A hand-book of Indian products : art manufactures and raw materials / [T. N. Mukharji].

Presented to J. E. O'conor Esq. with the author's best respects.

A HAND-BOOK OF INDIAN PRODUCTS,

(ART-MANUFACTURES AND RAW MATERIALS,)

BY

T. N. MUKHARJI,

Author of "A Rough List of Indian Art-ware" and "A Descriptive Catalogue of Indian Products contributed to the Amsterdam Exhibition."

PUBLISHED BY

J. PATTERSON.

Calcutta:
PRINTED BY C. J. A. PRITCHARD AT THE "STAR" PRESS,
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1883.

Price Rs. 2

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Calcutta International Exhibition, 1883-84.

ECONOMIC SECTION.

Statement showing the properties of articles of a Native Dietary, by Kanny Loll Dey, Rai Bahadoor, F.C.S., F.S.Sc.

Note.—English names are in Small Capital letters; Native names in **Antique** type; and Scientific names in *Italics*.

	ARTICLES OF FOOD.	Average per centage.			
		Flesh-formers.*	Heat-givers.†	Mineral-matters.‡	Watery and fatty matters.§
Amylaceous.	Rice, **Chal**, *Oryza sativa*	7	78	1	14
Amylaceous.	Arrow-root, **Arraroot**, *Maranta arundinacea*	4	82	1	13
Amylaceous.	Sago, **Sagu**, *Sagus lævis*				
Amylaceous.	Water-Caltrop, **Pani-phul**, *Trapa bispinosa*				
Amylaceous.	Potato, **Alu**, *Solanum tuberosum*	2	23	1	74
Saccharine.	Sugar, **Chini**, *Saccharum officinarum*	0	100	0	0
Oleaginous.	Butter, **Ghee**, *Butyrum*	0	100	0	0
Fibrinous and Albuminous.	Wheat, **Gam**, *Triticum vulgare*	13	72	2	13
Fibrinous and Albuminous.	Maize, **Janar**, *Zea mays*	9	75	2	14
Fibrinous and Albuminous.	Great Millet, **Jaware**, *Sorghum vulgare*	9	74	1	16
Fibrinous and Albuminous.	Spiked Millet, **Bajra**, *Penicillaria spicata*	10	73	2	15
Fibrinous and Albuminous.	Little Millet, **Kangni**, *Panicum miliaceum*	12	70	1	17
Fibrinous and Albuminous.	Oats, **Jai**, *Avena sativa*	11	69	3	17
Fibrinous and Albuminous.	Barley, **Jab**, *Hordeum hexastichum*	11	72	2	15
Fibrinous and Albuminous.	Fish, **Mach**, *Piscis*	14	7	1	78
Fibrinous and Albuminous.	Meat, **Mangsha**, *Carnis*	22	14	1	63
Caseinous.	Gram, **Chullar Dal**, *Cicer arietinum*	19	62	3	16
Caseinous.	Pigeon Pea, **Arahar Dal**, *Cajanus indicus*	20	61	3	16
Caseinous.	Common Pea, **Matar Dal**, *Pisum sativum*	25	58	2	15
Caseinous.	Lentils, **Musur Dal**, *Ervum lens*	24	59	2	15
Caseinous.	Vetch, **Khesare Dal**, *Lathyrus sativus*	28	56	3	13
Caseinous.	Chowlee, **Barbati Dal**, *Dolichos sinensis*	24	59	3	14
Caseinous.	Green Gram, **Mug Dal**, *Phaseolus mungo*	24	60	3	13
Caseinous.	Phaseol, **Mash Kalaya Dal**, *Phaseolus radiatus*	22	62	3	13
Caseinous.	Green Peas, **Karie Shooti**, *Pisum sativum*	7	36	2	55
Caseinous.	Milk, **Doodh**, *Lactis*	5	8	1	86

* **Flesh-formers** are *nitrogenous* matters, which supply nutriment and form the tissues of the body. The nutritive or flesh-forming parts of a food are called *fibrine, albumen,* and *casein*: they contain the four elements,—*carbon, hydrogen, nitrogen,* and *oxygen*,—in exactly the same proportions, and are found both in vegetable and animal food. Fibrine may be got either by stirring fresh-drawn blood, or from the juice of a cauliflower; albumen, or white of egg, from eggs, from cabbage-juice, or from flour; casein, or cheese, exists more abundantly in peas and beans than it does in milk itself. Both the animal and vegetable casein puts a great strain on the digestive functions to convert it into fibrine and albumen. Vegetables are the true makers of flesh.

† **Heat-givers**, or *carbonaceous* food, consist of starchy, saccharine, and oleaginous matters, which supply fat and heat to the animal system.

‡ **Mineral matters** supply the various salts which enter into the composition of the blood and tissues. These salts are iron, phosphate of lime and potash, carbonate of lime, fluoride of calcium, phosphate of magnesia, chloride of sodium and potassium, sulphates, silica, and manganese.

§ **Fatty matters** are only present in minute traces, the remainder being water.

PREFACE.

THE Hon'ble Colonel S. T. Trevor, R.E., Vice-President of the Calcutta International Exhibition, while inspecting my collection of Indian Raw Produce, expressed a wish that a short description of the articles should be placed within the reach of the visitors at the above Exhibition. This little work is the result of that wish. In the course of my official work, I have often had occasion to find that the general public greatly feel the want of a Hand-book of information relating to the products of India as a whole, a sort of index to the many valuable works contributed by eminent authors, but most of which relate to a particular portion of the country or a particular branch of the subject. The labours of Roxburgh, Balfour, Hooker, Drury, Royle, Brandis, Gamble, Stewart, Birdwood, Baden-Powell, Bidie, Kipling, Murray, Watson, Hunter, Atkinson, Liotard, Kanny Loll Dey, Udai Chand Dutt and many other well-known experts on Indian manufactures and raw products have done much towards informing the European nations about the developed and undeveloped resources of India, but, as I have just remarked, the valuable information collected by these able writers either relates to particular branches of the subject, or is mixed up with geographical, historical and other matters, or is contained in works too voluminous to form a key for casual enquirers, rapid tourists or busy merchants. In the latter part of the last year, therefore, I made an attempt to supply this want, and brought out a "Rough List of Indian Art-ware," which was so well received by the public that a second edition of it was required within three months after the first edition was published. In the beginning of the present year I took up the economic produce, and commenced a dictionary of raw materials.

This work is now in worthier hands, *viz.*, that of Dr. George Watt, M.B., of the Bengal Educational Service. But as this dictionary has not yet been completed and will not include "Art-manufactures," I have considered it advisable to place in the hands of the public a smaller work, a sort of Index to the manufactures and raw materials of the great continent of India. The object of this work is to interest European visitors at the Exhibition in the old Indian arts, which of late have so much attracted attention for the beauty of their design, the excellent selection and arrangement of colours, the minuteness of patterns and the high "finish" displayed in their execution, and to invite the attention of mercantile gentlemen to the innumerable raw materials which abound in every part of India many of which are capable of being developed into articles of commerce.

T. N. M.

CONTENTS.

INTRODUCTORY REMARKS.

THE vast continent of India lies between the 8th and 35th degrees of north latitude and between the 56th and 100th degrees of east longitude. It has an area of about 1½ millions of square miles and a population of 254,000,000.

By the inscrutable decree of Providence this ancient country has become a dependency of Great Britain, thus bringing it into contact with the high civilisation which the western nations have, by rapid strides in science and literature, acquired during the last few centuries. The indomitable energy of the northern people, in whose hands the future destiny of India has been entrusted, has at length awakened the numerous nations that inhabit India from the dull apathy in which they slept for more than a thousand years after an age of work and progress. New life has now been imparted to this old country, the cry for progress and advancement has again been taken up with fresh vigour, and the people are daily awakening to a sense of their importance and are ready to take their place among the nations of the world. Englishmen look with pride upon this, their noblest achievement of a hundred years' administration.

But much yet remains to be done. It is true that the heart-rending turmoils which preceded the dissolution of the Muham-

madan empire have given place to a universal peace, that even-handed justice is distributed among all classes of the people, that education has reached even the lowest of the low, and that roads, railways and telegraph lines traverse the length and breadth of the country. But the mass of the people are still as poor as they were in the worst times of the Hindu or Musalman rule. The wonderful works of art, which their ingenious hands are capable of turning out after generations of uninterrupted study aud practice, are dying out for want of encouragement ; vast areas of land suitable for the growth of tea, coffee, indigo, tobacco, wheat and other crops, for which an almost unlimited market can be found in Europe, America, or Australia, still lie uncultivated ; mother earth still retains in her bosom coal, iron, copper, gold and even diamonds and precious stones, unworked and uncared for. Providence has interwoven the interests of India and England, and it seems that all these inexhaustiblo sources of wealth are waiting to be developed by English energy and English capital to the mutual benefit of both the countries. Thus the admirable manufactures of India wait to be introduced to the western markets by European merchants ; the fertile soils of the Alpine and tropical India wait to give up their wealth to European capital and European perseverance ; and the mineral resources wait to be utilized with the help of the newest scientific appliances. Fortunes lie scattered all over India, ready to be picked up by those who have eyes to see them, and the energy and the means to acquire them. The object of this little work is to draw the attention of enterprising capitalists, merchants and traders to the unlimited recources which India possesses. With this view it is divided into the following two Sections :—

I.—Art manufactures of India suitable for being introduced into the European markets.

II.—Raw materials, already known in commerce, or suitable for being developed into articles of trade.

SECTION I.

Art Manufactures of India.

For administrative purposes India including British Burma has been divided into eight great provinces, *viz.*, Bengal, North-Western Provinces *cum* Oudh, Punjab, Central Provinces, Bombay, Madras, Assam and British Burma. Contiguous to, or intervening these Provinces, lie various Native States connected more or less with the British Government by treaty engagements, of which some are ruled by independent sovereigns like Nepal and Bhutan, while others are semi-independent possessing the power of life and death over their subjects, like Kashmir, Hyderabad &c. Others are classed only as petty chiefships. At the International Exhibition, the Indian art manufactures have been grouped into sections, called Courts, allotted to each of the above provinces, separate Courts being set apart for the larger native states. It will therefore be convenient to describe the art-manufactures of each province separately, instead of taking India as a whole. I will therefore commence with

(1) Bengal.

The tract of country under the administration of the Lieutenant-Governor of Bengal comprises the three Provinces of Bengal Proper, Behar and Orissa, and has a superficial area of 157,598 square miles with a population of 66 millions. Being at the furthest end of the first Aryan settlements in India, and distant from the original seat of Indian civilization, the arts and manufactures in this Province did not, except in a few cases, attain that high state of perfection for which Northern India is so justly famous, although from remote antiquity, its fate has been to play a very important part in the political history of the whole country. It was in Behar that the great Buddha, whose teachings are now followed by half of the human race, first preached the doctrine of universal love as the groundwork of his religion. It was here that the sage-king

Asoka reigned, whose empire extended far beyond the frontiers of India, and whose edicts, engraved on rocks and monumental obelisks, still bear testimony to the earnest solicitude for the welfare of his subjects, which characterised his rule. It was here that the mighty Chandragupta held sway, who dictated terms of peace to Seleukos and turned the tide of Greek conquest after the death of Alexander. On the opposite side of the Province, in Orissa, the shrine of Jagannath, built 700 years ago, still rears its head in proud defiance of the slanders cast upon it by prejudiced unbelievers, where millions of sinners every year get rid of their sins by paying homage to the spiritual symbol of the Lord of the World, a lump of wood having neither hands nor feet, intended to be a silent protest against the idolatrous practices all around, and where the lowest of the low can meet unabashed the highest of the high in terms of perfect equality. In Bengal Proper the great Chaitanya was born, who 400 years ago rescued one fifth of the population of the province from utter degradation to which it had fallen from the accumulated superstitions of centuries, by inculcating a high standard of morality and the doctrine of love both for God and His creatures, as the surest road to salvation. And lastly it was in this province that the first stone of the noble edifice, the British Indian Empire, was laid. The people of the province, though physically an inferior race owing to the peculiar nature of the climate, the food and the social customs, are one of the most intelligent nations of the world and occupy among the Indian people the foremost rank in education and progress and for which they are justly called by some European writers the "Athenians" of the east. Although the manufactures of Bengal are not of a varied character, still a high excellence was attained in certain branches, in which to this day the Bengalis have not been surpassed by any nation in the world. The muslins of Dacca, the silks of Murshidabad, the ivory carving of Sylhet and the filigree work of Cuttack commanded the

admiration of the ancient Persians, Grecians and Romans and formed important articles of trade in that remote antiquity. The machine made prosaic but cheap manufactures have now, however, come in competition with the more valuable poetry of art, and the result has simply been disastrous to the latter. The old Dacca muslin has disappeared from the face of the earth, and even that long-stapled cotton, the superior quality of which was achieved by continual selection of seed and improved culture extending through ages, and which alone could yield the soft fine yarn required for the manufacture of the true Dacca fabrics, has nearly again fallen back to its primitive condition and is now known as the Garo and the Khasia Hills cotton, What still remains of the true art in India can only hope to live from the revival of æsthetic principles that seem at present to be dawning in Europe and America. After these preliminary remarks, I will now give a short description of the several kinds of art manufactures for which the province of Bengal is famous, and of which specimens will be found in the Bengal Court at the International Exhibition.

Dacca Muslins.—The inventive faculty, the perception of beauty and the high intellectuality of the Indian people are no where better illustrated than in the manufacture of the various kinds of cotton, silk and woollen fabrics for which India has been justly famous from prehistoric times. Among the cotton manufactures, the fabrics known as the Dacca muslins were held in high repute from very ancient times, and when the Roman empire was at the zenith of its power large quantities of it were annually exported to Western Europe by way of Egypt and Asia Minor. Later on, the manufacture received a great impetus on account of the high demand for it in the harem of the Kaliphs of Bagdad, where for some centuries the wealth and splendour of the world were concentrated. The muslins of the finest kinds were known by

the name of "Ab-rawan" or the "Running water" and "Shabnam" or the "Evening dew." They were of such a delicate texture, that as their name implies, they could not be distinguished from pure water when wet. Three hundred years ago a piece of "Ab-rawan," fifteen feet by three feet, could be made so fine as to weigh only 900 grains, but now a cloth of the same dimensions cannot be made without doubling the weight. The Ab-rawan and Shabnam of the present times occupy the second and the third place among the Dacca muslins in point of quality, the foremost place being given to the fabrics known as the *Shaugati* meaning "Presentation" and *Sharbati* or "Cold drink" and *Malmal Khás* or the "King's muslin." A piece of finest quality, measuring 20 yds. long by 1 yd. wide, can be made to pass through a finger ring : it can not be made in less than six months, and its value will be Rs. 300 or £25. A turban consisting of 30 yards of such a muslin placed within a cocoanut shell not larger than an ostrich egg was, according to Travernier, presented to the king of Persia by his ambassador in India on his return home. In delicacy of texture, in fineness of web, the Dacca muslins have not as yet been surpassed by the highest qualities of the machine-made mannfactures of Europe. Dr. Forbes Watson, one of the greatest experts in Indian products and manufactures, thus states his opinion on the subject :—"However viewed, therefore, our manufactures have something still to do. With all our machinery and wondrous appliances, we have hitherto been unable to produce a fabric which for fineness or utility can equal the "woven-air" of Dacca, the products of arrangements which appear rude and primitive, but which in reality are admirably adapted for their purpose." The prices for a piece, 20 yards long 1 yard wide, vary from Rs. 40 to Rs. 300 for first second and third class of muslins. The other kinds of fabrics made at Dacca are *Duria* with stripes of a thicker texture than the body of the fabric, *Báchádár*, *Dokiná* and *Saktá* with

white stripes, *Churidár* with coloured stripes, *Charkháná* or checked muslins, supposed by some to be the *diakrossia* in the "Periplus of the Erythrœan Sea," which has been rendered into "Striped" by Appolonius. The prices of these muslins vary from Rs. 10 to Rs. 20.

The only other place of note where muslins are manufactured in Bengal, is the town of Santipur in the Presidency District of Nadiya. Formerly the East India Company had a large factory in this place, and a considerable amount of cotton fabrics was annually manufactured for export to Europe. Since the time the East India Company gave up their trade, on acquiring the sovereignty of India, the manufacture of muslins at Santipur declined, and the weavers of the present day chiefly confine themselves to making cloths called *Dhotis, Sâris* and *Chadar*, suitable for native dress both for men and women.

Such cloths are also made in many other places, as Chandernagore, Howrah, Radhanagar, and Chandrakoná in the Midnapur District, Pabna &c. These manufactures do not possess such a special quality as to require a detailed notice, but some of the dyed ones, especialy those made in the Burdwan District and brought to the Howrah market, on the other side of Calcutta, are for their subdued native colours, valued by Europeans for making curtains. They sell very cheap, being Rs. 1-8 or Rs. 2 for a 5 yard piece.

Of other cotton manufactures in Bengal may be mentioned the table cloths, towels and napkins made at Dinapur near Patna. These are of various patterns, the mat-pattern, the damask-pattern and the birds-eye-pattern being the most preferred. The table cloths are sold from Rs. 5 to Rs. 12 each, and towels and napkins from Rs. 1-8 to Rs. 24 per doz.

Curtains and floor cloths of various kinds are made at Birbum, a place about 100 miles distant from Calcutta by the East Indian Railway. Those made by prison labour at the Midnapur Jail have acquired some celeberity. These are of

several patterns and of various colours, and there is a large demand for them in Calcutta and other places where Europeans reside. The price for a curtain 6ft. sq. is Rs. 6.

Darri or *Satranji* is a cotton floor cloth checked generally with blue and white. It is largly used both by Europeans and well-to-do natives for its great permanency. The best kinds are very handsome and sell at Rs. 1 to Rs. 1-8 per sq. yd. In Bengal, Darris are chiefly made at Rangpur, Purnia and Bhagalpur, but the best sorts are chiefly imported from Agra, a large town in the N.-W. Provinces.

Next to cotton, silk fabrics occupy a prominent position in the manufactures of Bengal. It appears from old Sanskrit books that silk was known to the Hindus from very ancient times, and both China and India exported large quantities of silk to Europe. In the last century the East India Company had silk filatures all over the country, and the produce of these factories formed one of the most lucrative articles of their extensive commerce. The principal kinds of silk cloths now made are the ordinary Bengal white silk known as *garad,* the unbleached silk known as *kora,* the *tasar* or the wild silk, the *eria* or the produce of the Attacus Ricini which feed on castor plant, and the strong *muga* silk of Assam. In the common domesticated silk of Bengal there has been much deterioration in quality of late years, and the trade has much suffered in consequence. The Districts where the rearing of the silk worm is carried on are Midnapur, Burdwan, Birbhum, Rajshahi, Murshidabad and Malda. The kora and garad silk cloths of Murshidabad and Malda have a good reputation. Tasar silk is chiefly found in the hilly districts of west Bengal. It has attracted much attention of late, and experiments made at Lyons and other places to fix a permament color on the cloth have met with success. The Tasar silk for its durability and cheapness seems to have a great future before it. The eria silk is

produced in the sub-Himalayan districts, chiefly by the aboriginal people called Kochs and Mechs. The Muga is perhaps the strongest silk known : a piece of cloth made of it is said to last for two or three generations. Silks are dyed of various colors such as the *Dhup-chháyá* or " sunshade," *Mayur-Kanthi* or " peacock's neck," *Lal-asmani* or " red sky color," *Lal-Maujlahar* or " red ripple," *Mayur Kanthi Maujlahar* or " peacock neck ripple," *Chauka-Maujlahar* or " chequered ripple," *Duregarad* or " striped " &c., &c. Poetical epithets have been given to various fancy pattern cloths, such as the *Chandtara* or " moon and stars," *Shutiphulal* " flower threaded," *Panchpát* or " five leaved," *Jhilmili* or " gauze-like," *Lahera* or " wavy," *Phulál* or " flower like " &c. Silks printed with the names of gods and goddesses are called *Namabalis.* The price of a plain piece of unbleached silk or kora of common quality, 18 yards by 1 yard, is Rs. 16, of medium quality Rs. 28, of best quality Rs. 40. A piece of white silk, 10 yards by 40 inches, costs about Rs. 20. Dyed silks, 5 yards long by 42 inches in breadth, are sold at from Rs. 6 to Rs. 12. Tasar silk, 4 yards long 1 yard wide, sells at about Rs. 20.

Besides pure silk various kinds of mixed fabrics (silk and cotton) are also made.—These are known as *Bafta,* a plain piece of which, 16 by 1 yard, is sold at Rs. 8, *Sada siraja,* white with cinnamon or orange stripes, *Lal siraja,* red with orange stripes, *Asmani siraja,* green with purple stripes, *Sabji Katar,* green with fine stripes of chequered and yellow, *Bulbul Chasham,* gold color figured with red eyes &c., &c.

Embroidery. No gold or silver embroidery is done in Bengal, as in Benares, Lucknow and Delhi in the Upper Provinces. Silk dresses with embroidered flouncings are sometimes made in Calcutta, but this is by no means an established industry. Muga silk embroidered with hand in Dacca, called Kasidas, was formerly exported in large quantities to Persia, Turkey and Egypt, but since the decline of the Muhammadan power in

these countries, the demand for this description of articles has decreased. Extensive demand has however arisen for the inferior sorts of embroidery, which are extensively woven by the women of the well-to-do classes of natives. The kinds of embroidery best known are as follows;—

Jhapphan is a cotton fabric embroidered either with silk or cotton, and is of very curious patterns, some consisting of a chequered diaper of green lines, the squares being filled in with split pomegranate fruit in maroon and gold colour, while others show "scroll arabesque of birds, insects, foliage, flowers and pomegranate fruit."

Duria is a cotton fabric striped alternately with gold and crimson coloured silk and dark maroon cotton, and embroidered in white cotton with a pattern of running leaves.

The other sorts of embroidery made *in the loom* by a peculiar process, are Karela or gourd-pattern (Momordica chirantia) Toradár or bouquet pattern, Panna hazara or a thousand emerald pattern, or Tercha butadar, oblique striped, Jaldar or net work &c., &c.

Embroidery with silk is also carried on at Santipur chiefly in raising the borders of native cloth. Some of these on black ground are very beautiful and might be used as ornaments in European houses.

Hand embroidery on white cotton called *chikan* work is at present chiefly confined to Calcutta, and is largely used by Europeans for children's clothes. Since the Melbourne Exhibition Chikan work has found great favor in Australia. A baby's robe, with embroidered apron and edges, costs about Rs. 8; handkerchiefs, flouncings for petticoats, yokes and sleeves are also embroidered in this style.

Carpets. Bengal is not a suitable place for the manufacture of woollen carpets, where the number of sheep reared is very small, of which the breed is very inferior, and wool produced is of a very low quality. The climate is such that

woollen carpets cannot last long as in the drier atmosphere of northern India, where carpets 400 years old can still be seen fully retaining their original brilliancy. Considerable attention has however been paid for some years at the Bhagalpur Jail to the manufacture of carpets, and the results have been successful. The patterns turned out are Ali-masjid, New shawl, Old shawl and Old Persian.

A carpet of the last named pattern measuring 10 feet by 8 feet is sold at Rs. 135.

Filigree work. Both Cuttack and Dacca are famous for their silver manufactures. Besides articles used as ornaments, the things made are scent holders, itardan, card-baskets, card-holders, bouquet-holders, purses &c. Considerable ingenuity is displayed in the making of these articles, and they are perhaps unrivalled in minuteness of design. The silver is first purified, then cast into bars, beaten into plates and drawn into wire. Lastly the patterns are formed on pieces of talc, and according to the design thus laid down, the wire is cut and soldered with great delicacy and finish. The work when complete is cleaned with acid, borax and the fruit of *Sapindus detergens* (*Ritha*) which gives it a snow white appearance. The price of a scent-holder is about Rs. 100, and that of a card-case Rs. 20. The articles are generally sold by weight, 100 per cent being added to the value of silver for workmanship.

Silver Jewellery is largely made both in Cuttack and Dacca. The diamond cut bangles, (churis) necklets, bangles, cross, butterfly-hairpin, hair flowers, earrings, solitaires, brooches, buckles, lockets &c. are in high repute and are largely used by European ladies. The patterns are various. For instance brooches are made of ribbon-tie pattern, flower pattern, cable pattern, rose pattern, leaf pattern, bow pattern, snake pattern, cross pattern, elephant pattern &c., &c. A pair of bangles costs about Rs. 16, a gold filigree cross, outlined with elephant hair, costs about Rs. 6, and a chain necklace costs about Rs. 10.

Gold ornaments are also made all over the country, but these are chiefly used by native ladies. The Braziers of Bhawánipur near Calcutta are famous for this kind of manufacture. The articles are generally made to order. Of gold ornaments, the necklet called *chik*, the bangle or *churis* are very handsome.

Bidri ware.—This is a sort of damascened work, the original home of which was at Bidar in the Nizam's territories in South India, hence its name "Bidri." It is said that this sort of metal ware was originally invented by an ancient Hindu king of Bidar, who used them to hold flowers offered to the gods. Since that time the manufacture has been considerably improved both by Hindu kings and their successors, the Muhammadan sovereigns. The ground work is a composition of copper, lead and tin on which gold or silver ornaments are inlaid. Bidri ware has attracted considerable attention from Europeans, and it was highly admired at the Melbourne Exhibition. The only place in Bengal where this ware is made is Purnia, a town in Northern Bengal, but its chief seat of manufacture in northern India is Lucknow. A water bottle called surahi, made at Purnia, costs Rs. 26, a spittoon costs Rs. 10, and a plate costs Rs. 12.

Brass, bell-metal and copper utensils are made all over the country. The natives consider clay utensils as impure, and hence the use of metal furniture instead of china or porcelain. A peculiar sort of superior bell-metal called *khankrai* is made near Murshidabad which is highly prized. The principal brass or bell-metal manufactures made are known as *Lota* a water vessel, *Thal* a platter, *Rekabi* a plate, *Ghati* a drinking pot, *Gelas* a corruption of glass, *Bati* a cup &c. Brass utensils are sold by weight at the rate of 13 annas per lb, and bell-metal utensils at Rs. 2 per lb.

Ivory carvings. The beautiful toys and other fancy articles made of ivory were originally a manufacture of Sylhet, a district of North Eastern Bengal now included in the newly created province of Assam, where large herds of elephants roam to this

day and where elephant tusks were consequently abundant. When in Muhammadan times the seat of Government was transferred from Dacca to Murshidabad, the manufacturers found it profitable to remove themselves to the capital. The industry is declining, owing it is said to the interference of Europeans in introducing European designs in place of the true indigenous patterns. Only about £ 200 worth of articles are turned out annually, and it is said that the number of artisans engaged in the manufacture is not more than one-fourth of what it was 20 years ago. The work is a representative of the finish and minuteness which characterise all true native art, and like the Dacca muslins affords an example of the beatiful and ingenuous things which natives can turn out by using only a few tools of the simplest and most primitive kind. The following is the price of a few typical articles. A pleasure boat, Rs. 55 ; goddess durga Rs. 25 ; a bullock cart Rs. 18 ; a native peasant carrying his plough, Rs. 13 ; a chain with cross pendant, Rs. 10 ; a work box, Rs. 8 ; a scent case, Rs. 3 ; a writing desk, Rs. 8.

Carved and turned ornaments.—Furniture as well as personal ornaments of buffaloe horns, palm and ebony wood and betel-nuts (*Areca Catechu*) are made at Monghir. Cabinet-ware of ebony, inlaid with ivory, has acquired a great celebrity, but the industry does not appear to be a pushing one. A set of personal ornaments made of buffaloe horn or ebony wood, consisting of a necklace, a pair of bracelets, a pair of earrings and a brooch, costs about Rs. 2-8 ; a set of palm wood ornaments costs about Rs. 1-8 ; and that made of betel-nut costs about Rs. 2.

Basket work.—Monghir is also celebrated for its straw and basket ware. The article used for the manufacture is a kind of grass locally known as *Sara* (Saccharum Sara) ; *munj* (Saccharum Munja) ; bamboo (Bambusa arundinacea). These fancy articles are very cheap, extremely handsome, and are in great request. A circular or oval shaped basket costs about 4

annas, a work box six annas, a lady's straw hat eight annas, a fan six annas, a set of fine bamboo table mats Rs. 2; a set of fine munj mat Re. 1.

Such straw and basket-work is also made in other parts of the Province, but the manufacturers of no other place have acquired such a celebrity as those of Monghir.

Connected with the above are the cane chairs of northern Bengal. These chairs are very fancy looking articles and yet very stong and comfortable. They are made at Rangpur, Faridpur, Dacca, Chittagong &c. It is very probable that within a short time a not inconsiderable trade will spring up in this article. Already an order for a consignment of such chairs has been received from Australia. These chairs are made either of bamboo or of rattan cane. The price varies from Re. 1 to Rs. 8 a piece.

A peculiar kind of boxes made of rattan cane is also brought from Chittagong and other eastern Districts. These are very strong and light and are well suited for tiffin baskets. The manufacturers have not yet turned their attention to suit them for European use. With proper encouragement this industry is likely to succeed in becoming an article of foreign trade. An ordinary box used by natives for keeping wearing apparel costs about Rs. 3.

Mats.—The *màdur* mats so extensively used in Calcutta for carpetting floors of European houses is a specialty of Bengal. It is made of a grass (Cyperus tegetum), which grows in damp localities in the lower regions of the Gangetic delta, and is cheap, light, strong and extremely fine-looking. The best sorts are called the *masland* mats, to make which the culms of the grass are split very fine, and the mats when woven are embellished by embroidery or other ornamentation. Masland mats are small in size and only laid on other floor cloths in particular places for sitting or lying upon. They are generally six feet in length by four feet in width, and are sold at Rs. 5 to Rs. 10 a piece according to quality.

Another kind of fine mat is known as the *Sital-pati*, or the cool mat, made from the split stems of *Maranta dichotoma*, a species of the plant from which Arrow-root is obtained. These mats have a very smooth surface, are used in covering beds, and are very cool and refreshing. Ordinary sital pati mats are sold at Rs. 3 a piece, but particularly good ones cannot be had at less than Rs. 20, and the price of the best kinds is even so high as Rs. 50 or Rs. 60 a piece. They are chiefly made in the eastern Districts of Bakarganj, Sylhet &c.

Coir mats are made both at Calcutta and at the Midnapur Jail; those made at the latter place have acquired a good reputation, and are either manufactured of country fibre or the Maldive fibre purchased at Calcutta. A piece of country fibre mat, 45 yards by 1 yard, is sold at 12 annas per yard, and of Maldive fibre at one rupee per yard; small pieces, five feet by 1½ feet, are sold at Rs. 4.

Good Aloe (Agave americana) fibre matting is made at the Hazaribagh Jail. This article is of a very fine quality, strong, durable and suited for covering stairs, aisles of churches, and saloons of ships and steamers. It is sold at Rs. 1-4 per yard.

Clay Models—Models of native life in clay, of full size or in miniature, have of late acquired great celebrity. Five images of this kind were sent to the Amsterdam Exhibition and they proved to be one of the most interesting objects at that Exhibition. A life-sized figure is made for Rs. 35, and a miniature figure is sold at Rs. 4. Jadunath Pal, the maker of the Amsterdam models, has been entrusted with the work of modelling the different races of India to be shown at the Calcutta Exhibition.

One other manufacture of Bengal deserving of mention is the lac-work of Ilambázár, a small town in the Bardwan district. Various kinds of toys and models of fruits, vegetables &c, are made, which are sold at Rs. 3 per dozen.

(2) N.-W. Provinces and Oudh.

The amalgamated province of the N.-W. Provinces and Oudh is bounded on the north by the higher ranges of the Himalayas, on the south by the native states of Rajputana and Central India, on the east by Bengal, and on the west by Panjab. It has a population of about 45 millions. This large province may be roughly divided into two portions, the Doab or the tract of land lying between the rivers Ganges and the Jamna, and the sub-Himalayan valley between the Himalayas and the river Ganges. Both portions were the seat of Aryan civilisation from very early times, and most of the incidents of ancient Indian history were acted here. It was in the town of Ajodhya, near modern Faizabad, that the great Rama reigned, and it was in the north-western part of the province near Mirat and Delhi that the scenes of the celebrated Mahabharata were played. Two of the most sacred places of the Hindus, viz. Benares the oldest city in the world, and Allahabad on the confluence of the Ganges and the Jamna, are within the limits of this province. From these circumstances, the art manufactures in this province attained a high excellence from so remote a time as the first Aryan settlement in the country. They received a further impetus from the encouragement given to them by the Muhammadan conquerors, who also introduced many new industries from countries west of the Indus, which at that age were the seat of civilisation and progress. With these preliminary remarks I will now begin a short description of the principal art manufactures for which the province is celebrated.

Cotton-manufactures. Muslins of a very superior quality were formerly made at Mau in the district of Balia, at Tanda in Faizabad and at Lucknow. In the last place a cloth called *Shar-batti* is made, which can be compared with the finest muslin now made in England, and, although dearer in price, can still hold its ground against the Manchester munufactures for its superior

quality. The industry of muslin manufacture is however on the decline, for country goods have now become only an article of luxury, which the people cannot now afford to have. Such articles were in high demand at the Muhammadan courts of Agra, Delhi, and Lucknow, and the subversion of the Musalman sovereignty on the one hand with the foreign drainage of national wealth as its consequence, together with the competition of Manchester on the other hand, have sealed the doom of the indigenous spinning and weaving industry. The fine cloths woven now are with the English yarn! Hand made cotton fabrics have no chance of revival, and the sooner the people engaged in this industry understand their position the better. They are ignorant, highly conservative, and extremely reluctant to deviate from the path which their ancestors followed. It is therefore desirable both for Government and the mill-owners, who are in want of skilled labour, to afford every encouragement to their emigration to places where cotton mills have been established. In seasons of scarcity, it is these people that suffer first and most the bitter pangs of hunger.

Chintzes. Calico-printing is carried on in almost all the large towns, but extensively at Farukhabad and Lucknow. The prints of the last place are highly prized and form an article of inland export. Coarse native cloths are largely used at Farukhabad, while the finer sorts of English long cloth are printed at Lucknow. The dyes used are chifly native vegetable dyes, *viz.* indigo, safflower, madder (*Rubia cordifolia*) al (*Morinda citrifolia*) and myrabolam (*Terminalia Chebula*). Of mineral dyes, a red ochre called *geru* and a yellow ochre called *Multáni mitti* are largely used. Some of these chintzes owing to their mild colours and peculiar patterns are preferred by Europeans for curtains, mattresses, pillow cases &c., to the more brilliant but fleeting colours imparted to European chintzes by aniline dyes.

Of dyed fabrics, the most important are the spotted cloths

called *chunris*, and the red cloths known as the *Sálu* and *Kharuá*. *Chunri* cloths, made chiefly at Brindában, are dyed by a very curious process; the parts to be dyed being knotted, which when untied produce patterns of various kinds—flowery ornaments and even figures of men and animals. In dyeing the red cloths, the root of *Al* (*Morinda citrifolia*) is used, which yields a dull crimson colour. The finer sorts called *Salu* are made at Cawnpore and Kalpi, while the coarse country cloths, called *Kharua*, are chiefly made at Mauránipur in the District of Jhansi.

Dyeing cloths in brilliant colours, which are worn by women, is practised all over the country. The men who are engaged in this trade are called the Rangrez, as distinguished from the Calico-printers who are known as the Chhipigar. The colours used are mostly indigenous, of which the principal are indigo, safflower, turmeric, pomegranate rind, sappan wood, lodh (*Rottlera tinctoria*), kamila (*Mallotus Phillipinensis*), tun (*Cedrela Toona*), tesu (*Butea frondosa*), and myrabolam (*Terminalia Chebula*). Aniline dyes have also come into use, but the colours produced by them are not so fast as native dyes.

Embroidery. The art of embroidery is extensively carried on in the towns of Benares and Lucknow, where silver brocades and lace are also made. The embroidery is made either with cotton or silk thread or with gold-gilt silver wire mixed with a percentage of silk. Those made of cotton thread on cotton cloth are known as *chikan*, and those of silver wire on velvet are known as the *kalabatun* work. The floral patterns in gold and silver on blue velvet ground produce a very beautiful effect. A piece of brocade, crimson ground with gold embroidery of Benares cloth, sells at about Rs. 150, and a piece of silk gauze with gold figured diagonal stripes costs about Rs. 30. Of Lucknow work a mantel piece border costs about Rs. 400, a pair of slippers Rs. 30, and a piece of brocade Rs. 60.

Carpets. The carpets made in these provinces are of five

kinds of which four are cotton and one wool. The different sorts of cotton carpets are known as *Farsh* or *Jazim*, a coarse cotton cloth dyed with red or yellow ochre on which floral patterns are printed generally with sulphate of iron. *Darris*, a cotton carpet woven in thick yarn generally dyed blue in indigo, with horizontal red stripes of yarn previously dyed red with sappan wood, red ochre or Al (*Morinda citrifolia*). The principal seats of *Darri* manufacture are Agra and Aligarh. Carpets of this kind in small size (say 6×3) are called *Darris*, while those of larger dimensions are all called *Satranj*. *Dosuti* is a thinner kind of *Darris* made at Bareilly and other places. The fourth kind of cotton carpets is known as the *Dulichas*, which are not properly woven but stitched in the same way as the woollen carpets are done, and are chiefly made in the Mirzapur District. Woollen carpets and rugs of a very superior quality are made at Mirzapur, the Allahabad and Agra Jails, and in the town of Jhansi. They are exported to Europe and America, are greatly admired and have repeatedly won gold and silver medals at various foreign exhibitions. Some idea may be given here of the price of the two most important of the carpets *viz.* the *Darris* and the woollen carpets. *Darris* are generally sold at Re. 1 to Rs. 1-8 per square yard. A Woollen carpet of common quality, Akbar Shah's pattern, sells at about Rs. 3 per square yard, while a very fine Persian carpet, $18' \times 14'$, sells at about Rs. 700, or more than Rs 20 per square yard.

Jewellery. Native jewellery is made all over the country and these are of the most ordinary type. Gold and silver jewellery are worn by the richer classes, while the women of the peasantry for want of something better are content to use brass, bell-metal, shell, lac, or glass ornaments. Brass ornaments are very heavy, extremely hideous to observers not accustomed to them, and painful to the wearers, though constant use and the pride engendered from their possession, render them insensible to any inconvenience. Diamond cut silver jewellery,

made at Lucknow, has however found favour with European ladies, and been highly admired at the Melbourne Exhibition of 1881. Their price may be stated as follows :—1 dozen bangles Rs. 14; a pair of bracelets Rs. 8; a pendant star Rs. 4. Besides personal ornaments, the other silver manufactures of Lucknow have also a great reputation. These generally consist of scent bowls Rs. 40; mustard pots Rs. 18; goblets Rs. 45; flower pots Rs. 148, each.

Manufactures in Metals. The ordinary metal manufactures chiefly of brass, copper and bell-metal, for every day use in native households, are carried on all over the country. But as these do not belong to "Art-manufactures" and are not anticipated to ever become an article of export trade, although similar ware may some day be imported from England or America or be made here with European capital and European machinery, they do not call for any lengthy description. The most important metal manufactures may, therefore, be considered those which have attracted European attention. These are the Benares brass ware, Moradabad ware and Lucknow Bidri work.

