avellana	-	-	Used for pipe stems.
16. Taphzoos	-	Taxus baccata.	-	-	
17. Tozham aradji	-	Pinus Picea	-	-	Timber for general purposes.
18. Zugunt	-	Salix alba	-	-	Used for light house work.

Besides these, specimens of *Pinus orientalis*, from Damascus ; *Quercus ægilops*, from Litckoftcha and Wallachia ; *Juniperus communis*, from Smyrna ; *Juglans regia*, from Damascus ; *Quercus coccinea*, from Rhodes, *Morus alba*, from Damascus, &c., are also exhibited.

A valuable and excellent collection of Italian woods is exhibited by the ROYAL TECHNOLOGICAL INSTITUTE of Tuscany, forming part of the series of Tuscan raw produce, for which the Jury awarded a Prize Medal (see p. 170). The collection consists of two series, the one being of furniture or ornamental woods, the other of timber trees, or woods of construction, so cut as to show the character of the wood in the best and most instructive manner ; several of the woods are scarce and highly interesting. The collection comprises panel and block specimens.

Panel specimens 2 feet long, varying from 15 inches to 20 inches in width, quarter-inch thick, consisting in most cases of pieces joined together longitudinally to display to the best advantage the colour and markings of the woods, and affording satisfactory evidence of their fitness for ornamental purposes.

## WOODS OF TUSCANY.

1. Acacia Julibrissin	-	-	-	Gaggia alborea.
2. Acer Negundo	-	-	-	Negundo.
3. Æsculus Hippocastanum	-	-	-	Castagno d'India.
4. Ailanthus glandulosus	-	-	-	Ailanto.
5. Alnus cordifolia	-	-	-	Ontano Napoletano.
6. Bctula alba	-	-	-	Betula.
7. Broussonctia papyrifera	-	-	-	Moro papirifero.
8. Cercis canadensis	-	-	-	Siliquastro del Canada.
9. Cercis Siliquastrum	-	-	-	Siliquastro.
10. Cotisus Laburnum	-	-	-	Maggio ciondolo.
11. Diospyrus Lotus	-	-	-	Loto.
12. Eleagnus hortensis	-	-	-	Olivo di Boemia.
13. Fraxinus americanus	-	-	-	Frassino Americano.

14. <i>Fraxinus sambucifolia</i> .				
15. <i>Gymnocladus canadensis</i>	-	-	-	Albero morto.
16. <i>Juglans nigra</i>	-	-	-	Noce nero.
17. <i>Kœlreuteria paniculata</i> .				
18. <i>Melia Azedirachta</i>	-	-	-	Albero di Zaccheo.
19. <i>Olea europæa</i>	-	-	-	Olivo.
20. <i>Pinus Cedrus</i>	-	-	-	Cedro del Libano.
21. <i>Platanus orientalis</i>	-	-	-	Platano orientale.
22. <i>Prunus Lauro-cerasus</i>	-	-	-	Lauroceraso.
23. <i>Prunus Mahaleb</i>	-	-	-	Albero di Santa Lucia.
24. <i>Rhamnus Alaternus</i>	-	-	-	Alaterno.
25. <i>Rhus typhina</i>	-	-	-	Somacco.
26. <i>Robinia Pseudacacia</i>	-	-	-	Acacia, or Cascia.

Block specimens, consisting of branches and trunks, cut in half, showing bark, longitudinal section, and oblique transverse section.

27. <i>Acacia lophantha</i> .				
28. <i>Acer campestre</i>	-	-	-	Loppo.
29. <i>Acer Negundo</i>	-	-	-	Negundo.
30. <i>Acer Pseudo-platanus</i>	-	-	-	Acero fico.
31. <i>Ailanthus glandulosus</i>	-	-	-	Ailanto.
32. <i>Amyris polygama</i> .				
33. <i>Betula alba</i>	-	-	-	Betula.
34. <i>Buxus sempervirens</i>	-	-	-	Bossolo.
35. <i>Carpinus Betulus</i>	-	-	-	Carpine.
36. <i>Castanea vesca</i>	-	-	-	Castagno.
37. <i>Celtis australis</i>	-	-	-	Giracolo.
38. <i>Citrus Aurantium</i>	-	-	-	Arancio.
39. <i>Corylus Avellana</i>	-	-	-	Nocciolo.
40. <i>Cratægus coccinea</i> .				
41. <i>Cupressus pyramidalis</i>	-	-	-	Cipresso.
42. <i>Elæagnus hortensis</i>	-	-	-	Olivo di Boemia.
43. <i>Eucalyptus populifolia</i> .				
44. <i>Fagus sylvatica</i>	-	-	-	Faggio.
45. <i>Fraxinus excelsior</i>	-	-	-	Frassino.
46. <i>Gleditschia triacanthos</i>	-	-	-	Gledischia.
47. <i>Gymnocladus canadensis</i>	-	-	-	Albero morto.
48. <i>Ilex aquifolium</i>	-	-	-	Agrifoglio.
49. <i>Juglans nigra</i>	-	-	-	Noce nero.
50. <i>Juglans regia</i>	-	-	-	Noce.
51. <i>Juniperus virginiana</i>	-	-	-	Ginebro di Virginia.
52. <i>Kœlreuteria paniculata</i> .				
53. <i>Laurus Camphora</i>	-	-	-	Albero della confora.
54. <i>Laurus nobilis</i>	-	-	-	Alloro.
55. <i>Melia Azedirachta</i>	-	-	-	Albero di Zaccheo.
56. <i>Morus alba</i>	-	-	-	Moro.
57. <i>Olea europæa</i>	-	-	-	Olivo.
58. <i>Pinus Abies</i>	-	-	-	Abeto.
59. <i>Pinus Cedrus</i>	-	-	-	Cedro del Libano.
60. <i>Pinus halepensis</i>	-	-	-	Pino d'Aleppo.
61. <i>Pinus Pinea</i>	-	-	-	Pino domestico.
62. <i>Pistacia Lentiscus</i>	-	-	-	Sondro.
63. <i>Platanus occidentalis</i>	-	-	-	Platano d'Occidente.
64. <i>Populus alba</i>	-	-	-	Gallice.
65. <i>Populus nigra</i>	-	-	-	Albero.

66. <i>Prunus canadensis</i>	-	-	-	Ciliegio del Canada.
67. <i>Prunus Cerasus</i>	-	-	-	Ciliegio.
68. <i>Punica Granatum</i>	-	-	-	Melagrano.
69. <i>Pyrus Malus</i>	-	-	-	Melo.
70. <i>Quercus Cerris</i>	-	-	-	Cerro.
71. <i>Quercus crinita</i>	-	-	-	Cerro.
72. <i>Quercus Ilex</i>	-	-	-	Leccio.
73. <i>Quercus pedunculata</i>	-	-	-	Querce.
74. <i>Quercus racemosa</i>	-	-	-	Quercia farnia.
75. <i>Quercus Robur</i>	-	-	-	Quercia Ischia.
76. <i>Quercus Suber</i>	-	-	-	Sughera.
77. <i>Rhamnus Alaternus</i>	-	-	-	Alaterno.
78. <i>Rhus Cotinus</i>	-	-	-	Scotano.
79. <i>Rhus typhina</i>	-	-	-	Somacco.
80. <i>Salix babylonica</i>	-	-	-	Salcio piagente.
81. <i>Salix vitellina</i>	-	-	-	Salcio.
82. <i>Sterculia platanifolia</i>	-	-	-	Sterculia.
83. <i>Styrax officinalis</i>	-	-	-	Storace.
84. <i>Tamarix africana</i>	-	-	-	Tamarigio.
85. <i>Taxus baccata</i>	-	-	-	Tasso.
86. <i>Ulmus campestris</i>	-	-	-	Olmo.
87. <i>Vitex Agnus castus</i>	-	-	-	Agnocasto.

Some very excellent veneers of walnut wood, cut in a peculiar manner, invented by the exhibitor, are shown by A. DUCCI of Florence (82). The Jury awarded a Prize Medal for these.

#### VIII. MISCELLANEOUS SUBSTANCES.

Under this head are classed those vegetable substances not properly coming under any of the preceding divisions: it would have been easy to have included in it a very large number of new and little known products, and of substances chiefly interesting as curiosities; the Jury, however, considered that in so doing they would merely increase the length of their Report, without leading to any practical result; they have therefore entirely omitted all mention of these substances, and simply here refer to one or two articles especially deserving of notice.

A very beautiful collection of anatomised plants, flowers, and leaves, is exhibited by E. KING (2). In these remarkable dissections, the whole of the soft and pulpy matter of the plants is removed, and only the woody or fibrous part is left, forming a perfect net-work of woody tissue. This effect is produced by steeping the plants in rain-water, in which they are suffered to remain until the whole of the soft parts are decomposed; they are then placed in fresh water, and the decomposed matter carefully removed with a brush; after this the remaining fibrous part is bleached in a weak solution of chloride of lime and then dried. The time required for this operation varies from a few weeks to several months, and its success essentially depends on the minute and patient care bestowed on the brushing away of the decomposed pulpy matter. The specimens exhibited by E. King are remarkable for their beauty and the very perfect manner in which the whole of the woody skeleton of the plants has been preserved; the Jury accordingly awarded a Prize Medal for them.