The articles made at Benares are generally plates, water pots called lotas, flower vases, perforated boxes, round or oval trays &c. They are very elegant in shape, and so well-polished as to make them look almost like gold. Europeans generally purchase them by piece, and the prices may be stated as follows:—A water cup Rs. 3; a box Rs. 6; a water jug called surahi Rs. 5; a pair of large vases Rs. 42. But the prices can also be settled by weight, the rate being Rs. 3 to Rs. 4 per seer or 2 lbs.

Moradabad ware is also made of brass and is either plain or "black-engraved" called in vernacular *Siya-Kalamkári.* The latter has found great favour among Europeans, and the industry, which a few years ago was in a declining state, is now in a very prosperous condition. The mode of manufacture is rather curious. The brass is first moulded into the shape of

the article intended to be made. It is then turned and polished in a rough way, and the delicate patterns which are either floral or of geometrical figures, are then engraved upon it. The spaces left between the patterns are then filled with a preparation of lac which gives the surface a permanent blue colour. Lastly the patterns are either wholly or partly silver-plated or left in their original brass or gold colour. A beautiful effect is thus given to the work by the silver and gold patterns on a black surface. The excellence of the Moradabad work depends on the minuteness with which the patterns are executed and the finish which the whole work has received. Moradabad ware is said to be synonymous with the Byzantine and Mediæval Italian work. The prices are high, as owing to the extreme delicacy with which the work has to be executed, it takes a long time to finish a thing. A small water cup costs Rs. 3; a box Rs. 6; a water jug or surahi of superior quality Rs. 45; a tray Rs. 15 to Rs. 20; and a pair of vases Rs. 40.

Lucknow Bidri ware. Bidri ware has already been described in the Bengal section. At Lucknow two kinds are made, one called *zarbuland* on which the patterns, generally of fish, from the late Kings of Oudh being of Shiah persuasion, are raised above the surface, while in the ordinary Bidri ware the patterns are generally floral and are even with the surface. On the black ground, which the combination of copper, lead and tin assumes, the silver or gold patterns look extremely handsome. The prices are for a goblet Rs. 10 to Rs. 30; a spittoon Rs. 25; a flower pot Rs. 10; a drinking cup Rs. 8.

Agra Marble ware. One of the most beautiful art-manufactures of the N.-W. Provinces is the mosaic work of Agra. Three hundred years ago the Emperor Shah Jahán built for himself and his favourite empress a mausoleum on the banks of the river Jamna. This magnificent edifice, which is now reckoned as one of the wonders of the world, is constructed entirely of white marble brought from the quarries of

Rajputana about two hundred miles distant. The marble inside the building is beautifully inlaid with stones of different colours, even with carbuncles and other precious stones. This art has now been extended to the making of plates, boxes, inkstands, &c. Stones of less value and mother of pearl are now used in the inlaying work, and the style of decoration generally floral, with an occasional figure of a bird &c., is the same as that of the Taj. Considerable skill and great patience are displayed in this inlaying work, and the materials used being also valuable, the prices of the Agra mosaic work are high. A table, passion flower inlaid work, sells at Rs. 600; a box Taj pattern Rs. 125; an inkstand Rs. 200; a box Rs. 25 to Rs. 150; a plate Rs. 10 to Rs. 100.

Small trinkets of soap-stone are also largely made at Agra, and owing to their cheap price have a considerable sale. A paper weight sells at Re. 1; a small box at Rs. 2, &c.

At Banda, a town on the South of the Jamna, small trinkets such as knive handles, buttons, paper-knives, paper weights, &c. are made of fragments of granite washed down by the river Ken. These articles are very cheap, a dozen knive handles being sold at Rs. 7, and six pairs of collar buttons at Rs. 3.

Of manufactures in wood, the most noted are the ebony work of Nagina, a town in the Bijnor District in Rohilkhand, the articles made of walnut and other woods at Agra, the white wood work of Saharanpur and the Tarkashi work of Mainpuri. The Nagina ebony manufactures have acquired a great reputation. The wood used is that of *Diospyros melanoxylon*, known in vernacular as the *kend*, a tree found in the Chhotanagpur and the Baghelkhand forests. The ornamented portion is carved out, the patterns being chiefly geometrical figures. The prices are for a tray Rs. 15; a blotting book Rs. 10; an envelope case Rs. 10; a book-stand Rs. 5 &c.

The Agra wood work is not of great importance, walnut s seldom used, some inferior wood being coloured and passed off as

such. The manufactures chiefly consist of looking-glass frames, small round boxes, and toys. The price for a looking-glass is Rs. 3 and of a small box Re. 1. These are not carved.

The white coloured wood used at Saharanpur for making small fancy boxes, looking glass frames, photo-holders &c. is that of *Holarrhena antidysentrica* called Dudhia in Hindi and found in the sub-Himalayan forests. The ornaments are carved, but the wood being soft, the prices are cheap. A box sells at Rs. 5; a glass frame at Rs. 3; a picture frame at Rs. 2.

Mainpuri *Tarkashi* may be classed as one of the superior art-manufactures of India. To such a state did this branch of Indian art fall a few years ago, that but for an accident this beautiful work would have disappeared from the face of the earth and its existence forgotten by this time. Even at present there are not half a dozen people who live by the industry, but it is reviving and its prospects are hopeful, as it has been favourably received by Europeans, the natives being too poor to be able to afford the luxury of possessing such things. The work consists in laying brass wire in very minute and delicate patterns on the surface of the wood. It is afterwards polished and the whole gives the appearance of wood with gold lines twisted into different patterns on its surface. The effect is extremely fine. The wood used is Sisham (*Dalbergia latifolia*). The prices are for a plate Rs. 5 to Rs. 30 according to size and excellence of work. The other things made are boxes, sandals, trays &c.

Pottery may be mentioned as one deserving of notice. Those made at Azamgarh and Aligarh may be classed as belonging to the department of Art. The Azamgarh pottery which consists of jugs, plates, cups &c., with black or red ground ornamented with a white silvery paint, has acquired a great reputation, but the supply is not adequate to the demand, owing to the mode of manufacture being a secret confined to

only one family, and scrupulously maintained for generations. A goblet sells at Rs. 3-8; a flower vase at Rs. 2-8; a wine glass at As. 8; a plate at Rs. 2. Similar pottery is also made at Sewan in Bengal, but of inferior quality. The Aligarh pottery is made of black earth, and is rather clumsy looking. A goblet sells at Rs. 2; a cup and saucer at annas 4; a dog at annas 5.

Like Krishnagar in Bengal, clay models of men, animals, fruits and vegetables are made at Lucknow. In modelling human beings the Lucknow artists are not equal to their brethren of Krishnagar, but are perhaps superior to them in copying fruits and vegetables. The shape is perfect, the colour is however a little too glossy. A country cart sells at Rs. 5; a marriage party, miniature figures, at Rs. 3; a dozen fruits Rs. 2 to Rs. 10.

(3) Panjab.

The north-western-most part of India, with the Himalayas on the north, the sandy deserts of Rajputana on the south, Afghanistan on the west, and the river Jamna on the east, is known as the Province of Panjab. The greater portion of the province is formed of the valley of the five great tributaries of the river Indus, hence the name Panjab, or the land of the five rivers. It was in ancient times known as the Brahmavartta where the Aryan emigrants from Central Asia first formed their settlements. To the Hindus Panjab is therefore a land of great sanctity, the seat of the gods and the first home of their forefathers. Here perhaps the most ancient book in the world, the Rig-veda was composed, and its verses sung by learned sages before their sacrificial fires. Alexander here met Porus, and the Greek conquerors learned here to pay just tribute to the great learning and high civilisation of those whom they defeated by brute force. This noble nation of the west did not forget in their hour of triumph that the Indians were not a nation to be treated as slaves.

As may be naturally supposed, the manufactures of the province acquired a high excellence from very ancient times. Apart from its being the seat of ancient Hindu civilisation, Panjab had the further advantage of being nearer to those regions where in the middle ages education and enlightenment reigned, just as western India, with Bombay as its capital, is in the present times. The principal art manufactures of Panjab are woollen and cotton fabrics, embroidery, carpet, enamelling, ivory-carving, ivory-painting, lacquered ware, jewellery, damascened work, papier-maché, porcelain and pottery, and manufactures of wood.

Cotton fabrics. The best kinds are the damask cloths made at Jallandhar, Hushiarpur, Patiala and Ludhiana. Considerable ingenuity is displayed in raising diamond-shaped patterns, called *Bulbul Chasm* or nightingale's eyes, on these cloths.

The other sorts of white cloths are the *chautahis* and *do-tahis*, which are also patterned with diamonds. Another thick kind of coarse cloth, is known as the *dosutis*. Of thin cloth the softest kind is the *malmal* muslin, but since the introduction of European fabrics the manufacture of this kind of cloth is on the decline. Checked coloured cloths known as *lungis* and *susis*, are extensively used for female dress, the cloths dyed with indigo called *nilás* are largely used by peasant women. Formerly all the cloths were made of native yarn, but English yarn, except in very coarse cloths, has almost superseded it.

Woollen fabrics. But Panjab is famous for its woollen manufactures. These are either made of foreign wool, brought from Tibet, Kirman and Rampur, or country sheep's wool, or goat and camel's hair. European wool has also been lately introduced. In supplying material for the Indian woollen manufactures, there appears to be a good field for Australian enterprise. Best kinds of woollen fabrics are known as the *pashmina* which are thus graphically described by Mr. Baden-Powell :—

"Of Pashmina, there is plain Pashmina pattu *i. e.* woven cloth, which has been felted ; it is made of various degrees of fineness, and in color generally black, white, grey, and shades of brown or drab. Pashmina is also woven into a fine class of coloured, black or white fabrics, which are afterwards richly embroidered round the edge with silk of the same color ; this class of manufacture is more recent, and articles of European clothing and shawls are the principal manufactures.

"The next class of pashmina goods are the alwán and sádá shawls, being fine pashmina fabrics coloured and woven into a long oblong shawl without pattern or embroidery; they are much esteemed for softness and texture.

"Lastly, come that wonderful class of manufactures which are known as Kashmir shawls ; they are of two kinds, loom wove, where the whole pattern is wrought in the loom, with

an endless series of threads of all colours,—the other *amlikar*, where a foundation is made of a plain fabric, or a fabric in portions of different colours, the surface of which is then minutely worked over by hand with a pattern embroidered in fine pashm thread or sometimes silk. For this class of work only the finest pashmina is used, the threads are fine-twined and do not felt.

"In other pashmina goods, there are qualities of softness and fineness dependent on the wool used, for the same animals yield a fleece which has to be separated into qualities—of the inner wool or pashm, which is the finest, and then the second and third, and the outer hair which is coarse. The fine wool of the sheep of Kirman is largely imported, and second class pashmina goods are made of it, but Kirmani wool is also largely used to adulterate real pashmina, being mixed with it. The subject will be noticed when we come to the class of shawls. At Rampur, the chief town of Bishahr, the wool is of such exquisite softness, almost like Kirmani, that it is largely imported and made up at Ludhiana and other places into plain shawls or wrappers of great softness and durability called Rampur Chadars."

Of country wools, which are obtained from the flat-tailed sheep called the Dúmba, reared in the Districts beyond the Indus, good blankets are made. The goat of the plains does not yield such a fine material for high class fabrics as that of the Tibetian plateau. The hair obtained from the Panjab goat is therefore used only in making floor mats, sack cloths, &c. The wool growing next to the skin of camels under the outer hairs yields a soft material for the manufacture of long coats (chogás), but these are chiefly made in the countries beyond the Indus.

Silk fabrics. The manufacture of silk fabrics is confined to Multan, Lahore and Bhawalpur. The cloths made are either plain, coloured or striped. Of coloured silks the *dhupchháyá*

or sunshade is the most noted. But the striped silk, called *gulbadan*, is the one most extensively used : the rich classes, both men and women make trousers of it. Beautiful netted sashes, either red or black, are also largely made at Patiala and Amritsar and exported in considerable quantities.

Shawls. But it is for *shawls* that Panjab (including Kashmir) is justly famous all over the world. Mr. Baden-Powell thus speaks of these embroideries. "And lastly the wonderful Kashmir '*amlikar*' or needle worked goods consisting of shawls, caps, coats and chogas, whose substance is Pashmina, but the pattern is worked by hand-stitching to a degree of fineness that is perfectly marvellous. In these works the great patience and extreme delicacy of finger of the workmen is exhibited to the utmost. Many of the embroidered specimens must have required the patient minute labour of consecutive months—and the beautiful arrangement of colour, and great variety and elegance of design in pattern, is very striking. The perception of colour appears purely intuitive; they have an empiric knowledge of what the complimentary colours are, and know that setting one beside its complimentary throws out both to the greatest effect,—or gives them *zeb*—as the native phrase is. It is however needless to observe that they have no knowledge of the principles of colouring, and hence it not seldom happens that their colour degenerates into glare, and their contrasts into gaudiness. Much might be done by educated supervision, in leading and restraining this natural impulse, so valuable in itself as a foundation in design art. The elegance in pattern of these embroideries as also in the woven shawls is scarcely less remarkable than the selection and arrangement of colour ; and this is a very noteworthy circumstance, because it shows that the power of design in tracing patterns, whether it be on a shawl, or on an enamelled cup, or on a gold inlaid shield, is a different power from designing in solid."

As mentioned above, in shawls the embroidery is either done by hand or the patterns are woven. The former is known as the *amlikar*, and the latter *tinaut*. The manufacture of shawls is confined to the Kashmiri settlers in the towns of Amritsar, Ludhiana, Jalalpur in the Gujrat district, Dinanagar in the Gurdáspur district, Nurpur, and Tilok Nath in the Kangra District. But the chief emporium of the shawl trade is Amritsar, the manufactures of which place approach nearest in excellence to those of Kashmir. As in the case of other Indian arts, the quality of this great branch of embroidery has greatly deteriorated in late years. In this practical age, when luxury has been made cheap all around, it would have been a matter of wonder, if the shawl industry had not suffered in consequence. For some time the principal customers of the Amritsar shawls have been the French merchants, and their orders are for cheap fabrics. The hands which formerly disdained to tamper with the true art have, for want of bread, been taught to turn out the most inferior stuffs, and the result of a continued practice in this direction would have been simply disastrous, had not the revival of love of beauty taken place in European minds at the most critical time. In needle work silk thread is chiefly used, but gold and silver threads are also used in the valuable fabrics. The latter work is known as the *kalabatun*.

No fair idea can be given of the prices at which shawls are sold. It all depends upon the nature and excellence of the work. The prices of ordinary articles sold in the market, plain or embroidered, may be stated as follows:—A lady's dress consisting of a piece of Alwan, 12 yards by 54 inches with four pieces of needle work bordering, Rs. 140 to Rs. 200; a pair of shawls Rs. 50 to Rs. 500; a scarf Rs. 3; a *malida* cap Re. 1; a shawl choga Rs. 65 to Rs. 185; a *malida* choga Rs. 18 to Rs. 50; a braided cloak Rs. 18 to Rs 40; borders per yard, Rs. 1-12 to Rs. 6.

Gold embroidery, similar to that made at Benares and

Lucknow in the North-Western Provinces, is also done at Delhi. Mr. Kipling, Principal of the Lahore School of Art, thus describes it. "The introduction of gold thread, locally called *kálábatun* which is silk covered with flattened silver gilt wire, distinguishes this work from the rest of the silk embroideries of the Panjab. These articles are all worked in the frame; the gold thread alone is confined to the copper surface, and is tacked down at each turning with yellow silk. The old patterns have undergone great modifications during the last thirty years." The prices are given as follows :—One table cloth, 2 yards square, silk and gold black ground, Rs. 165; 1 table cloth, red ground, Rs. 145; 1 gold and silk scarf Rs. 47 ; 1 pair of cushions Rs. 16; 1 pair tea cosy Rs. 12.

Phulkaris are a coarse cotton cloth dyed red (*kharua*) or blue (*nila*), which the peasant women of the Panjab embroider in their leisure hours with floss silk chiefly of yellow colour. Small pieces of glass are also stuck on the cloth. This simple work of household embroidery is exceedingly interesting, and very well suited for use as curtains in European houses. A piece sells from Rs. 3 to Rs. 6.

Rugs and *carpets* are made at the Lahore Jail, and in the town of Multán, Kasur, Amritsar and in the School of Art at Hushiarpur. Old Persian patterns are preferred, in short it appears to be a revival of that highly-admired manufacture of old Persia. At Amritsar a carpet, 25½ yards long with corresponding breadth, sells at Rs 226; at Lahore, carpets of new shawl pattern sell at Rs. 14 per sq. yard, and Herati new shawl pattern at Rs 25 per sq. yard ; at Hushiarpur a Persian pattern carpet 15′ × 8′ sells at Rs. 60. At Multan very strong cotton carpets are made, the patterns being identical with the woollen ones.

Jewellery. The old capital of the Mughuls, Delhi, is among its other art manufactures, noted for its jewellery. These are very nearly of the same type as the Cuttack, Lucknow

and Trichinopoly, but their chief characteristics, as Mr. Kipling states, " are the purity of the gold and silver employed, the delicacy and minuteness of the workmanship, the taste and skill displayed in the combination of coloured stones, and the aptitude for the imitation of any kind of original on the part of the workmen." The price of a gold bracelet, mounted with miniature paintings on ivory of the Taj Mahal pattern, is Rs. 70; a pair of flexible gold bracelets, mat pattern, Rs. 200; a quatrefoil shaped filligreen gold brooch, set with rubies, Rs. 18; a jewelled locket, turquoise cross on cornelian ground, Rs. 40; a silver belt with imitation coins, Rs. 55; a silver necklace Rs. 28; a gold necklace, *babul* work, Rs. 175; and a bracelet Rs. 60. Delhi jewellery met with a very favourable reception at the Melbourne Exhibition of 1881.

Mock jewellery of glass, tinsel and brass, flimsy and gaudy but of good design, is extensively made in most of the Panjab towns, especially Amritsar, and is used by women of all classes. A pair of bracelets costs Rs. 2; a necklace Rs. 1-4.

Enamelling. This art is practised in Kashmir, Multan and Bhawalpur. The Kashmir enamel is famous all over India and is highly prized. The metal employed is generally silver alloyed with copper, on which the patterns consisting of metal discs are hammered in. The colours used are generally blue, and sometimes red and yellow. The articles are sold by weight, about Rs. 3 to Rs. 5 per ounce. An enamelled necklace costs Rs. 20, and a pair of bangles with silk ties costs Rs. 14. Gold enamelling is also done at Kashmir, and is chiefly confined to jewellery. An ounce of enamelled gold ornaments costs about Rs. 100. Besides ornaments, enamelled drinking cups and other fancy aticles are also made. Mr. Kipling states that the " Bhawalpur enamel is remarkable for its translucent sea-greens, dark and light blues. Large pieces such as bowls and court dishes are made, and, unlike other enamelled work, plain or engraved surfaces of silver gilt are left which contrast

agreeably with the coloured petiores. This work is always costly."

Koftgiri or damascened work is principally done at Sialkot and to a certain extent at Bhawalpur. At the Melhourne Exhibition the Sialkot articles were highly admired, and large sales effected. Formerly this art was in great request for the manufacture of shields, muskets and other arms, but now it is confined to the making of ornamental knic-knacks for domestic use, or in the copying of old arms which are purchased as curiosities by Europeans. The art consists in the inlaying of gold or silver wire on articles of inferior metals, and the best types are those in which the patterns are first cut and the wire laid on them, and lastly the whole thing polished off into an even surface. The price of a large shield is Rs. 40; of a silvered plate Rs. 14; a circular casket Rs. 25; a pen case Rs. 15; a photo-frame Rs. 40 and a silvered paper knife Rs. 2-8.

Ivory-carving is done both at Amritsar and Delhi, but the industry is on the decline. Plenty of leisure, unlimited patience and a large amount of skill are required for turning out the finished articles of this sort, and no machinery can therefore be employed in it. A card case is sold at Rs. 8; a paper knife at Rs. 2 to Rs. 5; and a comb Re. 1.

Ivory-paintings. The miniature paintings executed at Delhi have acquired a just reputation all over India, and are highly admired by Europeans. The ivory is first sawn into very thin plates and then polished. The painting is done either in colour or in Indian ink. Mr. Kipling states that "these latter are often pleasing, especially in the landscape subjects, for then the very conventional treatment of the trees and sky becomes less prominent than in the coloured ones." The favourite subjects of the painters are the copying of the likenesses of the Mughul emperors, of the great Tajmahal at Agra and the Juma-Masjid at Delhi. A painting of the Táj sells at Rs. 25, and miniature portraits of emperors at Rs. 5 each.

Wood-manufactuures. The Hushiarpur work, inlaid with ivory or brass, which closely resembles the *Tarsia* work of Italy, has acquired some celebrity. The patterns are more varied and bolder than the Bombay work of similar nature. A teapoy costs Rs. 30; a box Rs. 15; and a pen-case Rs. 10 to Rs. 15.

Lacquered ware is made at Pákpattan, Hushiarpur and Dehra Ismail Khan. Mr. Kipling thus describes the process of manufacture :—"The articles are first turned in the rude lathe of the country, and the colour is applied by pressing sticks of coloured lac, like pieces of sealing wax, on the revolving surface. Sometimes two or three colours are laid on in patches to produce a mottled or marbled ground. Borders are usually in two or three colours superposed. A pattern is made by scratching with a sharp style or chisel. Thus, a red flower is made by scratching through the black or green coats, for leaves the black is only cut away exposing the green, and for a white line all these are cut through to the white wood. This is obviously a work requiring great delicacy of hand and long practice. The articles are unique both in the solidity of surface and in design." At Hushiarpur, figures of mythological character are painted and covered with transparent lacquer. Very few colours are employed at Dehra Ismail Khan, and the patterns usually consist of "fern-like scrolls of almost incredible minuteness and delicacy of execution." The price of a teapoy is Rs. 4; a cigar holder annas 6; a work box Rs. 1-4; and a plate annas 12.

Papier-maché work is confined to Kashmir, where it is known as the *kar-i-kalamdáni* or the pen case work. The process is about the same as in Europe and the designs are of the same style as the shawls. The ground work is generally white on which are traced patterns in red, green, blue or gold colour. The prices are—a tea set of 14 articles Rs. 30; a box Rs. 12; a tray Rs. 6; and a pen case Rs. 9.

Porcelain and pottery. The only true porcelain made in India is at Delhi, but the industry has lately much suffered through family dissensions. The material used is pounded felspar mixed with gum. The prices are—for a large jar Rs. 2; a small cup annas 2.

An article resembling the above, and which closely resembles the *faience* of Europe, is made at Multan. The material used is a kind of prepared clay which is covered with an opaque white enamel and then painted with a dark blue or turquoise colour. Owing to its curious nature it is in great demand among Europeans. A goblet sells at Rs. 4; a flower pot at Rs. 3; a plate at Rs. 1-4; a cup and saucer at annas 12; and a square tile at Re. 1.

Peshawar is famous for its pottery. Mr. Kipling who has closely studied the subject of Indian manufactures thus speaks of it. "This rough *faience*, a common reddish yellow earthen body or paste covered with a soft lead glaze, is chiefly made in the form of plates. Scarcely anywhere in India is glazed pottery employed in this manner. The ware is of the rudest description, and considered as pottery, it is decidedly poor. But there is a quality of colour in its very simplicity which is pleasing to artists. Of late years attempts have been made to adapt it to European requirements."

(4) Central Provinces.

The Districts which formerly composed the Marhatta kingdom of Nagpur are now known as the Central Provinces. These Provinces are very deficient in artistic handicrafts. The only articles of any note made here are the wood carving of Ságar, Nagpur, Jabalpur and Chanda; pebble work of Jabalpur; brass work of Mandla, Hoshangabad, Nagpur, Chanda, Bhandara and Sambalpur; silk embroidery of Burhanpur; Tasar silk maufactures of Seoni, Bilaspur and Sambalpur; chintzes of Jabalpur, Umrer and Sambalpur; and pottery of Burhanpur. Our information about these articles is still very imperfect. The manufactures of Burhanpur, which was for some time the capital of a Muhammadan kingdom, have lately attracted some attention. A silk coat, made at this town, embroidered with gold thread, costs Rs. 45, ditto of velvet costs Rs. 175, and pair of velvet shoes Rs. 2. Of Burhanpur pottery, a vase sells at Re. 1; a tea pot at annas 12; a plate at annas 8; an encaustic tile at annas 8. Formerly the District of Chanda was famous for its gold and silver ware, but the industry has declined owing to the demand having fallen. Good cotton cloths are made at Pauni in the Bhandara District as well as at Nagpur and Umrer. The cloth is made of very fine cotton yarn with a gold fringe or a silk border. The price of a turban is sometimes as high as Rs. 200 and of a piece of waist cloth (dhoti) Rs 250.

(5) Bombay.

The Presidency of Bombay includes Sind, Gujrat and the nothern Districts of the Malabar coast. It has an area of 124,462 square miles and a population of about 17 millions. The principal manufactures of this Presidency are described below :—

Cotton fabrics.—The Bombay Presidency owing to its proximity to Europe has been the first to suffer from the competition of machine-made cheap manufactures. The branch of artistic handicraft that suffered most is of course the cotton manufactures. Not only have they to compete with the goods imported from outside, but also with the produce of the mills established in the Presidency itself. Surat, where about 300 years ago, the English established their first factory in India, was formerly the seat of extensive cotton-weaving, the fabrics turned out being exported to Europe. The abolition of the East India Company's monopoly in 1833 was a death-blow to this industry ; but it is said, that of late years, it has shown some signs of a revival, the weavers having taken to the manufacture of bodices of a new pattern, which they import to Districts further south. Ahmadabad is famous for its *dhotis, susis* and *dopottas,* which are sold in Gujrat and exported to Bombay, but here as everywhere, the hand-woven fabrics are giving way to the cheap produce of the mills. The chintzes made at Ahmadabad were formerly largely exported under their commercial name of " Cambay," but the trade declined owing to the piracies of the Portuguese and the rise of Surat as an emporium of commerce. Calico printing is now extensively carried on in Kaira where the river water is said to be particularly favourable to dyeing operations. *Chunri* cloth by the knotting process is also largely made here. These dyed fabrics are exported to Siam, and the people of Gujrat itself are fond of wearing coloured cloths. The other places noted for their cotton manufactures are Yeola, a town in the Nasik

District, Ahmadnagar, Sholapur and Khandesh, and Margodi, Manoli, Asandi and Deshnur in the Belgam District. A large mart for cotton fabrics of all kinds is held at Nandigad. In Sindh, cotton fabrics, consisting of *susis* and *lungis* which are worn by women, are largely made at Alhyar-jo-Tando, Hala, Tatta, Karachi and Haidarabad. The Tatta chintzes were at one time considerd superior to all other fabrics of similar nature made in India. Bed covers, table cloths, parasoles &c. are now made at Shikarpur. A bed cover of this place sells at Rs. 25, and a table cloth at Rs. 66.

Silk fabrics.—Considerable quantities of silk goods are made at Ahmadabad, Surat, Belgam, Kaladgi, and many other places. The supply of raw silk is obtained from China, Bengal, Asia Minor and Central Asia. The articles generally made are bodices, sashes and the female cloths known as *susi* and *lugda*. A bodice sells at Rs. 10 to Rs. 15, a sash at Rs. 37, a piece of *susi* at Rs. 5 and a lugda from Rs. 50 to Rs. 70. Mixed silk and cotton called *Garbhsuti, Mashru* and *Elaicha* is also largely woven, but it is said that the demand for this cloth is declining. Tanna in Sindh was famous for its silk manufactures from very ancient times. A yellow cloth called Pitambari is now made here, as well as at Puna, Yeola and Nasik, which is worn by Hindus when engaged in prayers or on other sacred occasions. *Saris* or female dress, with silver or gold border, are woven at Bághmandi in the Ratnagiri District, and at Gulutgud in Kaladgi.

Embroidery.—Ahmadabad is famous for its kinkhabs or silk brocades, which are considered to be the best in all India. Its superiority consists in the brilliancy of colour imparted to the plain silk and the strength and purity of the embroidery-work. Sir George Birdwood, C. S. I., than whom none probably possesses more knowledge of, or have more sympathy for, the ancient art of India, thus describes the process of manufacture :—"To weave the brocades a more complicated arrangement

of the loom is necessary than for ordinary silk-weaving. A kind of inverted heddles called the *Naksh* (picture, i. e. design) is hung above the warp immediately behind the heddles, the other ends of the cords being fastened to a horizontal band running below the warp. Like the cords of a heddle, the *Naksh* strings where they cross the warp have loops through which certain of the warp threads are passed. But instead of getting an up-and-down motion from treadles pressed by the weaver's foot, the *Naksh* is worked from above, by a child seated on a bench over its father's head. The little fellow holds a bar of wood, and by giving it a twist, draws up the cords attached to the threads of the warp, which, according to the *Naksh* or pattern, are at any time to appear in the surface of the web. The weaver, at the head of the loom, adds variety to his design by working silks of divers colours into the woof, along with threads of silver and gold : and thus the vision grows into the sight of the young child seated aloft." Kinkhabs are also largely made at Surat, and the local price is Rs. 1-4 to Rs. 5 for a small piece.

Silk embroidery is extensively carried on at Haidrabad in Sindh. A teapoy cover embroidered with gold and silver sells at about Rs. 10, a tea cosy at Rs. 7, a pair of chair cushions at Rs. 10-8 and a pair of slippers for Rs. 3-0. The manufacture of gold and silver lace, used in embroidery is a thriving industry carried on at Ahmadabad, Surat, Puna and Bombay.

Carpets—Made at the Tanna and Yerrowda Jails and at the town of Karachi have acquired great celebrity. At the former place a carpet of Persian pattern, 7 feet by 4 feet, is sold at Rs. 20, one of Karachi fancy pattern at Rs. 10, and a Spanish carpet at Rs. 6. The price of a woollen carpet made at the Yerrowda central Jail, 21 feet by 16 feet, copied from a Bijapur carpet 300 years old, is Rs. 510.

Jewellery.—Gold and silver jewellery is made all over the

country, those made at Ahmadabad, Surat, Kaira, Dharwar, Puna and Sindh being noted. These consist of nose-rings, ear-pendants, armlets, necklaces, bracelets, bangles, anklets &c. The value of these is regulated according to the quantity of gold and silver used *plus* the workmanship.

Metal manufactures.—Ordinary brass or copper lotas, plates, cooking pots &c. are made all over the country. Of these articles the manufactures of Ahmadabad, Nasik, Puna and Haidrabad may be classed as " art." The peculiar kind of small boxes, called " spice boxes" by the Europeans have long attracted attention for their graceful form and delicate tracery. The prices of these articles are cheap. A box coloured with gold made at Haidrabad sells at about Rs. 3-8, a plate sells at Rs. 3, a pair of flower vases at Rs. 5, &c.

Damascened work on arms like those of Sialkot in the Panjab is made in Kach. Kach is also noted for its hammered *repoussé* silver work, which is said to be of Dutch origin.

Wood manufactures.—The Presidency of Bombay is famous for its black-wood furniture. These are made of Sisham wood (Dalbergia latifolia) and are elaborately carved. The chief seat of the manufacture is the Bombay town and Ahmadabad, as well as Surat.

The Inlaid wood work has also a great reputation. These consist of glove boxes, blotting cases book-stands, work boxes, desks, card-cases &c., which are all known by their commercial name of " Bombay boxes." Sir George Birdwood thus describes the manufacture of this article :—" They are made in the variety of inlaid wood-work or marquetry or tarsia, called *piqué* and are not only pretty and pleasing, but interesting on account of its having been found possible to trace the introduction of the work into India and Persia, step by step, from Shiraz into Sindh and to Bombay and Surat. In Bombay the inlay is made of tin-wire, sandalwood, ebony, sappan wood, ivory, white and stained green, and stag horn. Strips of these materials are

bound together in rods, usually three-sided, sometimes round, and frequently obliquely one sided, or rhombic. They again are so arranged in compound rods, as, when cut across, to present a definite pattern ; and in the mass have the appearance of rods of varying diameter and shape, or of very thin boards, the latter being intended for bordering. The patterns commonly found in Bombay, finally prepared for use are *chakar-gul* or "round bloom ;" *katki-gul,* "hexagonal bloom ;" *tinkonia-gul,* "three-cornered bloom ;" *adho-dhar-gul,* "rhombus bloom ;" *chorus-gul,* "square bloom ;" *tiki,* a small round pattern ; and *gandirio,* "plump ;" compounded of all the materials used ; also *ekdáná,* "one grain ;" having the appearance of a row of silver beads set in ebony ; and *porinlihar, jafran, marapech, jeri &c., &c.*" An inlaid ebony box sells at Rs. 75 and a carved box at Rs. 60.

The other important art manufacture in wood is sandal wood carving which is extensively carried on in Surat, Ahmadabad, Bombay, Kanara. The work executed at Surat and Bombay is in low relief with floral patterns, that made at Kanara is in high relief with figures of gods and goddesses. In the Ahmadabad work, the amorous scenes connected with Krishna, sporting with the milk-maids on the banks of the Jamna, are raised in flat relief. A large sandal wood box costs Rs. 90, an album book Rs. 12, a carved glove box, Rs. 16, a large work-box containing glove box, writing-desk and work box Rs. 120.

Pottery—The other manufactures of Bombay deserving of notice are the pottery, toys, and stone articles. The articles sent from the Firozshah Pottery Works and the Bombay School of Art, which is presided over by Mr. J. Griffith, were very much admired at the Melbourne Exhibition of 1881. A pair of brackets is sold at Rs. 6 ; a fancy glazed jar at Rs. 4 ; a flower pot at Rs. 2 ; a flower vase Japanese pattern from the Bombay school at Rs. 3-8 ; ditto Egyptian style at Rs. 3, and a goblet at Rs. 3. Sind is also famous for its pottery, which, according to

Dr. Hunter "is of two kinds, encaustic tiles and vessels for domestic use. In both cases, the colours are the same—turquoise blue, copper green, dark purple or golden brown, under an exquisitely transparent glaze. The usual ornament is a conventional flower pattern, pricked in from paper and dusted along the pricking."

Miniature models of fruits, vegetables and animals are made in wax at Belgam. The prices of these toys are from Rs. 2 to Rs. 18 per dozen.

Stone articles—The various knic-knacks, made of moss-stone, agate, blood-stone and stones of other colours, which are known as the Cambay articles are chiefly made at Kaira. The price of a paper-cutter is from Rs. 2 to Rs. 11, and of pieces of jewellery boxes from Rs. 5 to Rs. 40.

Lacquered ware is made in Sind. Figures of animals, birds &c. are delicately painted on the articles and afterwards covered with a fine coat of transparent lacquer.

(6) Madras.

The Madras Presidency comprises the eastern and southern part of the Indian peninsula. It has an area of 138,318 square miles and a population of 32 millions. The principal manufactures of this province are cotton and silk fabrics, embroidery, carpets and rugs, jewellery, brass ware, sandal-wood, ivory and horn manufactures, mats, and pottery.

Cotton fabrics.—In Madras, as in every other parts of India, the weaving industry is on the decline owing to the importation of cheap Manchester cloths. Very fine muslin was formerly made at Arni which was exported to Europe by the East India Company. Like the "Evening Dew" cloth of Dacca, Arni muslin could be made so fine as to become nearly imperceptible when immersed in water. Excellent cloths are now made at Urpada in the Godavari district, which are chiefly used to make turbans. In the Nellore District, excellent muslins, suitable for ladies' dress and pocket handkerchiefs, are made at Kovour, Yapallagunta, Gundur, Raipur, Nellore, and Kavali. Nellore formerly exported large quantities of the blue cloth called *Salampores*, which were worn by the Negro slaves in America, but the trade has ceased to exist since the West Indian Emancipation.

Bed covers, known as the *Palmpores*, are made at Masulipatam in the Kistna District, Ponneri and Saidapet in Chingleput, Kalastri in North Arcot and Cuddalore in South Arcot. The printings on these cloths, which in some cases are done with wooden blocks, but generally by stencilling and hand-painting, are very curious and artistic. Dr. Bidie, C. I. E., the curator of the Madras Museum, and one of the most eminent men who have made the Indian products the subject of their special study, thus describes the process :—"The stencil plates are made of stout pieces of paper. On these the outlines of the pattern are first traced in ink, and then perforated with minute holes in the most accurate manner with a fine needle. The stencil is

then complete, and when in use is placed on the cloth and covered with charcoal in very fine powder, which is rubbed so as to make it pass through the minute perforations and leave a tracing. The rest of the work is done entirely by hand, and thus considerable scope is given for the exhibition of individual taste in the selection and grouping of colours. The Kalastri *Palampore* contains mythological scenes, and full descriptions of these in the vernacular." The price of *Palampores* ranges from Rs. 2 to Rs. 15 a piece.

Masulipatam chintzes have been famous from very ancient times. The colours are permanent. Two dyeing substances, not known in Upper India, are used here, *viz.* the chay root, *Oldenlandia umbellata* and the wood of *Ventillago madraspatana.* There is a large demand for these chintzes in Burma, the Straits, and the Persian Gulf. They have however come in competition with the Manchester goods, and it is feared that this ancient manufacture will ere long decline, if not absolutely destroyed.

Silk fabrics. In the Madras Presidency the manufacture of silken fabrics is chiefly confined to the native State of Mysore, where purses, cords, and tassels are largely made by the Muhammadans. The Bangalore silk cloth has a great reputation for its rich texture and costly patterns. A valuable silk cloth, interwoven with lace, is also made in Mysore.

Embroidery. According to Sir George Birdwood, the embroidered cloths and lace made at Vizagapatam, Dindigal, and Chikakol have a wide reputation, but the industry must have greatly declined of late, as they were not included in the collection sent by Dr. Bidie to the Melbourne Exhibition of 1881. Dr. Bidie, in his Melbourne Catalogue, only mentions some very ordinary embroidery work done by the Musalmans at the Madras town.

Carpets and rugs. Carpets of superior quality are not made in this Presidency. A goat's hair rug made at Bellary, measuring 6′ by 3′ sells at Rs. 1-4; and an Adoni cotton

carpet with yellow and green stripes, 8′ by 4′, at Rs. 5.

Jewellery. Silver and gold jewellery is made at Vizianagram, Vizagapatam, Tanjore Trichinopoly and Tumkur in Mysore. The Trichinopoly work has acquired a great reputation among Europeans, and Sir George Birdwood states that though it "has been corrupted to suit European taste; nothing can exceed the technical excellence of the rose chains, and heart-pattern necklaces and bracelets made in this city."