Some excellent specimens of similar anatomised plants are likewise contributed by Lieut. TILLEY (5A). These were deemed deserving of Honourable Mention.

Various small collections of dried or preserved plants and flowers are shown by different exhibitors; namely, preserved flowers intended as botanical illustrations, by W. STEVENS (3): preserved pitcher plants, by E. W. COOKE (2 A); dried mosses, by M. ROCK (5); and dried mosses and sea-weeds by E. HOLT (128).

A series of well prepared and carefully dried ferns from Madeira is contributed by GENOVEVA GONSALVES; this was deemed worthy of Honourable Mention.

Finally, the Jury would specify in this department, as deserving of Honourable Mention, the specimen of selected teazles for the use of wool-dressers, exhibited by — ROTSCH and REICHEL, in the Austrian department (98).

EDWARD SOLLY, *Reporter.*

London, February 1852.

## PART II.—ANIMAL KINGDOM.

### A.—FOR TEXTILE FABRICS AND CLOTHING.

#### WOOL.

The raw material of most importance and in most general use for the above purposes is Wool. This is a peculiar modification of hair, presenting, when viewed under the microscope, fine transverse or oblique lines, from 2,000 to 4,000 in the extent of an inch, indicative of an imbricated scaly surface, on which, and on its curved or twisted form, depends its remarkable felting property and its consequent value in manufactures.

Most quadrupeds possess the woolly variety of hair as an under-clothing, but in a small proportion and hidden by the smooth, exterior, coarser, and straighter kind of hair. In the wild sheep (*Ovis ammon* and *Ovis musimon*) the woolly variety of hair is developed in excess; and in the domesticated breeds the fleece has been modified and improved, in various degrees, by crossing the breeds, choice of climate and pasture, and careful attention and defence during its growth, until not only has the original coarse character of the product disappeared, but qualities of wool of different kinds and of different degrees of superiority have been obtained, which are generally divisible into two classes, the one better adapted for “carding,” the other for “combing,” and both available for a great variety of useful and elegant textile fabrics.

In judging of these qualities in the wools exhibited, the Jury have tested the fineness and elasticity of the fibre, the degrees of imbrication of the scaled surface of the fibre as shown by the microscope, the quantity of fibre developed in a given space of the fleece, the comparative freedom of the fleece from extraneous matters, and the skill and care employed in preparatory processes, such, for example, as that termed “scouring” the fleece, upon which depends its liability or otherwise to mat at the bottom of the staple.

In these examinations the Jury have to acknowledge the valuable aid of well-versed English and Foreign Experts.

After the comparison of the wools exhibited by the growers of different nations, the Jury are unanimous in making the first mention of those transmitted from Germany, as being pre-eminent in the qualities of highest value.

Under “German Wools” are included those from Austria and Austrian Silesia, Hungary, Prussia, Saxony, and Polish Silesia.



*Austria.*

No. 90. FIGDOR and SONS.—The fleeces exhibited by this firm present in a high degree the desired qualities of substance in the staple and of fineness and elasticity of the component fibres, the spiral curves of which are close and regular, and are immediately resumed after being obliterated by stretching the fibre, the length of which is also considerable for wool of this “carding” quality, the most valuable for the finest descriptions of cloth. One of the Experts in wool characterises the specimens exhibited by Messrs. Figdor and Sons “as a superior and high-bred wool, the finest and most legitimate specimen in the whole Exhibition.” The degree of superiority over some of the wools in the same department, which was contested by another Expert, was admitted by the first to be slight, whilst opinions were unanimous as to the superior character of the wools generally from Austrian Silesia and Hungary. The Jury, therefore, appreciating the difficulty of arriving at a correct judgment of the degrees of individual merit, especially from samples giving an uncertain indication of the average value of the produce of flocks, came to the conclusion of recommending the award of the Council Medal, as notified in the Second Section of the Report, so as to signify their appreciation of the highest class of wools; and to distinguish the manifestly superior qualities of the wools exhibited by individuals by the award of the Prize Medal, and they place first on the list the firm of MM. ISAAC FIGDOR and SONS, of Vienna.

No. 92. Count H. LARISCH MOENNICH.—The product of a fine and well-known flock, from Silesia, is exhibited by four fleeces, which present similar excellent qualities to those of No. 90, the difference, on the whole, being so slight that the Jury also award the Prize Medal to Count H. LARISCH MOENNICH, of Silesia.

No. 91. Count ANTON VON MITTROWSKY.—These fine and high-bred fleeces of a pure merino stock, from Silesia, exhibit the valuable qualities of fineness and elasticity of fibre in so eminent a degree that the Jury award the Prize Medal to their exhibitor.

No. 89. Count JOSEPH HUNYADY VON KETHELEY.—The fleece, from a flock in Hungary, is an unwashed specimen, but of a very fine quality of fibre; it is a little inferior to the best Silesian examples only in being somewhat thinner or poorer in substance. The fine imbrication and elastic properties of the fibre are, however, so remarkably characteristic of this fleece, that the Jury award to its exhibitor the Prize Medal.

The washed and unwashed wools exhibited by Count O. VON WALLIS (No. 93, Bohemia), and by Messrs. PANNA and ALEXIS (No. 94, Transylvania), present qualities which entitle them to Honourable Mention.

*Zollverein.*

No. 803. W. GRAFF.—The fleece of wool exhibited on a stuffed sheep from the merino flock of this exhibitor, at Münchenhoff, merits, from the fineness and closeness of the fibre and its excellent “carding” qualities, the award of the Prize Medal.

No. 29. LEGATIONS-RATH KUEPFER.—The merino fleeces of two-year old ewes,

from Bromberg, here exhibited, are remarkable for the fineness and regularity of the staple, and illustrate favourably the advance of the improvement of wool in the Prussian districts of the Middle Vistula: the Jury deem them to merit the award of the Prize Medal.

No. 24. E. LUBBERT.—The fleeces transmitted by this exhibitor from Zweybrodt, near Breslau, are very remarkable for those qualities which, like the Austrian-Silesian wools, adapt them for the fabrication of the finest cloths, and the Jury award to Mr. Lubbert the Prize Medal.

No. 30. G. L. NORDMANN.—The fleeces from Liskow, near Mowraelaw, are also fine specimens of Prussian wools, remarkable for the great regularity in the staple, and meriting the award of the Prize Medal to M. Nordmann.

Nos. 45 and 46. OBERBURGGRAF VON BRUNNECK.—The fleeces of a ram and a ewe from a merino flock at Bellschwitz, and the specimens of wool indiscriminately taken from a merino flock at Rosenberg, though rather inferior in quality to the finest Silesian wools, manifest a fineness, softness, and elasticity of fibre and a regularity of staple which, in the opinion of the Jury, merits an award to the exhibitor of the Prize Medal. The Bellschwitz flock was procured by the Oberburggraf in Spain in 1814, and afterwards improved by additions of the finest Saxon and Silesian races in 1820 and 1824.

No. 27. M. OCKEL, for the ROYAL ADMINISTRATION of FRANKENFELDE.—The fleeces of a ram and of ewes shorn in the spring of 1850, and the samples of wools from the flocks kept at Wrietzen on the Oder, under the above Administration, manifest qualities which the Jury have considered to entitle the Administration to the award of the Prize Medal.

Of other exhibitors of wools in the Zollverein, No. 32, Baron ECKARDSTEIN, on account of the regularity of the staple in two examples of wool in fleeces; No. 33, Count VON SCHWERIN, for the fleeces of a ram and ewe of the Saxon breed, remarkable for their fine qualities as "combing wool;" No. 355, FLOCKENHAUS and Co.; No. 42, Baron VON LUTTWITZ; No. 47, R. LEHMANN, for fleeces of fine raw wool; No. 23, A. P. THAER, for the richness of the staple and fineness of the hair; No. 369, MM. PEILL and Co., of Düren;\* No. 433, M. A. VON SAUCKEN; No. 280, S. M. V. ROTHSCHILD, for four fleeces of fine merino wool, from a flock of 15,000 head at Schillersdorf; No. 25, J. VON LIPSKI, for a ram's fleece from the owner's flock at Ludomy; No. 26, — HEY, for the fleeces of wool from the flock of the Electoral race, under the personal superintendence of the exhibitor at the Royal Domain of Hainsburg, Saxony; and the fleeces exhibited by the Royal Remounting Horse-Depôt, No. 22, on account of the weight of the wool and the length and resistance of the fibre, which adapt it for combing, are severally deemed by the Jury to be worthy of Honourable Mention.

#### *United States of America.*

Mr. COCKERILL.—The wool transmitted by this exhibitor from Northville is well got up, and exhibits, like the preceding specimens, a quality of fibre, indicative of care and skill in the development and improvement of the fleece, which calls for the award of the Prize Medal.

\* This firm's name is inserted in the Award List of Class XII.

No. 188. Mr. J. H. EWING.—The wool transmitted from Washington, Pennsylvania, by this exhibitor, is remarkable for the good substance of the fleece, as well as for the quality of the fibre, and the Jury award to him the Prize Medal.