Metal-manufactures. The brass and copper manufactures of Tumkur in Mysore, and Madura and Tanjore have a world-wide reputation. Sir George Birdwood highly praises that made in the last two places, and states that "in its bold forms, and elaborately inwrought ornamentation, it recalls the descriptions by Homer of the work of the artists of Sidon in bowls of antique frame" Dr. Bidie states that "the Tanjore brass-ware is very remarkable and quite *sui-generis.* The vessels are of elegant shapes, and made of copper covered with an elaborate series of figures in silver, engraved and in bold relief. The contrast between the bright silver ornamentation and the dark brown of the copper is very striking and effective, and becomes heightened by age. The designs are mythological with subordinate floral ornamentation. The price of a lamp for religious services, with symbolical figures is Rs. 8; a round perforated brass tray Rs. 0-8; a lotá Rs. 14 to Rs. 45-8.

Wood, ivory and *horn manufactures.* Vizagapatam has of late become famous for these manufactures. The articles generally made consist of work-boxes, desks, chess-boards and other knic-knacks. The materials used are sandal wood, ivory, bison and stag horn and porcupine quills. The artistic taste displayed in the workmanship is very superior. The prices are :—A sandal-wood bezique, Rs. 45; a blotting-pad, Rs. 36; a whist counter box, Rs. 35; a carved glove box Rs. 12; a large work box, Rs. 120; a bison horn bezique, Rs. 48; a horn picture frame, Rs. 11, &c.

Mats and basket work. Various kinds of mats and basket work are made in the Madras Presidency. For mats, the materials used are bamboo, palmyra leaf, grass, rattan, and split culms of a species of Cyperus. The mats made at Palghát are of specially good quality, "very strong and durable, pleasant and cool to lie on, and remarkable for their quiet colours and peculiar patterns." A coloured grass mat of this place sells at Rs. 8. The basket work made at Palikat is also very remarkable. The substances used are palmyra leaves and rattan, which by being plaited are made into a neat durable article. The articles are plain or dyed. A basket of palmyra leaf sells at annas 8; a cigar case at annas 2, and a tiffin basket of rattan at Rs. 13.

(7) British Burma.

Our information regarding the manufactures of this Province is still very meagre.

We know however that many curious articles are made here which deserve greater attention than has hitherto been bestowed on them. For instance, the curious applique hangings (Kalagis) of Rangoon should only be known to be admired. A silk kalaga costs about Rs. 150. Excellent gold and silver-smith's work is made at Rangoon, Prome and Akyab. Of these necklaces and hair ornaments have acquired a great reputation. Besides personal ornaments, *repouseé* work consisting of silver cups, betel-boxes, cigar-cases, bowls and other decorative articles for domestic use are turned out by these workers. Niello work is executed at Shwaygyin. Captain Cole states that there is now (1880) only one man in British Burma who does this work. Of other manufactures of British Burma may be mentioned the carved wood furniture of Rangoon, the bamboo articles of ditto, the ivory carving of Moulmein, the manufacture of brass images and gongs, and the lacquered ware of Prome.

SECTION II.

Raw Products.

The economic produce forms the most important section of the Indian products, for it is in this branch that the greatest expansion of commerce is susceptible. The Indians now use only articles of which they learnt the use three thousand years ago. But the world has changed, and what in their eyes is mere rubbish may, if seen through the scientific eyes of the Europeans become a source of national wealth. Only a few years ago, Indian wheat was universally believed to be very inferior, and the climate of India was considered unsuitable for the growth of the best kinds. But, now, Dr. Forbes Watson, than whom few possess more knowledge about the raw produce of this country, has pronounced the wheat produced by the industrious Jats on the banks of the Jumna near Dehli as one of the best wheats in the world, and South Russia and America have now commenced to feel the Indian competition in the European market. Then the Mahua flower (*Bassia latifolia*), which a few years ago was almost unknown in Europe, has now been found to be extremely suitable for the fattening of live stock and for the manufacture of a cheap brandy, and large quantities of it are annually exported to France and other countries of South Europe. Tea which grew wild in Assam was imported into this country from China, but now India exports millions of pounds every year to almost all the civilised countries of the world. Coffee and cinchona have been successfully introduced and worked with European capital. Indigo, in the manufacture of which thousands of persons have accumulated vast fortunes, was a hundred years ago considered a common weed, like so much rank vegetation of the present day that grows and rots in villages during the rainy season, emitting poisonous gases, vitiating the atmosphere and killing thousands every year from malarial fever, cholera and other diseases of the most virulent type. Has the developement of Indian produce reached its

climax? Are these undergrowths only created for the destruction of man? Or are they waiting to be turned into wealth by European science and European enterprise just as tea and indigo have been done? The most fatal poison loses its obnoxious qualities and turns into a healing agent in the hands of a skilful physician. Our earth contains iron, copper, and even gold, and yet how many millions worth of iron do we import every year? There are the forests of plantains all round the sea coast from Burma to Madras which, though they yield excellent material for paper manufacture, are allowed to rot by thousands of tons while we import paper to the annual value of £400,000. The forests abound in gums, fibres, dyeing materials, medicinal products and fibrous substances of which as yet only a few have been carefully tried. In short the raw-material resources of India are unlimited. We have not the means, neither have we the education to properly develope them. The permanent settlement of land revenue, which should have been made with the cultivators themselves, has created in Bengal a set of rack-renters who are sucking the life-blood of the nation, destroying its independent yeomanry class, reducing the middle class to abject poverty, and damping all the energies that English education has infused into the country. Unfortunately Government itself, where it is the proprietor of land, has no better example to show, and the condition of the peasantry in temporary-settled Provinces is worse, if anything, than the permanently-settled Province of Bengal. The elder branch of the great Aryan people cried for help a century and a quarter ago from its younger brethren. That cry was heard and a helping hand was immediately extended. But we have only just commenced to rise from the low depth of degradation to which we fell, and those who abuse their authority, and use their pen or their power of eloquence by taking advantage of our helplessness to keep us where we are, act against the decrees of Providence and the usual course of nature, and are

the enemies of the human race. We look upon our European brethren to teach us how to develope the resources of our country, and to share with us the profits arising from it. Neither should we think them as intruders, nor should they think us as mere hackers of wood and drawers of water. The Almighty has decreed that we should be united in a bond of sympathy and affection. The interests of England and India are identical. After these preliminary remarks I will now begin a short description of those articles which we call the Raw Products of India.

These products may be divided into the following principal classes :—

(1) Minerals.
(2) Animal products.
(3) Food substances.
(4) Medicinal products.
(5) Dyeing materials.
(6) Fibres.
(7) Oily substances.

I will give below the names of the principal articles under each head, with a short description of those most important in a commercial point of view. The descriptions are taken mostly from my official catalogue of articles sent to the Amsterdam Exhibition.

1 Minerals.

(1) *Iron.*—The most important of the mineral products is iron, which is found all over the country. Iron smelting was carried on by the natives from time immemorial, and the iron and steel turned out are of the first quality, but the process is very rude and the consumption of charcoal great. The native produce therefore could not compete with the European import. Native smelting has now been abandoned in most places. Attempts were several times made to manufacture iron with European capital and by European processes, but owing to the difficulty of charcoal or good coal at remunerative rates, the enterprise has hitherto been unsuccessful.

Coal is found in many places in India, and the developement of the mining industry has been in proportion to the extension of railways. There are now about 60 collieries worked in the country, with an annual outturn of more than 50,000 tons. Indian coal is, however, inferior to the English coal as it contains a large proportion of ash, varying from 14 to 20 per cent. while English coal contains only 3 to 6 per cent.

Gold is found in many places in India. It is found mixed with sand in the beds of rivers, which fact has given name to two rivers distant from each other by hundreds of miles; one is the Subanrekha, which rising from the hills of the Chota Nagpur plateau falls into the Bay of Bengal in Orissa, and the other is the Subansiri, a river of Assam. From ancient times a class of people have made it their profession to wash the sand for gold, but the work hardly pays at the present time when there are so many other more remunerative openings for labour. Auriferous quartz reefs have lately been discovered in the Nilgiris and companies have been formed for working them, but it is premature to say whether the enterprise will be successful. Preliminary experiments made up to this time have however given every promise of the venture eventually proving a very profitable business. A ton of reef yielded on an average 7 dwts. of gold,

which in fineness is equal to 20 carat gold of Australia.

Silver is said to exist in the hills of west Bengal, but no serious attempt has yet been made to work it. Copper occurs in the lower Himalayas and in the Singhbhum district of Bengal. It is still worked by the Nepalese in the former place, but abandoned in the latter. The other metals deserving of notice are *lead* in the N.-W. Himalayas, *tin* in Burma, *antimony* in Panjab, *cobalt* in Rajputna, and *petroleum* in Burma and Assam.

Salt.—Two other mineral substances may also be mentioned, viz. salt and saltpetre. Salt is a Government monopoly and formerly it was extensively manufactured in all the sea-board districts, but most of these tracts are now supplied with Liverpool salt. In the interior, the supply is obtained from the Sambhar Lake in Rajputana and the salt mines of the Panjab.

Saltpetre is extensively manufactured in Northern Behar, and largely exported to all the countries of Europe, which chiefly depend upon India for its supply. The annual export from Calcutta is about 450,000 cwts. The manufacture of saltpetre is said to be on the decline.

(2.) Animal Products.

Silk. The most important of the animal products is silk. In the last century the East India Company had silk filatures all over Bengal, but since then Bengal silk is said to have much deteriorated, which is attributed to the fraudulent practices of native manufacturers. The colour of the Bengal silk is of a rich golden yellow; it is also sometimes white, specially that reeled in April. The domesticated silk of commerce is generally the produce of the moth, which chiefly feeds on mulberry leaves, hence it is called *Bombyx Mori.* The Tasar silk is the produce of the forest tracts. It is very strong and glossy, and the proper way to dye it with brilliant colours has lately been discovered. The Tasar silk-worm feeds on the leaves of various wild trees. The Eria silk-worm of Assam and Northern Bengal feeds on castor-plant leaves. Eria silk cloth is very durable, and it is said that one person's lifetime is not sufficient to wear out a garment made of it. Muga is a wild silk of Assam, and of all the wild silks it is next in importance to Tasar; the worm feeds chiefly on the leaves of the Súm tree *(Machillus odoratissima).*

The following figures show the export of silk from British India during the five years ending 1880-81 :—

	Quantity. lbs.	Value. £
1876-77	150,567	58,844
1877-78	145,186	46,890
1878-79	205,116	53,641
1879-80	271,698	88,130
1880-81	207,030	20,085

Hides and Skins. In this section, the next article in importance is hides and skins. Extensive trade is carried on in raw hides and skins. These are chiefly brought to the seaport towns from the interior and thence exported. The value

of hides and skins exported during the five years ending 1880-81 was as follows:—

	Value. £
1876-77	2,998,683
1877-78	3,756,887
1878-79	3,096,847
1879-80	3,738,005
1880-81	3,733,565

Wool. Next in importance is wool, the best kinds of which are imported from Tibet, and the countries beyond Afghanstan. Australian wool appears to be destined to drive this foreign produce from the Indian market, and it is time to make earnest endeavours in this direction. The first link of that chain which will ere long bind these two continents, the one a dependency and the other a colony of great Britain, in bonds of mutual interest, was made at the Melbourne Exhibition of 1881. The enterprising Mr. Joubert has just now in his forge the second great link of that great chain, which year by year will lengthen until the great mission of great Britain in the world is finally accomplished.

The Exhibition will afford an opportunity to the Australians to study the different kinds of wool produced in India or imported from foreign countries. The wool produced or used in India may be divided into three classes:—(1) Kashmir Pashm, which is produced in Kashmir and also brought from Central India. It is a downy substance, growing next to the skin under the thick hair of the Tibetan goat. This is the real shawl wool. (2) Wool produced in Kabul, Bokhara, Persia, &c. It is largely exported to Europe *via* Karachi and Bombay. (3) wool of the plains. This is generally of an inferior quality, fit for making blankets. There is much room for improvement in the Indian wool, but as yet no earnest endeavours have been made in this direction. Mills for the manufacture of woollen cloths are now being established by European capitalists, and

it is hoped that the improvement required will now gradually be accomplished.

Of other animal products may be mentioned *musk* of which the supply is very small, preserved *fish* which can never compete with the countries situated near the North Sea, and *lac* and *cochineal*, for which see the Chapter on "Dyeing materials."

(3) Food Substances.

The following is a list of the principal articles used more or less as the staple food by the people of the country :—

Cereals and millets.

Oryza sativa (rice).
Triticum vulgare (wheat).
Hordeum hexastichum (barley).
Zea Mays (maize).
Coix lachryma (Job's tears).
Eleusine coracana.
Oplismenus frumentaceus.
Panicum miliaceum.
Panicum miliare.
Panicum psilopodium.
Panicum Uliginosum.
Paspalum scrobiculatum.
Penicillaria spicata.
Setaria italica.
Sorghum bicolor.
Sorghum saccharatum.
Sorghum vulgare.

Peas and pulses.

Cajanus indicus.
Canavalia ensiformis.
Cicer arietinum.
Cyamopsis psoralioides.
Dolichos biflorus.
Dolichos Lablab.
Ervum Lens.
Glycine Soja.
Lathyrus sativus.
Phaseolus aconitifolius.
Phaseolus calcaratus.
Phaseolus Mungo.
Phaseolus Mungo (var. Max.)
Phaseolus Mungo (var. aureus).
Phaseolus Mungo (var. radiatus).
Pisum arvense.
Pisum sativum.
Vicia Taba.
Vigna Catiang.

Other food-crops.

Amarantus (different species of).
Fagopyrum esculentum.
Trapa bispinosa.

I will now subjoin a short description of the most important ones :—

Oryza sativa. *Rice.*

Vern.—*Bengali, Hindi,* Dhán, Cháwal ; *Tamil,* Nellu, Arisi ; *Telugu,* Bium, Vudlu ; *Burmese,* Sábá.

Rice is the most important of the Indian crops, and is the staple food of the natives of Bengal, Assam, Burma, and parts of Madras and Bombay. There are upwards of three hundred well-marked varieties of rice. The two principal divisions known in cultivation are autumn and winter rice. These are again subdivided into rice sown board-cast and rice transplanted. The varieties are distinguished according to the quality of the husked rice, the long, fine, white, fragrant kinds being deemed superior. The produce of uplands is generally superior to lowland rice. The Patna and Pilibhit table-rice holds the

first place. Rice is eaten boiled, and also made into flour and cakes. It is not a nourishing food, containing only 9 per cent. of nitrogenous ingredients, and 89 per cent. of non-nitrogenous ingredients. In medicine it is used for poultices, and various preparations of it as sick diet. Rice straw is a valuable fodder; it is used for thatching houses, and is suitable for the manufacture of paper. The quantity of rice (husked) exported from India during the five years ending 1880-81 is as follows :—

	Quantity Cwts.	Value. £
1876-77	19,548,741	5,742,539
1877-78	18,211,388	6,889,361
1878-79	20,621,712	8,810,121
1879-80	21,908,045	8,341,685
1880-81	26,769,344	8,971,660

Triticum vulgare. *Wheat.*

Vern.—*Sanskrit*, Godhum ; *Bengali*, Gam ; *Hindi*, Gehun ; *Tamil*, Gadumai ; *Telugu*, Godu-mulu

Largely cultivated in North-Western Provinces, Panjab, Central Provinces and Bombay, and is the staple food of the upper classes of the people in these parts of India, the poorer classes living on barley, maize, and millets. There are many varieties of wheat, of which the soft white of Jabalpur, called *ekdana;* the soft white of Muzaffarnagar, known as Delhi wheat ; the soft white of Cawnpore, called *dudhia;* the hard white of Bundelkhand, called *kathia;* and the *mundipisi, sufedpisi, lalpisi, jalalia, dáudi, kathia, &c.*, of Narsingpur and other places, are well known in commerce. In the Calcutta market the commercial names of the two best wheats are Club No. 1 of Delhi and Club No. 2 of Cawnpore. After a careful trial, experts have come to the conclusion that the best varieties of Indian wheat are not at all inferior to the best varieties of other countries. The value of Indian wheat has of late years been appreciated in Europe, and the trade is rapidly

increasing, as the exports for the five years ending 1880-81 will show:—

	cwt.	£
1876-77	5,583,336	1,956,332
1877-78	6,340,150	2,856,989
1878-79	1,044,209	5,13,778
1879-80	2,195,550	1,121,014
1880-81	7,441,375	3,277,941

Hordeum hexastichum. *Barley.*

Vern.—*Bengali*, Jab; *Hindi*, Jau; *Tamil*, Barley-arisi; *Telugu*, Barley-biyam; *Burmese*, Mu-yau.

Barley is largely cultivated in the North-Western Provinces and the Panjab, where it is extensively used as food by the poorer classes. The average produce is about 8 cwts per-acre. There is no export trade in this grain.

Zea Mays. *Maize or Indian Corn.*

Vern.—*Bengali*, Janár; *Hindi*, Bhuttá, Makká, ; *Dakhini*, Makha-Jowári; *Tamil*, Makka Cholum; *Telugu*, Makkazonalu.

Largely cultivated in Upper India and the Himalayas, where it is an important article of food of the poorer classes. It is eaten roasted in cobs when green, or the seed is ground into flower and made into cakes. It is considered nutritious, containing 6 to 7 per cent. of a yellowish fat. Its chemical composition has been ascertained to be—nitrogenous ingredients, 14·66 per cent.; non-nitregenous ingredients, 84·52; inorganic ingredients, 1·92. Many new varieties of maize have of late been introduced into the country, among which may be mentioned the Cuzco in the hills, and the Canada, Tuscara, Golden Dent, White Flint, and Pennsylvania Yellow in the plains. An excellent crop of the four last varieties was produced at Ajmir last year. Of country varieties the Jaunpur maize has a good reputation.

Eleusine coracana.

Vern.—*Hindi*, Maruá; *Dakhini*, Raggi; *Tamil*, Kayur; *Telugu*, Tamidalu.

Extensively cultivated in the hilly districts for its grain,

which forms the staple food of the poorer classes in some parts of the country, specially in South India. It is considered very nutritious. Its chemical composition is stated to be—nitrogenous ingredients, 18·12 per cent., non-nitrogenous ingredients, 80·25; inorganic ingredients, 1·63.

Oplismenus frumentaceus.

Syn.—Panicum frumentaceus.

Vern.—*Bengali*, Shámá; *Hindi*, Sánwá; *Dakhini*, Kathli; *Telugu*, Bonká shámá.

A wholesome and nourishing millet, used as food by the poorer classes. It is extensively cultivated in the Rohilkhand Division of the North-Western Provinces. In South India it yields two crops in the year. It is not cultivated in Bengal, but the grass is found wild in rice-fields and lowlands, and used as a green fodder in the rainy season.

Panicum miliaceum. *Little Millet.*

Vern.—*Hindi*, Chiná; *Dakhini*, Wari, Shamakh; *Tamil*, Varagu; *Telugu* Worgá.

Cultivated as a dry crop in many parts of India. It is imported into England from South Europe for feeding cage birds. There are two well-known varieties, one brown and the other yellow-coloured. Dr. Bidie, however, mentions four kinds known in South India, *viz.*, (1) common, (2) Gru, (3) Chada-gru, and (4) Kadakani. The seeds, when husked, are white and smooth like sago, and considered a good diet for invalids. The grain contains about 9 per cent. of nitrogenous matter and 59 of starch. In North India the crop takes only three weeks to ripen, and it is therefore a food permitted for Hindus on fast-days.

Panicum miliare. *Millet.*

Vern.—*Bengali, Hindi*, Kangu; *Tamil*, Sawmay.

This millet is not easily distinguishable from *Setaria italica*, and the samples of both are often confused with each other. Dr. Bidie states that in South India it is "pretty

generally used as an article of food." Dr. Balfour describes the seeds as "oval, slightly compressed, brilliant, about a line in length; bark or envelope blackish, brown or fair; parenchyme, white or sweet taste. In the Peninsula of India, it is generally cultivated on an elevated rich soil. The seed is one of the sorts of dry or small grain which forms an article of diet of the Hindus who inhabit the higher lands, and cattle are fond of the straw."

Panicum psilopodium.

Cultivated in some parts of the North-Western Provinces as a food-crop Four varieties are known: Mijhri, Phikar, Rali, and Basi; used as food by the poorer classes.

Penicillaria spicata. *Spiked Millet.*

Vern.—*Hindi*, Bajrá; *Tamil*, Kambu; *Telugu*, Gantelu Sajjalu

Cultivated almost in all parts of India, except Eastern Bengal. This millet is extensively used as food by the poorer classes in Behar, North-Western Provinces, and Panjab, and the stalks form an excellent fodder for cattle. Bajra millet is reckoned heating, and is therefore much consumed in the cold season: in 100 parts it contains 13·92 parts of nitrogenous ingredients, 82·07 of non-nitrogenous ingredients, and 0·73 of inorganic ingredients. It is sown on poor soils as a rain-crop, and ripens later than *Sorghum vulgare*.

Setaria italica. *Italian Millet.*

Syn.—Panicum italicum.

Vern.—*Bengali*, Kaun; *Hindi*, Kangni, Kauni; *Dakhini*, Korakong; *Tamil*, Tenney; *Telugu*, Koralu.

Cultivated for its seeds; used for food by the poorer classes. Mr. Atkinson says it is apt to produce diarrhœa, and that it renders beer more intoxicating.

Sorghum saccharatum. *Sorgho.*

Vern.—*Hindi*, Vilayati Joar; *Dakhini*, Shalu.

This is a newly-introduced plant. There are three varieties

distinguished from the colour of the seeds,—red, amber, and black. The stalks afford a nourishing food for cattle, and also yield sugar. The grain is eaten made into cakes like the Joár.

Sorghum vulgare. *Great Millet.*

Vern.—*Hindi*, Joar, Junri ; *Dakhini*, Joari ; *Tamil*, Cholam ; *Telugu*, Juralu ; *Burmese*, Pyoung.

Joár is one of the staple food-crops of Upper India. The poorer classes entirely live upon it for some months of the year. There are two varieties, one red-seeded and the other white-seeded. The stalks form a good cattle fodder, and are occasionally sown close for a fodder crop only. Joár contains about 15·53 per cent. of nitrogenous ingredients, 83·67 of non-nitrogenous ingredients, and 1·26 of inorganic matter.

The following kinds of peas and pulses are cultivated.

Cajanus indicus. *Pigeon Pea.*

Syn.—Cajanus flavus ; Cytisus cajan.

Vern.—*Sanskrit*, Adaki ; *Persian*, Shakhull ; *Bengali*, *Hindi*, Arhar ; *Dakhini*, Turva ; *Tamil*, Thovaray ; *Telugu*, Kandalu ; *Burmese*, Pai-yenkhyung.

An annual, 3 to 6 feet ; cultivated all over the country, but extensively in Behar and the North-Western Provinces. It yields a valuable pulse, which is split, made into pudding and eaten with bread-cakes. There are many varieties, of which (*bicolor*) the *tur* is the most noted. The stalks are used for making mats and baskets. A decoction of the leaves is given in smallpox.

Cicer arietinum. *Gram.*

Vern.—*Bengali*, Chhola ; *Hindi*, But, Chaná ; *Tamil*, Kadalay ; *Telugu*, Senaga ; *Burmese*, Ku-la-pai.

This valuable pulse is cultivated as a winter crop all over India, and is largely used as an article of food by the people of Northern India. There are many varieties, large and small, white and brown. Large quantities of gram are brought down to

the Calcutta market from Behar and the North-Western Provinces. It is eaten by the natives, parched, or parched and ground into flour, and also split and cooked. It is considered a nourishing horse-food. The green plants are eaten as a vegetable. The dried plants are a valuable fodder. Medicinally it is considered antibilious. Dr. Udai Chand Datt states that the "acid liquid exuded from the hairs of the stem and leaves of *Cicer arietinum* is called *chanakamla* in Sanskrit. It is collected by spreading a cloth out on the plants during the night and rinsing the fluid absorbed by it. *Chanakamla* is described as acid, refrigerant, saltish, and useful in dyspepsia, indigestion, and costiveness."

Ervum Lens. *Lentil.*

Vern.—*Bengali*, Musuri; *Hindi*, Masur; *Tamil*, Misur-purpur; *Telugu*, Misurpappu.

A valuable pulse, grown as a winter crop all over India. The seeds, which are of a deep red colour when husked, are split and eaten cooked. The chemical composition is stated to be as follows: nitrogenous ingredients, 30·46 per cent.; non-nitrogenous ingredients, 65·06; inorganic ingredients, 2·60. The varieties sold at Calcutta are Khari, Patnai, and Desi.

Glycine Soja. *Soy Bean.*

Vern.—*Hindi*, Bhat, Bhatwans.

Extensively cultivated in the hills of Kumaun as a food-crop. It is used as food both for man and cattle. Its chemical composition has been ascertained as follows:—

Nitrogenous ingredients . .	per cent. .	37·74 to 41·54
Carbonaceous or starchy ingredients	„ . .	29·54 to 31·08
Fatty or oily matter	„ . .	12·31 to 18·90

Lathyrus sativus. *The Chickling Vetch.*

Vern.—*Bengali*, Teora; *Hindi*, Khesari.

Largely cultivated on alluvial soils. The seed is split and eaten cooked like other pulses; it is, however, hard and indigestible, and its frequent use is said to bring on palsy of the lower limbs. Its chemical composition is stated to be nitrogenous

matter, 31·50 per cent.; starchy matter, 54·26; fatty or oily matter, 0·95; mineral constituents, 3·19; moisture, 10·10.

Phaseolus aconitifolius. *Aconite-leaved Kidney Bean.*

Vern.—*Hindi*, Moth; *Tamil*, Tulka-pire; *Telugu*, Kunkum-pesalu.

A small pulse, much cultivated as a rain-crop in the Northern Provinces of India. Its leaves are much indented like those of *aconite*, hence its name "aconitifolius." It is split, cooked like other pulses, and eaten along with bread or rice. Its chemical composition is stated to be 23·80 per cent. of notrogenous ingredients, 60·78 of carbonaceous or starchy ingredients, and 0·64 of fatty or oily matter. The beans, the seeds, and the straw are a nourishing cattle fodder.

Phaseolus calcaratus, variety torosus.

Vern.—*Hindi*, Guránsh.

This grain is cultivated in the Himalayas at a higher elevation than any other pulse. There are two varieties, one with a red and the other a cream-coloured seed.

Phaseolus Mungo. *Green Gram.*

Vern.—*Bengali*, Hali mung; *Hindi*, Hari mung.

Extensively cultivated in Bengal and North-Western Provinces. The grain is eaten cooked like other pulses.

Phaseolus Mungo, variety aureus.

Vern.—*Bengali*, Soná mung.

The seeds are yellow, hence the name "aureus", in vernacular it is also called the golden mung. It is considered the best of all the pulses, and is first parched before splitting.

Phaseolus Mungo, variety Max.

Vern.—*Hindi*, Urd, Másh.

This variety is extensively cultivated in Northern India, and is largely eaten by all classes of the people. It is also given to working cattle as a nourishing food.

Phaseolus Mungo, variety **radiatus**.

Vern.—*Bengali*, Mashkalai.

This pulse is closely allied to the above, and is largely cultivated in Northern Bengal. It is universally liked as food, eaten along with rice in the same manner as all pulses are eaten, *viz.*, by first splitting it and then by boiling it with a little turmeric, red pepper, and other condiments. *Thikra-kalai* (*Tamil*, Karupu-du-lunthu), is a sub-variety extensively cultivated in South India.

Pisum arvense. *Field Pea.*

Vern.—*Bengali*, Payra matar ; *Hindi*, Matar.

Cultivated all over India as a winter crop for its seeds, which are eaten either parched or split, and cooked like other pulses. In Bengal, two principal varieties are known, one with brown seeds and the other white. The dried plant is a good fodder.

Pisum sativum. *Field Pea.*

Vern.—*Bengali*, *Hindi*, Matar ; *Dakhini*, Watana ; *Tamil*, Pattani ; *Telugu*, Gundusani-gilu.

Cultivated all over India. The green pea is used as a vegetable. The ripe seeds are eaten either parched whole, or parched and ground into flour, and also split and cooked like other pulses. It is extensively cultivated in Northern India along with barley, and the mixed grain *bejhra* is the staple food of the poorer classes. The chemical composition of the pea is given as follows ; nitrogenous, 26·52 per cent ; non-nitrogenous ingredients, 70·38 ; inorganic ingredients, 3·10. The plant is a good fodder. There are several varieties, the white (*Kabuli*) and brown seeds being the most distinguished.

Vigna Catiang.

Syn.—Dolichos Catiang, D. sinensis.

Vern.—*Bengali*, Barbati ; *Hindi*, Lobiya, Raish.

Cultivated in Bengal, North-Western Provinces, and other parts of India. The green pods are used as a vegetable ;

the seeds are eaten cooked like other pulses.

Vicia Faba. *Horse Bean.*

Vern.—*Hindi*, Bakla.

Cultivated in the North-Western Provinces. The beans in the green state are used as a vegetable. The grain is used as food both for man and beast. In the experiment conducted at the Lucknow Horticultural Gardens by Dr. Bonavia, the cultivation of the crop proved to be very remunerative.

Amarantus frumentaceus. *Prince's Feather.*

Vern.—*Hindi*, Bathu ; *Tamil*, Kirai.

This species is extensively cultivated in Upper India, in Mysore and Koimbatur, where the seed forms, for some months of the year, the staple food of the people. In an experimental cultivation in the Calcutta Botanical Gardens, the yield on 40 square yards of land was 21 lbs. of seed, giving an average of more than 22 cwts. per acre. It is extensively cultivated in the North-Western Himalayas up to an elevation of 10,000 feet. Land newly cleared of forest yields a heavy crop. Bears, deer and other wild animals do not easily injure it, as they generally do other crops in these regions. Here it is the staple food of the poorer classes.

(4) Medicinal Products.

The following is a list of the substances generally used as medicine by the people of this country :—

Abroma augusta.
Abrus precatorius.
Abutilon indicum.
Acacia arabica.
Acacia Catechu.
Acacia leucophlœa.
Acalypha indica.
Achyranthes aspera.
Aconitum ferox.
Aconitum heterophyllum.
Acorus Calamus.
Adhatoda Vasica.
Adiantum venustum.
Ægle Marmelos
Agave Americana.
Ailanthus excelsa.
Ailanthus Malabarica
Aleurites moluccana.
Alahagi maurorum.
Albizzia Lebbeck.
Allium Cepa.
Allium sativum.
Aloe indica.
Aloe vulgaris.
Alpinia Galanga.
Alpinia nutans.
Alstonia scholaris.
Althœa rosea.
Alum sulph.
Amarantus spinosus.
Ammania baccifera.
Amomum Cardamomum.
Amoora Rohituka.
Amorphophalus campanulatus.
Anacardium occidentale.
Andropogon calamus aromaticus.
Andropogon muricatus.
Andrographis paniculata.
Aneilema tuberosa.
Anthocephalus Cadamba.
Antimoni Ferri sulphuretum.
Aquilaria Agallocha.
Arachis hypogæa.
Argyreia speciosa.
Aristolochia indica.
Artemisia vulgaris var. Indica.
Artemisia vulgaris.
Artocarpus Lakoocha.
Asparagus racemosus.
Asparagus sarm entosus
Astercantha longifolia.
Astragalus hamosus.
Balsamodendron Mukul.
Balsamadendron Myrrha.
Bambusa arundinacea.
Barringtonia racemosa.
Bassia latifolia.
Benincasa cerifera.
Barberis artistata (chitrak).
Beta vulgaris.
Blumea lacera.
Bœrhaavia diffusa.
Bombax malabaricum.
Borax.
Brassica campestris.
Brassica juncea.
Brassica nigra,
Buchanania latifolia.
Butea frondosa.
Cæsalpinia Bonducella.
Camphora officinarum.
Cannabis sativa.
Capsicum annuum.
Capsicum frutescens (long pepper).
Capsicum frutescens (round).
Capsicum frutescens (long).
Carica papaya.
Carthamus tinctorius.
Carum Carui (var. white).
Carum Carui (var. black).
Carum Carui (var. small).
Carum copticum.
Carum Roxburghianum.
Caryophyllus aromaticus.
Cassia sp. (senna).
Cassia alata (leaves).
Cassia alata (flower).
Cassia Fistula.
Cassia occidentalis.
Casia Sophera.
Cassia Tora.
Cedrela Toona.
Cedrus Deodara.
Celastrus paniculatus.
Chavica Roxburghii.
Cinchona Calisaya.
Cinchona succirubra.
Cichorium intybus.

Cinnamomum Tamala.
Cinnamomum zeylanicum.
Citrullus Colocynthis.
Citrullus vulgaris.
Citrus aurantium.
Cleome viscosa.
Clerodendron infortunatum.
Clerodendron (variety).
Cocculus cordifolius.
Cocculus palmatus.
Coccus Cacti.
Coccus Lacca.
Cochlospermum Gossypium.
Coffea arabica.
Corchorus olitorius (seed).
Corchorus olitorius (leaves).
Cordia Myxa.
Coriandrum sativum.
Crocus sativus.
Croton Tiglium.
Cubeba officinalis.
Cucumis Melo.
Cucumis Melo (Momordica).
Cucumis sativus..
Cucumis trigonus
Cucumis utilissimus.
Cucurbita sp.
Cuminum Cyminum.
Cupressus sempervirens.
Cupri sulphus.
Cureuma Amada.
Curcuma aromatica.
Curcuma longa.
Curcuma Zedoaria.
Cuttlefish bone.
Cydonia vulgaris.
Cyperus rotundus.
Datura fastuosa.
Datura Stramonium (alba).
Daucus Carota (seed).
Dioscorea sativa.
Diospyrus embryopteris.
Dorema ammoniacum.
Dracocephalum Royleanum.
Eletaria Cardamomum.
Erythrina indica.
Eugenia Jambolana.
Ferri sulphas.
Ferula Narthex.
Ficus Carica.
Ficus indica.
Ficus religiosa.
Flacourtia Cataphracta.
Fœniculum vulgare.
Fumaria parviflora
Garcinia Morella.
Gentiana Kurroo.
Glycyrhiza glabra.
Grewia asiatica.
Gynocardia odorata.
Helleborus niger.
Helicteres Isora.
Hemidesmus indicus.
Hibiscus cannabinus.
Hibiscus esculentus.
Hibiscus Abelmoschus.
Hibiscus tiliaceus.
Holarrhena antidysenterica.
Hydrargyri per sulphuretum.
Hydrocotyle asiatica.
Hyoscyamus niger.
Ichnocarpus frutescens.
Indigofera tinctoria.
Ipomœa turpethrum.
Juniperus communis.
Lactuca scariola (var. sativa).
Lawsonia alba.
Lepidium sativum.
Linum usitatissimum.
Luffa ægyptica.
Mallotus Philippinensis.
Malva rotundifolia.
Mangifera indica.
Maranta arundinacea.
Matricaria Chamomilla.
Mariscus cyperus
Melia Azardirachta (bark).
Melia Azardirachta (leaves).
Mentha sativa.
Mesua ferrea.
Michelia Champaca.
Momordica Charantia.
Moringa pterygosperma
Morus alba.
Mucuna pruriens.
Myrica sapida.
Murraya Kœnigii.
Myristica moschata.
Myrsine africana.
Nardostachys Jatamansi.
Nelumbium speciosum.
Nerium odorum.
Nicotiana Tabacum.
Nigella sativa.
Nyctanthes Arbor-tristis.
Nymphœa lotus.
Ocymum Basilicum.
Oldenlandia biflora.

Onosma echioides.
Ophelia Chirayta.
Orchis Mascula (salep misri).
Oxalis corniculata.
Pedalium Murex.
Pharbitis Nil.
Phyllanthus Emblica.
Pinus longifolia.
Piper Chaba.
Piper longum.
Piper nigrum.
Pisonia villosa.
Pistacia integerrima.
Pistacia lentiscus.
Pistia Stratiotes.
Plantago Ispaghula.
Plumbago rosea.
Plumbago zeylanica.
Plumbi oxidum.
Pogostemon Patchouli.
Prunus communis.
Prunus communis var. bokhariensis.
Psidium Guava.
Psoralea corylifolia.
Pterocarpus santalinus.
Pucedanum graveolens.
Punica Granatum.
Pyrethrum indicum.
Quercus lamellosa (bark).
Quercus lamellosa (fruit).
Quercus infectorius.
Quercus pachyphylla.
Randia dumetorum.
Raphanus sativus. (seed)
Rheum Moorcroftianum.
Rhus succidanea.
Ricinus communis.
Rosa alba (var. glandulifera).
Sagus lævis.
Salammoniac.
Salt (Lahori).
Saltpetre.
Samara Ribes.
Santalum album.
Sapindus trifoliatus.
Saussurea Lappa.
Scilla indica.
Scindapsus officinalis.
Semecarpus Anacardium.
Sesamum indicum.
Sesbania ægyptica.
Sesbania grandiflora.
Seseli indicum.
Shorea robusta.
Sida cordifolia.
Solanum Melongena.
Solanum nigrum.
Soymida febrifuga.
Spinacea oleracea.
Spondias mangifera.
Stereospermum suaveolens.
Strychnos nux-vomica.
Strychnos potatorum.
Styrax Benzion.
Symplocos Sumuntia.
Tamarindus Indica.
Taraxacum officinale.
Terminalia belerica.
Terminalia Chebula.
Tetranthera monopetala.
Thespesia populnea
Tiaridium indicum.
Tragia involucrata.
Trapa bispinosa,
Trichosanthes anguina.
Trichosanthes dioica.
Trigonella Fœum-graecum.
Valeriana Hardwickii.
Ventilago maderaspatana.
Vernonia anthelmintica,
Viola sp.
Vitex Negundo.
Vitex trifolia.
Withania somnifera.
Woodfordia floribunda.
Xanthium strumarium.
Zanthoxylum alatum.
Zingiber officinale.
Yellow arsenic.
Zizyphus Jujuba.

A short description is given below of the most important ones. Besides medicinal properties, the other uses to which each plant is put is also described.

Abroma augusta. *Perennial Indian Hemp.*

Vern.—*Bengali*, Ulatkambal.

A perennial shrub, 10 to 12 feet; found in Bengal and

South India. The root-bark is a valuable remedy for female diseases, specially in irregular menstruation, but it does not appear to have received the attention it deserves. The stalks yield a fine, strong fibre, a cord made of which bore 74lbs., while *san* broke with 68lbs. Dr. Royle, in his "Fibrous Plants of India," states that "it particularly attracted Dr. Roxburgh's attention, as the bark abounds with strong white fibres, which make a very good substitute for hemp, affording good common cordage. The plant grows so quickly as to yield annually two, three, or even four cuttings fit for peeling; hence it may be advantageously cultivated, and is, deserving of more than common attention on account of the beauty, strength, and fineness of its fibres." The tree is scarce around Calcutta, but is said to be common in the Malda district.

Abrus precatorius. *Bead Tree; Indian Liquorice.*

Vern.—*Sanskrit*, Gunja; *Persian*, Chashmi-i-khoras; *Bengali*, Kunch; *Hindi*, Ghuncha; *Dakhini*, Gumcha; *Tamil*, Gundumanni; *Telugu*, Guriginja; *Burmese*, Khien-ra.