No. 500. Messrs. KIMBER and Co.—The specimens of fine clothing wool exhibited by this firm also exhibit qualities which merit, in the opinion of the Jury, an award of the Prize Medal.

No. 201. Messrs. PERKINS and BROWN.—The samples of fine combing wool transmitted from Ohio exhibit qualities which merit the award of the Prize Medal.

Amongst the samples of American wools deserving Honourable Mention the Jury include—No. 131, Mr. J. BLAKESLEE, of North Castle, New York, samples of merino wools;—No. 4, Mr. P. A. BROWN, of Philadelphia, Pennsylvania;—No. 235, Messrs. PARKER and BROWN, bale of fine wool;—No. 106, Mr. T. C. PETERS, of Darien, New York, specimens of wool of the Saxony breed;—No. 197, Mr. S. SIBLEY, of Hopkington, New Hampshire, sample of wool from a flock of the Saxony breed. One of the able Experts, whose valuable aid the Jury have already acknowledged in their examinations of the wools, reports “those shown by America as most approximating to the character of the German wools.”

#### *Russia.*

No. 128. N. N. SCHLOSS-TRIKATEN.—The specimens of wool from Livonia here exhibited appear to be derived from a flock of Silesian origin, and exhibit all those characters of the fibre which adapt it for good clothing purposes; and the Jury award to the exhibitor an Honourable Mention.

Amongst other examples of wool of a good and valuable quality in the Russian Department, the Jury select, as deserving Honourable Mention—No. 123, T. GAMALEY, of Bessarabia, district of Acherman, samples of wool of the merino breed;—No. 122, VASSAL, of Tauride, district of the Dnieper, specimens of merino wool;—No. 124, L. and F. PHILIBERT, Tauride, district of Melitopol, specimens of merino wool;—No. 126, A. AKHOONDOFF SHAH MIRZA, of Stavropol, district of Piatigorsk, specimens of white and black wool, unwashed;—No. 130, S. GIGOLO, of Gork, for specimens of black wool unwashed:—No. 121, THE FARM of GORIGORETZK, of Mohileff, for specimens of merino wool;—No. 129, MAHOMET KHAN YOUZBASH, of Derbent, in the Khanate of Kiurin, for specimens of white wool, unwashed;—No. 131, J. ABRAMOFF, of Ekaterinoslaff, for his examples of fine unwashed Cashmere goats' hair;—and No. 127, L. K. NARISHKIN, Saratoff, district of Balasheffsk.

#### *France.*

No. 245. J. L. GRAUX.—Council Medal. The specimens of the new variety of wool exhibited by M. Graux, and which have been deemed worthy of the recommendation of the Council Medal, have already been noticed in the second Section of the Report.

No. 1249. LE GÉNÉRAL GIROD (DE L'AIN).—The fleeces of merino wool, from the exhibitor's flock at Nuz, although of a thin staple, and apparently not full-

grown, manifest the qualities adapting it for the finer descriptions of cloth in so excellent a degree, that the Jury award to Général Girod (de l'Ain) the Prize Medal.

No. 1080. NATIONAL SHEEPFOLD OF RAMBOUILLET.—The qualities of the four fleeces of the true merinos, exhibited by this valuable institution, are also such as to merit the award of the Prize Medal.

No. 1312. E. LEFÈVRE.—The specimens of wool in tufts transmitted by this exhibitor from Gevrolles (Coté d'Or) are long in the staple and very sound, forming a very superior description of combing wool, and, as such, deserve the award of the Prize Medal.

No. 354. F. RICHER.—The two fleeces of rams, of pure merino breed, two years old, transmitted from Gouvix, Calvados, have also appeared to the Jury to merit, in the comparison of the wools from France, the award to M. Richer of the Prize Medal.

The exhibitors of wools in the French Department which the Jury would distinguish by Honourable Mention are—No. 142, DALLATTRE and SON; No. 900, LAPORTE and SON; No. 38, MM. BRUNEAUX and SON, for the specimens of combed wool spun by an apparatus of the exhibitors' construction;—No. 322, M. MALINGIÉ, for the fine combed wool, the produce of a flock reared at the Agricultural School of La Charmoise, Pont Leroy (Loire et Cher);—No. 901, MM. LAROQUE and JAQUEMET, for the assortment of spun wool for knitting blankets;—No. 987, G. RIVAUD, of Petit Rochefort, for his good fleeces of merino wool;—No. 1048, V. E. WARMONT, for his specimens of wool in skeins;—No. 1381, MM. PATURLE-LUPIN, SEYDOUX, SEIBER, and Co., for their samples of cleansed wools;—No. 1498, J. A. TERASSON DE MONTLEAU, for his fleeces of Merino wool;—and No. 1548, MM. BERNOVILLE, LARSONNIER, and CHENEST, for the examples of combed wool and woollen yarn.

### *Spain.*

No. 230. JUSTO HERNANDEZ.—Of black and white wool from Salamanca four samples have been transmitted by this exhibitor:—1. Unwashed wool for clothing purposes; 2. Unwashed wool for worsted; 3. Wool washed before shearing, in the Saxon manner; 4. Wool sheared in February 1851. M. Justo Hernandez has introduced into Spain the custom of clothing the sheep from the beginning of December to the end of May; and amongst the specimens transmitted to the Exhibition is a fleece which has been so defended, and one that has been exposed to the direct influence of the atmospheric agencies. The difference in the quality is remarkable, and speaks decidedly in favour of the temporary protection of the fleece. The good qualities of most of these specimens of Spanish wool have appeared to the Jury to merit for J. Hernandez the award of the Prize Medal.

Of other samples of wool transmitted from Spain the Jury select as deserving Honourable Mention—No. 225, S. MONTERO, of Seville, for his samples of fine unwashed merino wool;—and No. 226, the PROVINCE OF HUELVA, for the good quality of wool exhibited from the flocks fed in the Sierra de Audevalo.

*United Kingdom of Great Britain and Ireland.*

No. 81. C. DORRIEN.—The samples of wool transmitted from Chichester by this Exhibitor give evidence of a very high-bred flock, and manifest qualities of fibre for which the Jury award the Prize Medal.

No. 85. R. MILLNER.—The fleeces showing a long staple, grown in the counties Meath and Galway, and the long and short wool fleeces of the mountain sheep, county of Wicklow, exhibit qualities of fibre for which the Jury award the Prize Medal.

No. 84. J. G. REBOW.—The specimens of wool from the South Down breed also exhibit qualities of such excellence as to call for the award of the Prize Medal.



The fleeces of Cheviot wool, grown at an elevation of 2,600 feet above the level of the sea, exhibited by Mr. HENDERSON, of Wooler, Northumberland, are remarkable for the fine silky quality of the fibre, which is well adapted for the blanket manufactory. The Jury regard these specimens as deserving Honourable Mention. The Jury also desire to make Honourable Mention of the fleeces of fine German wools, exhibited under No. 97, by Mr. LIPPERT, of Leeds; and the series of wools shown under No. 179, Class XII., by Mr. CHEESEBOROUGH, of Bradford.

An object of curiosity is shown in the English Department, being a South Down ewe, stuffed, seven years old, which had never been shorn. The weight of the accumulated annual fleeces was 36 lbs. This specimen is exhibited by Mr. J. MOORE, of Littlecott Farm, Pewsey, Wilts.

*Australia.*

Lieut.-Col. E. MACARTHUR.—The case containing 132 specimens of merino wool exhibits very favourable examples of the condition of the fleeces of that valuable variety of the sheep in New South Wales. The Jury regret that the quantities transmitted are too small to afford the requisite means of judging of the average qualities of the flocks; but taking into consideration the important services rendered by Lieut.-Col. Macarthur to the colony by his persevering and successful endeavours to develop a source of wealth from the merino breed of sheep, the Jury award to him the Prize Medal.

The first importation of wool from New South Wales into England in 1807 was 245 lbs. In the year 1848 the quantity from New South Wales alone amounted to 23,000,000 lbs., valued at more than 1,200,000*l.*

The Jury desire to express by Honourable Mention the opinion of the good qualities of the wools exhibited by Mr. T. LEARMONTH (S), marked ; by Messrs. STEVENS and THOMSON ; and by Mr. GRANT, of Tasmania.

*Cape of Good Hope.*

With regard to the wools exhibited from this colony, Nos. 31 and 32 are fine samples, but are too small in quantity to support a judgment as to the average value of the fleece from the flock. The Jury, however, regard the samples transmitted by REIZ, RIEDA, and Co. (31), and by D. J. VAN BREDA, as deserving Honourable Mention.

The specimens of wool, the production of the Cachemere goats kept by HIS ROYAL HIGHNESS PRINCE ALBERT at Windsor, and exhibited by His Royal Highness, are examples of an additional staple new to England, and give encouragement by their quality to the repetition of similar efforts to multiply and preserve that remarkable variety of the genus *Capra*. This staple includes, besides the closer and finer hairs answering to the wool of sheep and the fur of other quadrupeds, a coarser or stronger kind of white hairs. Both kinds are of value in manufactures—the stronger hairs, which require to be picked out prior to attempting to manufacture the finer portions, being afterwards used in the fabrication of coarse woollen cloths. This example of European Cachemere wool would have received a medal from Jury IV. had not one been already awarded to it by the Jury of Class XII.

#### HAIR AND BRISTLES.

##### *Russia.*

The best developed and most valuable examples of these productions are exhibited in the Russian Department, in which the Jury select—

No. 340. BASILE KOUDRIAFFZEFF JADENOFFSKY—for the award of the Prize Medal, merited by the superior qualities of the horse-hair exhibited by him under that number. In the sample of white hair from the tail, the hairs are 40 inches in length, and of the first quality for evenness, elasticity, and shining surface. In the sample of black tails, the hairs are 42 inches in length. Fine specimens of white hair from the mane, of from 28 to 30 inches in length, both transparent and opaque, and good samples of horse-hair for furniture, both drawn and curled, black, grey, and white, are also shown by the above Exhibitor.

Of the samples of bristles exhibited in the Russian Department, the Jury select—

No. 135. SEMENOFF and FALEYEFF—as deserving, from the superiority of the combined qualities of strength, elasticity, and fineness of surface, the Prize Medal. These qualities are particularly shown in the packets of the sorted variety called “okàtka.”

The Jury regard as deserving Honourable Mention, the fine-textured and well-formed bristles shown under No. 134 by the peasants KORIAKIN and MOUGIKOFF, of Vologda; and the selected bristles, of different qualities, shown under No. 136 by J. ZOLOTOREFF, of Kalonga; the prepared horse-hair for mattresses shown under No. 248, by BEZROUKAVNIKOFF SOKOLOFF; and the plumes of horse-hair, horse-tails, and black buffalo-tails, exhibited under No. 259, by P. IVANOFF, of St. Petersburg.

##### *Belgium.*

Amongst the examples of hair and bristles transmitted from Belgium, the Jury deem worthy of Honourable Mention, No. 257, samples of hogs' bristles prepared and bleached for painting-brushes, exhibited by B. HAUSSENS-HAP\*, of Villoorde; and No. 265, the samples of horse-hair, horse-tails and manes, and pigs' bristles, shown by H. SOMZÉ-MAHEY of Liège.\*

\* These exhibitors receive Medals in Classes XVI. and XXVIII., in whose Award List their names appear.

*Netherlands.*

No. 30. MM. CATZ and Co.—Specimens of drawn horse-hair for fiddle-sticks, and horse-hair for stuffing furniture, show qualities deserving Honourable Mention.

*Zollverein.*

No. 596. H. FUDIKAR, of Elberfeld.—Specimens of horse-hair for upholstery purposes, deserve, for their fine and equal texture and elastic qualities, Honourable Mention; and the Jury also award the same distinction to GOTTLIEB FOESE\* for his well-selected series of hogs' bristles and picked hogs' hair from Halle.

*Spain.*

No. 231. D. DELGADO, of Saragossa.—This exhibitor has transmitted some interesting examples of the hair of the rabbit and hare, shaved off the skin by a mechanical process. The vast numbers of these prolific rodents in Spain would afford a large supply of this kind of hair; and the Jury desire to signify their encouragement and approbation of V. Delgado's industry by making Honourable Mention of these specimens.

## WHALEBONE.

The substance so called is closely analogous, in its chemical and physical properties and mode of growth, to hair and bristles, but is developed in compact plates which resolve into stiff bristles at their free margin, from the thick gum at the circumference and palatal surface of the upper jaw of the animals of the whale tribe. The most valuable kind of whalebone is obtained from the great Arctic whale (*Balæna mysticetus*), in which the plates or 'blades' are arranged in several rows, the outermost consisting of the longest plates, attaining, in a full grown whale, the length of from 8 to 12 feet.

*England.*

No. 103. Mr. HENRY HORAN.\*—This exhibitor shows well-selected examples of whalebone plates from the Arctic whale (*Balæna mysticetus*), which yields the largest and best kind; from the Antarctic whale (*Balæna australis*), which affords the second best kind; and from the great finner whale (*Balænoptera Boops*), which affords the shortest and coarsest plates. With these examples of the raw material, Mr. Horan exhibits specimens in various states of preparation, and numerous and ingenious applications of the prepared whalebone of different colours, as, *e. g.*, for covering whip-handles, walking-sticks, and telescopes, and in the form of shavings for plaiting, like straw, in the construction of light hats and bonnets. The Jury, taking into consideration the illustrative collection of this raw material in connexion with its various applications, adjudge to Mr. Horan the Prize Medal.

No. 104. WESTALL and Co.†—The same grounds which are specified in relation to No. 103 sustain the award of the Prize Medal to Mr. Westall, in whose

\* These exhibitors receive Prize Medals in Class XXVIII., in whose Award List their names appear.

† This firm receives a Prize Medal in Class XXVIII., in whose Award List their names appear.

collection the Jury have to specify more especially the great variety of filamentary modifications of the whalebone material for numerous useful applications.

The fine blades of whalebone from the *Balæna mysticetus*, exhibited in the *United States* Department, under No. 537, by Mr. L. GODDARD, deserve Honourable Mention; as do likewise the specimens of Baleen plates from the *Balæna australis*, exhibited by Mr. S. MOSES, under No. 237, from Van Diemen's Land.

#### SILK.

The most valuable kind of silk, and that which is the subject of the most extensive and painstaking culture, is a secretion of the larva of a species of moth, indigenous to China, called, *par excellence*, the "silk-moth," and by entomologists, *Bombyx mori*, from its native and favourite food, the leaves of the mulberry tree. The species was first introduced into Europe in the reign of the Emperor Justinian, by two Nestorian monks who had travelled in China, and who succeeded in bringing a quantity of eggs, secured in a hollow cane, to Constantinople, where they were hatched, and the larvæ fed and reared on the leaves of the white mulberry. The breeding of silkworms in Europe was confined for six centuries to the Greeks of the Lower Empire. In the twelfth century the rearing of silkworms and the manufacture of silk were introduced into Sicily; in the thirteenth century into Italy; whence this important branch of industry has been successively established in Spain, France, England, and most of the colonies with a suitable climate.

Silk is a secretion of a pair of long glandular tubes which terminate in a prominent pore or spinnaret on the under lip. Before their termination they receive the secretion of a smaller gland which serves to glue together the fine filaments from the two 'sericteria,' the apparently single thread being in reality double, and its quality being affected by the equality or difference between the secreting power of the two sericteria. The silkworm commences spinning when it is full grown, in some convenient spot affording points of attachment for the first formed thread, which is drawn from one part to the other until the body of the larva becomes loosely enclosed by the thread. The work is then continued from one thread to another, the silkworm moving its head and spinning in a zigzag way, in all directions within reach, and shifting the body only to cover the part which was beneath it. During the period of spinning the cocoon, which usually takes five days for its completion, the silkworm decreases in size and length considerably; then casts its skin, becomes torpid, and assumes the form of the chrysalis.

The main object of the silkworm breeder is to obtain cocoons of a large size, composed of a long, strong, very fine, even, and lustrous thread. These properties of the silk have been realized in the highest degree in the specimens transmitted from France, in which country the development of the silkworm has for a long period exercised the care and pains of many able breeders, and of late years has been the object of systematic advancement by the Central Society of Sericulture of France.

The *Bombyx mori*, having been bred and reared under the special care and management of man during a long succession of ages, may be regarded as a domesticated species of insect; and it has become the subject, as in the higher



domesticated races, of varieties, of which those called 'Sina,' 'Syrie,' and 'Novi,' in France, are examples.

The 'Sina' variety of the silk-worm is known and esteemed for the pure whiteness of its silk, the thread of which is fine, but weak, and not very lustrous. The 'Syrie' variety is of large size, produces a cocoon abundant in silk, but the thread is rather coarse, and inclines to a greenish tint. The 'Novi' race is small, but the cocoons are firm and well made, and the silk is lustrous, but has a yellowish tint.

The specimens of silk exhibited in the French Department are numerous, and the degrees of excellence hardly to be discriminated in the finest examples selected for the award of the Prize Medal. In specifying the names of the exhibitors so distinguished, the Jury propose, therefore, to limit themselves to the mention of the more remarkable circumstances which they have found to be associated with certain examples. The Jury select, as the first in order of merit,—

France, No. 782, MAJOR COUNT DE BRONNO BRONSKI, exhibitor of unbleached silk and silk cocoons from the Château de St. Selves, near Bordeaux, Department de la Gironde. The cocoons are remarkable for their large size and regularity of form, and the silk for the unusual length of the thread, its natural pure white colour, its fineness and lustre. The circumstances under which this superior quality of silk is obtained are certified, in a Report by a 'Committee of the Agricultural Society of the Gironde,' signed *Philippar*, and dated 28th April, 1847, to be as follows :—

In 1836, Major Bronski reared separately the eggs of the three varieties, 'Sina,' 'Syrie,' and 'Novi.' In 1837 he set apart the cocoons of the varieties 'Syrie' and 'Novi;' and on the exclusion of the imago, or perfect insect, he associated the males of the 'Novi' with the females of the 'Syrie;' and the hybrid ova were hatched at the ordinary period in 1838, the same operations being repeated in 1839 and 1840. With regard to the race 'Sina,' M. Bronski, in 1837, separated the white from the black worms as soon as they were hatched. He then selected the largest and best-shaped cocoons, and made a special collection of the eggs from the moths excluded from those cocoons. This procedure was repeated in 1838 and 1839; but in 1840 he associated the males excluded from the large cocoons of the black worms with the females excluded from the largest cocoons of the white worms. In 1841 he associated the males of the 'Sina' race with the hybrid females obtained from the above-described crossings of the 'Novi' and 'Syrie' breeds.