A twining plant, found all over India and Burma. There are three varieties of the plant, producing red, black, and white seeds. The red seeds are principally used as an ornament, and also for jewellers' weights, each measuring about two grains. In Egypt they are used as an article of food, but are considered indigestible. In India, however, they are poisonous, especially the white variety, producing vomiting and pains, purging, and convulsions. The whole plant is demulcent, and the root is efficacious as a good substitute for liquorice. The leaves, mixed with honey, are applied to swellings.

Abutilon indicum. *Indian Mallow.*

Vern.—*Bengali*, Potári; *Hindi*, Kungani; *Dakhini*, Kangoi; *Tamil*, Perun tuti; *Telugu*, Nugubenda Tutti.

A small shrub, 2 to 3 feet; common in most parts of India. The whole plant abounds in mucilage. An infusion of the

leaves is given in fevers as a cooling drink; the seeds are considered a laxative. The stalks yield a strong fibre.

Achyranthes aspera. *Rough Chaff Tree.*

Vern.—*Sanskrit,* Apamárga; *Bengali,* Apáng; *Hindi,* Chirchirá; *Dakhini,* Aghara; *Tamil,* Nai-urivi; *Telugu,* Utareni.

A small shrub, 3 to 4 feet; found all over India. The plant possesses valuable medicinal properties as a pungent and laxative, and is considered useful in dropsy, piles, boils, eruptions of the skin, &c. Mustard oil, in which the root of this plant has been boiled, is considered very efficacious in bad ulcers. The seeds and leaves are considered emetic, and are useful in hydrophobia and snake-bites.

Aconitum ferox. *Aconite.*

Vern.—*Sanskrit,* Atibisha; *Bengali,* kát Bish; *Hindi,* Mithatitia; *Dakhini,* Uchanak; *Tamil,* Vasha-navi.

A shrub, 2 to 3 feet; found at high elevations in the Himalayas. The root, known as Aconite in English Pharmacopœias, is highly poisonous, and is used as a very effective medicine in various kinds of diseases, but great caution is necessary in its use. One lb. of the root contains about 50 to 90 grains of *Aconitine,* one-tenth of a grain of which is fatal to man. It is chiefly used externally in tetanus, rheumatism, gout, heart disease, &c. Other species of the plant, such as *A. luridum, A. Napellus,* and *A. palmutum,* possess similar properties.

Aconitum heterophyllum.

Vern.—*Sanskrit,* Ataes; *Hindi,* Atis; *Dakhini,* Vajje-turki; *Tamil,* Ativadayam; *Telugu,* Ativasa.

A shrub, 2 to 3 feet; native of the Himalayas. The root of this variety contains no poisonous principle, is reckoned a tonic and valuable febrifuge, and is administered in various diseases. The root is adulterated with that of *Asparagus sarmentosus.* There are two kinds, one black and the other white.

Acorus Calamus. *Sweet Flag.*

Vern.—*Sanskrit*, Vacha ; *Persian*, Vaj ; *Bengali, Hindi*, Bach ; *Tamil* Vasambu ; *Telugu*, Vadaja ; *Burmese*, Linhe.

A semi-aquatic perennial, native of Europe and North America, but cultivated in damp, marshy places of India and Burma. The whole plant is aromatic, but the rhizomes only are used in medicine, which contains an aromatic bitter principle, and are considered useful in epilepsy, cold, fever, coughs, rheumatism, colic, dyspepsia, and various other diseases. An essential oil is obtained From the leaves, which in England are used by perfumers in the manufacture of hair-powders.

Adhatoda Vasica. *Malabar Nut.*

Vern.—*Sanskrit*, Arus ; *Bengali*, Bákas ; *Hindi*, Arúsá ; *Tamil*, Adádode ; *Telugu*, Adasara.

A shrub, 8 to 10 feet ; found all over India. This is a medicinal plant which has not received the attention it deserves. The leaves and the root-bark are considered very efficacious in all sorts of coughs. The flowers and the root are bitter, aromatic, and antispasmodic. A yellow dye is obtained from the leaves. The wood makes good charcoal for gunpowder manufacture.

Adiantum venustum. *Venus hair.*

Vern.—*Hindi*, Par-i-siya-washan, Hansráj.

A fern, found in the Himalayas, possessing astringent and aromatic properties ; emetic in large doses ; also considered a tonic and febrifuge. It forms the basis of capillaire syrup.

Adina cordifolia.

Vern.—*Hindi*, Haldu.

A large Himalayan timber tree. The wood is durable, seasons well, and takes a fine polish.

Ægle Marmelos. *Bengal Quince ; Bael Fruit.*

Vern.—*Sanskrit*, Sriphal ; *Bengali, Hindi*, Bel ; *Tamil*, Vilva-pazham ; *Telugu*, Bilvapandu.

A tree of middling size found all over India. The fruit, known as the Bengal quince is eaten by the people, and is very

nutritious. The dried pulp of the unripe fruit is a valuable remedy for chronic diarrhœa, dysentery, and habitual costiveness. It ought to become an article of export. At present large quantities of pulp are thrown away in Birbhum in Bengal, where the rind is used to make necklaces. The root, bark, and leaves are given in intermittent fevers, palpitation of the heart, and asthma. A transparent mucus surrounds the leaves, which may be used as a ready-made varnish. A yellow dye is obtained from the rind of the fruit. A perfumed water is distilled from the flowers.

Ailanthus malabarica.

Vern.—*Tamil*, Peru-mara, Mati-pal; *Telugu*, Mati-palu.

A large tree, native of the forest of South India, but not very common. Major Drury states that "the bark has a pleasant and slightly bitter taste, and is given in cases of dyspepsia, and is, moreover, considered a valuable tonic and febrifuge." The thick bark, on incision, yields a bright-coloured resin, known as the Matipal resin, which is used as a remedy for dysentery. The fruit is considered useful in cases of ophthalmia.

Alhagi maurorum. *Manna.*

Vern.—*Sansk rit*, Giri-karnika; *Persian*, Shutarkhor; *Bengali*, *Hindi*, Juwasa; *Telugu*, Tella-giniá-chettu.

A shrub, 2 to 3 feet; native of the desert of Egypt, Arabia, Asia Minor, Beluchistan and Central India. It is the chief fodder for camel in those desolate regions. The substance known as Manna is the exudation from the leaves and branches of this shrub, but the Indian plant does not form this secretion. The herb itself is considered cooling and bitter, and is used in bilious complaints and vertigo. The manna is administered in coughs, uterine diseases, and pulmonary affections.

Aloe indica. *Aloes.*

Vern.—*Sanskrit*, *Bengali*, Ghrita-kumari; *Persian*, Mussabbr; *Hindi* Ghi-komar; *Dakhini*, Kanwar; *Tamil*, Kattale; *Telugu*, Kala banda; *Burmese*, Mok.

A species of aloe, found in all parts of India. Major Drury

states that an inferior description of aloe is obtained from it. Dr. Balfour states that the pulp is eaten by the natives after washing it well in cold water, and adding a little sugar to it. The leaves make a good fibre suitable for ropes, cordage, and mats. Dr. Royle states that "the fibre is white in colour, fine in quality, with sufficient tenacity for textile fabrics, and readily takes colours. The fibres are about 2 feet in length, and have considerable strength. A bundle of them bore 160 lbs., when a similar one of Petersburgh hemp broke with the same weight." The Bengal *Gritakumari*, however, does not yield fibre. The pulp is used medicinally, having "a powerful action on the uterus : is an emmenagogue and anthelmetic. It is considered cooling and aperient, useful in affections of the spleen and liver and fever, also in pain of the bowels." Dr. Bidie is of opinion that *A. indica* is only a variety of *A. vulgaris*.

Aloe vulgaris. *Aloes.*

Vern.—*Persian.* Mussabbr ; *Tamil*, Kariapollam ; *Telugu*, Mussam bram.

This species of aloe, originally a native of Greece, or, according to some, Cape Colony, has now been thoroughly naturalised in India. The substance known as the Barbadoes Aloes is the product of this plant, which is considered inferior in quality to the Socotrine aloes, the produce of *A. socotrina*.

Mr. Murray mentions the following species of the aloe plant : *A. barbedense, indica, littoralis, perfoliata, purpuracens, socotrina, spicata*, and *vulgaris*. *Indica* and *perfoliata* are used by natives as a demulcent, while the others produce the aloe of commerce. During the five years ending 1880-81 the quantity and value of aloes (Indian produce) exported from British India are given as follows :—

	cwt.	£
1876-77	27	23
1877-78	8	7
1878-79	14	16
1179-80	130	151
1880-81	61	76

Aloes is considered a very valuable medicine. As an aperient it is highly beneficial to persons predisposed to apoplexy.

Alpinia Galanga. *Greater Galangale.*

Vern.—*Sanskrit*, Kulanjan ; *Bengali*, *Hindi*, Kulanjan ; *Dakhini*, Pan-Kiljar ; *Tamil*, Perarattai ; *Telugu*, Peda-dumpa-rash-trakam.

A perennnial plant, native of Sumatra, now cultivated in Eastern Bengal and South India. The tuberous roots are known as the greater Galangale of the druggists ; they are aromatic, pungent, and somewhat bitter, given in infusion in fever, rheumatism, and catarrhal affections, and form a substitute for ginger ; but are not much used now owing to their acrid pungency. The Lesser or Light Galangale is the produce of *A. nutans* or *chinensis*. The seeds also possess medicinal properties like the root, and are given in dyspepsia, rheumatism and catarrhal affections. Dr. Birdwood states that a spurious article, the root of *Kœmpferia galangale* is often substituted for the true galangale.

The quantity and value of galangale (Indian produce) exported during the five years ending 1880-81 are as follows —

				cwt	£.
1876-77	...	...	...	626	400
1877-78	...	...	...	312	202
1878-79	...	...	...	702	570
1879-80	...	...	...	1,139	941
1880-81	...	...	...	542	450

Alpinia nutans. *Light Galangale.*

Vern.—*Persian*, Kastas-zerambet ; *Bengali*, Punag-champa ; *Hindi*, Ilachi ; *Burmese*, Pa-ga gyi.

A native of Eastern Archipelago, found in Burma on the banks of the Salwen, in Silhet, and on the Coromandel Coast. The whole plant is fragrant like the cardamoms. The roots are often mixed with the true galangale.

Alstonia scholaris.

Vern.—*Sanskrit*, Ayugma chadda ; *Bengali*, Chhutin ; *Hindi*, Satawar ; *Tamil*, Iriolepallay ; *Telugu*, Eda-kula-ariti.

A tree, 50 feet ; native of Bengal, Assam, South India, and

Burma. The whole plant abounds in a milky juice. The bark is bitter like Gentian, and is said to possess similar medicinal properties. It is a powerful tonic, efficacious in bowel complaints, and useful as a febrifuge.

Althœa rosea. *Holly Hock.*

Vern.—*Hindi*, Gulkhaira ; *Tamil*, Shemai-tutti.

A native of Kashmir and the Punjab Himalayas. The seeds are mucilaginous, demulcent, diuretic and febrifuge, and are useful in inflammation of the lungs and bladder. The flowers are cooling and diuretic, prescribed in rheumatism ; roots are considered astringent and given in dysentery. The leaves yield a colouring matter resembling indigo. Mr. Murray states that more than 3 cwts. of seeds and 7 cwts. of flowers are annually exported from Afghanistan.

Ammannia baccifera. *Blistering Ammania.*

Syn.—A. vesicatoria.

Vern.—*Bengali*, Pan-marich ; *Hindi*, Dad-mari ; *Dakhini*, Agni-buti ; *Tamil*, Kallurivi ; *Telugu*, Agnivendrapaku.

A small plant, 1 to 3 feet ; found on wet lands in Bengal and South India. The plant has a strong smell, like that of muriatic acid, and is used to raise blisters in rheumatic pains, but is not recommended, owing to the excessive pain it causes. The juice of the plant is given internally in spleen ; but it causes great pain and the result is not certain.

Anacardium occidentale. *Cashew Nut.*

Vern.—*Bengali*, Hijili bádám ; *Hindi*, Kaju ; *Tamil*, Mundiri-ottai ; *Telugu*, Idi Mamidi.

A perennial, 30 to 40 feet ; indigenous to the West Indies ; now common in Burma and the eastern coast of India. The fruit is of a bright scarlet colour, at the bottom of which the Cashew nut protrudes. The kernel when raw is exceedingly acrid, but when boiled it forms a delicious article of food. The oil of the nut is used as an anæsthetic in leprosy with advantage. In warts, corns, and ulcers it is also held beneficial,

The expressed juice of the fruit is given in diarrhœa and diabetes. The oil of the nut, by virtue of its acridity, prevents the attacks of white-ants upon wood. The astringent juice, which oozes out from the trunk, gives a beautiful varnish and may be substituted for gum arabic. The bark may be used for tanning.

Dr. Kanny Lall Dey, in his "Indigenous Drugs of India," makes the following remarks on the use of the different products of this tree:—

"The kernel has a sweet and agreeable taste, and is eaten with relish when roasted. The oil obtained from it by expression is exactly similar to olive oil. A gum, that exudes from the bark, resembles gum arabic, but is partially soluble in water, and consists of true gum and Bassorine. The pericarp of the nut contains a black acrid oil, called *cardole*, and is a powerful vesicating agent. The oil is also applied to the floors and wooden rafters of houses to prevent the attacks of white-ants. Specific gravity of the kernel oil 0·9160; soluble in ether; partially in alcohol. It is nutritous and emollient; internally used as a demulcent in form of emulsion; can be used in pharmacy like olive oil. The gum may be used as a substitute for gum arabic."

Andrographis paniculata. *King of Bitters.*

Vern.—*Sanskrit*, Kairata; *Bengali*, Kalmegh; *Hindi*, Kriat; *Dakhini*, Kalafnath; *Tamil*, Nila-vembu; *Telugu*, Nila-vemu.

An annual, 1 to 1½ feet; grows wild in Bengal upon walls and on dry ground, and cultivated in South India for its stomachic and tonic properties. It blossoms in winter. The whole plant, known as the "King of Bitters," contains medicinal properties, but the roots and the leaves are rather more appreciated. They are febrifuge, stomachic, tonic, alterative, and anthelmintic. The root of this plant enters largely into the tincture called "Drogue amere." Mr. Murray, in his "Plants and Drugs of Sind," states that this plant "is very useful in general debility, in advanced stages of dysentery, and as a mild aperient in certain forms of dyspepsia." According to Rai Kanny Lall Dey, Bahadur, the domestic medicine known as *aloie* is composed of the juice of this plant mixed

with some carminative and formed into pills. No trade appears to exist in this medicinal plant, but any quantity of it can be exported if a demand arises for it.

Andropogon calamus aromaticus. *Sweet Calamus.*

Vern.—*Hindi*, Rusá Ghás.

This scented grass, called sweet calamus in English, grows wild in Central India, North-Western Provinces, and Punjab.

The oil obtained from this plant, known as the Rusa grass-oil, is sold in England under the name of grass-oil or oil of rose-scented geranium. The grass-oil is seldom taken internally by the natives, but is considered a powerful stimulant to the functions of the several organs, when rubbed externally, and is used as a liniment in chronic rheumatism and neuralgic pains: but it is too expensive for general use. The oil prevents the hairs of weak invalids from falling off, and is also considered very efficacious in baldness.

Andropogon muricatus. *Khas-khas.*

Vern.—*Sanskrit*, Usir; *Bengali*, Khas-khas ghás; *Hindi*, Khas; *Tamil*, Vette-ver; *Telugu*, Kuruveru.

This species of grass grows in abundance on high sandy banks and waste tracts in Bengal, the Coromandel Coast, and Upper India. The roots are made into mats and placed before doors in the hot season, which, when wetted, render the atmosphere cool, and impregnate it with a balmy odour. On distillation with water, they yield a fragrant oil, which is used as a perfume, and as such it deserves the attention of European perfumers. The infusion of the roots is held to be stimulant, diaphoretic, stomachic, and refrigerent.

Aquilaria Agallocha. *Agallocha; Aloe or Eagle-wood.*

Vern.—*Bengali*, Agaru; *Persian*, Ud-i-Hind; *Hindi*, Agar; *Tamil*, Aggalichandana; *Telugu*, Agru; *Burmese*, Akyau.

A large tree; native of the mountainous tracts of Silhet and Assam; supposed to produce the true calumbac, or eagle-wood of commerce. Other trees are also said to produce

similar substance, as *Aquilaria ovata*, *A. secundaria*, *Excœcaria Agallocha*, and the *Aloexylon Agallochum*. The wood is much prized as a perfume, and is also used in medicine. Given in decoction, it allays thirst in fever, and is also serviceable in vertigo and palsy. An essential oil obtained from it is given in special diseases. In Cochin-China a common paper is manufactured from the bark.

Argyreia speciosa. *Elephant Creeper.*

Vern.—*Sanskrit*, Samudrapalaka; *Bengali*, *Hindi*, Bich-tarak, Guguli; *Tamil*, Shamuddirap-pach-chai; *Telugu*, Samudrapala.

A twining perennial, found all over India. The leaves are both maturative and absorptive; when the under-part is applied to the inflammation it hastens suppuration, and the upper part hastens resolution. It is also efficacious in skin diseases.

Aristolochia indica. *Indian Birthwort.*

Vern.—*Sanskrit*, Sunanda, Hari, Jovari, arkamula; *Bengali*, Isarmul; *Hindi*, Isarmel, Jorabel; *Dakhini*, Sampsun, Isharmul; *Tamil*, Ich-chura-muliver; *Telugu*, Ishvara-veru.

A twining perennial, found all over India, but not in abundance. The root is said to possess emmenagogue and antarthritic properties. It is also reckoned a valuable antidote for snake-bite, and is used to cause abortion. An infusion of the leaves, mixed with castor oil, is considered highly efficacious in obstinate psora. The juice of the fresh leaves is very useful in the croup of children, by inducing vomiting, without causing any depression, where ipecac. and iodide of potassium have failed to procure any favourable result; and it is said that, if resorted to in the earlier stages, no surgical operation becomes necessary.

Artemisia vulgaris, var indica. *Indian Wormwood.*

Vern.—*Sanskrit*, Damana suraparna; *Persian*, Barinj-asif-i-kohi; *Bengali*, Dona; *Hindi*, Gandmar, Mustaru; *Dakhini*, Mustaru; *Tamil*, Machi-pattiri; *Telugu*, Machi-patri.

Cultivated in Indian gardens, but that used in India is

brought from Kabul. The dried plant is considered a febrifuge useful in cerebral diseases, asthma, and dyspepsia. The following history of the plant is taken from Mr. Murray's "Plants and Drugs of Sind" :—

"This plant is said to have been named Artemis, one of the names of Diana, the goddess of Chastity, on account of the purposes to which it was applied in bringing on precocious puberty. Among tonic, bitter, and aromatic medicines, the plants of this genus are more deserving of notice, the various species having been employed in medicine from the most remote antiquity. Of these, wormwoods are the most celebrated; they derive their English name from their employment as vermifuges. The plant under notice is a powerful deobstruent, and its strong aromatic odour and bitter taste indicate stomachic and tonic properties, and, according to Ainslie, it is regarded as possessing such by the people of Southern India, who sometimes also use it in antiseptic fomentations, as they do its congener, *Artemisia abrotanum*. In nervous and spasmodic affections connected with debility the leaves and tops are administered, and an infusion of them in phagadenic ulceration. Bellew states that in Afghanistan, as throughout India, a stong decoction is given as a vermifuge, and a weak one to children in measles. He also mentions that an infusion of any of the Artemesias is given as a tonic. In Sind and Persia, *Artemisia Vahliana* also furnishes a tonic, febrifuge, and vermifuge."

Asparagus racemosus.

Vern.—*Sanskrit, Bengali*, Satamuli ; *Hindi*, Satáwar ; *Telugu*, Challa.

A small climbing plant, with fragrant flowers, found all over India. Root used medicinally, considered refrigerent, demulcent, diuretic, aphrodisiac, antispasmodic, and alterative; employed chiefly in nervous and renal diseases. When administered in combination with sugar and honey, it is effectual in diarrhœa and dysentery caused by bilious disorders.

Asparagus sarmentosus. *Linear-leaved* or *Climbing Asparagus.*

Vern.—*Hindi*, Sufed-musli ; *Tamil*, Tannir-vittan-kiz ; *Telugu*, Challa-gaddalu.

A climbing shrub, found in upper India and the Dekhan. The root, which is long, white, and fleshy, is considered nourishing and aphrodisiac. Boiled with oil, it is applied to cutaneous

diseases. It is often brought from China in a candied state. The root of *Bombax malabaricum* and *Hyposcis orchioides* is also sold in the market as *Sufed musli.*

Astercantha longifolia. *Long-leaved Barleria.*

Vern.—*Sanskrit*, Ikshugandha, Kantakalika; *Bengali, Hindi*, Talmakhaná; *Tamil* Nirmuli; *Telugu*, Nirgubi Veru.

An annual, found on moist lands all over India. The whole plant possesses tonic and diuretic properties; the seeds, called *Talmakháná*, are given in gonorrhœa; the root in decoction, is administered in dropsical cases and gravel; the leaves are also used as a diuretic after being boiled in vinegar; and even the ashes of the dried plant are considered useful.

Astragalus hamosus. *Hook-podded Milk Vetch.*

Vern.—*Hindi*, Taj-bâdshahi, Katila.

An annual, found in Beluchistan, Sind, and the Panjab, belongs to the genus of plants which produce the gum tragacanth of commerce; possesses emollient and demulcent properties, and is useful in the irritation of the mucus membranes, especially the pulmonary and genito-urinary organs, By dyers and calico-printers it is employed as an adjunct to dyeing substances, for producing a glaze on the coloured stuffs.

Aucklandia costus. *Costus Root.* (*Reduced to* Saussurea Lappa,)

Vern.—*Sanskrit*, Kuta; *Persian*, Kust-i-hind; *Bengali, Hindi*, Pachak, Két; *Tamil*, Kustam; *Telugu*, Changle.

An annual, native of the southern slopes of the Himalayas, especially near Kashmir. Dr. Falconer has identified this plant to be the source of the *Costus arabicus* of the ancients, used as an incense in the temples. It forms also an ingredient for hair-powder. Medicinally, it is considered a bitter, aromatic tonic, used in fever; also stomachic, depurative, and aphrodisiac. A preserve made of it is reckoned wholesome and nutritious. Mr. John Smith, in his "Dictionary of Economic Plants,"

however, identifies the costus root with the produce of another plant. He states :

"Costus of the ancients has of late been ascertained to be the roots of *Aplotaxis auriculata*, a strong-rooted perennial plant of the composite (compositæ) family, a native of Kashmir, having a flowering stem attaining 5 or 6 feet in height, bearing heads of purple coloured flowers like thistles, on the apex of the branches. Its roots are extensively collected, it is stated, to the amount of 2,000,000 lbs. a year, forming an important article of trade. It is conveyed to Bombay, and thence shipped to the Persian Gulf, Red Sea, and China. Its chief use is in perfumery, and in China is burnt in the temples and used medicinally to excite appetite. In Kashmir it is not much used except to keep away insects from shawls. It is known by the name of *kút* in the bázárs."

Averrhoa Carambola. *Carambola Tree.*

Vern.—*Bengali*, Kámrángá ; *Hindi*, Karmal ; *Dakhini*, Khamrak ; *Tamil*, Tamarta maram ; *Telugu*, Karomonga.

A small tree, 15 to 20 feet ; native of Ceylon and the Moluccas, now cultivated in gardens in Bengal, Burma, and South India. The fruit is made into syrup, pickled or preserved in sugar. In Burma, cooked in curries, it is highly relished as a wholesome dish. The acid leaves, are considered a good substitute for sorrel. The leaves, the root, and the fruit are used as a cooling medicine. The fruit is also used as an acid in dyeing.

Balsamodendron Mukul. *Gum Bdellium Tree.*

Vern.—*Bengali, Hindi*, Guggul, Mukul.

A small tree, 4 to 6 feet ; native of Western India and Rajputana.

The produce of this tree, as also of *B. Agallocha, B. pubescens*, &c., is the gum resin bdellium of commerce, which is used as an incense and a medicine. It is found in brittle masses of a red, yellow, or brownish colour, sometimes transparent, with a bitterish, balsamic taste, like myrrh ; is soluble in potass, and contains resin, gum, bassorine, and a volatile oil. It is often used as a substitute for myrrh, and possesses

similar medicinal virtues. Guggul is used in native medicine as a demulcent, carminative, and alterative and is considered specially useful in leprosy, rheumatism, and syphilic disorders. When applied externally to boils and abscesses, it acts as a powerful resolvant ; in ulcerous mouths it forms a valuable gargle.

Balsamodendron pubescens, a native of Sind, also yields the gum bdellium which is used for similar purposes.

Balsamodendron Myrrrha. *Myrrha.*

Vern.—*Sanskrit,* Bola ; *Bengali, Hindi,* Hirábol.

A tree, native of Arabia and Africa. The gum resin obtained from this tree is the celebrated myrrh of commerce, of which according to Dr. Pareira, there are three varieties. From ancient time myrrh has been burnt in temples as an incense. Medicinally it is bitter, acrid and aromatic, and is largely used as an expectorant in chronic coughs, and as an emmenagogue in irregular menses. Externally used as rubefacient, in combination with some irritant oil, on painful parts ; it forms also a valuable gargle in ulcers of the mouth.

Barringtonia racemosa.

Vern.—*Bengali,* Samudraphal ; *Hindi,* Ijjul ; *Tamil,* Samudrapallam ; *Telugu,* Kanapa chettu.

A large handsome tree, found in Bengal and Southern India. The root and the bark are bitter, possessing virtues similar to that of cinchona, and are considered a valuable medicine for their deobstruent and cooling properties : the fruit is very efficacious in coughs, colds, and asthma : the kernels of the drupes, mixed with sago and butter, are given in diarrhœa, with ginger and lemon-juice, in tenesmus ; and with milk, in jaundice and other bilious diseases ; the seeds are aromatic, useful in colic, parturition, and in ophthalmia.

Berberis aristata and **Berberis Lycium.** *Indian or Nepal Barberry.*

Vern.—*Bengali, Hindi,* Chitra, Darhaldi, Rasaut, Kashmal ; *Persian* Zirishk, Chitra.

A spinous shrub, native of the Himalayas and the Nilgiris.

The extract, *Rasaut*, obtained from the bark and wood is largely used by the native practitioners as a tonic, and a remedy for ophthalmia. A yellow dye is obtained from the root chiefly used in colouring leather. The berries are dried for currants and brought to the plains, where they are sold under the name of *Zirishk tursh*, or acid currants. An oil is also extracted from the seeds. The average annual export of *Rasaut*, from the Kumaun hills does not exceed 5 cwts.

Cæsalpinia Bonducella. *Bonduc* or *Fever Nut.*

Syn.—Cæsalpinia bonduc ; Guilandina bonduc.

Vern.—*Bengali*, Kat-karanja, Nátáphal ; *Tamil*, Gach-chakkay ; *Telugu*, Gachchakaya ; *Burmese*, Ka-lein-dza.

A scrambling shrub, found almost all over India, common in Bengal, Burma, and South India. The seeds of this plant have a peculiar appearance, irregularly round, white in colour, and very hard. The kernel inside the seeds is extremely bitter, and possesses to a great extent the febrifugal properties of cinchona. In disorders of the liver, the tender leaves are considered very efficacious, and the root is reckoned a valuable tonic in Amboyna. The natives of India have a prejudice against allowing the seed into their houses, from an idea that it causes social animosities. Dr. K. L. Day considers that the kernel of the seeds can be substituted for quinine in fevers and other malarious disorders. The seeds yield an oil, known as the Bonduc nut oil. They also contain a large percentage of starch, sugar, and resin.

Cassia Fistula. *Pudding Pipe Tree.*

Vern.—*Sanskrit*, Suvarnak ; *Persian*, Khyari-chembis ; *Bengali*, Sondal ; *Hindi*, Amaltas ; *Dakhini*, Bhawa ; *Tamil*, Konraik-ke ; *Telugu*, Rela-kayalu.

A middle-sized tree, 20 to 40 feet ; found all over India, and other parts of Southern Asia. The fruit yields a pulp, used as a laxative ; and the bark of the root is also a strong purgative. The bark of the tree is used in tanning. The tree yields a gum.

Cassia glauca. *Sulphur-flowered Cassia.*

Vern.—*Telugu*, Kondatantepu chettu.

A small tree, found in Burma and South India. Its bark and leaves are given in diabetes and gonnorhœa.

Cassia Lignea.

The cassia bark sold in the Calcutta market is known as *Cassia Lignea*, the name by which it is generally known in commerce. It is now known to be the bark of *Cinamomum Tamala*, variety *Albiflorum*. Cassia bark is used as an astringent medicine by European practitioners.

Cassia occidentalis. *Round-Podded Cassia.*

Vern.—*Bengali*, Kalkashanda; *Tamil*, Peyo-veri; *Telugu*, Kashinda; *Burmese*, Kalan.

An annual; common as a weed in Bengal, South India, and Burma. The leaves and seeds are used externally in cutaneous diseases.

Cassia Sophera.

Vern.—*Hindi*, Banar; *Dakhini*, Sari-kasondi; *Tamil*, Periya-takarai; *Telugu*, Paidi-tangedu.

A common shrub, found in the Himalayan Tarai, Bengal, Burma, and South India. The bark, leaves, and the seeds are used as a cathartic and as a remedy for ringworm.

Cassia Tora. *Fetid Cassia; Oval-leaved Cassia.*

Vern.—*Sanskrit*, Prabanatha; *Bengali, Hindi*, Chakunda; *Dakhini*, Tarota; *Tamil*, Ushit-tagarai; *Telugu*, Tagariha chettu; *Burmese*, Dan-ky-wai.

A common weed, grows all over India and Burma. The leaves are used as an aperient, and much used to adulterate senna. The leaves and the seeds are a valuable remedy in cutaneous affections, specially for ring-worm. The leaves also yield a blue dye, which is fixed by lime-water. The seeds, now called Cassophy, are a good substitute for coffee. Colonel Sladen, the commissioner of Arakan, writes—

"It has recently been discovered, that the bean or seed of this plant when roasted and ground forms of itself an excellent substitute for coffee, and used as an adulterant with coffee in the proportion of one part coffee, five parts *Cassia Tora*, or, as the preparation is now called in the London market, 'Cassophy.' It improves the quality and flavour of coffee, and adds considerably to its wholesome and digestive properties. Cassophy has been analyzed by Professor Attfield, Ph. D., F. I. C., and pronounced free from all deleterious or nerve-exciting properties. It can be landed and sold in Europe with considerable profit, at a price which is less than a third of the price paid for genuine coffee."

Cassia sp. *Senna.*

Vern.—*Bengali, Hindi,* Sonamukhi ; *Tamil,* Nilavirai ; *Telugu* Nela-tangendu.

The senna leaves of commerce are obtained from several species of Cassia, of which *C. elongata, C. lanceolata,* and *C. obovata,* are said to be the most imporant in India. Senna leaves are chiefly used as a purgative ; and are also given in habitual constipation, dyspepsia, derangements of the liver. and fever.

Celastrus paniculata. *Staff Tree.*

Vern.—*Hindi,* Malkagni ; *Tamil,* Atiparich-cham ; *Telugu,* Mala-erikata.

A scrambling shrub, common in all parts of India. The red seeds are used medicinally, principally for horses. In the human constitution they act as a warm and dry remedy, and are given in rheumatism, paralysis, and special diseases. An empyreumatic oil is obtained from the seeds by destructive distillation, which is applied externally. The leaves are also officinal.

Chavica Roxburghii. *Long Pepper.*

Syn.—Piper longum.

Vern.—*Sanskrit,* Pippuli ; *Persian,* Fil-fil-undaraz ; *Bengali,* Pipul ; *Hindi,* Piplamul ; *Tamil,* Tipili ; *Telugu,* Pipul ; *Burmese,* Pei-khyen,

This plant is extensively cultivated in South India, but also grows spontaneously on the river-banks in the Circar moun-

tains, South Concan, Bengal, and Burma. The dried catkins from the female plant are used medicinally as an acrid, stimulant and carminative. It is given with advantage in coughs, intermittent fever, cholera, and special diseases. Dr. Bidie states that in South India it is chiefly used as a condiment, and that it contains a volatile oil, an acrid resin and *piperine*.

Cinchona.

Originally a native of South America, now acclimatised in the Darjiling Himalayas, chiefly through the exertions of Dr. King, Superintendent of the Royal Botanical Garden, Calcutta, and in the Nilgiris. Mr. Gamble gives the following history of its introduction into India :—

"The cinchona trees were first brought to India in 1860, chiefly through the labour of Mr. C. R. Markham. C. B., who was sent by the Secretary of State in 1859 to Peru to collect plants and seeds of the different kinds. The plants he brought did not live, but the seeds were sown and the tree planted in the Nilgiri hills. In 1862, Dr. T. Anderson instituted the plantations at Rangbi in Sikim with plants and seeds brought by him from Java. There are four principal species cultivated in the Indian plantations, *viz.*, *C. succirubra, Calisya, officinalis, and micrantha.*"

Cinnamomum glanduliferrum.

Vern.—*Bengali*, Sassafras.

A tree of the Nepal Himalayas, which yields the sassafras bark of commerce. Sassafras bark is also obtained from America. It is considered stimulant and diaphoretic. The tree also contains solid grains of camphor in its wood. The wood is durable, used in Sikim for cabinet work, and in Assam for canoes and boat-building. It is being tried for railway sleepers.

Cinnamomum zeylanicum. *Cinnamon.*

Vern.—*Bengali*, Dalchini ; *Hindi*, Darchini ; *Tamil*, Karua-puttai ; *Telugu*, Sanna-lavanga-putta ; *Burmese*, Thit-kya-boh.

The cinnamon of commerce is the bark of this tree, a native of the Ceylon forests, but now cultivated on the western

coasts of that island. An inferior quality of cinnamon is obtained from China, but the Ceylon or Cayenne variety is reckoned superior. In India cinnamon is chiefly used as a spice. Medicinally it is considered heating and tonic.

Citrullus Colocynthis. *Colocynth Gourd.*

Syn.—Cucumis colocynthis.

Vern.—*Sanskrit,* Indra-varuni ; *Bengali, Hindi,* Makal, Indrayan ; *Tamil,* Pey-komati ; *Telugu,* Eti-puch-cha.

Common all over India. The Indian colocynth is considered a safe purgative. The pulp of the fruit is used by native practitioners in biliousness, constipation and fever, and is said to possess bitter, acid, and cathartic properties. The root is also used as a cathartic medicine in various diseases.

Cochlospermum Gossypium. *Golden Silk Cotton tree.*

Syn.—Bombax Gossypium.

Vern.—*Hindi,* Kumbi ; *Tamil,* Tanaku ; *Telugu,* Gungu.

A small tree of the forests of India and Burma. The tree yields the gum *katirá,* used as a demulcent in coughs and special diseases, and as a substitute for tragacanth.

Coffea arabica. *Coffee.*

Vern.—*Bengali,* Kafi ; *Tamil,* Kapi ; *Burmese,* Kahpi.

The coffee plant, originally a native of Abyssinia, was introduced into India in the last century, and extensive plantations have now been formed in the Nilgiris, Kurg, and the mountainous slopes of other parts of South India. The decoction of the berries forms the well-known beverage coffee, largely used like tea as a stimulant all over the world. The following interesting history of the introduction of the coffee plant into India is quoted from Dr. Bidie's Paris Exhibition Catalogue :—

"Coffee was introduced into Southern India about two centuries ago by a Musalman pilgrim, Baba-buddin. This man, on his return from Mecca, brought a few berries in his wallet, and taking up his abode amid the fastnesses of the hills in Western Mysore, which still bear his name, planted them near his hut. From the trees raised thus by the Fakir,

most of those cultivated in native gardens in Kurg and Mysore seem to have been derived. For a long time the culture was entirely in the hands of natives, but about 50 years ago it began to attract the attention of Europeans. Since that time the industry has been taken up by European capitalists, till at the present day there is an almost continuous chain of estates along the Western Ghâts from the northern extremity of Mysore down almost to Tutikorin. Within the last two or three years a new species of the coffee plant, the *Coffea liberica*, has been attracting much attention, and is likely to develop quite a new industry. This plant, unlike the *C. arabica*, will only grow at low elevations, but this peculiarity will have the advantage of permitting its culture to be carried on in localities on the plains where land and labour are cheap, and where the export of crop and import of plant and manure will be easy and inexpensive. The culture of the Liberian tree is at present only in the experimental stage, but so far the success obtained promises a bright future."

The exports of coffee during the five years ending 1880-81 were as follows:—

			Quantity. Cwt.	Value. £
1876-77	...	...	302,489	1,345,821
1877-78	...	...	297,327	1,338,499
1878-79	...	...	341,186	1,543,642
1879-80	...	...	359,313	1,626,746
1880-81	...	...	369,357	1,599,668

Cordia Myxa.

Syn.—Cordia latifolia.

Vern.—*Persian*, Sapistan; *Bengali*, Balphal; *Hindi*, Lasora; *Tamil*, Vidi, verasu; *Telugu*, Pedda-boku; *Burmese*, Thanat.

A moderate-sized tree, found all over India. The fruit is edible; bark yields a coarse fibre suitable for rope and cordage and paper manufacture; the viscid pulp surrounding the seeds is made into bird-lime; the leaves are formed into plates and used for wrapping cigars in Burma; and the kernel is used for marking linen. Medicinally, the mucilaginous fruit is used as a demulcent and laxative, the bark as a mild tonic in fever, the leaves as an application for ulcers, and the seeds as a remedy for ringworm.

Coriandrum sativum. *Coriander Seed.*

Vern.—*Sanskrit*, Dhanyaka ; *Bengali, Hindi*, Dhania ; *Tamil*, Kotalmalli ; *Telugu*, Danyalu ; *Burmese*, Nan-nan.

Coriander plant is cultivated all over India for its seed, which, when green, has a disagreeable smell ; hence its name "coriander," from the Greek word *koris*, a bug. It is chiefly used as a spice in India, and exported to Europe, where an aromatic oil is distilled from it. The quantity of coriander seed exported in 1880-81 was 31,084 cwt., value £14,436.

In medicine, the seeds possess carminative, refrigerent, diuretic, tonic, and aphrodisiac properties. The fresh leaves are considered pungent and aromatic.

Crocus sativus.

Vern.—*Sanskrit*, Kunkum ; *Bengali*, Jafran ; *Hindi*, Kesar, Zafran ; *Tamil*, Kungumapu ; *Telugu*, Kunkum apavu ; *Burmese*, Than-wen.

Saffron is chiefly brought from Persia and Kashmir, and is used as a spice. It yields a yellow dye, but the price is too high to admit of its extensive use as such. It is prescribed in fevers, melancholy, and enlargement of the liver. In small doses it is stomachic, in large doses it stimuates the nervous system.

Croton Tiglium. *Purging Croton.*

Vern.—*Sanskrit*, Jayapala ; *Bengali*, Jaypal ; *Hindi*, Jamalgota ; *Tamil*, Nervalam ; *Telugu*, Nepala-virtulu ; *Burmese*, Kanakho.