By these and similar experiments M. Bronski at length appears to have succeeded in obtaining a race of silkworms not subject to disease, producing large and equal-sized cocoons of a pure white colour, the silk of which is equal in all its length, strong, and lustrous, and which is certified to present an average length of thread of 1,057 metres.

The Jury, in awarding the Prize Medal to Major Count Bronski, desire, at the same time, to give expression to their unanimous opinion as to the importance of the resumption, by the highest administrative and scientific authorities in France, of those investigations which had been entered upon with a view to determine the stability and commercial value of the results of

M. Bronski's experiments and discoveries in the amelioration of the breed of silkworms.

The French exhibitors of silks of fine qualities are numerous; and amongst these the Jury award the Prize Medal to—

No. 1050. MM. ALCAN and LIMET; in regard to whom the Jury desire to express their approval of the new mode of 'filature à froid,' and of the mode of dividing the silk of the grey cocoons of the Indian silk-worm (Tussar), both of which improvements are due to MM. Alcan and Limet.

No. 8. MM. ARDUIN and CHANCEL.

1076. C. BEAUVAIS, to whom the silk-manufacture in France owes much, for his establishment of a school of sericulture, for diffusing the true principles on which the development, breeding, and improvement of the silkworm should be carried on.

No. 1105. L. BOUDON.

113. C. CHAMBON.\*

114. J. CHAMPANHET SARGEAS.

No. 96. MM. COUDERC and  
SOUCARET\*.

169. MM. DROUIN and BROSSIER.

846. GIBELIN and SON.

1273. JAME, BIANCHI, and DUSEIGNEUR. With this series of cocoons and of raw and thrown silks are associated twenty-five ingenious daguerreotype figures of the silk-thread as viewed by the solar microscope, in illustration of a valuable memoir by M. Duseigneur, in course of publication at the charge of the Chamber of Commerce and of the Agricultural Society of Lyons.

No. 697. E. DE TILLANCOURT.

189. A. DUVAL.

784. GUÉRIN, MÉNÉVILLE, and  
ROBERT.

1292. LAPEYRE and DOLBEAU.

1657. J. MENET.\*

No. 647. L. MOLINES.

1426. MM. REGARD BROTHERS.

1464. MM. RUAS and Co.

1490. L. SOUBEYRAND.\*

1031. TEISSIER DU CROS, L. and E.

The Jury, in testimony of their admiration of the qualities of the silk exhibited in the French Department, unanimously voted a recommendation of the award of a Council Medal to the 'Central Society of Sericulture of France' (see page 166).

The Jury desire also to express their esteem for the highly-promising qualities of the silk exhibited by the colonists in Algeria; and to specify as deserving Honourable Mention the following exhibitors of raw silk in the French Department:—

No. 17. M. A. BAHUET.

39. M. MORIN (Algeria).

749. M. G. L. AFFOURTIT.

410. M. C. BARRAL.

41. MM. BARRÈS BROTHERS.

757. L. DE BARTHELATS.

760. Madame BÉNOUVILLE.

429. MM. V. BONNAL and Co.

771. M. BONNETON.†

No. 81. MM. CABRIT and ROUX.

1136. M. F. CARRIÈRE.

1137. MM. CAUSSE and GARION.\*

794. M. N. CHAMPOISEAU.

796. MM. CHARTRON and SONS.†

470. M. P. DARRAS.

1169. MM. DARVIEU, VALMALE,  
and Co.

1176. M. V. DELARBRE.\*

\* These exhibitors' names are inserted in the Award List of Class XIII.—W.

† These exhibitors receive Medals in Class XIII.

No. 1178. M. A. DELEUZE.  
 175. M. X. DUMAINE.†  
 150. M. DUSSOL.  
 831. MM. EYMIEU and SON.\*  
 832. MM. FABRIQUE-NOURRY,  
 BARNOUM, and Co.\*  
 1217. M. H. FARJON.  
 537. M. HERME.†  
 1298. M. LAVERNHE and MATHIEU,  
 dit VERGER.\*

No. 1353. MÉJEAN.\*  
 1363. MM. MOURGUE and BOUS-  
 QUET.  
 937. M. J. L. NOGARÈDE.  
 1406. M. J. PRADIER.  
 1430. M. E. REIDON.  
 1446. M. L. ROECK.  
 1470. M. P. SAMBUC.  
 1519. M. VERDET and Co.  
 1526. M. J. VINCENT.

### *Spain.*

Good examples of silk, commendable for the length, elasticity, strength, and brilliancy of the thread, are shown in the Spanish Department; amongst which the Jury select the following as deserving the award of the Prize Medal:—

No. 209. The AGRICULTURAL BOARD, Valencia.

215. MM. DOTRES and Co.

202. F. MONFORT, who exhibits cocoons from the variety of Spanish silkworm called 'Trevoltino,' from that called 'Raicho,' and from the Turkey silkworm.

No. 207. M. REY and Co.

The Jury also award the Prize Medal to the PROVINCE of MURCIA, No. 199, for the excellence of the specimens of 'Sanza,' or silkworm gut.

The Jury have selected for Honourable Mention from the Spanish exhibitors of raw silk:—No. 210, T. TRENOR, of Valencia; No. 220, J. CALDERON, of Granada; and the specimens exhibited by RODRIGUEZ LEAL (220).

### *Belgium.*

From the raw silks exhibited in *Belgium* the Jury select for Honourable Mention:—

No. 112. A. DE CONINCK. 86. C. DE MEVIUS. 111. A. DE POTTER.

### *Tuscany.*

Amongst the Italian silks the first mention is due to those exhibited in Tuscany, which show well the desirable qualities of the cocoons and thread. From these the Jury select for the award of the Prize Medal:—

No. 43. G. FRANCESCHINI;  
 47. T. LEPORI;  
 39. N. POIDEBARD;\*

No. 48. P. RAVAGLI;  
 37. SCOTI BROTHERS;  
 49. P. ZAVAGLI.

And as deserving Honourable Mention:—

No. 50. C. F. CASUCCINI;  
 46. L. DAVITTI;  
 38. L. DELLA RIPA;  
 36. R. LAMBRUSCHINI;

No. 45. C. G. MORDINI;  
 40. C. PETRUCCI;  
 41. COUNT G. PIERI.

\* These exhibitors' names are inserted in the Award List of Class XIII.

† These exhibitors receive Medals in Class XIII.

51. Prof. P. SAVI, for the specimens of raw silk from silkworms fed upon leaves of the Philippine mulberry.

*Switzerland.*

The specimens of raw silk exhibited by T. B. FOGLIARDI, of Milano, are considered by the Jury as deserving of Honourable Mention.

*Sardinia.*

In the Department of Sardinia the Jury have selected as deserving, for their excellent qualities, the Prize Medal, the silks exhibited by—

No. 27. CASSISA and SONS; 26. H. JACQUET & Co.; 30. RIGNON & Co.\*

And the Jury regard, as deserving Honourable Mention, the examples shown by—

No. 45. BORZONE, J.		No. 38. IMPERATORI BROTHERS;
24. MICHAEL BRAVO*;		25. SINIGAGLIA BROTHERS.

*Austria.*

In the Department of *Austria* are exhibited some fine examples of Italian silks, from which the Jury select, for the award of the Prize Medal—

No. 84. G. QUERINI, Venice;  
80. SCHEIBLER and Co.,\* of Milan;  
87A. VERZA BROTHERS, of Milan.

From *Austria* Proper the Jury also consider the "SILKWORM BREEDING ASSOCIATION of GRATZ," Styria, as highly deserving the Prize Medal for the specimens exhibited by them under No. 73.

The exhibitors of raw silk, deserving Honourable Mention, are—

BOZZONI BROTHERS, of Riva;  
No. 77. G. B. MATTIUZZI, of Varmo, Friouly;  
72. A. SCOLA, of Upper Austria;  
81. F. SECCHI, of Milan;  
78. SENIGAGLIA & CARMINATI, of Palma Friouly;  
87. G. STEINER and SONS, of Bergamo.

*Prussia.*

The Jury wish to distinguish by Honourable Mention the specimens of raw white and spinning silk, produced in Berlin, by means of a hanging spinning hive, on the principal of bee-hives, invented by the exhibitor, A. M. BOLZANI (38), by the use of which no double cocoons can be produced: and also the specimens of silk exhibited by KISZEWSKI, No. 39.

*Russia.*

From the examples of silk transmitted from Russia the Jury select—

No. 138. P. RIER, from Tauride, district of Molotschansk, as exhibiting the finest quality of the thread, and as meriting the award of the Prize Medal;

\* These exhibitors receive Medals in Class XIII., in whose Award List their names appear.

And as deserving Honourable Mention—

No. 139. A. REBROFF, of Stavropol; and No. 140. M. RAYKO, of Odessa.