A small tree, found almost in all parts of India, but not common. The seeds are a drastic purgative, not safe for weak persons ; about 20 of them have been known to kill a horse. A brownish-yellow oil is obtained by expression of the seeds, which is so powerful in action that a single drop applied to the tongue ensures the full results. It is used internally in apoplexy and paralysis of the throat, and externally in rheumatism and indolent tumours. Croton is not mentioned in the Sanskrit Materia Medica ; it was known in Europe in the 17th century. Dr. Bidie states that the revival of its use in English medicine was due to certain Madras medical officers.

Cubeba Officinalis. *Cubeb Pepper.*

Vern.—*Bengali, Hindi,* Kabab-chini ; *Tamil,* Val-milaku ; *Telugu,* Taka miriyalu *Burmese,* Sinban-karawa.

Cubebs are brought from Java and are chiefly used as a spice. Medicinally they are used in special diseases, their virtue being due to an essential oil which is obtained from the fruits by distillation with water. They also contain a neutral crystalline substance called *cubebin* and a resin.

Curculigo orchioides.

Vern.—*Bengali, Hindi,* Siyah musli ; *Tamil,* Nilap.panaik-kizhangu ; *Telugu,* Nelatati-gaddalu.

Found in moist localities in the hills, one of the sources of the tuberous roots sold in the market under the name of *siyah musli.* It is considered a valuable medicine for special diseases.

Curcuma Amada. *Mango Ginger.*

Vern.—*Sanskrit,* Karpura-haridra; *Bengali,* Amada.

Found wild in Bengal and the hills. The fresh rhizome smells like mango. It is used as a condiment, and is regarded as cooling and useful in prurigo.

Curcuma angustifolia. *Wild or East India Arrowroot.*

Vern.—*Hindi,* Tikhur.

This Plant is found wild in the hills of Chota Nagpur and the Central Provinces, and is also cultivated to a small extent in some parts of Bengal. The rhizomes called Tikhur are used in medicine. The cultivated arrowroot (*Maranta arundinacea*) has been introduced into India.

Curcuma aromatica. *Wild Turmeric.*

Vern.—*Sanskrit,* Banharidra ; *Bengali,* Ban-halud ; *Tamil,* Kasturi-manjal ; *Telugu,* Kasturi pasupu.

The rhizome has an agreeable fragrant smell, and a warm bitter taste. It is said to possess tonic and carminative properties, and useful in skin diseases and disorders of the blood.

Curcuma Zedoaria. *Long Zedoary.*

Syn.—C. Zerumbet.

Vern.—*Sanskrit, Bengali,* Sati ; *Hindi,* Kachura ; *Tamil,* Kich-chilik-kizhangu; *Telugu,* Kichlie-gaddia ; *Burmese,* Thanu-wen.

Found wild in moist forests; is also cultivated near Calcutta. The rhizomes possess an agreeable smell, and aromatic, stimulant and carminative properties : considered useful in fever and skin diseases. They are largely employed in the manufacture of the red-powder known as the *Abir*, which the Hindus throw upon each other during the Holi festival.

Cydonia vulgaris. *Quince.*

Vern.—*Bengali,* Bihidana.

Dr. Kanny Lall Dey states in his " Indigenous Drugs of India " that the *Bihidana* seeds are " imported from Kabul, Bokhara, and Asia Minor. They are highly valued by the Muhammadans as a demulcant tonic and restorative remedy. From the presence of a mucilage, which they yield to water, they possess the demulcent and emollient properties of Gum-acacia."

Cyperus pertenuis.

Vern.—*Bengali, Hindi* ; Nagar motha.

Found in moist places all over India; root used in medicine as diaphoretic, astringent, and stomachic ; used in dyeing to give a scent to the cloth; also used as a perfume.

Cyperus rotundus.

Vern.—*Bengali, Hindi,* Mutha ; *Dakhini,* Kore-ki-jhar ; *Tamil,* Koray ; *Telugu,* Shakha-tungu-veru.

Found in moist places; root possesses an agreeable smell and an aromatic taste, used medicinally as diaphoretic and astringent. Dr. Bidie states that people use it for food in famine times.

Datisca cannabina.

Vern.—*Hindi,* Akalber.

Found in the Himalayas. The root is used to aid in dyeing a red colour; medicinally it acts as a sedative in rheumatism.

Datura fastuosa. *Black Datura.*

Vern.—*Sanskrit*, Dhustura ; *Bengali, Hindi*, Kala Dhatura ; *Tamil*, Karu-umate ; *Telugu*, Nalla-ummetta ; *Burmese*, Pad-daing-phu.

A small shrub, found all over India. It is with the seeds of this plant, mixed with sweetmeats, that travellers are stupified and robbed. The seeds, leaves, and the root are all used in medicine. The seeds contain a large proportion of the alkaloid known as the *Daturine*, and are given as a narcotic anodyne in asthma, bronchitis, and emphysema ; they are also considered useful in insanity and complicated fevers. Leaves are smoked to obtain relief in spasmodic asthma.

Datura Stramonium (alba). *White Datura.*

Vern.—*Bengali*, Sada dhutura ; *Tamil*, Ummatai ; *Telugu*, Ummetta.

The white Datura possesses properties similar to the above, and native practitioners use the two indiscriminately.

Dipterocarpus turbinatus. *The Gurjan Oil Tree.*

Vern.—*Bengali*, Garjan ; *Burmese*, kanyin-nee.

A lofty evergreen tree, found in Eastern Bengal and Burma. The wood is used for house-building and canoes ; but the tree is famous for its wood-oil, called Gurjan oil, which is used as pitch and varnish ; and medicinally as an external application on ulcers, ringworm, and other cutaneous diseases.

Eletaria Cardamomum. *The Lesser Cardamom.*

Vern.—*Bengali, Hindi*, Chhota elachi ; *Tamil, Telugu*, Ellakay *Burmese*, Paulat.

In India, this cardamom is obtained from the Madras Presidency specially Travankor and Kurg. It is chiefly used as a spice. Medicinally it is a cordial and stimulant.

Eriodendron anfractuosum. *White Cotton tree.*

Vern.—*Bengali*, Shwet-simul ; *Hindi*, Hatian ; *Tamil*, Elava maram *Telugu*, Pur.

A large tree, common on the Coromandel Coast. The seeds are coated with a fine, soft, silky wool. The tree yields

a gum known as the *Hatian gond*, which is used in medicine as a remedy for bowel complaints. The wood is soft, used for making toys.

Ferula Narthex. *Assafœtida.*

Syn.—Narthex Assafœtida,

Vern.—*Sanskrit*, Hingu ; *Bengali, Hindi*, Hing ; *Tamil*, Perungayam ; *Telugu*, Inguva.

The assafœtida plant is a native of Kashmir, Persia, and Afghanistan. The exudation from the root, which is the assafœtida of commerce, has a very disagreeable smell, but people accustomed to it use it as a condiment. It contains a resin, gum, and an essential oil ; is a powerful antispasmodic and expectorant, a nervine stimulant and a feeble laxative. The leaves are sudorific and carminative. Mr Baden-Powell states :—

"Assafœtida is the most powerful of the fœtid gum-resins ; it acts as a stimulant nervine tonic ; and is also an expectorant and anthelmintic ; it is largely used in hysteric and nervous affections ; also in colic, dyspepsia, and hooping-cough ; in asthma, chronic bronchitis, and palpitation of the heart ; it is said to destroy round-worm and the guinea-worm,—in doses of from 10 to 30 grains. Used by *hakims* (Muhammadan physicians) to disperse induration and to carry off urine and to promote menstruation."

Fœniculum vulgare. *Fennel Seeds.*

Syn.—Fœniculum Panmorium.

Vern.—*Bengali*, Mauri ; *Hindi*, Sonf ; *Tamil*, Sohikire ; *Telugu*, Pedda-jila-karra.

Cultivated for the seeds, which are largely used as a condiment. In medicine they are used as a stimulant, aromatic, and carminative ; much used in flatulency, colic and dyspepsia. Distilled fennel-water, called *arakbadian*, is used as a domestic carminative. The seeds also contain a volatile oil. The root is said to be purgative and the leaves diuretic.

Fumaria Parviflora.

Vern.—*Hindi*, Pitpapra.

Found in rice-fields and other damp places. The dried

plant is extremely efficacious in low fever, and is also employed as an anthelmintic, diuretic, diaphoretic and aperient, and to purify the blood in skin diseases.

Garcinia Morella. *Gamboge.*

Vern.—*Hindi,* Rewand-chini, Gota.gamba ; *Tamil,* Mukki ; *Burmese* Sanatosi.

An evergreen tree, found in the Khasia Hills, Eastern Bengal, and Western Coast of India. The gum-resin, gamboge of commerce, is the produce of this tree. But the gum is not carefully prepared in India, and the supply is chiefly received from Siam, although the Indian produce has been found by chemical examination to be as good as that sent to Europe through Singapur. It is used as a pigment ; in medicine it is a warm purgative, and considered a valuable hydragogue cathartic in dropsy and obstinate constipation, and also in cerebral diseases and tape-worm.

Gentiana Kurroo. *Himalayan Gentian.*

Vern.—*Bengali, Hindi,* Karu, katki.

The plant grows near the snow-hills of the Himalayas. The root is used in medicine as a bitter tonic and substituted for the true gentian. About five tons are annually exported from Kumaun.

Glycyrhiza glabra. *Liquorice.*

Vern.—*Bengali,* Jaisthamadhu ; *Hindi,* Mulethi, Rubus-sus.

The liquorice root is brought to India from South Europe, Canada, and Cochin China, but it has been known to Hindu physicians from a remote period, and is described to possess sweet demulcent properties useful in pulmonary affections, hoarseness, thirst, &c. The root of *Abrus precatorius,* which possesses similar properties, is often sold in the market as liquorice. Liquorice is also used in calico-printing to perfume the cloths printed.

Hedychium spicatum.

Vern.—*Hindi*, Kapurkachri.

Grows on the Himalayas. The aromatic root possesses carminative and stimulant properties; it is also used as a perfume, and as an adjunct to other dyes in calico-printing with the object of giving a fragrance to the cloth. It is, however, chiefly used as a medicine for cattle. A few tons are annually exported from the Kumaun hills.

Helleborus niger. *Black hellebore.*

Vern.—*Bengali*, Kala katki.

Dr. Kanny Lall Dey states that black hellebore is produced in Nepal. It is a powerful cathartic administered in maniacal and dropsical cases, but owing to its action being very violent and result uncertain, it has not been recommended. In veterinary pharmacy it still holds an important place. The article is much adulterated.

Hemidesmus indicus. *Indian Sarsaparilla.*

Vern.—*Bengali*, Anantamul; *Hindi*, Magreba; *Dakhini*, Nannari; *Tamil*, Gadisugandhi; *Telugu*, Pala-sugandi.

The root of this plant is used as a substitute for sarsaparilla. It possesses diuretic, diaphoretic, and alterative properties. The root of *Hemidesmus indicus* is often mixed with that of *Ichnocarpus frutescens.*

Holarrhena antidysenterica.

Syn.—Echites antidysenterica.

Vern.—*Bengali*, Kurchi; *Hindi*, Dudhi, Kuar; *Tamil*, Kulup-palai-varai; *Telugu*, Amkudu-vittum; Burmese, Lyton-kgyi.

A small tree, common in Sub-Himalayan tracts, Bengal, Central and Southern India. The bark is bitter and astringent, and is a valuable remedy for dysentery; it is also prescribed in hœmorrhoids and fever. Mr. Gamble, in his "Manual of Indian Timbers," states that at Saharanpur and Dehra Dun in the North-West Provinces, the wood is largely used in carving ornamental boxes, glass-frames, toys, &c. In Assam

it is used for cabinet-work, and in South India for turning. The leaves, the fruit, and the seeds are also prescribed in dysentery. Beads made of the wood are used in Assam as a medicine. There was formerly a large trade in the bark, but this has ceased to exist owing to adulteration.

Hydrocotyle asiatica. *Asiatic Pennywort.*

Vern.—*Bengali* Thulkuri; *Tamil*, Vullari-kire; *Telugu*, Mundukabrummi.

A small herbaceous plant, found in damp places in Bengal and Southern India. Dr. K. L. Dey states that "the leaves, which are bitter, are toasted and given in infusion to children in bowel complaints and fevers. They are also employed as anti-inflammatory in pains and bruises. This plant is considered to possess powerful alterative properties, and on the Malabar Coast reported as an excellent specific in leprosy, but further trials are necessary to substantiate its properties."

Hyoscyamus niger. *Henbane.*

Vern.—*Bengali*, *Hindi*, Khorasani ajowan; *Tamil*, Kurashani-yomam; *Telugu* Kurasani-vamam.

As the name implies, it was originally a native of Central Asia. It is now cultivated in India, in the Saharanpur Botanical Gardens and in the neighbourhood of Agra and Ajmir. The plant contains an alkaloid, called hyosciana, resembling atropia, which acts as a narcotic and antispasmodic, and is used as a substitute for opium. Both the leaves and the seeds are used in medicine, but the latter are more powerful. Hyoscyamus has been found extremely useful in all kinds of pulmonary affections and cerebral diseases.

Ipomœa turpethum. *Turpeth Root.*

Vern.—*Bengali*, Teuri; *Hindi*, Turbid.

The powdered root, mixed with sugar, is given as a mild purgative. Mr. Baden-Powell states that it is used by Muhammadan doctors in paralysis, gout, and leprosy, and diseases of the mucus membrane.

Mangifera indica. *Mango.*

Vern.—*Sanskrit*, Amra ; *Bengali*, Amb ; *Hindi*, Am ; *Tamil*, Mampazham ; *Telugu*, Mamidi-pandlu.

A large tree, cultivated almost in all parts of India for its fruit, which is reckoned by the natives as the most delicious fruit in India, but Europeans do not seem to appreciate the varieties most admired by natives. The *Ramayan* says that the mango was brought to India from Ceylon. The unripe fruit is made into pickles and also sliced and sold in the bazár in the dried state ; ripe fruits are made into jam. The bark and the leaves yield a yellow dye, which is but rarely used'; the dried unripe fruit is, however, used in dyeing as a mordant or a purifier of other substances. A pink-coloured gum exudes from the tree in small quantities. The seed inside the stone is used for food by the poorer classes, especially in the times of scarcity. It is astringent and a valuable remedy in leucorrhœa.

Matricaria Chamomilla. *Chamomile.*

Syn.—Anthemis nobilis.

Vern.—*Bengali, Hindi*, Babun-phul ; *Tamil*, Chamaindu-pu.

A native of Europe and Persia, imported into India from the latter country. The flowers are aromatic, bitter in taste, and considered tonic, carminative, and anodyne.

Melia Azadirachta. (M. indica in Brandis' Forest Flora.) *Nim Tree*

Syn.—Azadirachta indica.

Vern.—*Sanskrit*, Nimba ; *Bengali, Hindi*, Nim ; *Tamil*, Vepu-maram ; *Telugu*, Vepa ; *Burmese*, Thembau-ka-makah.

A large tree, found almost in all parts of India, but it thrives luxuriantly in the dry climate of the North-West Provinces. Every part of the tree is intensely bitter ; the bark possesses febrifuge, astringent, and alterative properties, much used in fevers and cutaneous diseases ; a poultice of the leaves hastens maturation of boils ; the saccharine juice, which

sometimes exudes from the tree, and the gum, are used in leprosy and asthma. The seeds are aromatic, and yield an oil very bitter and disagreeable in taste, which is held as an anthelmintic stimulant, and a valuable remedy for skin diseases, specially leprosy. Many other virtues are ascribed to the Nim tree, and it is held in great veneration from very ancient times. The bark yields a fibre. The wood is hard and is used for post and agricultural implements, and in South India for ship-building and furniture.

Mesua ferrea.

Vern.—*Bengali, Hindi,* Nagkesar ; *Tamil,* Nangal ; *Telugu,* Naga Kesara ; *Burmese,* Ganjan.

A large evergreen tree, found in Bengal, Assam, South India, and Burma. The tree is often planted for its handsome flowers, which perfume the air to a great distance. The dried buds are considered a mild remedy for coughs with profuse expectoration. An oil is extracted from the seeds by expression, which is considered an excellent remedy for cutaneous affections. The wood is hard, used in building bridges, furniture, &c., and is suited for railway sleepers.

Michelia Champaca.

Vern.—*Bengali, Hindi,* Champa ; *Tamil,* Shimbu ; *Telugu,* Champakamu ; *Burmese,* Tsaga.

A tall evergreen tree, cultivated throughout India for its fragrant flowers, which are given as an offering to the gods, and of which a perfume is made. The bark is bitter and aromatic, useful in intermittent fevers and in promoting menses. The aromatic *sampanghi* oil of Madras is obtained from this tree.

Mimusops Elengi.

Vern.—*Bengali,* Bakul ; *Hindi,* Maulsri ; *Tamil,* Magadam ; *Telugu,* Pogada ; *Burmese,* Khaya.

A large evergreen tree, cultivated throughout India, found wild in the forests of South India and Burma. The fruit is

eaten, but it is not pleasant. A perfume is made of the star-shaped flowers. The bark is astringent, used in tanning, and as a febrifuge and tonic medicine. A decoction of it is used as a tooth gargle. Wood used for house-building and furniture.

Moringa pterygosperma. *The Horse-radish Tree.*

Vern.—*Bengali, Hindi,* Sajna ; *Tamil,* Moranga ; *Telugu,* Saihan ; *Burmese,* Daintha.

A middle-sized tree, found wild in the Sub-Himalayan regions, and cultivated in India and Burma for its leaves, flowers, and fruit, which are eaten as a vegetable and pickled. The root-bark, which smells like horse-radish, is poisonous, and is used as a vessicant and considered a good remedy in bites by rabid animals, in paralysis, epilepsy, and hysteria. The seeds also possess pungent and stimulant properties, and they yield an oil similar to the *Ben oil,* which is considered aperient and is much used in gout and rheumatism. Large quantities of gum are obtained by excision made in the bark, which is used as an external application in headache and pain in the limbs. The bark yields a coarse fibre, suited for the manufacture of mats, paper, and rough cordage.

Mucuna pruriens. *The Cowhage Plant.*

Vern.—*Bengali,* Alkushi ; *Hindi,* Kiwach ; *Tamil,* Pene Kali ; *Telugu,* Pilladugukailu.

A climbing shrub, found wild in Bengal and the forests ; cultivated in some parts of Upper India for its pods, which are used as a vegetable. The hairs covering the seed-pods, called cow-itch, stick to the skin and produce an intolerable itching. Cow-itch is administered internally as a vermifuge. The seeds are considered efficacious in special diseases and are also supposed to be a good nervine tonic.

Murraya Kœnigii.

Vern.—*Bengali,* Barsanga ; *Hindi,* Gani, Gandla ; *Tamil,* Kamwepila ; *Telugu,* Karepak.

A small tree of the outer Himalayas, South India, and

Burma. The leaves are used for flavouring curries; the seeds yield a clear, transparent oil, called *simboli* oil; the root is slightly purgative. Both the root and the bark are considered stimulant and are used in skin diseases and to check vomiting.

Myrica sapida. *Box Myrtle.*

Vern.—*Bengali, Hindi,* Kaiphal; *Telugu,* Kaidaryamu.

A moderate-sized evergreen tree, found in the outer Himalayas, Khasia hills and Burma. The fruit is edible, having a sweetish bitter taste. The bark is exported to the plains, and is used in medicine as a hot and aromatic stimulant, and externally applied in the form of plaster in the treatment of rheumatism. It is used in the Khasia hills to poison fish, and as a tanning agent in the North-West Provinces. About fifty tons of the bark are annually exported from the Kumaun forests.

Myristica moschata. *Nutmeg; Mace.*

Syn.—M. Officinalis.

Vern.—*Bengali, Hindi,* Jaiphal, Jaitri; *Tamil,* Jadikkai, Jadipattri; *Telugu,* Jalikaya, Japatri.

A tree originally native of Eastern Archipelago, now introduced into Southern India. Its produce is the nutmeg of commerce. A fine branching aril, of a vermilion colour, covers the nut of the fruit, which when dried is the mace, and the nut itself is the nutmeg. Mace contains a fragrant essential oil, a gummy principle and a woody fibre, and both mace and nutmeg are chiefly used as a condiment and as an aromatic adjunct in the preparation of various native medicines. An infusion of the nutmeg is recommended as a drink in cholera to allay thirst. The nut contains an essential and a fixed oil; the former is white, acrid, pungent, and smelling powerfully of nutmeg; the latter, called butter of nutmegs, occurs in flattened square masses, yellowish in colour, and solid.

Myrsine africana.

Vern.—*Hindi,* Bayabirang, Pahari-cha.

A small evergreen tree of Central Asia and Western

Himalayas. The fruit is a powerful anthelmintic, and is also used as a laxative in dropsy and colic. Dr. Balfour states that the gum obtained from the plant is considered a warm remedy and is used in dysmenorrhœa.

Nardostachys Jatamansi.

Vern.—*Bengali*, Jatamansi ; *Hindi*, Balchhar.

This plant occurs at high elevations of the Himalayas. Jatámansi consists of short pieces of an underground stem covered with a hairy fibre, supposed to be the *Nardus indicus* or *spikenard* of the ancients. It possesses in a high degree the same medicinal virtue as Valerian, and is regarded as an antispasmodic and a nervine tonic and useful in hysteria and epilepsy ; also employed in jaundice, affections of the throat, and as an antidote for poisons. It is also used to scent and clean the hair. About 15 cwts. are annually exported from the Kumaun hills.

Nerium odorum. *Sweet-scented Oleander.*

Vern.—*Bengali*, Karabi ; *Hindi*, Kaniyur ; *Tamil*, Alari ; *Telugu*, Ganneru.

A small shrub, cultivated in gardens for its flowers, which are given as an offering to the gods. There are two varieties, one with red and the other with white flowers. The whole plant is poisonous, and is used in leprosy and skin diseases. The root is used to procure abortion.

Nicotiana rustica and Tabacum. *Tobacco.*

Vern.—*Bengali*, Tamak ; *Hindi*, Tamaku ; *Tamil*, Pugai-ilai ; *Telugu*, Pogaku ; *Burmese*, Tsha.

Tobacco was introduced into India about the year 1605, and is now cultivated all over the country and extensively used in the same way as in other countries,—*viz.*, smoked in the pipe, chewed alone or with betel leaf, and taken as snuff. Smoking in a pipe made of cocoanut shell or of metal is, however, the universal practice. Tobacco thus smoked, called *guraku*, is prepared by an admixture of unrefined sugar and fragrant substances like patchouli leaf and rose otto. Many

varieties of tobacco are known in India. The principal seats of tobacco manufacture in India are the districts of Champaran, Purnia, Rangpur, Rajshahi, Kuch Behar, and Nadya in Bengal, Trichinopoly in South India, and Arakan in Burma. The following remarks on the Arakan tobacco have been made by Colonel Sladen, the Commissioner :—

"Tobacco of the best kinds can be grown in many parts of Burma, but the people fail in curing it and preparing it for the home market. Attempts are being made to remedy this state of things by educating the people in this branch of agriculture, and showing them what can be done with well-cured tobacco. The high price of labour is a great drawback. At present, tobacco imported from India fetches a lower price in the market than the local product. The tobacco-fields of Arakan are situated in three different localities—(1) Hill Tracts, Northern Arakan; (2) Cheduba Island, Kyouk Phyoo; (3) the Sandaway district.

An experiment undertaken lately to cure and manufacture tobacco on the American system by Messrs. Begg, Dunlop, & Co., of Calcutta, under the guidance of Mr. E. C. Buck, the former Director of the Department of Agriculture and Commerce of the North-Western Provinces, has proved quite successful. Two varieties of tobacco are known in Southern India—the Trichinopoly and the Lunkah tobacco. Trichinopoly is more acrid than the Lunkah. Dr. Bidie says that Pondicherry cheroots are sometimes quite equal to Havannahs. Large quantities of cigars are made in Burma. In medicine, tobacco is used as a narcotic. The quantity of tobacco exported from British India during the five years ending 1880-1881 was as follows :—

	1876-77.		1877-78.		1878-79.		1879-80.		1880-81.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	lbs.	£	lbs.	£	lbs.	£	lbs.	£	lbs.	£
Unmanufactured	10,508,720	75,137	10,594,604	74,767	13,279,158	111,126	10,874,623	116,702	13,267,325	122,185
Cigars ..	190,136	11,744	189,742	14,394	196,759	12,178	130,324	9,763	207,005	15,995

Nigella sativa. *Small Fennel.*

Vern.—*Bengali, Hindi,* Kalaunji ; *Tamil,* Karun-shivagam, Nalla jilakana

Extensively cultivated for its seeds, which in appearance resemble coarse gunpowder, and have a strong aromatic odour like sassafras or cubebs. It is considered a stimulant, aromatic tonic, useful in disorders of the digestive organs, in rheumatism and fever, and in promoting secretion of milk after child-birth. The seeds are put within folds of woollen cloths to preserve them from the ravages of insects. They contain 5 to 10 per cent. of an essential oil. Nigella seed is largely used as a spice in cooking meat.

Ocymum Basilicum. *Common Basil.*

Vern.—*Bengali, Hindi,* Babui tulsi ; *Dakhini* Salzat ; *Tamil,* Tirunitrup-pattiri ; *Telugu,* Vibudi patri.

A small shrub, found almost in all parts of India. The seeds steeped in water are deemed cooling and mucilaginous and are given in catarrh, dysentery, diarrhœa and special diseases, and are also considered useful in fevers. *Ocymom sanctum,* the Holy Basil, is one of the sacred plants of the Hindus, being dedicated to Vishnu, the Preserver of the World. The dried plant is used in medicine, and is considered a hot, pungent remedy, useful in fever, catarrh, affections of the liver, and leprosy. The leaves have an aromatic smell and possess stomachic properties ; seeds mucilaginous. The wood is used to make beads.

Ophelia Chirayta. *Chiretta.*

Syn.—Agathotes Chirayta.

Vern.—*Sanskrit,* Chiraitaka ; *Bengali, Hindi,* Chireta ; *Tamil,* Shaysait ; *Telugu,* Ilasattu.

An annual found in the southern slopes of the Himalayas. The whole plant is intensely bitter, and is held in high estimation by European practitioners in India for its tonic and febrifugal properties, being especially efficacious in cases of irregular liver. The following remarks on the efficacy of

Chiretta as a tonic medicine is quoted by Major Drury in his "Useful Plants":—

"Chiretta possesses the general properties of bitter tonics, but has at the same time some peculiar to itself, which fit it well for certain forms and complications of disease. Unlike most other tonics, it does not constipate the bowels, but tends to produce a regular action of the alimentary canal, even in those subject to habituul constipation. During its use the bile becomes more abundant and healthy in character. The tendency to excess of acidity in the stomach, with disengagement of flatus, is much restrained by its use. These qualities fit it in a most peculiar degree for the kind of indigestion which occurs in gouty persons. It may, when necessary, be associated with alkaline preparations or with acids; the latter are generally preferable. The same remark applies to its employment in the treatment of scrofula. As a remedy against the langour and debility which affect many persons in summer and autumn, nothing is equal to the cold infusion of this plant. It may be taken twice or even more frequently daily, for a considerable time; then discontinued, and afterwards resumed. Children take it more readily than most other bitters. It is found to be a very efficacious remedy in India against intermittents, particularly when associated with *Guilandina Bonduc* or Caranga nuts. The debility which is apt to end in dropsy is often speedily removed by infusion of chiretta, to which is added the tincture formed of it with orange peel and cardamoms. Its efficacy in worm-cases has procured for it the name of worm-seed plant. The extract is given with great benefit in some forms of diarrhœa and dysentery, particularly if combined with Ipecacuanha, the emetic tendency of which it very markedly controls."

Chiretta is also obtained from many other species of the same genus. About six tons of chiretta are exported every year from the Kumaun forests. Large quantities of chiretta are annually sent to Europe, where it is used chiefly to make bitter waters.

Orchis mascula, Eulophia vera, &c.

Vern.—Salep-misri.

The tubers known in the market as *salep-misri* are believed to be the produce of several terrestrial orchids, of which *O. mascula* probably yields the largest supply, and *E. vera* is the source of the Indian produce. It is generally brought to India from Afghanistan and Kashmir. It is considered a powerful

aphrodisiac and is taken boiled with milk. Mr. Murray, in his "Plants and Drugs of Sind," has given the following account of Salep-misri :—

"The nutritious substance called salep is prepared from the subterraneous succulent roots of *Orchis mascula* and many others of the ophreous division and in India from the species under notice (*E. vera*). It consists almost entirely of a chemical principle called 'Bassorin.' *E. campestris*, *E. herbacea*, and *E. vera* (Royle) are species found in India. Dr. Stewart says the first is found in Oudh and Rohilkhand, and in the Sewaliks of the Gangetic Doab, and he believes he found it in lowlands by the Ravi close to Lahore ; the second in Southern India and the outer Himalayas. The best kinds of salep are said to come from Afghanistan and Kashmir. By the natives salep is chiefly esteemed as a tonic aphrodisiac. It is said by Royle to be a nutritious unirritant diet for the sick, convalescent, or children, boiled with water or milk, and flavoured just as a sago and other farinaceous food."

Papaver somniferum. *Poppy; Opium.*

Vern.—*Bengali, Hindi,* Post, Afim; *Dakhini,* Khash-Khash-ka-post ; *Tamil,* Gasa-gasa-tol ; *Telugu,* Gasa-gasa-tolu.

The poppy plant is extensively cultivated in Nothern and Central India for the concrete inspissated juice, known as opium, obtained by making incisions on the capsules. Opium is a Government monopoly, and its cultivation is carried on on a system of advance received by the cultivators from the State to which they make over the whole of the produce. Opium produced in Northern India is known as the Bengal opium, while the produce of Central India is known in commerce as the Malwa opium ; the latter is of an inferior quality. Good opium contains about 4 per cent. of morphia and 3 per cent. of narcotine. Opium is generally used as an intoxicant in the form of pills, or smoked in a prepared form known as the *madak* and *chandu.* Europeans generally have an aversion to opium-eaters, as it is said to stupify the person using it. But such results can only be seen when used in excess, and it must be admitted that excess in opium is less injurious than excess in spirituous drink. On the other hand, moderate use of opium

after the age of 40 prevents waste of tissue, prolongs life, and makes the system less amenable to the influences of malarial and other poisons which vitiate the atmosphere of tropical countries. Opium is chiefly exported to China, and yields an annual revenue of about 9 millions sterling pounds, or more than a seventh part of the revenue of India. In medicine, opium is a valuable narcotic and anodyne, and is used in various diseases. The poppy heads are used as a narcotic in coughs, and a decoction of it for fomentation in pains, sprains, &c. The seeds are also used similarly. A valuable oil is obtained by expression from the seeds, which is used for culinary purposes, and as a demulcent in medicine. Poppy seeds are also used as a condiment and as food. Opium trash is a good manure.

The quantity of opium exported during the five years ending 1880-1881 was as follows :—

	Quantity. Cwts.	Value. £.
1876-77	130,775	12,404,748
1877-78	126,789	12,374,355
1878-79	125,765	12,993,978
1879-80	144,638	14,323,314
1880-81	127,484	16,600,147

Pedalium Murex. *Prickly-fruited Pedalium.*

Vern.—*Bengali, Hindi,* Bara-gokhuru ; *Dakhini,* Hati goghuru; *Tamil,* Anai-nerunji ; *Telugu,* Enuga-palleru-mullu.

A succulent plant, found in the rains on waste lands of Northern India and the sea-shore of Madras. The plant and the seeds render water mucilaginous if steeped in it. They are used in medicine as a demulcent and diuretic, prescribed largely in diseases of the urinary organs. In famine times the seeds have been used as food.

Pharbitis Nil.

Vern.—*Bengali,* Nil-kalmi ; *Hindi,* Kaladana ; *Tamil,* Kodi-kakkatanvirai ; *Telugu,* Jiriki-vittulu.

The plant grows throughout India ; the seeds are used in medicine and reckoned a safe and effectual cathartic, administered in constipation, dropsy, intestinal worms, and diseases of

the brain. Dr. Bidie states that their use was probably not known to the Hindus in ancient times, and that about the year 1861, while he was engaged in the investigation of native drugs, he discovered a resin in the seed which he called "Pharbitisin," and which proved to be the active principle of the drug.

Piper nigrum. *Black Pepper.*

Vern.—*Bengali, Hindi,* Kala-marich ; *Dakhini,* Choka ; *Tamil,* Milagu ; *Telugu,* Miriyalu.

This climbing plant is extensively cultivated in South India, and is also found wild among the hills. The cultivation of pepper-vine does not require great care. The cuttings or suckers are usually planted at the base of trees having a rough bark, *e. g.*, the areca nut, jack, mango, &c., and the plants trained on them. In three years the vine begins to bear ; the berries are plucked green and dried in the sun on mats, when they turn black. The chief use of black pepper is as a condiment. In medicine it is reckoned carminative and febrifuge, and a rubefacient in external application. In Hindu medical books, black pepper is described as "acrid, pungent, hot, dry, carminative, useful in intermittent fever, hœmorrhoids, and dyspepsia."

The white pepper sold in the market is not a distinct article, but merely the unhusked fruits of *P. nigrum.* The husk is easily removed by soaking the ripe berries in water for a short time.

Pisonia aculeata. *Prickly Pisonia.*

Syn.—P. Villosa.

Vern.—*Bengali,* Bagh-anchra ; *Telugu,* Embuddi-chettu.

A large straggling climber of Bengal, Southern India, and the coast forests of Burma and the Andaman Islands. It makes impenetrable hedges. The bark and the leaves are used as an irritant for application on swelling of the limbs and rheumatic pains.

Pistacia integrrima.

Vern.—*Panjabi*, Kaka ; *Hindi*, Kakrasingi.

A deciduous tree of the North-West Himalayas. Wood used for furniture and ornamental work ; leaves given as fodder for cattle. The gall-like excresences formed by insects on the leaves and petioles of this tree (which were formerly supposed to be the produce of *Rhus Kakrasinghee* or *Rhus succedanea)* are largely exported from the hills, and used in medicine as a tonic and expectorant, as well as in disorders of the digestive organs. They are also said to be used in dyeing.

Pistacia lentiscus.

Vern.—*Hindi*, Rumi-mastaki.

A yellow transparent gum-resin obtained from this tree is brought from Central Asia and used in medicine for disorders of the digestive organs, and as a local application for toothache.

Pistacia Terebinthus.

Vern.—*Persian*, Hub-ul-khizra.

The small, dried, brown fruits of this tree brought from Central Asia are chiefly used in medicine as an astringent in special diseases, and for palpitation of the heart. The tree also supplies a kind of gall.

Pistia Stratiotes.

Vern.—*Bengali*, Toka-pana ; *Dakhini*, Anter-ghunga ; *Tamil*, Agasa tamare ; *Telugu*, Antara tamara.

An acquatic stemless plant which grows in old tanks on the sea-coasts. An infusion of the plant is given in small-pox ; it is considered a cooling medicine.

Plantago Ispaghula. *Spogel seeds.*

Vern.—*Bengali Hindi*, Isabgul.

A native of Persia. The seeds are emmollient, demulcent, and diuretic, largely prescribed in dysentery and piles. The seeds swell in water, forming a demulcent mucilage.

Plumbago zeylanica. *Plumbago.*

Vern—*Bengali, Hindi,* Chita ; *Dakhini,* Chitar ; *Tamil,* Chittira ; *Telugu,* Chitra ; *Burmese,* Keu-kyok-phy.

The plumbago plant is common in Bengal, South India, and Kumaun hills. In Bengal it is used as a hedge plant. There are three varieties known in this country,—the white, red and blue ; the last Dr. Balfour states, has been brought from the Cape. The root is used in medicine as a powerful irritant, and contains a neutral crystalline, called Plumbagine. It is ground, made into a paste by mixing with flour, and applied as a blister on pains, &c. Taken internally it is employed to cure skin diseases and to promote digestion. It is also employed to cause abortion by applying it locally to the uterus, and also taken internally by mouth, but Dr. Bidie says its application frequently induces fatal uterine inflammation. It is considered a remedy for secondary syphilis and leprosy, but great caution is necessary in its use.

Pogostemon Patchouli. *Patchouli.*

Vern.—*Bengali,* Pachapat.

A labiate plant, found in Eastern Bengal, Burma, and the Malay Peninsula. It is largely used as a scent for smoking-tobacco and hair oil, and is also imported to Europe for perfumery purposes. Dr. Balfour makes the following remarks on its use :—

"The odour of the dried plant is strong and peculiar, and to some persons not agreeable ; the dried tops imported into England are a foot or more in length. In Europe this is principally used for perfumery purposes, it being a favourite with the French, who import it largely from Bourbon. They were led to use it because, a few years ago, real Indian shawls bore an extravagant price, and purchasers distinguished them by the odour of Patchouli, with which they were perfumed, and on discovering the secret, the French manufacturers got into the way of importing the plant to perfume articles of their own make, and thus palm off home-spun shawls for real Indian. The Arabs use and import it more than any other nation. Their annual pilgrim ships take up an immense quantity of the leaf ; they use it principally for stuffing mattresses and pillows, and

assert that it is very efficacious in preventing contagion and prolonging life. The characteristic smell of Chinese and Indian ink is owing to an admixture of this plant in its manufacture. Some people put the dry leaves in a muslin bag, and thus use it as it is done with lavender for scenting drawers in which linen is kept ; and this is the best way to use it, as this musk-like odour is most agreeable when diluted."

An essential oil is obtained from the plant, which is used as a perfume. In medicine it is used to perfume oils.

Polanisia icosandra. (*Cleome viscosa*) *Wild Mustard.*

Vern.—*Bengali,* Hur-huria ; *Dakhini,* Jangli-Hulvul ; *Tamil,* Nay-kadughu ; *Telugu,* Kukha avalu.

A common weed, grows in Bengal and South India in the rainy season. In South India the fresh plants are used as a green and tastes like mustard. The juice of the fresh leaves is poured into the ear as a remedy for ear-ache, and the bruised leaves are applied to the skin as a counter-irritant ; the seeds are carminative.

Pucedanum graveolens. *Dill Seed.*

Syn.—Anethum Sowa.

Vern.—*Sanskrit,* Sitasiva ; *Bengali,* Sulpha ; *Hindi,* Soya ; *Dakhini,* Sowa ; *Tamil,* Sthakuppa ; *Telugu,* Saddapa.

An annual, 2 to 4 feet ; a native of Southern Europe ; cultivated in almost all parts of India for its produce, the Dill seed of commerce, which is used as a condiment as well as in medicine. The seeds yield by distillation a volatile oil, soluble in alcohol, ether, and in 144 parts of water. Mr. Murray states that the seeds are considered emenagogue, and are also eaten by natives after meals to relieve flatulency.

Pueraria tuberosa.

Vern.—*Hindi,* Bilai-akand ; *Telugu,* Dari.

A large creeper, found in the Kumaun Himalayas and the Circar mountains. The tubers are applied as a poultice on swollen joints, and used internally as a demulcent and refrigerent in fevers. Large quantities are annually exported from Kumaun to the plains below.

Pyrethrum indicum. *Indian Fever Few.*

Vern.—*Bengali, Hindi,* Akarkara ; *Tamil,* Akarkaram.