*Turkey.*

The silks exhibited in this Department are many of them of a very fine character, exhibiting a good length of thread, with the qualities of fineness, strength, elasticity, and lustre. The Jury select, as meriting the Prize Medal, the following exhibitors:—

MOUSTAPHA NOURI PACHA, of Broussa;  
J. PAULAKY, of Broussa;  
SCOTT of SCHEMLAN, Mount Lebanon;  
The SCHOOL of SERICICULTURE at BROUSSA.

The Jury desire in same manner to distinguish the excellent specimens of raw silk and of cocoons exhibited by MIGHIRDITZ DJEZAIRGLOU, and by MORGUE and Co., of Beyrout.

*Bavaria.*

A Prize Medal is awarded to—

No. 36. PELLOUZ, BRENTANO, and Co., of Augsburg.

*Sicily.*

The specimens of raw silk exhibited by W. JAEGER and Co., of Messina, exhibit the best qualities, and merit the award of the Prize Medal.

*Sweden.*

Amongst the specimens of raw produce, transmitted at a late period of the Exhibition, from Sweden, the Jury desire to particularise, as meriting Honourable Mention, the fine examples of raw silk exhibited by Her Majesty the QUEEN of SWEDEN.

*India.*

Very fine examples of silk are shown in the Indian Department, from which the Jury select, as meriting the Prize Medal, the following exhibitors:—

D. JARDINE, of Calcutta;  
C. R. JENNINGS, of Commercolly;  
MACKENZIE BROTHERS, of Bengal;  
W. MCNAIR, of Surdah, Bengal;  
— WATSON, of Surdah, Bengal.

The specimens of silks exhibited from Mysore deserve Especial Mention.

The raw silk from Persia, exhibited by Mr. THOMPSON, likewise receives Honourable Mention.

*China.*

In the Chinese Department, the quality of the silk developed in the native country of the silkworm, is worthily illustrated by the specimens exhibited by

YUN-KEE, of Shang-hae;

to whom the Jury, therefore, adjudge the Prize Medal.

The Jury regard the specimens of silk, exhibited in this Department, by

Messrs. ASTELL and Co., Mr. C. J. BRAINE, Mr. HAMMOND, and Mr. LINDSAY, as severally meriting Honourable Mention.

### *Mauritius.*

In this colony the cultivation of the silkworm has been greatly promoted by the Company formed by the exertions of M. E. DUPONT, of Port Louis; and the Jury award to him the Prize Medal, for the excellent qualities of the white silk which he has transmitted.

Amongst the specimens of raw silk from the *Roman States* the Jury find worthy of Honourable Mention—

No. 6. D. BERRETTA; and No. 38. M. BOLGAIN.

In those from *Malta* the Jury award Honourable Mention to

No. 4. G. PULIS.

### *England.*

The specimens of silk, from silkworms reared on leaves of the white mulberry at Godalming, Surrey, and exhibited by (No. 32) Mrs. CATHERINE DODGE, possess qualities which, considering the unfavourable conditions of climate, have deserved, in the opinion of the Jury, Honourable Mention.

The Jury regard the raw silk exhibited in the Canadian Department, by Messrs. MACKAY and Co. (No. 97), as deserving Honourable Mention.

### FEATHERS AND DOWN.

An instructive and comprehensive collection of feathers and down, in different states of preparation for bed-stuffing, including English goose-feathers, Irish goose and mixed feathers, Dantzic feathers, Russian goose-feathers, and mixed duck-feathers, Hudson's Bay goose and duck-feathers, Russian down and Greenland eider-down, are exhibited by Messrs. HEAL and SONS (59); of which the Jury desire to make Honourable Mention.

No. 57. Messrs. W. and C. NIGHTINGALE exhibit an illustrative collection of feathers and down, showing the effects of their mode of purifying feathers by steam, without the use of sulphurous gas. Of this collection the Jury desire to testify their approbation by Honourable Mention.

No. 60. Messrs. BLYTH, HAMILTON, and BLYTH exhibit excellent examples of purified English white goose-feathers and of Irish white feathers, for which the Jury also award Honourable Mention.

In the *Russian* Department good specimens of white Bejetsk bed-feathers, grey feathers, and goose-down, are exhibited by J. LAPSHIN, No. 145, of St. Petersburg.

No. 283. Madame LADIGHIN, of Tamboff, exhibits a fine quality of down from the breast of the goose; together with articles made of goose-down.

No. 144. A. POPOFF, of Moscow, shows also down of the first quality.

Each of these exhibitors deserves, in the opinion of the Jury, Honourable Mention.

B.—FOR DOMESTIC OR ORNAMENTAL PURPOSES, OR FOR  
THE MANUFACTURE OF IMPLEMENTS.

OILS, WAX, &c.

A class of substances was exhibited under the head of oils, which are likely to be of great commercial importance, as they possess properties differing from the finest vegetable oils, and some of them can, it appears, be supplied in large quantities, and at a moderate cost. The Jury, with a view to mark their appreciation of this class, awarded a Prize Medal to R. CLARENCE (Cape of Good Hope, 13), for oil obtained from sheep's tails, and Honourable Mention to—

G. DOMINICK (21); T. EMORY (18); F. FRANK (19); and HOLBROOK and STANLEY (208), United States, for oil obtained from lard by pressure at a very low temperature.

Honourable Mention was also awarded to C. A. JETU (Canada, 109), for oil obtained from porpoises, which is used largely for lighting purposes; to C. RÖMER (Prussia, 337), for a sample of oil exhibited by him.

A Medal was awarded to MOSES, SON, and DAVIS (New South Wales, 15), for tallow.

Some fine white wax was exhibited in the Portuguese Department by M. F. BRETES (620), and by M. L. DE CARVALHO (617), both awarded Honourable Mention. Honourable Mentions were likewise awarded to M. GUISO (Sardinia, 23), to W. ROUT (Van Diemen's Land, 293), and E. E. VISSER (Netherlands, 17), for the samples of wax exhibited by them.

HORNS AND ANTLERS.

Of these productions a great variety of fine and illustrative specimens are exhibited; amongst which the collection of the Indian Department merits the first notice for the number and variety of the examples. There are shown the dense antlers of the *Cervus Aristotelis*, of the bara sinha (*Cervus Duvaucellii*), of the Sámber (*Cervus hippelaphus*), of the kaher or barking deer (*Cervus vaginalis*, Boddaert), of the axis (*Cervus maenlatus*), of the mar (*Capricornis bubalina*), of the hog-deer (*Cervus porcinus*), of the Rusa, and other species of Indian deer. Horns of the great Arnée Buffalo (*Bos bubalus*), of the gour (*Bos cavifrons*), of the gyal, and of other kinds of Indian buffalo, ox, and antelope, were also exhibited.

*Canada*.—A pair of fine moose-horns (*Alces Americana*) are shown in No. 62, and a second pair, No. 237, by Mr. J. THOMPSON, of Three Rivers.

From the *Cape of Good Hope* fine buffalo horns are shown in No. 16, by Mr. MEESER; and rhinoceros horns, in No. 28, by Mr. HANBURY.

From *Egypt* have been transmitted horns of the bull and buffalo, of antelopes, and of the two-horned rhinoceros.

It does not appear that any of the specimens exhibit improvements of size or texture, as the consequence of modifications in the food or habits of the species, superinduced to that end by the art of man. The functions of the Jury, in judging between degrees of excellence as the consequence of human ingenuity and skill, find no exercise in regard to the present class of raw materials, and the

Jury therefore limit themselves to the above notice of some of the more remarkable collections and specimens of horns and antlers.

#### IVORY.

The same considerations necessarily limit the functions of the Jury in regard to the tusks of animals presenting the modification of dental substance to which the term 'ivory' is applied. Fine ivory, distinguished by the decussating curved lines on the surfaces of transverse fractures or sections of the tusk, is peculiar to the African and Asiatic elephant, amongst existing quadrupeds, and the best is obtained from the wild individuals; domestication of the elephant, in India at least, having been usually attended by deterioration of the length and quality of the tusks.

The finest specimens of elephants' tusks are a pair weighing 325 lbs. from the *Elephas Africanus*, obtained from an animal killed near Lake Ngami, in South Africa; each tusk measures 8 feet 6 inches in length, and 22 inches in basal circumference. A single tusk, weighing 110 lbs., from the same locality, is associated with them. These specimens are exhibited by Mr. JOSEPH CAWOOD, to whom the Jury award Honourable Mention.

Messrs. FAUNTLEROY and SONS, Potter's Fields, Tooley Street, exhibit an instructive collection of elephants' tusks in No. 135. The largest of these is from the African elephant, and weighs 139 lbs. Varieties of tusks are exhibited from the Gold Coast, the Gaboon River, Zanzibar, the Cape of Good Hope, Angola, Alexandria, Ceylon, and the East Indies. The mode of implantation of the tusks is illustrated by the skull of the African elephant. Of the tusks which exhibit a dense texture, but have not the engine-turn markings of true ivory, Messrs. Fauntleroy exhibit those of the narwhal, the walrus, and the hippopotamus; and the Jury regard this instructive collection as deserving Honourable Mention.