The root is imported into India, where it is used in medicine, and prescribed internally for colic, hysterical affections, pain in the head, lethargic complaints, and typhus fever. Externally it is given in paralysis of the tongue, chronic opththalmia, and rheumatic affections of the face. As a Masticatory it is used to check spontaneous salivation.

Rheum Emodi, Moorcroftianum, &c. *Rhubarb.*

Vern.—*Bengali,* Reuchini ; *Hindi,* Dolu.

The Himalayan rhubarb is said to be the produce of four species of Rheum which grow in abundance in many parts of the hills. Rhubarb contains Chrysophanic acid, tannic acid, resin, and a large proportion of oxalate of lime, and is used as an astringent tonic and purgative in diarrhœa, dyspepsia, and derangement of the liver. It also yields a yellow dye. The leaf-stalks are eaten boiled with sugar and make excellent preserve.

Scindapsus officinalis.

Vern.—*Bengali, Hindi,* Gajpippul ; *Dakhini,* Hati-pippli ; *Tamil,* Anaitippili; *Telugu,* Enuga-pippalu.

The plant is found in moist forests ; fruit used as a stimulant, anthelmintic, and diaphoretic.

Shorea robusta. *The Sal Tree.*

Vern.—*Bengali,* Sal ; *Hindi,* Sakua ; *Telugu,* Gugal.

A large tree of the Sub-Himalayan regions and the forests of Central India. The tree is very valuable for its timber, which is extensively used for beams and door-posts. Formerly sál logs were brought to Calcutta from Nepal, but the supply has almost entirely ceased, owing to the prohibition of their export by the Nepalese Government, and the demand for the Calcutta market is now met by Burma teak, the supply of which is, however, diminishing. Extensive sál forests exist

in the Chhota Nagpur Division, which may be utilised when the railway under construction in this direction is completed. Large quantities of white transparent resin is obtained by incisions made in the bark, which is used as an incense, to caulk boats and ships, and to form varnishes. Medicinally it is employed to form plasters, as an application to indolent ulcers, and internally as a stimulant, and also in special diseases. The bark is used in tanning.

Soymida febrifuga. *Indian Red Wood.*

Vern.—*Bengali,* Rohina ; *Hindi,* Rohan ; *Tamil,* Shem ; *Telugu,* Sumi.

A large deciduous tree of Central India and Dekhan. The bark is bitter and astringent, useful in fevers and disorders of the bowels; it may also be used in tanning. The red-coloured wood is durable, and is used for furniture and agricultural implements.

Strychnos Nux-vomica. *The Snake-wood, Nux-vomica or Strychnine Tree.*

Vern.—*Bengali, Hindi,* Kuchila ; *Tamil,* Yetti ; *Telugu,* Mushti ; *Burmese,* Khaboung.

A moderate-sized evergreen tree of Bengal, Burma, and South India. All parts of the plant (except the pulp of the fruit, which is eaten by cattle, monkeys and birds, and the flowers) are poisonous, but the bark and the seeds only are used in medicine as a stimulant of the spinal chord, and a nervine tonic. In European medicine the seeds are extensively employed; they contain two powerfully poisonous alkaloids, *viz.*, strychnine and brucine, and an acid. The seeds are largely exported for the manufacture of strychnine. The wood is adapted for fancy work and cabinet-making.

Strychnos potatorum. *The Clearing Nut Tree.*

Vern.—*Bengali, Hindi,* Nirmalli ; *Dakhini,* Chil-binj ; *Tamil,* Tettan-kottai ; *Telugu,* Chilla-ginjalu.

A moderate-sized evergreen tree of Bengal, Central and

South India. The seeds have the remarkable property of clearing muddy water. It is considered an emetic by the natives, but Dr. Bidie doubts it.

Styrax Benzoin. *Gum Benzoin.*

Vern.—*Bengali, Hindi,* Luban.

The tree is a native of the Malay Archipelago. It yields the gum benzoin of commerce, which is used as an incense by the Muhammadans. It contains a resin with a large proportion of benzoic acid; reckoned a very useful stimulant, expectorant, and diuretic, employed in chronic bronchitis, laryngitis, and also in jaundice and diseases of the urinary organs. It is also used as a hair-wash.

Tamarindus indica. *Tamarind.*

Vern.—*Sanskrit,* Tintiri; *Bengali,* Tetul; *Hindi,* Imli; *Tamil,* Puli; *Telugu,* Chinta; *Burmese,* Magyi.

A large evergreen tree, cultivated throughout India and Burma. It produces large quantities of an acid fruit which is eaten raw with rice or used as a condiment in cooking vegetables, pulses, fish, &c. It is dried and kept in almost every house in Bengal. This is one of the Indian products which should form an article of export to Europe. In medicine it is used as a laxative and antiscorbutic; mixed with sugar it forms a good refrigerent drink. An infusion of the leaves is given as a cooling drink in dysentery. The kernel of the seeds is stomachic. The wood is very tough, but highly prized for cart-wheels, mallets, and sugar, oil and rice mills. Powdered and mixed with gum, the seeds form a strong cement.

Taraxacum officinale. *Dandelion.*

The plant is found in the Himalayas. It is a valuable remedy for hepatic diseases. The whole plant is bitter, but the root is chiefly used in medicine as tonic and diuretic.

Tea. (Camellia theifera.)

The cultivation and manufacture of tea has now become

one of the most important industries of India. It is now almost entirely conducted with European capital, and the article manufactured is of so superior a quality that Indian tea is gradually driving out China and Japan tea from the markets of Europe, Australia and America. Indian tea became better known in Australia during the Melbourne Exhibition, since which time the export to that country is annually increasing as the following figures will show :—

Year.	Quantity. lbs.	Value. £
1876-77	42,269	4,278
1877-78	24,359	2,330
1878-79	62,487	5,940
1879-80	85,994	6,474
1880-81	807,608	51,510
1881-82	906,762	67,570

The total quantities of Indian tea exported by sea to foreign countries during the same years are as follows :—

Year.	Quantity. lbs.	Value. £
1876-77	27,784,124	2,607,425
1877-78	33,459,075	3,044,571
1878-79	34,432,573	3,138,423
1879-80	38,173,521	3,051,020
1880-81	46,413,510	3,054,240
1881-82	48,691,725	3,609,136

The places where tea is cultivated in India are the Province of Assam, including Silhet and Kachar ; the southern slopes of the Himalayas, including Darjiling Tarai, Kumaun, Kangra, &c. ; the table-land of Chhota Nagpur in Bengal ; and the upper slopes of the Nilgiris. Tea was found growing wild in Assam, and its cultivation first commenced in that province about the year 1837. There are now upwards of two thousand plantations, with an area of more than 200,000 acres actually under tea cultivation.

Trichosanthes dioica.

Vern.—*Bengali*, Patal ; *Hindi*, Parwal.

Cultivated in Bengal and some parts of the North-Western Provinces for its fruit, which, in the green state, is used as a

vegetable. The tender tops, called *Palta*, which are bitterish in taste, are used as a pot-herb and also as a condiment. The leaves in decoction with coriander seed are considered an agreeably bitter tonic, given in bilious and chronic fevers; the juice of the green fruit is considered cooling and laxative; the roots are purgative. The fruit is sometimes preserved in sugar.

Trigonella Fœnum-grœcum. *Fenugreek Seeds.*

Vern.—*Bengali, Hindi*, Methi; *Tamil*, Vendayam; *Telugu*, Mentulu.

Cultivated in many parts of India. The plant is eaten as a vegetable, and the seeds are largely used as a condiment. In medicine they are considered useful as a tonic, demulcent, and vermifuge. The small variety, called *chhota methi*, is used as a hair perfume. Mr. Baden-Powell states that the seeds are used as coffee after roasting, and that they form a yellow dye.

Vernonia anthelmintica. *Purple Flea-bane.*

Syn—Conyza anthelmintica.

Vern—*Bengali*, Somraj; *Hindi*, Kali-jiri; *Tamil*, Kattu-shuagam; *Telugu*, Adavijilakara.

The plant is found wild in moist localities. The seeds are powerfully anthelmintic and also diuretic; considered a valuable medicine for leprosy, and also given in infusion in coughs and flatulency. Powdered and mixed with lime-juice, they are employed to destroy parasites among the hair; and, mixed with oil, used in scabies and anasarca, and also as plasters for abscesses.

Vitex Negundo. *Five-leaved Chaste Tree.*

Vern—*Hindi*, Nirgandi; *Tamil*, Vellainochi-elai; *Telegu*, Tella-vavili-aku.

A deciduous shrub, common in the drier parts of India. The leaves are used in acute rheumatism, intermittent fever, and special diseases; the dried leaves are smoked to relieve headache and catarrh; heated and applied externally as a discutient on swellings of joints, &c. The root and fruit possess anodyne, diuretic, and emenagoguic properties.

Vitex trifolia. *Indian Prenet.*

Vern—*Bengali*, Nishinda ; *Hindi*, Shambhalu ; *Tamil*, Nirnochi ; *Telugu*, Vavili ; *Burmese*, Kyoung-ban.

A shrub or small tree of Bengal, South India, and Burma. The leaves and flowers are agreeably heavy-scented, the former are considered useful in special diseases and after parturition, and also in cutaneous diseases. They are said to regulate the bile and increase the appetite ; also applied externally in enlarged spleen, contusions, sprains, and rheumatism.

In native medicine, *V. Negundo* and *V. trifolia* are usually used indiscriminately ; the plants are alike ; *V. Negundo* has blue flowers, and *V. trifolia* has pale-blue flowers.

Withania somnifera. *Winter Cherry.*

Syn—Physalis somnifera.

Vern—*Bengali*, Aswagandha ; *Hindi*, Asgand ; *Dakhini*, Nat-ki-asgand ; *Tamil*, Amuk-kura-virai ; *Telugu*, Bunkra-gadda-vittulu.

A small shrub, found in all parts of India. The leaves are bitter and narcotic, given in fever and special diseases. The long, white root, which smells like a horse,—hence the Bengali name *Aswagandha*, or *horse-smelling*,—is considered diuretic and deobstruent, and also a sedative ; useful in special diseases. The root and the leaves made into pulp are used as an external application to boils and swellings. The seeds coagulate milk. Dr. Bidie states that the medicinal virtues of the plant deserve further investigation.

Zingiber officinale. *Ginger.*

Vern.—*Bengali*, Ada, Sunt ; *Hindi*, Adrak, Sont ; *Tamil*, Shukku ; *Telugu*, Sonti.

Ginger is cultivated in many parts of India for its root, which is used as a condiment as well as in medicine. The dried roots are usually sold in the market. Ginger possesses acrid, heating, and carminative properties, and is prescribed in bronchial and pulmonary affections, rheumatism, dropsy, &c. The juice of fresh ginger is laxative. It is also preserved in sugar.

(5) Dyeing Materials.

The following is a list of the dying materials used by the native dyers :—

Acacia arabica (bark).
Ditto (legumes).
Acacia Catechu.
Acacia Concinna.
Acacia leucophlœa (leaves).
Adhatoda Vasica.
Ægle Marmelos.
Alpinia Galanga.
Alum.
Anogeissus latifolia.
Areca Catechu.
Bauhinia purpurea.
Bauhinia speciosa.
Berberis Lycium.
Bixa Orellana.
Bombax malabaricum.
Borax.
Butea frondosa.
Cæsalpinia Sappan.
Calendula officinalis.
Carthamus tinctorius.
Cassia auriculata.
Casuarina equisetifolia.
Cassia Fistula.
Cassia Tora.
Cedrela Toona.
Ceriops Roxburghiana.
Cinnabar.
Coccus Cacti.
Coccus Lacca.
Crocus sativus.
Curcuma Amada.
Curcuma longa.
Curcuma Zedoaria.
Datisca cannabina.
Diospyrus embryopteris.
Eugenia Jambolana.
Garcinia Morella.
Glycyrhiza glabra.
Hedychium spicatum.
Hæmatoxylon Campechianum.
Indigofera tinctoria.
Lawsonia alba.
Mallotus Philippinensis.
Mangifera indica.
Mariscus cyperus.
Memecylon tinctorium.
Morinda citrifolia.
Morinda tinctoria.
Myrica sapida.
Nyctanthes Arbor-tristis.
Ochres, yellow (multani)
Ochres, yellow (piuri)
Ochres, yellow (ramraj)
Oldenlandia umbellata.
Ougeinia dalbergoides.
Phyllanthus Emblica.
Pterocarpus Marsupium.
Punica Granatum.
Quercus lamellosa (bark)
Quercus infectorius.
Randia dumetorum.
Rheum emodi.
Rhus succedanea.
Rubia cordifolia.
Rubia tinctoria.
Sapindus detergens.
Semecarpus Anacardium.
Shorea robusta.
Soda, carbonate of (sajji).
Symplocos Sumuntia.
Tamarindus indica.
Terminalia belerica.
Terminalia Chebula.
Terminalia tomentosa.
Ventilago maderaspatana.
Verdigris.
Woodfordia floribunda.
Wrightia tinctoria.
Yellow arsenic.
Zizyphus xylopyrus.

A short account is given of the most important dyeing materials in the following paragraphs :—

Acacia arabica. *Gum Arabic.*

Vern.—*Sanskrit*, Barbara ; *Bengali*, Babla ; *Hindi*, Babul ; *Dakhini*, Kali-kikar; *Tamil*, Karuvelum ; *Telugu*, Nalla-Tuma.

A valuable tree, 30 to 40 feet; found in almost every part of India. The wood, though not straight, is very strong, and supplies the cultivator with his plough-handles, sugar-cane-rollers, spokes, naves, wheels of carts, &c. The bark is a powerful astringent, and the best and most extensively used tanning substance in India, which may probably become an article of commerce, if its value is properly appreciated by European tanners.

The following extract is made from a letter of Mr. W. N. Evans, Tanners' Laboratory, Taunton (published in the *Tropical Agriculturist* of 1st May 1882) with regard to the value of Babul bark as a tannery material :—

"I have also received from India specimens of the bark of the Bábúl tree (Acacia arabica), which gives a percentage of 18·95 of tannin. One fact worthy of notice with this bark is the beautiful creamy white colour it gives when precipitated with gelatine, this being at present the only bark or tanning material that gives that colour. The Bábúl is very abundant in India, and might be worth sending to England, where, for the best kind of work, it would probably be worth from £12 to £14 per ton."

The pods yield a black dye. Medicinally, an extract of the bark is given as a demulcent and astringent; the leaves in mucus discharges; the pods in coughs; and the gum as a substitute for gum acacia, which is the produce of *Acacia vera*. The bark of the slender stalks is fibrous, and may be used in the manufacture of paper.

The leaves, pods, and seeds are a good fodder for cattle, sheep, and goats, and their value as such is much enhanced in seasons of drought when other cattle-food fails. Lands deteriorated from over-cropping are much benefited by the cultivation of *Acacia arabica* on them by the layer of manure which the falling leaves gradually form.

Acacia Catechu. *Catechu, Cutch.*

Vern.—*Sanskrit*, Khadir; *Bengali*, Khayer; *Hindi*, Katha; *Dakhini*, Khair; *Tamil*, Kashu-katti, Wodalior; *Telugu*, Podala-manu, Vempa-chettu-putta.

A tree, 30 to 40 feet; found in the forests of India and Burma. The Catechu of commerce, formerly known as Terra

Japonica, is an extract obtained by boiling the wood of this tree. Similar extract is also obtained from *Uncaria Gambier*, and from the nuts of *Areca Catechu*. It is a valuable astringent, used as a dyeing and tanning material, as well as in medicine in diarrhœa, dysentery, and mucus discharges. Two sorts of Catechu are known in commerce—the black, called catechu or Gambier; and the white, the Cutch. Dr. Balfour makes the following remarks on its value as a dyeing and tanning material :—

"Both kinds of catechu contain about half their weight of tannin, which differs from that of galls in affording olive-green precipitates with salts of iron, and yielding no Pyrogallic acid on destructive distillation. The tannin of catechu is soluble in cold water; catechu also affords a peculiar principle, which has been named *Catechin* and *Catechuic Acid*, which is not soluble in cold water, but is slightly so in the solution of the tannin of catechu. Catechu is extensively used in Indian tannin, and of late years has also been much used in Britain. It tans the skins with great rapidity, but the leather is light, spongy, permeable to water, and of a dark-reddish fawn colour. The light-coloured variety of catechu produces a softer leather than that tanned with cutch. Catechu produces but little of the deposit of bloom which is yielded by oak bark, valonia, and divi. Catechu is used by calico-printers to produce a fast bronze on cotton fabrics. When of good quality, catechu is more powerful as an astringent than kino. Of all known astringent substances, the catechu appears to contain the largest proportion of tannin, and Mr. Purvis found that one pound was equivalent to seven or eight of oak bark for tanning leather."

The varieties of catechu sold at the Calcutta market are *Belguti*, 4*d*. per lb.; *Pegu* 6*d*. per lb.; *Gánti*, 5*d*. per lb.; *Janakpuri*, 5½*d*. per lb. The total exports of Cutch and Gambier from India during the five years ending 1880-81 are as follows :—

	Cwt
1876-77	264,933
1877-78	195,320
1878-79	217,194
1879-80	222-123
1880-81	316,077

The wood is very durable and is considered a valuable timber.

Acacia concinna.

Vern.—*Bengali*, Ban-ritha; *Hindi*, Ritha; *Dakhini*, Sike-kai; *Tamil*, Shaka; *Telugu*, Chikaya; *Burmese*, Ken Bwon.

A climbing shrub, found in South India, Bengal, Assam, and Burma. Major Drury states that a considerable trade is carried on in some parts of India in the pods of this tree, which resemble the Soap-nut, the fruit of *Sapindus detergens* and *S. trifoliatus*, and are used for washing the head. The plant is not, however, known in Calcutta. Dr. Balfour states that the "pods and bark are exported from Canara, the former as a washing material, and the latter for dyeing and tanning fishing nets."

Anogeissus latifolia.

Vern.—*Hindi*, Dhawa, Dhawra, Bakli; *Telugu*, Sheri-manu.

A native of the forests of the Himalayas and South India. The tree yields a gum, used by the calico-printers. The wood is highly valued on account of its great durability, and its suitableness for agricultural implements, railway sleepers, and ship-building.

Areca Catechu. *Areca or Betel-nut.*

Vern.—*Sanskrit*, Gubak; *Bengali*, Supari, Gua; *Hindi*, Chheli; *Tamil*, Kottaipakka; *Telugu*, Hoka-vakka; *Burmese*, Kwyun.

The most graceful and elegant of all Indian palms, which grows to a height of 30 to 40 feet, with a tuft of feathery leaves at the top; cultivated all along the sea-coast of India and Burma for its fruit—the Areca or Betel-nut of commerce. A decoction from the nut is used in dyeing, and a kind of inferior catechu is extracted from it. Natives chew the nut with betel leaves (*Piper betel*, *Pán*) or singly, and it is stated that about 50 millions of the human race use it in this way. An excellent tooth-powder is prepared from the roasted nuts. Young unhusked nuts possess astringent properties, and are

prescribed in bowel complaints and bad ulcers. An infusion of the ripe nut is given to horses as a purgative. The spathe which covers the tender blossoms is adapted for paper manufacture, and the leaves for thatching and matting, as well as for making rough bags. The juice of the palm is intoxicating. The following figures show the export of betel-nut from India during the five years ending 1880-81 :—

	Quantity. lbs.	Value. £
1876-77	687,230	6,085
1877-78	383,553	3,924
1878-79	381,732	4,535
1879-80	2,287,900	21,459
1880-81	667,065	8,077

In the last year (1880-81) the exports were chiefly to the following countries :—

	lbs.
United Kingdom	65,501
East Coast of Africa	208,663
Mauritius	60,142
Aden	34,538
Arabia	24,418
China and Hong-Kong	535,297
Other countries ... ... — ...	38,446

Of this quantity, Bengal contributed 97,717lbs.; Bombay 775,793lbs.; Sind, 2,110lbs.; Madras, 91,385lbs.

Bixa Orellana. *Arnotto.*

Vern.—*Bengali, Hindi,* Latkan; *Tamil,* Kuragu; *Telugu,* Jafra vittulu; *Burmese,* Tei-nin.

A middle-sized tree, found in South India, Bengal, and Burma. It is cultivated in Mysore and Burma for the yellow dye which the pulp of the seeds yields; the Indian dye is, however, inferior to that of the West Indies. About 300,000 lbs. of this are annually imported into Great Britain. It imparts an orange colour to silk and cotton, but is not very permanent. Medicinally, arnotto is reckoned an astringent and slightly purgative, and is considered a good remedy for dysentery and diseases of the kidneys.

Butea frondosa. *Downy-branch Butea.*

Vern.—*Sanskrit*, Kinsuka ; *Bengali*, Palash ; *Hindi*, Dhak ; *Dakhini*, Pallas ; *Tamil* Parrsa-maram ; *Telugu*, Tella moduga *Burmese*, Pouk pin.

A small tree, with deep purple flowers, found all over India. Dr. Hooker states that "when in flower the *Dhak* tree is a gorgeous sight ; the masses of flowers resembling sheets of flames, their bright orange-red petals contrasting brilliantly against the jet-black velvety calyx." The dried flowers, called *teeu*, are used as a yellow dye. Dr. Roxburgh made several experiments to test their value in this respect, and the following are his remarks on this subject :—

"Infusions of the flowers, either fresh or dried, dyed cotton cloth, previously impregnated with a solution of alum and tartar, of a most beautiful bright yellow, which was more or less deep according to the strength of the infusion. A little alkali added to the infusion changes it to a deep-reddish orange ; it is then dyed on prepared cotton cloth of the same colour, which the least acid changes to a yellow or lemon ; these beautiful colours I have not been able to render perfectly permanent. Amongst numberless experiments, I expressed a quantity of the juice of the fresh flowers, which was diluted with alum water, and rendered perfectly clear by depuration ; it was then evaporated by the heat of the sun into a soft extract ; this proves a brighter water colour than any gamboge I have met with ; it is one year since I first used it, and it remains bright. Infusion of the dried flowers yielded me an extract very little, if anything, inferior to the last mentioned ; they yield also a very fine durable yellow lake, and all these in a very large proportion."

The bark is also used for colouring blue and for tanning. A beautiful ruddy-coloured astringent gum is obtained from the bark, which was at one time supposed to be the kino of commerce, and is now frequently substituted for it. It contains about 73 parts of tannin, 22 parts of gum with gallic acid and other soluble substances, and 6 parts of almost insoluble substance. The seeds are a very powerful anthelmintic, which can be advantageously substituted for santonine ; the gum is used in diarrhœa and dysentery ; the flowers are given to enciente women in cases of diarrhœa, and applied externally

in orchitis. A rough cordage is prepared from the root-bark, which is also used for making paper. It is said that the seeds are eaten in famine times.

Cæsalpinia coriaria. *Divi-divi; American Sumach.*

A small tree, native of South America, introduced into India by Dr. Wallich in 1842, and now naturalised in Madras, Khandesh in Bombay, and at Cawnpore in the North-Western Provinces. The pods contain about 60 to 65 per cent. of pure tannin, which has proved to be a good substitute for sumach, a more valuable tanning material. It is used as such at the Government Harness and Saddlery Factory at Cawnpore. This is one of the exotic trees, the cultivation of which in India has been highly recommended. Dr. Bidie is of opinion that the pods may be used as an astringent medicine.

Cæsalpinia Sappan. *Sappan-wood.*

Vern.—*Sanskrit*, Patanga; *Bengali*, Bakam ; *Hindi*, Patang ; *Tamil*, Vartaing ; *Telugu*, Bakkapu ; *Burmese*, Tein nergyet.

A large tree, 40 feet ; native of Coromandel, Burma, Siam, and Amboyna. It grows freely without being cultivated in almost all parts of South India. It is one of the sources of the red or Brazil wood of commerce, but the wood of this tree is specially known as the Bakam or Sappan wood, and is extensively used in dyeing a red colour, which is, however, not very fast. It greatly resembles Logwood, differing, however, in the colouring principle, that of Sappan being brasilin, while that of Logwood is hæmatoxylin. With ammonia it produces a red colour, with salts of iron a black colour, and with sulphate of copper, alum, and cream of tartar, a blue dye, which does not fade. In Palghat it is largely used for dyeing mats, and is one of the ingredients of the red dye produced by Chay root in South India. Medicinally, a decoction of the wood is given as a powerful emmenagogue ; it is also considered astringent and may be substituted for Logwood.

Carthamus tinctorius. *Safflower.*

Vern.—*Sanskrit*, Kamalottara; *Bengali*, *Hindi* and *Dakhini* Kusum; *Tamil*, Sendurgam, Kashumba; *Telugu*, Agnisikha; *Burmese*, Hshoo.

An annual, 1 to 2 feet; grown extensively all over India. The seeds are used as food for poultry, and also yield an oil used for burning in lamps and for cooking, and supposed to be the principal ingredient of maccassar oil. In medicine, the seeds are considered laxative, and are also used in dropsy. The oil is used in rheumatism and paralysis. But the chief importance of the plant lies in the flowers, which yield a beautiful dye of various shades of colour, between red and yellow. The dye is obtained from the petals which contain two pigment principles, *viz.*, *safflower-yellow*, obtained by pounding and macerating the flowers with soda, and *safflower-red*, which is the dye of commerce. The colours produced by safflower are, however, not very fast. The Dacca safflower is the best in India, and ranks next to that of China.

A large quantity of safflower is yearly exported from India, but the trade has of late much decreased, owing probably to the discovery of aniline dyes.

During the five years ending 1880-81 the exports of safflower were as follows:—

			Quantity. Cwts.	Value. £
1876-77	...	...	7662	30,467
1877-78	...	...	3698	14,880
1878-79	...	...	4977	18,671
1879-80	...	...	2411	18,145
1880-81	...	...	6675	35,115

Cassia auriculata. *Tanner's cassia.*

Vern.—*Hindi*, Tarwar; *Tamil* Avarai; *Telugu*, Tangedu.

A common shrub in Central and South India. The bark is one of the most valuable tanning substances of India. Mr. D. E. Hutchins, Assistant Conservator of Forests, Mysore, stated, in his report to the Government of India on dyes, that "in tanning its bark occupies in this country the position which oak

bark does in Europe. It is also used in dyeing like myrabolams when an astringent is required to modify a colour." The price at Bangalor is about £6 per ton. Medicinally it is reckoned astringent. The seeds, powdered, are applied in ophthalmia.

Casuarina equisetifolia. *Beef Wood of Australia.*

Vern.—*Tamil,* Chouk ; *Telugu,* Serva ; *Burmese,* Tinyn.

A large evergreen tree, cultivated all over India, except the North-Western Provinces and the Panjab. The bark is used in tanning leather. The wood is very durable.

Cedrela Toona. *Toon,* or *Indian mahogany Tree.*

Vern.—*Bengali, Hindi,* Tun ; *Tamil,* Tunamaram ; *Telugu,* Nandi ; *Burmese,* Thitkado.

A large tree, 60 feet high ; grows in all parts of India. The bark is a powerful astringent. It is used in fevers as a substitute for cinchona bark, and is also efficacious in diarrhœa and dysentery. The flowers yield a beautiful red or yellowish dye, which is used in Mysore for dyeing cotton. A red dye is occasionally extracted from the seed. The wood is largely used for cabinet-work. The bark yields a gum.

Ceriops Roxburghiana.

Vern.—*Bengali,* Garan ; *Burmese,* Ka-by-ain.

A tree, which grows on the coasts of India and Burma chiefly in the Sundarbans, where new lands are being formed by the deposit of silt from the Rivers Ganges and Brahmaputra. It was formerly one of the chief sources of fuel-supply in Calcutta. The bark is used in tanning leather.

Coccus Cacti. *Cochineal.*

Vern.—*Bengali, Hindi,* Kirmdana.

Cochineal is the dried body of the female of the insect *Coccus cacti.* The article is chiefly imported from America and Central Asia, but it is also gathered in small quantities in Rajputana and South India from the prickly pear (*Opuntia Dillenii, &c.*), which grows as a weed in many parts of the

country. Cochineal is a valuable red dye. It is also used in medicine, and is supposed to possess anodyne and antispasmodic properties. It is believed that cochineal can be largely produced in India if the necessary measures are taken.

Coccus Lacca. *Lac.*

Lac is obtained from incrustations on the branches of various trees produced by the insect *Coccus Lacca*, which punctures the bark. The trees on which lac is mostly found are *Schleichera trijuga, Butea frondosa, Erythrina indica, Zizyphus Jujuba*, species of *Ficus*, &c.; that obtained on the tree first named, called *Kusumbi lac*, is highly prized. The incrustation called lac is formed by the female insect, and the bits of branches covered with it are termed stick-lac. These bits are then treated with water, which process separates the lac from the twigs and reduces it to the form of small grains: it is now called seed-lac. Shell-lac is prepared by putting the seed-lac into a cloth bag, which is extended over a slow fire; when the lac inside it melts, the cloth is twisted hard so that the liquid comes out of the pores of the cloth and is allowed to drop on a plantain leaf put underneath. The glossy nature of the leaf causes the liquid lac to spread into thin layers, which when cool, becomes the shell-lac of commerce. The liquid produced by treating the stick-lac with water is made into lac-dye by boiling down the coloured tincture into dryness and forming the residue into little cakes. Good lac-dye contains 50 per cent. of colouring matter, 25 of resin, and 22 of other extraneous substances. The exports of lac during the five years ending 1880-81 were as follows:—

	Quantity. Cwt.	Value. £.
1876-77	188,712	536,976
1877-78	104,645	362,048
1878-79	91,433	298,715
1879-80	71,048	371,495
1880-81	88,392	578,320

Curcuma longa. *Turmeric.*

Vern.—*Sanskrit*, Haridra ; *Bengali*, Halud ; *Hindi*, Haldi ; *Tamil*, Manjal ; *Telugu*, Pasupu.

Turmeric is cultivated all over India for its rhizomes, which are used as a condiment in cooking vegetables and meat. They are also extensively used as a yellow dye, the colouring principle being known as *Curcumin*, which is soluble in alcohol or ether, and changes with alkali into a deep red. Macerated turmeric is in some places rubbed on the body by women and is considered cooling. Native practitioners consider turmeric as stimulating ; used for external application in pains and bruises, and for internal administration in disorders of the blood.

Diospyros embryopteris. *Gab.*

Vern.—*Bengali*, Gab ; *Hindi*, Tendu; *Tamil*, Tumbilik-kay ; *Telugu*, Tubiki.

A small tree, found all over India and Burma. Fishing-nets in Lower Bengal and Assam are tanned with an infusion of the unripe fruits to make them durable ; it is also used as a tar in caulking the seams of fishing boats. The unripe fruit and the bark abound in tannin, and as such deserve notice. Medicinally they possess astringent properties. A medicinal oil is also obtained from the seeds. The tender leaves of the tree are eaten as a vegetable ; the fruit when ripe is sweet and edible, and children are very fond of it.

Emblica officinalis. (Phyllanthus Emblica). *Emblic myrabolam.*

Vern.—*Bengali*, Amlaki ; *Hindi*, Aonla ; *Tamil*, Nellikai ; *Telugu*, Usirika-manu.

A middle-sized tree, found all over India. The bark, the leaves, and the fruit are astringent ; used as a dyeing and tanning material. The fruit is preserved in a dried state or made into pickles and conserves ; is also used as a hair perfume. The fruit, the leaves, and the bark, specially the first, are a valuable astringent medicine.

Indigofera tinctoria. *Indigo.*

Vern.—*Bengali, Hindi,* Nil; *Tamil,* Nilam; *Telugu,* Nili-mandu.

The most valuable dye-stuff in India, and the only one which produces a blue colour. It is cultivated all over India, but chiefly in Bengal, North-Western Provinces, and Madras. The manufacture of indigo was formerly entirely in the hands of European capitalists, but of late large numbers of natives have taken up the industry. Mr. Liotard states that "good indigo is known by its fine purple-blue colour, and by its clear fracture when the two corner ends of a tablet are pressed with the fingers. The fracture, when rubbed with a hard, smooth surface, exhibits a copper-red lustre." The quantity of indigo exported from India during the five years ending 1880-81 was as follows:—

	Quantity. Cwt.	Value. £.
1876-77	100,384	2,962,785
1877-78	120,605	3,494,334
1878-79	105,051	2,960,462
1879-80	100,923	2,947,226
1880-81	116,870	3,571,581

There is an extensive inland trade in indigo seed between the North-Western Provinces and Bengal, as the N.-W. Provinces seeds are only used for sowing in Bengal. Indigo seed is said to yield an oil by expression, but is rarely extracted. The legumes are sometimes used as fodder. Dr. K. L. Dey states that indigo leaf is used as an alterative in hepatitis; the root as an antidote for poisons generally, and given in decoction in calculas; powdered indigo was used in epilepsy in Germany, but with uncertain results. An ointment of macerated indigo is applied around the navel in uremia. In the Panjab it is applied to severe ulcers, especially in horses; and the powdered seeds are used as a local application for ophthalmia, boils, and dropsy.

Lagerstrœmia parviflora.

Vern.—*Bengali*, Sida ; *Hindi*, Bakli, Katdhaura, &c. ; *Dakhini*, Nana ; *Telugu*, Chanda ; *Burmese*, Tsambelay.

A large deciduous tree, found in the Sub-Himalayan tracts, Bengal, Assam, Central and South India. The wood is hard, seasons well, works easily, and is fairly durable ; used as railway sleepers, for agricultural implements, and in cabinet-work. A gum is obtained from the bark ; bark used in tanning. Tasar silk-worm feeds on the leaves.

Lawsonia alba. *Henna.*

Syn.—L. inermis.

Vern.—*Bengali, Hindi*, Mehdi ; *Tamil*, Aivanam ; *Telugu*, Goranta.

A small shrub, common all over India as a hedge plant. The fresh leaves, with the addition of a little Catechu, is made into a paste with which native women dye the palms of their hands and finger-nails a dull orange colour ; it is also used for dyeing the hair. Dr. Roxburgh states :—

"The leaves yield in decoction a porter-coloured liquor. I have found it a deep orange colour which acids destroy, while alkali and infusions of astringent vegetables deepen it. This decoction dyes the finger a deep orange, but does not communicate any colour variously prepared, nor could I produce any precipitate from the decoction worth attending to."

A decoction of the leaves is occasionally used in dyeing cloth a light reddish-brown shade, known as malagiri. Ottos and perfumed oils are also made from the *henna* leaves. Mr. Baden-Powell says that it contains a peculiar sort of tannic acid, and is sometimes applied as an astringent remedy for ulcers in the mouth, and in other cutaneous affections. In South India an infusion of the leaves is used in bruises. The seeds yield an oil.

Mallotus Philippinensis. *Indian Kamila.*

Syn.—Rottlera tinctoria.

Vern.—*Bengali, Hindi* Kamila-guri ; *Tamil*, Kamela-mavu ; *Telugu*, Kapitapindi ; *Burmese*, Tau-ti-din.

A small forest tree, found in all parts of India. The most important produce of the plant is the powder covering the

ripe fruit, used as a dye, specially for silk, to which it imparts a fine yellow colour. It does not require a mordant. It is also used in medicine as a purgative and anthelmintic. The bark is used for tanning. An oil, obtained from the kernel of the fruit, is used as a cathartic.

Memecylon edule. *Ironwood Tree.*

Vern.—*Dakhini*, Ajan; *Tamil*, Kasha-elai; *Telugu*, Alli-aku.

A small tree of South India and Burma. The flowers and the leaves are extensively used in dyeing. A cold infusion of the leaves imparts a yellow dye; a crimson dye is also obtained from them. Dr. Bidie states that the leaves produce "a delicate yellow lake," and also yield a red dye used along with sappan wood and myrabolams to colour cotton cloths and mats. An infusion of the leaves is used in inflammation of the conjunctiva.

Morinda citrifolia.

Vern.—*Bengali*, Ach; *Hindi*, Al; *Tamil*, Manja-pavattay; *Telugu*, Maddi-chettu; *Burmese*, Yai-yoe.

A small tree, extensively cultivated in many parts of India for the roots, which yield a red dye. In the North-Western Provinces it is chiefly cultivated in Bundelkhand, south of the Jamna, where the town of Mauranipur has long been famous for the manufacture of a red cloth called *kharua* which is dyed with the *Al* root. In Madras, Dr. Bidie states, it is a common tree in dry soils. The colour imparted by *Al* is fixed by alum and is permanent. The price of the root is about 2½*d.* per lb.

Nyctanthes Arbor-tristis. *Square-stalked Nyctanthes.*

Vern.—*Sanskrit*, Sephâlikâ; *Bengali*, Siuli; *Hindi*, Harsinghar; *Dakhini*, Paharbati; *Tamil*, Paghala-malli; *Telugu*, Poghadamullay.

A small tree, found wild in the forests of Central India and the Sub-Himalayan regions, and also cultivated in many parts of India for its delightfully fragrant flowers, which are

given as an offering to the gods, and of which a perfume is made. The tree is, however, valuable for the tubes of the corollas of its flowers, which yield a beautiful yellow dye. The flowers are simply dried and kept in this state till they are needed for dyeing purposes. They are then boiled, the orange dye being thus extracted from the flower-tubes. The cloth is dipped in the infusion and dried. The colour yielded is fleeting. The bark is used in tanning and as an astringent medicine. The leaves are considered febrifuge. The flowers are also used in medicine, and, according to Mr. Baden-Powell, are considered cool and light, used in ringworm and to reunite broken bones, and also in disorders of the wind, mucus, and bile. They contain an essential oil.

Oldenlandia umbellata.

Vern.—*Tamil*, Sya-emburel cheddi ; *Telugu*, Cherivelu.

The root is used as a dye. Dr. Bidie states :—

"This article—the *chay root*—holds the same place amongst Indian dye-stuffs as madder does in Europe. For producing the brilliant and fast red dye for which Madras handkerchiefs were once famous, this root is used along with the *Morinda*, and alum as a mordant. When employed with *Ventilago* it gives the chocolate colour formerly so much prized in the *Bandana*, or Pulicat handkerchief. With iron the *chay* gives a black, and with safflower, lime-juice, and soda an unstable red colour."

Onosma echioides.

Vern.—*Bengali, Hindi*, Ratanjút, Gauzaban.

This plant is plentiful in the Kangra Himalayas. The root is used as a colouring matter, being substituted for the alkanet (*Anchusa tinctoria*), or giving a red tint to liquids, particularly Rowland's Macassar Oil. In medicine the root is applied externally to eruptions, the leaves used as an alterative, and the flowers as a cardiac and stimulant in rheumatism and palpitation of the heart. Mr. Atkinson states that under the name of Ratanjút, the roots of *Potentilla nepalensis*, Hook., *Jatropha Curcas*, and other plants are also collected and sold.

Pterocarpus Marsupium.

Vern.—*Hindi*, Bija-sal ; *Dakhini*, Dhorbeaula ; *Tamil*, Vengai ; *Telugu*, Egisa.

A large deciduous tree, found in Central and South India. The tree yields a red gum, like that of *Butea frondosa*. The heart-wood is full of gum-resin and may be made to dye yellow. Wood durable, takes a fine polish; used for doors, posts, beams, furniture, &c., and proved to be suitable for railway sleepers.