Fine tusks of the Ceylon variety of elephant are shown in the collection from that country; and several examples of the continental Asiatic kinds are exhibited in the Indian Departments, amongst which may be noticed some tusks of the Siamese elephants, one of which weighs 100 lbs., and shows a fine white compact kind of ivory.

Messrs. BUCHANAN and LAW exhibit from the Cape an elephant's tusk weighing 103 lbs.; and Messrs. HUTTON and SONS show ivory from Dahomey.

#### TORTOISESHELL.

The substance so called consists of certain large horn-like epidermoid plates, which cover in an imbricated or overlapping manner the carapace or back-shell of the marine tortoises or turtles (*Chelone*). The species which affords the most valuable of these plates are the Karet tortoises or imbricated turtles (*Chelone imbricata*, *Chelone caretta*), from which are obtained 5 large plates from the middle of the carapace, and 4 large ones from each side; these plates, 13 in number, are technically called 'blades'; 25 smaller plates are obtained from the margin of the carapace, which are called the 'feet' or 'noses,' in commerce. The other plates collectively are called the 'head' of the turtle.



Fine specimens of 'tortoiseshell' have been sent for exhibition from Trinidad by Lord HARRIS; of these, as well as the specimens sent from Labuan by Messrs. HAMMOND and Co., and those sent from Ceylon, the Jury desire to make Especial Mention.

#### PEARLS.

These precious substances are the result of an excretion in superimposed concentric laminae of a peculiarly fine and dense nacreous substance, which consists of membrane and carbonate of lime. The finest quality of pearl is produced by the bivalve of the Indian Seas, called "*par excellence*" the pearl oyster (*Meleagrina margaritifera*), fine specimens of which are exhibited in the Indian and Ceylon collections.

Pearls of an inferior description, formed in a fresh-water bivalve (*Unio margaritifera*), are exhibited under No. 15, Class I., by JOHN NELIS, of Omagh, county Tyrone, from specimens obtained from the deepest parts of the river Strule, near Omagh. Similar pearls, also found in the *Unio margaritifera*, from the river Ythan, Aberdeenshire, are shown under No. 16, Class I., by Messrs. CORVIE and RAE, of Ellon, Scotland. It is probable that the pearls from this source, collected by the ancient Britons, may have given rise to the statement by Tacitus in his Life of Agricola, of pearls "not very orient, but pale and wan," being among the indigenous products of Great Britain. Pearls similar to those from the *Unio margaritifera*, are exhibited under No. 41, Sweden and Norway, by TORSTRUP, from Christiana.

#### MOTHER-OF-PEARL, OR NACRE.

In the Indian collection are shown most of the shells which yield the manufacturer the finest kinds of nacre; these are the *Meleagrina margaritifera*, *Haliotis gigas*, *Haliotis iris*, and a large species of *Turbo*, which shells are known in commerce as flat-shells, ear-shells, green snail-shells, buffalo-shells, Bombay shells. The mother-of-pearl is the internal or nacreous layer of such shells.

Fine specimens of some of these shells from Singapore and Manilla, especially the great *Meleagrina* and *Haliotis*, are exhibited by Messrs. FAUNTLEROY, under No. 135; and by Mr. BANKS, under No. 287, Class XXII., in connection with the manufacture of mother-of-pearl buttons. As no specimens, however, of this raw material exhibit improved qualities as the result of human skill or ingenuity, the Jury limit themselves to the Honourable Mention of the largest and most instructive collection, which will be found in the Indian Department.

#### CAMEO-SHELLS AND CORALS.

Specimens of cameo-shells (*Cassis rufa*), species of *Cypræa*, and of shells used as ornaments by certain natives of India, with the rude but efficient instruments for cutting them, are shown in the Indian collection.

Shells adapted for cameo-cutting are dense, thick, and consist of three layers of differently-coloured shell-material. In the *Cassis rufa* each layer is composed of many very thin plates—in other words, is 'laminated'—the laminae being perpendicular to the plane of the main layer: each lamina consists of a series of

elongated prismatic cells, adherent by their long sides. The laminae of the outer and inner layers are parallel to the lines of growth, while those of the middle layer are at right angles to them. In the cowries (*Cypræa*) there is an additional layer, which is a duplicature of the nacreous layer formed when the animal has attained its full growth.

One of the finest examples of the red coral (*Corallium rubrum*) is exhibited by Messrs. PARAVAGUA and CASELLA, under No. 84, Class XXIII., in connection with cameo-work and carving in coral. The Jury desire to award to these exhibitors Honourable Mention for the branch of natural rough coral above referred to.

The Jury desire also to make Honourable Mention of the coral exhibited under No. 1, MAITLAND MINES, from the Cape of Good Hope: and of the specimens of coral shown by Messrs. REFFAELLI and SON, under No. 69, Tuscany. Specimens of red coral are exhibited in the collection from Algiers. A fine collection of both corals and madrepores, including the black flexible coral (*Gorgonia*), is shown by R. TUCKER and Co. (Bermuda), for which the Jury award Honourable Mention.

Specimens of cameo-shells, of shells used as ornaments by certain natives of India, with the rude but efficient instruments for cutting the shells, and several kinds of coral and madrepores are shown in the Indian collection.

#### SPONGES.

Of the numerous varieties of the common flexible sponge (*Spongia officinalis*) shown in different departments of the Great Exhibition, the Jury select first for Honourable Mention the specimens exhibited in Tunis, by SOLYMAN ESSADDY, under the Nos. 73, 74, and 75. They likewise desire to distinguish in the same manner the samples of sponges shown by B. PAVLIDES, No. 12, Greece, from the Gulf of Nauplia; the sponges shown by MM. THIEME-WIDTMARKTER and PUESCHEL, No. 4, Saxony; and those shown by F. WINKLER, No. 31, Prussia.

Very large and fine specimens of sponges are also shown in the collection transmitted from the Bahamas.

#### SPONGIO-PILINE.

The substance so called, of which the patent epithems for medical, surgical, and veterinary purposes are fabricated, is exhibited under a great variety of ingenious and useful forms, especially for applying heated fluids to the body in lieu of poultices and fomentations: and the Jury have pleasure in awarding to the inventor, manufacturer, and exhibitor, M. MARKWICK (114), the Prize Medal.

#### GOLDBEATERS' SKIN.

This substance is the peritoneal or serous membrane separated from the intestinal tube of the ox, and sometimes of other animals; it is attenuated by being beaten with a hammer, and subsequently prepared so as to resist putrefaction. The Jury desire to make Honourable Mention of the instructive series of this material in various conditions, exhibited in No. 108, by FREDERICK PUCKRIDGE; and also in No. 104 Class XXIII., by E. S. MARSHALL.

C.—AS AGENTS IN THE MANUFACTURE OF VARIOUS  
ARTICLES.

GELATINES AND ISINGLASS.

The raw materials chiefly used in manufactures derived from the gelatinous texture of animal bodies may be divided, as regards their commercial value and application, into two kinds:—

1st. The gelatines and glues, properly so called, derived from the dissolution of certain animal tissues, and especially from the waste residue of parts of animals which have served for food, or for the operations of tanning, or for the fabrication, as from bones, of articles in imitation of ivory, or from the waste particles in the carving of ivory itself.

2nd. The cleansed and dried membranes of different species of fish, more especially of the sturgeon family (*Acipenseridæ*), preserving a peculiar texture, on which their value in the refining of fermenting liquors more especially depends; such membranes are called isinglass.

GELATINES AND GLUES.

The most remarkable progress in the extraction and preparation of gelatines and glues, from the waste remnants of hides and skins, bones, tendons, ligaments, and other gelatinous tissues, has been made in France, in which country the well-arranged and systematic establishment for the slaughtering of the cattle, sheep, and horses, in the large towns, give great facility for the economical application of all the parts of animal bodies.

*France.*

No. 247. L. F. GRENET.—Amongst the most beautiful productions of this industry in France are the specimens exhibited under the above number, which have been specially noticed in the Section of the Report on the Awards of the Council Medal, that distinction having been recommended by the Jury to their ingenious inventor.

Many manufacturers in France have risen to great eminence in this line by following the processes of M. Grenet.

H. CASTELLE, of Paris, exhibits (No. 107) a still more varied assortment of the modifications of gelatine, amongst which are particularly deserving of notice the very large sheets of transparent gelatine, colourless, white, of various well-defined colours, and embossed or stamped with elegant patterns. Taking into consideration the variety and perfection of these modifications of gelatine, the Jury award to Mr. Castelle the Prize Medal.

No. 496. D'ENFERT BROTHERS; No. 960. V. PITOUX; No. 1302. N. LE CLERCQ; No. 1461. J. C. A. ROYER; No. 1624. HERVÉ BROTHERS; No. 774. BOUASSE, LEREL, and Co.—have exhibited beautiful collections of glues and gelatines similar to the foregoing, and applicable to all the purposes for which a pure, colourless, inodorous gelatine is adapted. MM. COIGNET and SON, of Lyons, fabricate, from bones and various other animal remains, considerable quantities of glues and gelatines, good specimens of which are exhibited, to-

gether with other chemical products of animal bodies in No. 1153. The Jury regard the above-named exhibitors of gelatines and glues as worthy of Honourable Mention.