Pterocarpus santalinus. *Red Sandal wood.*

Vern.—*Bengali*, Rakta-chandan ; *Hindi*, Lal Sandal ; *Tamil*, Shenshandanum ; *Telugu*, Erra-gandhapu-chekka.

A small tree, found in South India, chiefly in Kadapa and Karnúl districts. Red sandal is brought from these districts of Madras in billets or root-pieces, and exported. Its chief value is as a dye wood, containing a red colouring principle, "santalin," which, dissolved in alcohol, imparts a beautiful salmon-pink colour to cloth. In Europe it is used to dye leather and wood, and as a colouring agent in pharmacy. In native medicine, the wood is used as an astringent, and an ointment of it is applied externally in headache. The wood is close-grained, used for carved work in houses and temples.

Punica Granatum. *Pomegranate.*

Vern.—*Bengali*, Dalim Bedana ; *Hindi*, Anar ; *Tamil*, Magilam ; *Telugu*, Dadima.

The pomegranate tree is common all over India, but the fruit is of a very inferior quality. The fruit sold at the markets of Nothern India in the cold season chiefly comes from Kandahar; the inside of these is of a beautiful red colour, with small seeds and of great lusciousness. The fruits with broken surface, called *be-dana*, are of superior quality, while those with a smooth surface, called *muscat*, are sour, and have large seeds. The pomegranate tree is abundant in the lower Himalayas, but the fruit is very poor—useful, however, for its rind, called *naspal*, which is largely employed in dyeing cloth a greenish colour, in tanning, and as an astringent medicine. It is of a reddish brown

colour, hard and leathery, and contains 18·8 per cent. of tannin, with 10·8 of extractine, and 17·1 of mucilage. The flowers also yield a fleeting dye of a light-red colour. Morocco leather is tanned and dyed with promegranate rind. The root-bark is a valuable anthelmintic.

Randia dumetorum.

Vern.—*Bengali, Hindi,* Mainphal ; *Tamil,* Maddukarry ; *Telugu,* Manda.

A deciduous tree, found in the jungles all over India. The fruit and the root-bark are used in medicine ; the former is heating and a powerful emetic, used internally in colic, and as an application to swellings and as a poison to destroy fish; the latter is used in infusion to nauseate. In calico printing the fruit is employed as a colour-intensifier. Mr. Gamble states that, when ripe, it is roasted and eaten as food.

Rubia cordifolia. *Indian Madder. Manjit.*

Vern.—*Bengali,* Manjistha ; *Hindi,* Manjit ; *Telugu,* Tamraval.

The plant producing the manjit dye is common in the Himalayas. The dye is largely exported to the plains. The colour of manjit is bright, though not so durable as that of the European madder. Like madder, the utility of manjit results from the presence of two colouring principles, called alzarine and purpurine. These will not attach to cotton fabrics, unless in combination with a metallic oxide. It is, however, too expensive a dye to be much used. It is largely employed to colour medicinal oils, and as an astringent, is considered useful in skin diseases.

Symplocos Sumuntia.

Vern.—*Bengali,* Lodh ; *Hindi,* Pathani-Lodh.

A small tree of the dry forests of Bengal and Burma. The bark and the leaves yield a yellow dye which is used along with madder. Mr. Liotard thinks the leaves are employed more as a mordant than a colouring material. In medicine it is reckoned cooling and astringent, and prescribed in bowel complaints, diseases of the eye, bad ulcers, &c.

Tectona grandis. *The Teak Tree.*

Vern.—*Bengali, Hindi,* Sagun; *Dakhini,* Sag ; *Tamil,* Tekku ; *Burmese,* Kyan.

A large deciduous tree, found in Burma, Central and South India. The teak tree is famous for its timber, which (Mr. Gamble states) "does not split, crack, warp, or alter its shape when once seasoned; it does not suffer in contact with iron, and is rarely, if ever attacked by white ants. Its durability is probably due to the aromatic oil contained in the wood. It is the chief timber of India and Burma; it is exported largely for ship-building and the construction of railway carriages. In India it is used for all purposes of house and ship-building, for bridges, sleepers, furniture, and most other purposes. The leaves give a red dye; they are very large, and are used as plates, for packing and for thatching. An oil is extracted from the wood in Burma and is used medicinally as a substitute for linseed oil and as a varnish". The supply of teak wood is said to be diminishing.

Terminalia belerica. *The beleric Myrabolam.*

Vern.—*Bengali, Hindi,* Bahera ; *Dakhini,* Balra ; *Tamil,* Taurik-kay; *Telugu,* Tandra-kaya ; *Burmese,* Thiseiny

A large deciduous tree, found in the forests of India and Burma. The astringent fruit is one of the myrabolams of commerce, used in dyeing cloth and tanning leather. It is exported to Europe. Medicinally it is an astringent tonic in small doses, in large doses purgative; considered useful in dropsy, piles, diarrhœa, and leprosy. The kernel of the fruit is said to act as a narcotic poison, and produces intoxication if taken in a large dose; an oil obtained from it is used for the hair. The tree yields large quantities of gum, which is not much used.

Terminalia Chebula. *Chebulic or Black Myrabolam.*

Vern.—*Bengali,* Haritaki ; *Hindi,* Harra ; *Dakhini,* Halda ; *Tamil,* Kaduk-kay ; *Telugu,* Karak-kaya ; *Burmese,* Panga.

A large, deciduous tree of the Sub-Himalyan regions, Eastern Bengal, Assam, Central and Southern India. The tree is very valuable for its fruit, known as the black myrabolam

of commerce, which is one of the best tanning agents in India. Mr. Gamble states :—

"They are largely exported from Bombay to Europe. So valuable is this trade in the Southern Circle in Bombay, that the Forest Department of that Circle clear annually at least Rs. 50,000 (£5,000) clear profit from it alone. In 1877-78, the net profit was Rs. 77,000 ; in future years it is expected to average a lakh (£10,000). The unripe fruit is used in tanning, dyeing, and in medicine. The fruits give with alum a yellow dye, and with iron-clay give a good sort of ink. Astringent galls form on the young twigs, which are also used for ink and in dyeing and tanning. The kernel gives a transparent oil."

The value of myrabolam has of late been greatly appreciated in Australia, and since the Melbourne Exhibition large quantities of it have been exported to that country. The galls formed on the tender leaves by punctures made by an insect are as good as oak-galls in the manufacture of ink. Mixed with alum they give a yellow dye, and with ferruginous clay a permanent black colour. In medicine the fruit is used as a powerful astringent in opthalmia and to purify the blood; in large doses it is purgative. An infusion of the fruits of *T. Chebula, T. beleria,* and *Phyllanthus Emblica* taken every morning is said to improve the general health by regulating the action of the liver. Two kinds of *T. Chebula* fruits are sold in the market, one large and the other small, called *Jangi-har;* the latter is used in medicine only. A sweet conserve is made of the bigger fruits. The wood is durable, takes a good polish, and is used for building purposes, agricultural implements, and cabinet-work. The exports of myrabolams during the five years ending 1880-81 were as follows :—

	Cwts.	£
1876-77	361,217	135,822
1877-78	537,055	230,526
1878-79	541,346	234,574
1879-80	354,977	158,081
1880-81	315,628	123,608

Terminalia tomentosa.

Vern. —*Bengali, Hindi*, Asan, Piyasal ; *Tamil*, Karra-marda ; *Telugu*, Maddi ; *Burmese*, Touk-kyan.

A large deciduous tree of the Sub-Himalayan tract, Bengal, Burma, Central and Southern India. The bark is used in tanning, and also in producing a black dye ; the ashes of the bark are made into a sort of lime which are eaten by the natives with betel leaf. The tree yields a gum ; the fruit is edible, and is said to be a kind of myrabolam. The Tasar silk-worm feeds on the leaves. The wood is largely used for building purposes and for agricultural implements.

Ventilago maderaspatana.

Vern.—*Bengali*, Raktapitta ; *Tamil*, Papli ; *Telugu*, Yerrachikatli.

A large climbing shrub of Central and Southern India and Burma. The bark is made into cordage ; the root yields a red dye, and is also used in medicine ; the tree is said to yield a gum. Dr. Bidie states :—

"The bark is used along with Chay root (*Oldenlandia umbelatta*) to produce a chocolate colour, often seen on the borders of native cloths in Mysore, Bellary, Haidarabad, &c. If galls be added, it is said to yield a black colour. The collection of the dye at certain times of the year yields occupation to a large number of people in Western Mysore, where the plant is abundant."

Woodfordia floribunda.

Syn.—Grislea tomentosa.

Vern.—*Bengali*, Dhai ; *Hindi*, Dha, Dhaora ; *Dakhini*, Phul-satti ; *Telugu*, Jargi.

A large shrub, common throughout India. The tree is valuable for its flowers which yield a red dye used in colouring cotton, silk, and leather. The leaves and the twigs are used in dyeing yellow. About 27 tons of the flowers are annually exported from the Kumaun hills. The Dhái flower deserves the attention of European dyers. In medicine the dried flowers are prescribed as an astringent tonic in the disorders of the

mucus membranes, hœmorrhoids, and in derangements of the liver; and are also considered a safe stimulant in pregnancy. The leaves are also *officinal.*

Wrightia tinctoria.

Vern.—*Bengali*, Indrajau; *Hindi*, Dudhi; *Tamil*, Pálá, Vepále; Telugu, Tedlapál.

A small deciduous tree, found in Rajputana, Central and South India. The leaves yield an inferior sort of indigo blue and are used in dyeing. The wood is valuable, used for carving and turning. In medicine the seeds are used as an anthelmintic.

(6) Fibrous Substances.

India is rich in fibrous resources; but a large number of them has not yet been utilised owing to the difficulty of extraction from the stems, or the heavy cost of transport. The following is a list of plants from which fibre is generally extracted :—

Abroma augusta.
Abutilon indicum.
Acacia Latronum.
Agave americana.
Agave indica.
Aloe vulgaris.
Ananassa sativa.
Anona reticulata.
Anona squamosa.
Bambusa arundinacea.
Bauhinia racemosa.
Bauhinia tomentosa.
Bauhinia Vahlii.
Berrya Amonilla.
Betula Bhojpattra.
Bœhmeria nivea.
Bombax malabaricum.
Borassus flabelliformis.
Broussonotea papyrifera.
Butea frondosa.
Calamus species.
Calotropis gigantea.
Cannabis sativa.
Careya arborea.
Cerbera Odollam.
Cocos nucifera.
Corchorus olitorius.
Cordia augustifolia.
Cordia Myxa.
Crotalaria juncea.
Daphne papyracea.
Dischrostachys cenerea.
Dolichandrone falcata.
Ficus bengalensis.
Ficus religiosa.
Ficus Tsiela.
Foureroya gigantea.
Gora corylifolia.
Gossypium herbaceum.
Grewia caficata.
Grewia oppositifolia.
Grewia rotundifolia.
Grewia tilæfolia.
Hardwickia binata.
Hibiscus Abelmoschus.
Hibiscus cannabinus.
Hibiscus esculentus.
Hibiscus ficulneus.
Hibiscus mutabilis.
Hibiscus rosa sinensis.
Hibiscus tiliaceus.
Linum usitatissimum.
Malachra capitata.
Marsdenia Roylei.
Melia Azadriachta.
Moringa pterygosperma.
Musa paradisiaca.
Musa sapientum.
Musa textilis.
Odina Wodier.
Opuntia Dillenii.
Pavonia odorata.
Pavonia zeylanicum.
Phœnix dactylifera.
Phœnix sylvestris.
Polyalthia longifolia.
Saccharum Munja.
Saccharum officinarum.
Saccharum Sara
Saccharum spontaneum.
Sanseviera zeylanica.
Sesbania aculeata.
Sesbania ægyptica.
Shellus aspera.
Sida acuta.
Sida rhombifolia.
Sterculia ornata.

The most important ones are discribed below :—

Abroma Augusta, See Medicinal Products.

Abutilon indicum, See ditto

Agave americana. *Aloe Plant.*

Vern.—*Bengali*, Koyan, Murga ; *Hindi*, Rakas ; *Tamil* Anaik-katragh-ai ; *Telugu*, Rakashi mattalu.

The American aloe, a native of America, is now common in every part of India, where it forms a good hedge plant. An excellent fibre is obtained from the leaves, suitable for the manufacture of ropes, and other articles. Beautiful strong mats are manufactured from this fibre at Hazaribagh, in Bengal. A ligneous fibre is also obtained from the stem of the plant, which is known in Madras as the *Pitá* thread. Major Drury states that in many comparative experiments aloe fibre rope was found stronger than coir, country hemp, or jute ; a bundle of it bore a weight of 270 lbs., while that of Russian hemp only 160 lbs. According to Lindley, the roots possess diuretic and antisyphilitic properties, and are brought to Europe mixed with sarsaparilla.

Ananassa sativa. *Pine-apple.*

Vern.—*Bengali*, Aanaras ; *Dakhini*, Anánas ; *Tamil*, Anasha ; *Telugu*, Ananas.

A perennial 1 to 3 feet; native of the moist forests of South America ; said to have been introduced into India by the Portuguese, in 1594, but now common in Bengal, Burma, South India, and at the foot of the Himalayas. The pine-apple may be grown in abundance in all warm countries, in damp soils, under the shade of trees. When once planted it requiries very little attention; although, if cultivated with care and manured with sweepings the size and taste of the fruit are much improved. The fruit, which is abundant in the rainy season, is very agreeable. The leaves, sometimes 3 yards long, yield a fine white fibre, which is made into strings and ropes. They become stronger when wet. In Java and the Straits, a valuable fabric, the *pina* silk of commerce, is manufactured from it. Dr. Royle, in his " Fibrous Plants of India," makes the following remarks on the Ananas fibre :—

"The pine-apple, or ananas, is so well known as an object of the most careful culture in Europe, on account of its pleasantly sweet and aromatic fruit, that we should not expect to find it included among cordage plants. But its long and rigid leaves, which are thorny at the edges and point abound in a quantity of fine white fibres which are, in some countries, woven into the finest fabrics, netted or twisted into lines for fishing and into ropes possessed of considerable strength. These are said not to be injured by constant immersion in water, a property which the natives increase by tanning them. * * * * * In the experiments which I have made with these various fibres (different kinds of pine-apple fibres), a certain quantity of those prepared at Madras bore 260 lb., while a similar quantity from Singapur bore 350 lbs. before they broke; but New Zealand flax, in the same proportions, bore only 260 lb."

The extraction of the fibre from the leaves is, however, very laborious, and until some machine is invented for facilitating the process, the industry has no chance of further development in India. The juice of the fresh leaves is a powerful anthelmintic, and that of the fruit a remarkable antiscorbutic.

Anona reticulata. *Netted Custard-apple.*

Vern.—*Bengali,* Nona; *Dakhini,* Rámphal; *Tamil,* Rámsitá maram; *Telugu,* Rám chettu.

A tree, 20 to 30 feet; grows wild or cultivated in Bengal, Burma, and South India. Its dark brownish fruit (netted custard-apple), which ripens in the hot season, is eaten by the natives, but is not much esteemed. The dried unripe fruit yields a black dye. A good fibre can be extracted from the branchlets, which is suitable for the manufacture of rope, cordage, &c. As the tree requires no cultivation, and the fruit improves by pruning after it is in season, the fibre can be obtained at a small cost from the cuttings. As a cheap article, therefore, it deserves some attention.

Bambusa arundinacea. *Bamboo.*

Vern.—*Sanskrit,* Vansa; *Persian,* Nai-hindi; *Bengali, Hindi,* Báns; *Tamil,* Mangil; *Telugu,* Malkas.

The bamboo is found almost everywhere in India, and is one of the most useful of Indian plants. The frame-work and the

posts of the village huts in Bengal are entirely made of bamboo. Baskets, mats, chairs, ladders, masts of vessels, bed posts, fishing-rods, spears, carts, and all sorts of house-hold furniture are made of it. The young shoots, when tender, are eaten as a vegetable.

Different species of bamboo grow wild in almost all the mountainous tracts in India and Burma, and various proposals have from time to time been made to utilise them as a paper-making material, but no satisfactory result has yet been achieved in this direction. Mr. Routledge, in his paper on "Bamboo considered as a paper-making material," writes—

"Of all the fibre-yielding plants known to botanical science, there is not one so well caculated to meet the pressing requirements of the paper trade as bamboo, both as regards facility and economy of production, as well as the quality of the paper 'stock' which can be manufactured therefrom. Grown under favourable conditions of climate and soil, there is no plant which will give so heavy a crop of available fibre to the acre and no plant that requires so little for its cultivation and continuous production."

Mr. Atkinson states that

"attempts have been made in England to obtain from the bamboo a half-stuff or pulp for paper manufacture, but these have failed, chiefly from using the plant when it had attained to some degree of maturity, and the fibre had become extremely dense and the external skin hard and silicious. In this state the processes for softening the material and converting it into pulp by long continued boiling or digesting in very strong solutions of caustic alkali at a high temperature were troublesome, expensive, and dangerous. Mr. Routledge will therefore take the young plant, and by a system of close plantations, well watered and systematically cropped, ensure successive growths available for paper stock."

Sir J. D. Hooker, in his Himalayan Journal, describes a manufactory for making paper out of bamboo. He found the stems steeped in large water-tanks with a solution of lime for a length of time, after which they were taken out, and beaten on stones, until they became soft, and all the hard matter removed. The bamboo flowers once in 30 or 40 years in seasons of extreme drought, and this event is considered as a precursor of famine.

The seeds are eaten boiled like rice. Medicinally the silicious deposit, called in *Hindi* Tabashir or Banslochan, *Tamil* Mungaluppu, *Telugu* Venduruppu, formed in the joints of the female bamboo, is considered efficacious in paralytic complaints, flatulency, and poisoning cases. It is also esteemed as a valuable nervine tonic. The root is considered a diluent, the bark a specific for eruptions, and the leaves an anthelmintic and a powerful emmenagogue. A fungus growing at the root of the bamboo is esteemed as a valuable vermifuge.

Bauhinia purpurea.

Vern.—*Bengali*, Rakta-kánchan; *Hindi*, Kaliar; *Tamil*, Pedda-aré; *Telugu*, Kanchan; *Burmese*, Mahalay-kani.

An ornamental tree, 20 to 30 feet; found in Bengal, Burma, North-Western Provinces, and South India. Buds eaten as a vegetable. Bark used for dyeing and tanning. Medicinally, bark astringent, root carminative, flowers laxative; bark or root and flowers, mixed with rice-water, used as maturant for boils and abscessess. The tree also yields a gum, called *semki-gond*. A fibre is extracted from the bark.

Bauhinia tomentosa. *Downy Mountain Ebony; Yellow Bauhinia.*

Vern.—*Sanskrit*, Usamaduga; *Tamil*, Katatti; *Burmese* Ma-ha-hlæ-ga-wa.

A large shrub, 12 feet; native of South India. The dried leaves and buds are given in dysentery; a decoction of the root-bark is considered useful in liver complaints and as an anthelmintic, the bruised bark is externally applied on tumours and wounds. A cordage fibre is extracted from the bark.

Bauhinia Vahlii.

Vern.—*Hindi*, Malda; *Dakhini*, Chambuli; *Telugu*, Adda.

A large climbing shrub, 40 to 50 feet; native of the Himalayas and the hilly districts. The seeds have a sweet, astringent flavour, eaten fried in clarified butter. The creeper in its natural state is used for suspension bridges over hill streams

in the Himalayas, and a fibre, called *selu*, is manufactured from the bark, for which purpose it is first boiled and then beaten with a mallet, to render it soft and pliant. The leaves, which are a foot in length and breadth, are made into umbrellas and baskets by being sewn together with twigs, and also used for thatching. The kernels are said to possess tonic and aphrodisiac properties.

Betula Bhojpattra. *Indian Paper Birch.*

Vern.—*Sanskrit, Hindi,* Bhurja ; *Bengali,* Bhurjipatra ; *Telugu,* Barjapatri chettu.

Native of the Himalayas. In ancient times the bark was used as writing paper. It is at present used for packing, making umbrellas, covering thatches, and for hukka tubes.

Bœhmeria nivea.—*Rheea Grass ; Chin Grass ; Ramie.*

Vern.—*Bengali,* Kiah ; *Hindi,* Puia ; *Burmese,* Goun.

A perennial, indigenous in China, Japan, Indian Archipelago, Burma, Assam, Eastern Bengal, and the lower Himalayas. The plant has of late attracted considerable attention for its beautiful, soft, glossy fibre, suitable for the manufacture of textile fabrics, and which promises to be one of the most important of the economic products of India. The separation of the fibre from the stems is, however, at present very laborious and expensive, and a machine capable of facilitating this process is much wanted. In 1871 a prize of £5,000 was offered for any successful machine, and this reward was again renewed in 1877, and a competitive trial of seven machines was held at Saharanpur, but none of these were able to produce very satisfactory results.

What the Government of India required is—

"A machine or process capable of producing, by animal, water, or steam power, a ton of dressed fibre of a quality which shall average in value net less than £45 per ton in the English market, at a total cost, including all processes of preparation and all needful allowance for wear and tear, of not more than £15 per ton, laid down at any port of shipment

in India, and £30 in England, after payment of all the charges usual in trade before goods reach the hands of the manufacturer. The processes of preparation are to be understood to include all the operations required subsequent to the cutting of the stems from the plants in the fields, until the fibre is in a condition fit to be packed for conveyance to the market. The machinery employed must be simple, strong, durable and inexpensive, and should be suited for erection in the plantations where the rheea is grown. It must be adapted for treatment of the fresh stems as cut from the plant. The treatment of dried stems offers certain difficulties, and the fibre prepared from them must, moreover, always be much more costly than the fibre produced from green stems. Except during hot, dry weather preceding the rains in Upper India (where the rheea grows best) it is very difficult so to dry the stems that no fermentation or mildew shall occur. But during this season the stems are comparatively short and the crop poor and stunted, unless it is artficially irrigated and such greatly increases the cost of cultivation. In the rainy season the plant is in fine condition, but at this season it is almost impossible to dry the stems in quantity without injuring the fibre, unless recourse is had to artificial means of dessication, which greatly increases the cost of the material. It is therefore obvious that the attention of inventors should be given to the discovery of a process for the treatment of the green stems."

The leaves are suitable for the manufacture of paper.

Bombax malabaricum. *Red Cotton tree.*

Vern.—*Sanskrit*, Salmali; *Bengali*, Simul; *Hindi*, Simal; *Dakhini*, Sair; *Tamil*, Mulilava; *Telugu*, Mundla-buraga; *Burmese*, La-i.

A large tree, found all over India and Burma. A large quantity of cotton is every year obtained from the tree, which is chiefly used in stuffing pillows and mattresses. It is too short for the manufacture of textile fabrics, but is very valuable as a paper-material, and as such it deserves the attention of paper manufacturers. The inner bark yields a fibre suitable for the manufacture of rough cordage. The gum, called *mochras*, is a valuable aphrodisiac, and is efficacious as an external applicant to swellings of the limbs; the root is stimulant and tonic, and emetic in large doses; leaves employed as an aphrodisiac and in special diseases: in Java the bark is used as an emetic. The seeds also contain a large proportion of oil. The wood is

not durable, and is used only for toys, scabbards, tea-chests, planks for light work, &c.

Borassus flabelliformis. *Palmyra Tree.*

Vern.—*Sanskrit*, Tála; *Bengali*, Tál; *Hindi*, Tár; *Tamil*, Panan maram; *Telugu*, Tutti chettu.

The palmyra palm is common in Bengal, Behar, and South India, the various products of which are put to many economic uses. A Tamil poem of Ceylon mentions eighty purposes to which this tree can be put. The immature stone inside the green fruit is delicious to eat and considered cooling. The pulpy matter adhering to the fibres surrounding the stone in the ripe fruit, the sago-like substance found inside the head of the tree, and the kernel of the germinating seeds, are all eaten. The sweet juice drawn from flowering spathes yields sugar, and by fermenting it an intoxicating liquor is made, which is largely drunk by the lower classes. An ardent spirit is also distilled from it. The leaves were formerly used like paper to write books on and to this day they are used for this purpose in Orissa and Southern India, where an iron style is used to write upon them; in certain parts of Bengal young children use them to write the alphabet. They are also largely used for making fans, mats, baskets, bags, winnows, hats, umbrellas, and for that ching&c. Very neat baskets of palmyra leaf are made in Madras. The fibres of the petioles of the leaves are used for making rope and twine. The wood is very hard and is used to make rafters, beams, &c. At Monghir it is used to make ornaments. Medicinally, the juice of the fresh petioles is given as a stimulant antiphlegmatic, and is used by the native physicians as an adjunct of their stimulant drugs in the low stages of intermittent and remittent fevers. The ash of the dry spidan of barren trees is anti-acid and is largely used in heartburn; it also acts as a powerful blister, and therefore applied on enlarged liver and spleen in combination with some demulcent substance. The water inside the seeds of the green fruit is refrigerent and diuretic, and is given to

check hiccup The pulp of the ripe fruit is applied externally in skin diseases. Palm sugar is antibilious and alterative and is used in hepatic disorders and gleet. The juice is diuretic and is prescribed in chronic gonorrhœa.

Broussonetia papyrifera. *Paper Mulberry.*

Vern.—*Burmese,* Mahlaing.

A small tree found in Burma. The tree is famous for its fibrous bark, from which a very fine white cloth is made in Otaheite, which is worn by the people there. It readily takes colour. A paper is made from the bark in China and Japan.

Calamus Rotang. *Rattan Cane.*

Vern.—*Persian,* Bed; *Bengali, Hindi,* Bet; *Tamil,* Perambu; *Telugu,* Beta mu.

This plant, which grows in moist localities in Bengal, Assam South India, and Burma, yields the best rattan cane of commerce. There are many forms, distinguished according to the thickness or thinness of the canes and other properties, and found in different localities. Rattan cane is split into strips and largely used in the manufacture of chairs, sofas, and light carrages. It is also made into strong ropes for dragging heavy weights, and for binding wild elephants. Baskets and boxes are made of thin entire canes and so also are peculiar boats seen on the Megna. The seeds and tender shoots are used as an article of food.

Calotropis gigantea. *Gigantic Swallow Wort; Madar.*

Vern.—*Sanskrit,* Arka; *Bengali,* Akanda; *Hindi,* Madar; *Dakhini,* Akra; *Tamil,* Eruhkam; *Telugu,* Jilledu-chettu; *Burmese,* Mai-oh.

A small shrub, 6 to 10 feet; found in waste lands all over India. The different products of this plant can be put to various economic uses, but as yet no method has been discovered to work them cheaply. It yields a manna, called *Madar-ka-shakkar;* the dried milky juice which exudes from the plant can be prepared like caoutchouc and gutta-percha; the silky down

contained in the pods is suitable for stuffing pillows and is made into paper, and is also capable of being spun into the finest yarn from which can be woven a sort of flannel-like cloth. The fibre obtained from the stems, known as the bowstring hemp of India, is perhaps the strongest vegetable fibre known. In a comparison made between madar and other fibres with a three-strand $\frac{2}{8}$ inch rope, the following results were obtained :—

		lbs.
Cocos nucifera,	capable of sustaining	224
Hibiscus cannabinus	" "	290
Sanseviera zeylanica	" "	316
Gossypium herbaceum	" "	346
Agave americana	" "	362
Crotalaria juncea	" "	407
Calotropis gigantea	" "	552

The milky juice and also the root are used medicinally as an alterative ; and in the treatment of leprosy and other cutaneous affections.

Careya arborea. *Carey's Tree.*

Vern.—*Hindi,* Kumbhi ; *Tamil,* Púta-tammi ; *Telugu,* Budá-darmi ; *Burmese,* Bambai.

A large deciduous tree, found in the Sub-Himalayan tracts, Bengal, Burma, Central and Southern India. The bark yields a fibre suitable for cordage; wood durable, used for agricultural implements and now being tried as railway sleepers in Bengal ; fruit called *khuni* is eaten in the Panjab. Medicinally, bark astringent, flowers given as a tonic after child-birth. The tree also yields a gum of which little is known.

Corchorus olitorius. *Jute.*

Vern.—*Bengali,* Pát.

Since the Crimean war, jute has become one of the most important articles of the export trade of Bengal. It is now extensively cultivated in Northern Bengal. Many jute

factories have now been established near Calcutta. The following figures show the exports of raw jute during the five years ending 1880-81.—

	Quantity. cwt.	Value. £
1876-77	4,533,255	2,636,646
1877-78	5,450,276	3,518,113
1878-79	6,021,382	3,800,426
1879-80	6,680,670	4,370,032
1880-81	5,809,815	3,934,029

Besides raw jute the value of jute manufactures exported during the same years was as follows :—

	£
1876-77	719,477
1877-78	771,127
1878-79	1,098,434
1879-80	1,195,361
1880-81	1,130,671

The tender leaves of the jute plant are eaten as a vegetable, and the bitter leaves of another variety are used as an antibilius medicine.

Crotalaria juncea. *Indian Hemp.*

Vern.—*Bengali, Hindi*, San ; *Dakhini*, Janab-ka-nar ; *Tamil*, Jenappa-nar ; *Telugu*, jenapa-nara ; *Burmese*, Pan.

Extensively cultivated all over India for its fibre, which is, however, not so soft as jute. Dr. Bidie states that the specimens of cloth made of it kept in the Madras Museum are pretty and strong. At Jaipur, paper is manufactured from coarse *san*. Seeds used to purify the blood in special diseases.

Cyperus tegetum.

Vern.—*Bengali*, Mádurkáti.

The smooth, elegant mats, commonly found in Lower Bengal, are made of this sedge, which is cultivated in Midnapur, a district in the neighbourhood of Calcutta. The culms in the green state are split into two or three pieces, which in drying contract and become nearly round. The floors of houses in Calcutta are almost entirely covered with mats made of this sedge. The fine *Masland* mats are also made of it.

Daphne papyracea.

Vern.—*Hindi*, Setbarúa.

A large shrub, found in the Himalayas and the Khasia Hills. Two varieties of this plant are known in the Kumaun Hills, one with white flowers and yellow fruit, and the other with purple flowers and fruit of the same colour. From the bark of both the tough Nepal paper is made. Mr. Atkinson states:—

"The pulp manufactured from the *Daphne papyracea* yields materials for a paper that gives the engraver finer impressions than any English-made paper, and nearly as good as the fine Chinese paper that is employed for what is called India-paper-proofs. The paper made from the shrub in Kumaun is almost as strong and durable as leather, and is largely used for village records and court proceedings. It is exported to Tibet on the north and to the plains on the south for manuscripts and account-books. With this wealth of raw material in existence, it is remarkable that so little has been done to render the fibre resources of our hills available to European enterprise."

The bark is also used to make ropes.

Dhadka grass. *Andropogon sp.*

A consignment of 200 lbs. of this grass was sent to Amsterdam by Mr. J. Deveria. The exhibitor states that the grass is an excellent paper material, and is anxious to have a fair trial from paper manufacturers. He states:—

"The grass could be procured, if required, in unlimited quantities; and if any paper-making firm will undertake to put up a mill on the spot where it comes from, arrangements could be made to give up all the land required for the mill premises free of rent or at a nominal rent for 99 years; and 5,000 acres of land would be laid out for the growth of the grass for the use of the mill so built. The yield from the 5,000 acres would most likely be about 2,500 tons of grass, and the cost of growing, cutting, and laying down on the mill premises would be about £1-5*s.* per ton. The grass would yield about 60 per cent. of paper, whence the mill could depend on turning out about 1,500 tons of paper. This at the wholesale rate of 6*d.* per lb. in Calcutta would present an income of £84,000 per year; allowing a third for cost of manufacture, &c., would leave a clear profit of about £56,000 a year. The Bally mills, paying

for their material from £3 to £4 per ton, are paying large dividends every year, and they have no material known to them (except the Dhadka grass that I first brought to their notice two years ago) that can be worked cheaply. These mills have a capital of £96,000, so that in two years by the above arrangement such a capital could be recovered.

Gossypium herbaceum. *Cotton.*

Vern.—*Sanskrit*, Karpas; *Bengali*, Tulá; *Hindi*, Rui; *Tamil*, Parutti; *Telugu*, Pratti; *Burmese*, Wa.

Cotton wool is the fibrous substance attached to the seeds of several species of Gossypium. The cotton plant is by some authors regarded as indigenous to this country, and the fabrics made in India were in ancient times the wonder of the world. Dacca, a town in Bengal, was the seat of extensive cotton-fabric manufacture in ancient times. In the last century the East India Company used to export large quantities of cotton fabrics to Europe, but the native manufacture has now almost entirely been superseded by the cheap machine-made articles from Manchester. Raw cotton is now largely exported to Europe, and the following figures show the quantities exported during the five years ending 1880-81 :—

	Quantity. cwt.	Value. £
1876-77	4,557,914	11,746,183
1877-78	3,459,077	9,383,534
1878-79	2,966,060	7,913,045
1879-80	3,948,476	11,145,452
1880-81	4,541,539	13,241,734

The American war of 1865-66 gave great impetus to this trade; before that date the trade was not so important.

Various attempts have from time to time been made to improve the quality of cotton, and a special office (that of the Cotton Commissioner) was for some time entertained to look after the interests of the cotton trade. The exotic varieties that have been acclimatised in the country are New Orleans, Upland Georgian, Bahmie, &c. Other varieties that deserve notice are the Garo Hills cotton, a long-stapled soft fibre lately discovered; and the Nankin (*G. herbaceum*, var. *religiosum*),

a naturally-coloured fibre said to be suitable for brown uniforms for soldiers. The Hinganghat cotton has found most favour in the European market.

Cotton seeds are a valuable fodder, very nutritius owing to the large percentage of nitrogenous matter they contain. They also yield an oil by expression, but very little oil is extracted in this country.

Grewia oppositifolia.

Vern—.*Hindi*, Biul.

A moderate-sized tree of the North-West Himalayas. The leaves are used as fodder ; the bark yields a fibre, used for rope-making and paper, but is not durable.

Hardwickia binata.

Vern.—*Hindi*, Anjan ; *Tamil*, Acha ; *Telugu*, Nar-yepi.

A deciduous tree, found in the dry forests of South and Central India. Mr. Gamble states that it is perhaps "the hardest and heaviest wood in India; it is extremely durable, liable to split, but does not warp. It is used for bridge and house posts and for ornamental work. It is recommended for sleepers, but is probably too hard, heavy, and difficult to work, to be in much favour. Out of nine sleepers laid down on the Mysore State Railway and taken up after 7 to 8 years, six were found good, two still serviceable, and only one bad. About 2,000 have been used on the Holkar and Nimach line. The bark yields a strong and valuable fibre. The leaves are given as fodder to cattle. It yields a gum."

Helicteres Isora. *Screw Plant.*

Vern.—*Bengali*, Antmora ; *Hindi*, Murorphali ; *Tamil*, Valambirikai ; *Telugu*, Gabadarra ; *Burmese*, Thugmay-chay.

A shrub, found in almost all parts of India and Burma. The singular-looking fruits of this plant, consisting of five capsules twisted closely in the shape of a screw, are made into a liniment for application on sores of the ear. They are also internally prescribed in colic, from an idea that the twisted capsules are supposed to resemble the convulsions of the intestines. The branches

yield a fibre suitable for the manufacture of coarse cordage and a kind of gunny bags.

Hibiscus Abelmoschus. *Musk Mallow.*

Syn.—Abelmoschus moschatus,

Vern.—*Sanskrit, Bengali,* Kasturi; *Hindi,* Mushkdana; *Dakhini,* Kala-kasturi; *Tamil,* Kastura-benda; *Telugu,* Karpura-benda; *Burmese,* Balu-waki.

An annual, found in the rainy season in many parts of India. The seeds, called *musk mallow* in English and *hub-ul-mushk* in Arabic, from its smell resembling a mixture of musk and amber, are used medicinally in chronic dyspepsia as a cordial and stomachic. They are also used as a scent to perfume powders and pomatums. The stalks yield a white, glossy fibre, which in Dr. Roxburgh's experiments broke with a weight of 107 lbs. In Bengal the plant grows wild, within enclosed orchards, under the shade of larger trees, and may probably be made to take the place of useless undergrowths, if a demand arises for the fibre and the seeds. The seeds deserve attention as a perfuming agent : they sell at Calcutta at 2½s. per pound.

Hibiscus cannabinus. *Hemp-leaved Hibiscus; Brown Hemp.*

Vern.—*Bengali,* Mesta-pat ; *Hindi,* San ; *Dakhini,* Ambari ; *Tamil,* Palungu ; *Telugu,* Ghongu-kurn.

Cultivated in the North-Western Provinces and Panjab for its fibre, of which ropes and cordage, sackcloth and paper are made. The plant also grows wild in the Kumaun hills. In the plains it is generally put on the edges of the fields in which other crops have been sown. *Hibiscus cannabinus* fibre is not so good as the fibre of *Crotolaria juncea,* but it is stronger, as proved in Dr. Royle's experiments, in which it broke with a weight of 190 lbs., while *san* broke with 150 lbs. The young leaves are eaten as pot-herb ; seeds are used as an external application on pains and bruises.

Hibiscus esculentus. *Okhro.*

Vern.—*Sanskrit,* Gandhamula ; *Bengali,* Dhenras ; *Hindi,* Bhindi ; *Tamil,* Vendi ; *Tulugu,* Benda.

A herbaceous annual, cultivated all over India for its fruit, which is eaten as a vegetable. The mucilage from the fruits and

seeds is used medicinally as a demulcent. The stems yield a good fibre, which, however, has not yet been much utilised. They are thrown away or burnt after the fruit has been removed. The fibre can probably be obtained cheaper than many fibres now in use, should a market be established for it. Major Drury, in his work on the "Useful Plants of India," states that the fibre is "strong and pliant, and well suited for the manufacture of ropes, string, gunny bags, and paper. A bundle of them tested by Dr. Roxburgh bore a weight of 79 lbs. when dry and 95 lbs. when wet."

Hibiscus ficulneus.

Vern.—*Bengali*, Ban-dhenras; *Tamil*, Parupu benda, Nella benda.

Dr. Balfour states that "it grows abundantly in the black cotton soils of India, and the bark contains a large proportion of white reticulated fibre similar to that obtained from the mulberry, and useful for gunny bags and paper."

Hibiscus mutabilis.

Vern.—*Bengali*, Sthalpadma ; *Hindi*, Gul-i-ajail.

Cultivated in gardens for its flowers, which are given as an offering to gods. The stems yield a fibre, of which the inner layer is soft and silky.

Hibiscus rosa-sinensis. *Shoe-flower.*

Vern.—*Bengali*, jaba ; *Dakhini*, jasut ; *Tamil*, Shappattup-pu ; *Telugu* Java-pushpamu.

Cultivated in gardens for its red flowers, which are given as an offering to the Goddess of Energy. In medicine the flowers are considered emollient, and an infusion of the petals is given as a demulcent. The flowers also yield a red dye, and may be used to polish boots and shoes. The stems yield a fibre, of which the inner layer is soft and silky.