MM. REISS DE DREUZE, of Meurthe, and M. FAUSSEMAGNE, of Lyons, merit notice for their excellent gelatines from bones and isinglass for the purpose of dressing various stuffs and cloths.

No. 376. The COMPANY of BOUXWILLER (Bas-Rhin) exhibits gelatine in small plates, much esteemed for various preparations or dressings; it is extracted from the bones from which the same Company obtains phosphorus and phosphates of lime. This Company, No. 1214, MM. ESTIVANT BROTHERS, and No. 1272, HUBERT and Co., who exhibit excellent specimens of glues, are severally, in the opinion of the Jury, deserving of Honourable Mention.

### *England.*

The greater part of the gelatinous products exhibited by the English manufacturers is prepared from isinglass, and chiefly applied to articles of food. The commercial qualities of isinglass are instructively shown in the collection exhibited under Nos. 117, 118, and 141. Some exhibitors, however, show excellent glues and gelatines obtained from various residues of animal bodies, and destined for manufacturing purposes.

Mr. MULLER (No. 125A) has exhibited a fine assortment of glues and gelatines, analogous to the products of M. Grenet; but a part of his fine gelatine in threads, for confectionary purposes, appears to have been obtained from isinglass. This is deserving of Honourable Mention.

M. DUFAVILLE (125) shows a beautiful sample of amber-coloured, transparent gelatine in shreds, called 'crystalline,' from its glittering surface; and also good filaments of isinglass for culinary purposes. Messrs. WATT and SON (No. 120) exhibit fine specimens of glue obtained from the refuse pieces of hides and skins. Mr. JAMES VICKERS\* (No. 117) exhibits a rich variety of specimens of isinglass in the different raw states in which it is imported, and in all the states of its preparation for the various applications for which it is sold. The variety of colours of the different kinds and parts of isinglass are exemplified in elegant forms and arrangements of this material. Messrs. DAWSON and MORRIS (No. 118), and Class III., No. 141, Mr. GLASS, have exhibited good specimens of isinglass, dried, beaten into layers, and cut into threads, exhibiting care and skill in the latter kinds of preparation. The Jury desire to make Honourable Mention of each of the above exhibitors. The Jury also deem worthy of Honourable Mention the beautiful specimens of refined gelatine, exhibited by Messrs. SWINBORNE. The more opaque filamentary specimens resembling isinglass appear, from microscopic and chemical tests, to be refined gelatine, from which the shining surface has been removed by a process of damping. This is a good material for the purposes of the confectioner, but is not adapted for clarifying white wines and beers, like true isinglass.

\* This Exhibitor was awarded a Prize Medal in Class III.

*Canada.*

Mr. A. MACFARLANE (No. 124) exhibits good specimens of glue of the deep brown semi-transparent kind, adapted for cabinet-work, and deserving Honourable Mention.

*Zollverein.*

Three manufacturers here exhibit specimens of the present class of raw materials. One of these, J. G. LOOSEN, of Cologne, No. 336, shows a fine specimen of an esteemed and long-known article called 'Cologne glue' (Colle de Cologne), which was the best kind of glue prior to the recent advance in the manufacture of gelatine, and which is still highly esteemed by the joiner and cabinet-maker. The Jury deem it deserving of Honourable Mention.

M. A. FEIGENSPAN, of Mühlhausen, *Saxony*, exhibits specimens of gelatines of the Dutch and Givet kinds, of the ordinary qualities.

The samples from *Belgium*,—No. 93, H. BIHET of Liège, and No. 94, H. G. HANSOTTE DELLOYE, of Liège, consist of glues in thick, reddish, transparent plates, presenting the characters of good 'Givet glue,' and deserving Honourable Mention.

From *Portugal* has been sent (No. 627) specimens of glues of an inferior quality and putrescent odour. The specimens (Nos. 625 and 626) present qualities of the best productions of a gelatinous nature; but the denomination of 'grenetine' under which they are exposed, indicates their French origin.

The specimens (No. 7) from *Sardinia* of glue, in thin plates, betray an inferior quality and putrescent odour.

## ISINGLASS.

This raw material owes the greater part of its commercial value to its special organization, which permits its separation into extremely delicate fibres, capable of operating mechanically in the clarification of white wines and malt liquors. In order to obtain the best isinglass, care must be taken to choose the most suitable membranes of the proper species of fish, and to avoid altering their peculiar tissue in the process of drying and preparing them.

*Russia.*

Under these two relations the products of Russia hold their first rank.

MARIMANOFF and ARMAKOONA (No. 81) display specimens of the best quality of isinglass, consisting of the tissues of the air-bladders of the sturgeon (*Acipenser Huso*), well cleaned, and removed and dried without the texture being affected. The Jury select this Exhibitor as deserving Honourable Mention.

No. 116 presents a variety of isinglass obtained from the intestinal membranes in the form of elongated stripes, made into bundles. This substance, like the gelatines from the tendons, bones, and hides of cattle, serves well for different culinary purposes, and for the same uses in manufactures as fine gelatine from other sources.

*India.*

Amongst the specimens from India there are different kinds of isinglass in the raw state, from species of fishes distinct from those of Europe which commonly afford this substance. The principal of these are from a siluroid fish, the *Polynemus plebeius*, the dried air-bladders of which are exhibited by Dr. M'CLELLAND. (A Prize Medal has been given to this exhibitor in Class III.) They possess the fine fibrous tunic which imparts the clarifying qualities that render isinglass so valuable in the manufacture of white wines and beers; and they are also well adapted for the fabrication of fine gelatines used in manufactures and confectionary.

In the same collection from India are examples of dried sharks' fins, such as are prepared for culinary purposes for the Chinese market; but this raw material is doubtless applicable to the preparation of gelatine for economical and industrial purposes.

## ALBUMEN.

Some excellent examples of this substance, obtained from eggs, dried and manufactured, are exhibited in France (No. 1538) by M. H. ALLÉON, of Annonay, Ardèche, of whom the Jury desire to make Honourable Mention.

## ANIMAL CHARCOAL, BONE BLACK, IVORY BLACK.

The Jury have examined and compared many specimens of these substances, exhibited by different nations, and propose to distinguish by a Prize Medal the charcoal exhibited by J. H. M. VIOLETTE (France 1528), and by Honourable Mention the following:—

No. 555. MM. KUHLMANN BROTHERS, for the specimens of granulated and pulverised animal charcoal, included in their instructive samples of different chemical products.

No. 1422. L. RAUCHER, jun., for his samples of animal charcoal.

No. 699. M. TORDEUX, for his examples of bone black, granulated, pulverised, and of various qualities.

*Portugal.*

No. 629. J. F. PINTO BASTO, for his specimens of animal charcoal, in powder.

*Netherlands.*

No. 20. P. SMITS, for his specimen of animal charcoal.

*Zollverein.*

No. 434. J. WAECHTER, for his granulated and powdered animal charcoal, obtained from the scum of sugar in the process of refining.

*Mecklenburgh-Schwerin.*

No. 6. M. MEYER, for his samples of charcoal.

*Belgium.*

No. 110. B. SEGHERS, for his animal black, bone black, and ivory black.

No. 108. E. VERSTRAETEN, for his specimens of animal black.

*England.*

No. 65, Class XVII. D. CAHN, for his bone black and ivory black.

## D.—FOR PIGMENTS AND DYES.

## COCHINEAL AND CARMINE.

The beautiful red dye called cochineal is obtained from the dried body of an insect (*Coccus cacti*), which feeds chiefly on the *Cactus coccinellifer* and the *Cactus Opuntia*. The female insects, which are wingless, are alone collected, and the different degrees of value attached to them, depend chiefly on the different methods employed to kill and dry the insects. Analyses of the cochineal have yielded chitine, fatty matter, phosphates of lime and of potash, chloride of potassium and carbonate of lime, and the colouring matter to which the name of 'carminium' or carmine is given. The chief use of cochineal is the dying of scarlet: the fine colour which it yields is converted to that tint by means of chloride of tin, called by the dyer 'tin-spirits.'

The following are the specimens of cochineal which, in the opinion of the Jury, demand special and Honourable Mention:—

*England.*

JEWESBURY and Co., No. 66.—Varieties of cochineal from Honduras, Mexico, Teneriffe, Java, and the West Indies.

1. SADLER, No. 76.

*Spain.*

No. 192A. J. B. BERENGUER.

No. 151. M. GOMEZ ALCAIDE.

No. 150. E. MERON.

The culture of cochineal in Spain has extended itself of late years along the sandy and barren coasts of the Mediterranean, and with good success.

Another red dyeing substance called *Grana kermes* is obtained in some abundance from the shrubs of the province of Huelva, which is sold at Valencia at eight reals per lb. The Governor of the province of Huelva has transmitted a specimen of this kermes, of which the Jury desire to make Honourable Mention.

*Algeria.*

No. 28. M. HARDY.—The Jury award Honourable Mention to this exhibitor for his very promising specimens of cochineal from that young colony.

Finally, amongst the animal raw products the Jury desire to select for Honourable Mention the specimens of guano from the Cape of Good Hope, exhibited under No. 37 by J. SEARIGHT, No. 50 by A DE PASS, and that from Van Diemen's Land, No. 255, by J. MILLIGAN.

RICHARD OWEN, *Reporter.*

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