Hibiscus Sabdariffa. *Roselle ; Red Sorrel.*

Vern.—*Bengali*, Mesta ; *Dakhini*, Lal-anbara ; *Tamil*, Sivappukashurukkai ; *Telugu*, Erra-gom-kaya ; *Burmese*, Them-ban-khien boung.

Cultivated in gardens for the calyces, which are acid in taste, and are made into an excellent jelly. The stems contain a good silky fibre. The leaves are used as greens.

Hibiscus tiliaceus.

Syn.—Paritium tiliaceum.

Vern.—*Bengali*, Bola, Chelwa ; *Burmese*, Thengben.

Common in the Sundarbans and the river-banks of Burma. The fibre of the inner bark is made into cordage. The bark is used in medicine.

Maranta arundinacea. *Arrowroot.*

A native of the West Indies, now acclimatised in India. It produces the best kind of arrowroot. A sample of arrowroot grown by Messrs. Speed & Co. at Alipur, near Calcutta, was sent to the Amsterdam Exhibition.

Maranta dichotoma.

Vern.—*Bengali*, Pati ; *Burmese*, Then.

Grows in Eastern Bengal, Assam, the Coromandel Coast, and Burma. The stems are split and made into very smooth mats, which, owing to their coolness, are largely used in the hot weather for sleeping on. Some of the finest ones cost about £5 each.

Marsdenia Roylei.

Vern.—*Hindi*, Murkula.

A large knotty creeper of the outer ranges of the Himalayas. The plant is cut in the knots and boiled in alkaline ashes to loosen the outer bark, which when taken out, discloses a fibre inside, of which fishing-nets and ropes of great strength are made. It is also suitable for the manufacture of textile fabrics.

Musa paradisiaca. *The Plantain,* and **M. sapientum,** *The Banana.*

Vern.—*Sanskrit*, Kadali ; *Bengali*, Kala ; *Hindi*, Kela ; *Tamil*, Vashaippazham.

Extensively cultivated throughout India, but especially at the chief seaboards. The fruit of the former is eaten fresh, of the latter generally cooked in curries. There are many varieties of each differing in size and flavour. Plantains do not seem

to be exported from India, although they might easily enough be taken, the fruit being cut before it ripens. The flowers are eaten as a vegetable. A beautiful fibre can be obtained from the stems, inferior, however, to the Manilla hemp (*Musa textilis*) in the manufacture of rope and cordage; but it can be used for paper-making, for which the leaves are also suited. The plant fruits only once, after which it is cut down and either used as a fodder or thrown away. A black dye is obtained from the rind of the unripe fruit of some varieties. An alkaline ash is obtained by burning the dried leaves and leaf-stalks, which can be used for washing clothes instead of fuller's earth. The flower is considered cool and astringent, very useful in diabetes. The root is a valuable fodder.

Musa textilis. *Manilla Hemp.*

A native of the Philippine islands, now thoroughly acclimatised in the Madras Presidency. The Indian produce, however, has not as yet become an article of commerce. Dr. Royle states that "among the various substitutes for hemp, few have hitherto attracted more attention than Manilla hemp, and this from the elegance of its appearance, combined with the power of bearing great strains, as well as from being very durable, lighter, and also cheaper than Russian Hemp."

Ocymum pilosum.

A paper material has been discovered by Mr. Bowstend of Haripur Factory, in the Bhagalpur district of Bengal, under the vernacular name *Marua*. Mr. Bowstend gives the following description of the article :—

"It grows all over Behar in the rainy weather, yields a seed-grain of a dark-brown colour, which the poor native labourers make into flour and bake into cakes for food. Each plant has three or four stems averaging about two feet in length, to each of which the fibre bearing leaves adheres. These, after the plant is sufficiently retted, are pulled off by the hand, washed and dried. If ravelling, the stuff is of no consequence, then it may be beaten on the ground with sticks to separate, from the parchment-like tissue, *the fibre threads;* but should uniform straightness be

necessary, this last process must be avoided and machinery of some sort adopted for the purpose. It makes a very good strong twine also, fit for the common purposes of house-thatching, for tying, and would probably sell for such at Rs. 5 per maund. The jute twine ordinarily sells for Rs. 6 or 7."

The manager of the Bally Paper Mills has spoken of it as a "good coloured straw or grass ; seems good material and worthy of a trial."

Opuntia Dillenii. *Prickly Pear.*

Vern.—*Bengali*, Pheni-mansa ; *Dakhini*, Chappel send ; *Tamil*. Nagadali.

The prickly pear is largely found in Rajputana and in the Madras Presidency. Laage areas of land in Madras have been rendered unfit for cultivation by being covered with this plant. A coarse fibre is obtained from it, which is suitable for the manufacture of paper. In many places the cochineal insect is found on the prickly pear, but no attempt has been made to cultivate it systematically, although it is believed that the industry has much chance of success in India.

Phoenix sylvestris. *Wild Date Palm.*

Vern.—*Bengali*, *Hindi*, Khejur ; *Dakkini*, Sendi ; *Tamil*, Itsham-pen ; *Telugu*, Ita-chettu.

This species of date palm is cultivated largely in Bengal for its juice, which is obtained by notching the head of the tree. Date sugar is obtained by boiling down the juice and causing the moisture to evaporate. The chief seat of date sugar manufacture is the presidency districts of 24 Parganas, Nadiya, and Jessor. An intoxicating toddy is also made by causing the juice to ferment, which is largely consumed by the poorer classes in Bengal and Behar. The fruit of *P. sylvestris* has a larger stone and less of that sweet pulp which makes *P. dactylifera* such a valuable article of food in Arabia and Egypt. It, however, forms the staple food in some of the desert districts of the Panjab, and is known by different names, according to the method by which it is preserved, split, dried, boiled in oil, &c.

The fruits of *P. dactylifera* are imported from the Persian Gulf, of which three kinds are sold in the market,—(1)dried, called Chohara, used in medicine as a general tonic and a nourishing food ; (2) Ghara-khejur, the best kind of date, very sweet and considered a good diet for consumptive persons ; and (3) the glutinous mass called the Pindi-khejur, a cheap article. The farinaceous substance found in the head of *P. sylvestris* is edible, and is given as a delicate food to invalids. The leaves are woven into mats and baskets. The fibrous Petioles of the leaves are suitable for the manufacture of paper and cordage. The kernels of the fruit are used in medicine to relieve thirst. A gum called *huchmchil* is obtained from the palm.

Saccharum Munja. *Munj Grass.*

Vern.—*Hindi*, Munj, Sirki.

Munj grass is common in North India. Strong ropes and strings are made from the sheathing leaves of the culms, which are first softened by beating with a mallet. Munj rope is used in rigging boats, for the bottom of cots and chairs, and in the manufacture of mats. This grass is a good paper material ; large quantities of it are used for this purpose at the Upper India Paper-mill at Lucknow and at the Bally Mills near Calcutta. The upper half of the culm known as *sirki*, which is not suitable for fibre in rope-making, is used in thatching houses.

Saccharum officinarum. *Sugar-cane.*

Vern.—*Sanskrit*, Ikshu ; *Bengali*, Akh ; *Hindi*, Ukh, Ganna ; *Tamil*, Kairamba ; *Telugu*, Sheruku.

Sugar-cane is extensively cultivated all over India. There are many varieties of it ; some are suitable for the extraction of sugar, while others are sucked raw. Sugar-cane is a paying crop, but its cultivation requires much care, heavy manuring, and frequent irrigation. The juice is obtained by grinding the cane, which, when boiled down, becomes unrefined sugar called

gúr. Unrefined sugar, when kept in a liquid state, is called *ráb*, but in many parts of the country it is generally made into cakes for convenience of transport. Sugar-cane stalks, out of which the juice has been extracted, and the leaves, are suitable for the manufacture of mats and paper, but at present they are used only as fuel.

Saccharum Sara.

Vern.—*Bengali*, Sar; *Hindi*, Sarpat; *Telugu*, Gundra.

Common in the plains. The fibre is inferior to munj. The reeds are used in matting, thatching, and to make chairs. The flower is used to stuff pillows and may be used as a paper material.

Saccharum spontaneum.

Vern.—*Bengali*, Kush; *Hindi*, Kans; *Telugu*, Rellu-gaddi.

Common in Bengal, the submontane tract of the Himalayas, and Bundelkhand. The roots of this grass go deep into the soil, and the grass cannot be easily eradicated if it once takes possession of the field. In this way large areas of land in Bundelkhand have been rendered uncultivable. The grass is used to make rope and mats and for thatching.

Sanseviera zeylanica. *Bowstring Hemp.*

Vern.—*Bengali*, Murvamúl, Marúl; *Hindi*, Murgabi; *Dakhini*, Múrgali; *Tamil*, Marúl; *Telugu*, Chaga.

A plant resembling the agave; grows in moist localities along the coast. A soft white fibre is obtained by scraping off the pulpy part from the leaves, which is firm, hair-like and silky, and, according to Dr. Royle, "may, from its fineness, combined with tenacity, be applied to a variety of purposes." In Dr. Wight's experiments a rope made of this fibre bore a weight of 316 lbs. It has been made into fine cloth and twine. But until some cheaper method is discovered for the extraction of the fibre from the leaves, there is no prospect of its ever becoming an article of commerce. The root is prescribed in the form of electuary in chronic coughs and consumption.

Sesbania aculeata.

Vern.—*Bengali*, Dhanicha ; *Tamil*, Erra-jilgua.

This hardy plant is found in Bengal and South India. The charcoal of the wood makes good gunpowder, and for that purpose it is largely cultivated in the neighbourhood of the Ichapur Gunpowder Factory in Bengal. A strong fibre is obtained from Dhanicha stalks, which is made into ropes and fishermen's nets, and it has been found to be very durable under water. At an experiment made in Fort William, a 3½-inch rope made of it broke with a weight of 75 cwts., the Government proof required of such rope being only 49 cwts. Dr. Royle was of opinion that this fibre should not remain neglected. Nothing has been done since Dr. Royle wrote his work on Indian Fibres.

Sesbania ægyptica.

Vern.—*Bengali, Hindi*, Jainti ; *Tamil*, Kurum-chembi ; *Telugu*, Suiminta ; *Burmese*, Yathagyi.

A small tree, found in almost all parts of India, and in some places used as a hedge plant. The charcoal of the wood makes good gunpowder ; leaves applied as a cataplasm to promote supuration or absorption of boils and abscesses ; seeds mixed with flour applied externally to itching of the skin, and are supposed to possess stimulant emmenagogue properties. The bark is made into a rough cordage.

Sida carpinifolia.

Syn.—S. acuta.

Vern.—*Bengali, Hindi*, Kareta ; *Tamil*, Vatta-tirippi ; *Telugu*, Chitimuti.

A small plant, found chiefly in Southern India. A good fibre is obtained from the stems. The root is bitter and mucilaginous, prescribed in intermittent and chronic diarrhœa. It promotes perspiration and increases the appetite, and may be substituted for more expensive bitters.

Sida cordifolia.

Vern.—*Bengali*, Berela, Bala ; *Hindi*, Bijband, Muttava.

A small weed, found in moist places. The mucilage of

the plant is prescribed for dysentery and fevers; the root is considered cooling, astringent, tonic; and given in disorders of the nervous system, urinary organs, and of the blood and bile; the seeds are regarded as cooling, used with rice as a demulcent in dysentery and special diseases. The plant yields a fine white fibre.

(7.) OILY SUBSTANCES OR OILSEEDS AND OTHER SUBSTANCES YIELDING OIL.

The following is a list of substances from which oil is obtained in India :—

Acorus calamus (Sweet Flag).
Adenanthera pavonina.
Adiantum cappilus veneris.
Albizzia Lebbeck (Siris Tree).
Aleurites moluccana (Candle nut).
Allium Cepa (Onion).
Allium sativum (Garlic).
Alnus nepalensis.
Amomum Cardamomum.
Amoora Rohituka.
Anacardium occidentale (Cashew nut).
Anamrita cocculus, (Cocculus Indicus.)
Anatherum muricatum.
Andropagon calamus aromaticus (Sweet calamus).
Andropagon citratus (Lemon Grass).
Andropagon nardus (Citronella).
Andropogon Schananthes (Geranium Grass).
Aquillaria Agallocha.
Arachis Hypogœa (Ground nut).
Argemone mexicana.
Argyreia speciosa (Elephant Creeper)
Artemisia vulgaris (Worm wood).
Atlantia monophylla (Wild Lime).
Balanites Roxburghii.
Baliospermum montanum.
Balsamodendron Roxburghii.
Bassia butyracea (Indian butter tree).
Bassia latifolia (Mahua tree).
Bassia longifolia,
Bauhinia acuminata.
Bauhinia tomentosa.
Bauhinia variegata.
Benincasa cerifera (Pumpkin or white melon).
Berberis aristata.
Berberis Lycium.
Betula alba.
Bombax malabaricum (Cotton tree).
Brassica alba (While mustard).
Brassica campestris (Colza, Swedish Turnip and sarson).
Brassica juncea (Rye or Indian mustard).
Brassica nigra (Black or True mustard).
Bryonia callosa.
Buchanania latifolia.
Butea frondosa.
Cæsalpinia Bonducella (Fever Nut).
Cæsalpinia digyna.
Calendula officinalis.
Callophyllum inophyllum (Alexandrian Lansel).
Calophyllum tomentosa.
Calophyllum Walkeri.
Calophyllum Wightianum.
Camellia theifera.
Cananya odorata.
Canarium commune (Java Almond).
Cannabis sativa (Hemp).
Carthamus tinctorius.
Carum Carui (Caraway seed).
Carum copticum (True Bishops weed ; Lovage).
Caryophyllus aromaticus (Cloves).
Cedrus deodara (Deodar, Himalayan Cedar).
Celastrus paniculatus.
Celastrus senegalensis.
Cerbera Odollam.
Cinnamomum zeylanicum (True Cinnamon).
Citrullus Colocynthis.
Citrullus vulgaris (Water melon).
Citrus medica (Citron).
Cleome viscosa (Wild Mustard).
Cnicus arvensis.
Cochlospermum Gossypium.
Cocos Nucifera (Cocoanut Tree).
Colchicum illyricum.
Connarus nitidus.
Connarus speciosus.
Coriandrum sativum (Coriander)
Cornus sanguinea.
Cornus macrophylla.
Corylus colurna (Indian Hazel nut).
Costus Speciosus.
Croton oblongifolius.
Croton Pavana.
Croton Tiglium (Purging Croton).
Cucumis melo (Sweet melon).
Cucumis momordica.
Cucumis sativus (Cucumber).

Cucumis utilissimus.
Cucurbita maxima (Gourd).
Cucurbita Moschata (Musk melon).
Cucurbita Pepo (White Gourd).
Cuminum Cyminum.
Cydonia vulgaris (Quince).
Cynometra cauliflora.
Cynometra ramiflora.
Cyperus rotundus.
Dalbergia lanceolaria.
Dalbergia latifolia. (Black wood or Rose wood of Southern India.)
Dalbergia Sissoo. (Sissoo.)
Daucus Carota. (Carrot.)
Dichopsis elliptica.
Diospyrus Embryopteris.
Dipterocarpus lævis.
Dipterocarpus turbinatus.
Dipterocarpus zeylanicus.
Dorema Ammoniacum. (Eastern Giant Fennel.)
Dryobalanops Camphora.
Elettaria Cardamomum. (Lesser Cardamon).
Entada scandens.
Eriodendron anfractuosum. (White cotton tree).
Eruca sativa.
Erythroxylon monogynum.
Euphorbia dracunculoide.
Excæcaria sebifera (Chinese Tallow Tree.)
Feronia Elephantum.
Ferula Narthex.
Flacourtia Cataphracta.
Fœniculum vulgare. (Common Fennel.)
Garcinia indica, (Cocum or Kokum Butter.)
Garcinia morella. (Gamboge Tree.)
Givotia rottleriformis.
Gossypium herbaceum. (Cotton.)
Guizotia oleifera. (Niger seed and oil.)
Gynocardia odorata. (Chal mugra oil.)
Helianthus annus. (Sun flower.)
Heritiera littoralis.
Hibiscus cannabinus.
Hibiscus ficulneas.
Hibiscus Sabdariffa. (Rosselle.)
Holarrhena antidysenterica.
Hura crepitans. (Sandbox Tree.)
Hydnocarpus Wightiana.
Hyoscyamus niger.
Illicium anisatum. (The Sacred Star Anise of China and Japan.)
Impatiens racemosa.
Impatiens Roylei.
Impatiens sulcata.
Impatiens Edgeworthii.
Indigofera aspalathoides.
Indigofera Tinctoria (Indigo).
Jasminum grandiflorum (Spanish Jasmine).
Jasminum officinale.
Jasminum Sambac (Arabian Jasmine).
Jatropha curcas (Physic nut).
Jatropha glandulifera.
Jatropha mulifida (Coral plant).
Juglans regia (Walnut).
Kokoona zeylanica.
Lactuca Scariola.
Lagenaria vulgaris (Bottle Gourd).
Lawsonia alba (Henna Plant).
Lepidium sativum (Garden cress).
Linum strictum.
Linum usitatissimum (Linseed).
Litsæa consimiles.
Litsæa zeylanica.
Leucus cephulotes.
Luffa acutangula.
Luffa ægyptiaca.
Mallotus philippinensis.
Mangifera indica.
Matricaria chamomila (Chamomile).
Melia Azadirachta (Nim Tree).
Melia Azedarach (Bastard Cedar or Bead Tree).
Mentha sativa.
Mentha viridis.
Mesua ferrea.
Michelia Champaca.
Mimusops Elengi.
Mimusops indica.
Mimusops Kauki.
Moringa pterygosperma (Horse Radish Tree).
Murraya Kœnigii.
Myristica malabarica.
Myristica moschata (Nutmeg).
Myrtus communis (Myrtle).
Nardostachys Jatamansi (Spikenard).
Nerium odorum (Sweetly-scented Oleander).
Nicotiana Tabacum (Tobacco).
Nigella sativa (Black Cumminseed).
Nyctanthes Arbor-tristis.

Ocimum Basilicum (Common Basil).
Ocimum gratissimum.
Ocimum adescendens.
Ocimum Sanctum.
Olea europæa (Olive).
Olea ferruginea.
Pandanus odoratissimus.
Papaver somniferum (Poppy ; opium).
Peucedanum graveolens.
Pimpinella Anisum (Anise seed).
Pinus excelsa.
Pinus Gerardiana.
Pinus longifolia.
Piper cubeba (Cubeb pepper).
Piper nigrum (Black pepper).
Pistacia lentiscus.
Pistacia vera (Pistachio nut).
Pithecolobium dulce.
Pogostemon Patchouli (Patchouli).
Polyanthes tuberosa.
Polygonum bistorta.
Pongamia glabra.
Prinsepia utilis.
Prunus amygdalus (Almond).
Prunus armeniaca (Apricot).
Prunus communis (Plum).
Prunus persica (Peach).
Psoralea corylifolia.
Pterocarpus Marsupium.
Putranjiva Roxburghii.
Raphanus sativus (Radish).
Rhus semialata.
Rhus Wallichii.
Ricinus communis (Castor oil Plant.)
Rosa Alba.
Salix capensis.
Salvadora oleoides.
Salvadora persica (Tooth-brush Tree.)
Samadara indica.
Santalum album (Sandal wood).
Sapindus detergens (Soap-nut of North India).
Sapindus trifoliatus (Soap-nut Tree of South India).
Sarcostigma Kleinii.
Schleichera trijuga.
Semecarpus anacardium (Marking-nut Tree).
Sesamum indicum (Gingelly or Sesame oil).
Shorea robusta.
Smilax China.
Spinacia oleracea.
Sterculia fœtida.
Strychnos Nux-vomica.
Styrax benzoin
Symplocos cratægoides.
Tabernæmontana dichotoma.
Tamarindus indica (Tamarind).
Tectona grandis (Teak Tree).
Terminalia belerica.
Terminalia Catappa (Indian Almond).
Terminalia Chebula.
Tetranthera laurifolia.
Tetranthera monopetala.
Thespesia populnea (Portia Tree or Tulip Tree).
Thevetia neriifolia (Exile oil.)
Trigonella Fœnum græcum.
Ulmus integrifolia.
Vateria indica (Piney varnish or Indian Copal Tree).
Varonia anthelmintica.
Viburnum coriacum.
Viola serpens.
Vitex trifolia.
Wormia triquetra.
Wrightia tomentosa.
Xanthium strumarium.
Xylia dolabriformis (Iron wood Tree of Pegu and Aracan.)

The most important ones are described below :—

Aleurites moluccana. *Belgaum Walnut.*

Syn.—A. Triloba.

Vern.—*Bengali, Hindi,* Akhrot.

An interesting plant, said to be native of the Society Islands, now introduced into India, in Bengal, Assam, and

South India. The nuts are edible, resembling the English walnut in taste ; a useful oil, known in South India and Ceylon as the *kekuná* oil, is easily extracted from the kernels ; the cakes after the expression of the oil can be used as cattle-food or as manure.

Arachis hypogæa. *Earth-nut*, *Ground-nut*, or *Pea-nut*.

Vern.—*Sanskrit*, Buchanaka ; *Bengali*, Mata-kalai, chiner-badam ; *Hindi*, Mungphali ; *Dakhini*, Vilayati-mung ; *Tamil*, Verkadalsi ; *Telugu*, Veru-sanaga-kaya ; *Burmese*, Mai-bai.

An annual, a native of South America, now extensively cultivated in South India and some parts of Bengal and Upper India. The fruit of this plant, instead of ripening above ground, buries itself below the surface. When parched, it tastes like sweet almond, and is considered a valuable food in many parts of Asia, Africa, and America. It is also made into sweetmeats in certain parts of India. But the most valuable produce of the plant is the oil, obtained by expression from the seeds. It tastes like the olive oil, for which it is often substituted in pharmacy. It has a specific gravity of about 0·918, becomes turbid at 3°, concretes at 3° to 4°, and hardens at 7°. It is chiefly used for burning in lamps, and in the manufacture of soap. Large quantities of the oil are annually exported from the Madras Presidency.

Argemone mexicana. *Mexican Argemone*, *Gamboge Thistle*, *Jamaica Yellow Thistle*, or *Mexican Poppy*.

Vern.- *Sanskrit*, Brahma,dandi ; *Bengali*, Shial-kanta ; *Hindi*, Bherband ; Dakhini, Pila-dhutura ; *Tamil*, Brahma-danduvirai ; *Telugu*, Brahma-dandi-vittulu.

A herbaceous annual, native of Jamaica, the Caribee Islands, and Mexico, brought to India about three centuries ago, now grows spontaneously on waste lands at the beginning of the cold season. The whole plant abounds in a yellow juice, which, when dry, resembles gamboge, and is prescribed in

dropsy, jaundice, and cutaneous affections. Externally it is applied to ophthalmia, but is considered a dangerous remedy. The seeds are narcotic; used in the West Indies as a substitute for Ipecacuanha. A pale-yellow, clear, limpid oil is obtained from the seeds, which is used for burning in lamps, and given medicinally in ulcers and eruptions. Price of seeds, 2½*d.* per lb,

Bassia butyracea. *The Indian Butter Tree.*

Vern.—*Hindi*, Phulwa, Chiura.

A tree, 30 to 40 feet; native of Kumaun and Nepal. The honey produced by bees feeding on the flowers of this tree is considered the best honey in Kumaun. A vegetable butter, of a delicate white colour, and resembling fine lard, is obtained by expression from the seeds, which melts at 120° Fr. It is used as a lubricant in rheumatism, and as a cold cream and lip salve. The cakes left after the expression of the oil and the sweet insipid pulp of the fruit are edible. The seeds also contain a large proportion of saccharine matter from which sugar is manufactured in Kumaun.

Bassia latifolia. *Mahua Tree.*

Vern.—*Sanskrit*, Madhuka; *Bengali*, *Hindi*, Mahua; *Tamil*, Kat elupei; *Telugu*, Ipi.

A large tree, 40 feet; found in the forests of Western Bengal and Central India, also cultivated in the North-Western Provinces and Oudh. The tree is very valuable on account of its flowers, which, preserved by drying, form an article of food to the poorer classes, especially of the wild tribes inhabiting the forests of Central India. The flowers are sweet, but, owing to a very strong smell, are not relished except by those accustomed to their use. A first-class tree often yields more than 20 cwts. of flower. An ardent spirit is manufactured from them, which is largely consumed by those classes of the people who have no caste objection to the use of spirituous liquors. The Mahua flowers should attract the attention of European

spirit manufacturers. Major Drury states that the Mahua spirit, if carefully distilled, resembles good Irish whisky in taste. An oil is obtained by expression from the seeds which is used for burning in lamps, as well as for adulterating *ghi* (clarified butter). It is also suitable for the manufacture of soap. Medicinally, a decoction of the flowers is given in coughs; the spirit used as a stimulant; the kernels as a demulcent; and the oil applied externally as an emollient. The wood is strong and was tried as railway sleepers in the Central Provinces.

Bassia longifolia. *Wild Sapota Tree.*

Vern.—*Tamil*, Illuppai; *Telugu*, Ippa; Burmese, Kan-zan.

A species of the above tree, found in Southern India. The flowers of this species are more fleshy, and are eaten as food after being roasted, as well as the skins of the fruit, boiled to the consistency of jelly. The oil obtained from the seeds is used as a lamp oil, in the manufacture of country soap, and as a substitute for *ghi* (clarified butter) and cocoanut oil in cooking curries and making sweet-cakes. Dr. Balfour states that the seeds contain about 30 per cent of oil, which is of a bright yellow colour, and that it may form an important article of export, as it makes good candles and soap. Medicinally, a decoction of the bark, the leaves, and the green fruit is employed as an astringent and emollient, and also in the cure of itch and rheumatic affections; the oil is applied externally for skin diseases. The cakes left after the expression of the oil are used in washing the head, for which purpose they are exported to places where the tree does not grow.

Brassica campestris. (Sinapis) *Mustard*

Var.—Dichotoma *Roxb.*, The Black Mustard. Vern.—Kalli sarson.

Var.—Glauca, *Roxb.*, Rapeseed or yellow Mustard. Vern.—Pila sarson.

Var.—Glauca, *Royle.* Vern.—Lâhi Tarra or Torria, of Northern India.

The seeds of this species are perhaps the most important of all the Indian oil-seeds. They afford the oil with which the people cook their vegetables and fish, and which they burn in

their lamp. The oil-cake is a very nourishing fodder and valuable manure chiefly used for sugar-cane and potato. The seeds of the first two varieties are used as a spice, and also as a medicine.

Brassica juncea.

Vern.—Rai.

There are several varieties, some of which are cultivated for their leaves, used as a vegetable, and others for the seeds from which oil is expressed.

Brassica nigra.

Vern.—Rai.

The seeds of this plant are chiefly used in medicine as poultices. The oil expressed from them is also used medicinally.

Buchanania latifolia. *Caddapah Almond.*

Vern.—*Sanskrit*, Piyala ; *Bengali*, Piyal ; *Hindi*, Chiraunji ; *Dakhini*, Char ; *Tamil*, Kat manga ; *Telugu*, Charapuppu ; *Burmese*, Csu-lwon.

A moderate-sized tree, about 30 or 40 feet high, found in the forests all over India. The fruit is edible, has a sweetish subacid taste, and is an important article of food to the aboriginal tribes of Central India. The kernel is largely used in confectionery, and is also eaten roasted and mixed with milk. It yields a fine straw-coloured oil, which is, however, seldom extracted. The bark is used for tanning. The tree yields a gum, sometimes used in medicine as a specific for diarrhœa. The seeds are also used in medicine.

Cedrus Deodara. *Deodar ; Himalayan Cedar.*

Vern.—*Bengali, Hindi*, Deodar.

A large tree, found in the Western Himalayas and Afghanistan. The aromatic wood is used medicinally as a carminative, diaphoretic, and diuretic. A dark, strong-smelling oil, of powerful antiseptic properties is obtained from the wood and a tar is obtained from it by destructive distillation which is considered a remedy for ulcers. The wood is also burnt as an incense. The timber is the most durable of all Himalayan Conifers.

Cocos nucifera. *Cocoanut Palm.*

Vern.—*Bengali*, Narikel; *Hindi*, Nariyal; *Tamil*, Tenna; *Telugu*, Nari-kadam *Burmese*, Ong.

The cocoanut is one of the most valuable plants of the sea-coasts of India, Burma, and the tropical islands. All human wants can probably be supplied by this single tree. The albumen is a nutritious food; the water inside the unripe fruit is an excellent beverage; the oil extracted from the dried albumen is used for culinary purposes and for burning in lamps; the oil-cake is an excellent manure; the sweet juice extracted from the flowering spikes is made into palm-wine and toddy, and from which a coarse sugar is also produced; the wood is used for making the frame work of houses, posts, rafters, fences, shears, lathes, shingles, chairs &c.; the leaves for thatching; the leaf-stems used as fuel; the shells made into hukkas, drinking vessels, pitchers, spoons, lamps, &c.; the thick fibre surrounding the fruit is the coir fibre of which strong ropes and mats are made;—in short the uses to which the cocoanut palm may be put are innumerable. Medicinally the green fruit is given as a refrigerent; the flowers as an astringent; the oil is an excellent substitute for cod-liver oil. As a valuable hair tonic, it is extensively used by the women in Bengal.

Eruca sativa.

Vern.—*Hindi*, Dua.

Cultivated all over the North-Western Provinces for its seeds which resemble mustard; the oil expressed from them is less pungent. The green plant is used as fodder.

Excœcaria sebifera. *The Chinese Tallow Tree.*

Vern.—*Bengali*, Mom-china.

A moderate-sized tree, originally native of China and Japan now introduced into India. Mr. Gamble states:—

"The white pulp round the seeds gives the Chinese tallow which is separated by boiling in water. It is used in China and Japan for candles. Roxburgh says it is bad for burning, that it only remains firm at a cool

temperature, and that it easily becomes rancid. It melts at 104°. The seeds give an oil, the leaves a black dye."

Guizotia oleifera. *Niger seed.*

Vern.—*Bengali, Hindi,* Sirguja, Ram till ; *Tamil,* Uchilia ; *Telugu,* Ulisi.

Cultivated in Bengal chiefly in the hilly districts for seeds which yield a sweet oil resembling sesamum oil. Its commercial name is Niger seed.

Jatropha Curcas. *The Physic Nut.*

Vern.—*Bengali,* Bagbheranda ; *Tamil,* Kat-amunak ; *Telugu,* Nepalam ; *Burmese,* Thinhan-kyeksu.

A soft-wooded evergreen plant indigenous to America, cultivated in India chiefly as a hedge plant. The juice of the plant forms a lather, like soap, which is applied to ulcers. The seeds yield an oil used for burning also in medicine as a purgative and emetic. *See* also Onosma echioides.

Juglans regia. *Walnut.*

Vern.—*Persian,* Charmaghz; *Hindi,* Akhrot.

A large tree, wild in the Himalayas, and also cultivated largely in Afghanistan and Kashmir. The fruit of the wild tree has a small kernel, which is rarely eaten ; that of the cultivated varieties is largely exported to the plains. A clear oil is extracted from the fruit, which is used for culinary purposes, as well as for burning in lamps. The bark is used as a dye and as an astringent medicine, and is largely exported to the plains. Women use it as toothsticks, and it is said to prevent tartar and to give a red colour to the lips. The rind of the fruit is also used in dyeing and tanning, and the tender branches and leaves are given to cattle as fodder. The wood is very valuable, and is largely used in furniture work.

Linum usitatissimum. *Linseed ; Elax.*

Vern.—Bengali, Tisi, Masina; Hindi, Alsi; Tamil, Alsi-virai; Telugu, Atasi.

Linseed is largely cultivated in Bengal and the North-West Provinces. It is one of the most important of the oil-seeds of India. The chemical composition of the seeds has been found

to be, in one hundred parts, mucilage 15·12, chiefly in the seed-coat; 11·26 fatty oil in the nucleus; emulsion 44·38 in the husk; besides a small proportion of wax, starch, resin, &c.

The varieties known in commerce are small and bold. The seeds are also distinguished for their colour,—brown, white, and red. The oil is obtained by expression, and is either cold-drawn, or subjected to a heat of 200° ; when cold-drawn, the colour is greenish and more viscid than when hot-drawn. It is used as a drying oil in the manufacture of paints, varnishes, printing ink, &c. The exports of linseed during the five years ending 1880-81 were as follow:—

	Quantity. Cwt.	Value. £
1876-77	5,614,617	3,015,437
1877-78	7,198,918	4,224,429
1878-79	3,503,795	2,189,211
1879-80	3,105,058	2,030,602
1880-81	5,997,172	3,698,126

In medicine linseed is used for poultices, and also taken internally in bronchial affections, diarrhœa, dysentery, visceral inflammation, and special diseases. As the plant is cultivated for seed, and not sown close to make the stems grow straight and without branchlets, the fibre produced is of a very inferior quality; and, indeed very little fibre is extracted, the stalks being burnt as fuel. It may be utilised for paper-making.

Pinus excelsa.

Vern.—*Panjabi*, Chir; *Hindi*, Raisalla, Kali.

A large tree, found in the Himalayas. The wood is more durable than *P. longifolia*, and is used for house-building, shingles, water-channels, and agricultural implements. It is very resinous and contains turpentine, but is not usually extracted. The tar produced by this tree is said to be equal to the best Swedish, and is used for protecting wood-work.

Pinus longifolia. *Long-leaved Pine.*

Vern.—*Bengali*, Gandhbiroza; *Hindi*, Chir.

A large tree, found in Afghanistan and the outer North-Western Himalayas. The tree yields large quantities of resin

called *gandhbiroza*. Dr. Brandis states :—

"The yield of an ordinary tree is 10 to 20 lbs. of resin the first, and about one-third the quantity the second, year, after which the tree either dies or is blown down."

Mr. Atkinson says :—

"The long-leaved pine is the principal source of the oleo-resin known as *birja* in Gurhwal and *lisha* or *lassa* in Kali-Kumaun, and of the oil called *birja-ka-tel* or *tarpin-ka-tel*. There are two kinds of resin,—(1) the *birja* or *berja* sort, which comprises the tears exuding naturally from the bark ; and (2) the *bakhar-birja*, or resin produced by making long and deep incisions in the sap-wood. The latter is chiefly used by bangle-makers."

Tar is extracted from the resin, and turpentine oil is distilled from the tar. The resin *gandhbiroza* and the tar are used in medicine as a stimulant diuretic in diseases of the urinary organs, chronic bronchitis, hœmorrhages, and also in rheumatism and fevers. The bark, which is of great thickness, is used in tanning ; the charcoal of the leaves, mixed with rice-water, is used as ink. The wood is largely used for building purposes in the Simla and Naini Tal hill sanitaria, but is not durable. The fruit, called *syuta*, is edible.

Pistacia vera. *Pistachio Nut.*

Vern.—*Bengali, Hindi*, Pistá.

Pistachio nuts are brought to India by the Kabul traders. They smell very much of assafœtida, being brought along with that substance. The nuts are considered very nourishing and are eaten raw, parched, or made into confection. In medicine, pistachio is considered a warm, moist remedy, used in general debility. An oil is extracted from the kernels, which acts as a demulcent and restorative. The bark is employed as a tonic in indigestion. Dr. Balfour states that the galls found on the tree, known as *Gul-i-pista*, *Bazghanj*, or *Bozaganj*, are used as a dye for silk, and as an astringent in medicine.

Pongamia glabra.

Vern.—*Bengali*, Dal-karanja ; *Hindi*, Karanj ; *Tamil*, Ponga ; *Telugu*, Kanga.

A moderate-sized tree, found in the Sub-Himalayan regions

Bengal, Burma, Central and South India. The seeds yield a thick brown oil used for burning, and as an application for cutaneous affections and rheumatism. The seeds are also used as a remedy for skin diseases.

Prunus Amygdalus. *Almond.*

Syn.—Amygdalus communis.

Vern.—*Sanskrit*, Inghurdi ; *Persian, Bengali, Hindi*, Badam ; *Tamil*, Parsivadam ; *Telugu*, Parsi badam ; *Burmese*, Badamsi.

The almond tree is a native of Western Asia, but has now become naturalised in the Mediterranean countries of Europe and Africa. It is cultivated in Afghanistan, Kashmir, and the Panjab, but in the plains of India the fruit does not ripen. The following description of the various uses to which almond is put is taken from Mr. Murray's "Plants and Drugs of Sind" :—

"In India it does not appear to be much used in native medical practice. The Arabians and Persians, according to Ainslie, place blanched almonds (sweet) amongst their aphrodisiacs, and bitter almonds as lithontriptic. The varieties are not distinguished from each other by any particular difference, save the taste of the kernels, and both are said to be sometimes obtained from the same tree. The best sweet almonds are those called Jordan almonds which are imported into England from Malaga. There are also other varieties, *viz.*, Valentia, Italian, Portugal, and Oporto ; the bitter almonds come chiefly from Mogadore. Both bitter and sweet varieties are imported into India from the Persian Gulf.

"Sweet almonds are of greater use in food than in medicine, but are reckoned to afford little nourishment ; and, when eaten, are not easy of digestion, unless thoroughly comminuted. In pastry of all kinds, and sweetmeats, they form a very necessary ingredient as a flavouring article ; medicinally they are supposed, on account of their unctuous quality, to deaden acrimonious humours and to give relief in heart-burn ; six or eight peeled and eaten at a time answering the purpose. The true composition of the kernel was first made known by Boullay, who shows that it contains no starch, and that 100 parts are composed of fixed oil 54, emulsion or albumen 24, liquid sugar 6, lignin 4, pellicles 5, water 3·5, and acetic acid 0·5 ; so that, in fact, they are analogous to a concrete milk, and an emulsion may be considered as a vegetable milk. The principal constituent of the kernel, as will be seen above, is the oil, which is obtained from varieties by expression. That of the sweet almond is of a pale yellow, and very liquid,

of specific gravity 0·917 to 0·920—consisting of marghrine 24 and elaine 76 parts in 100. Its action and uses are laxative and emollient, and it may be employed for the same purposes as olive oil. As a laxative, it is mixed with an equal volume of syrup of violets and roses, and given to new-born infants. To assist in allaying troublesome coughs, it is not unfrequently used in the form of linctus, with confection of hips and syrup of poppies. It also forms the basis of many scented oils.

"Bitter almonds are poisonous, and have proved fatal to men, children, and small animals. They contain less fixed oil than the sweet, and a portion of prussic or hydrocyanic acid, upon which their narcotic properties depend. Though not officinal, the oil requires to be noticed, as it is sometimes used therapeutically and has been found of some service in intermittent fevers. It is a powerful poison. It is used like hydrocyanic acid, and sometimes for the same purposes."

Native physicians in Bengal and Upper India use the kernel in alterative medicines, and the oil is applied to the head in chronic chephalalgia, vertigo, and other disorders of the brain.

Mr. Baden-Powell, in his "Panjab Products," states that the bitter almonds are the fruits of *Amygdalus amara*.

Prunus armeniaca. *Common Apricot.*

Vern.—*Persian*, Khubani; *Hindi*, Zar alu, Khubani.

The apricot tree is a native of Kaghan, China, West of Asia, and the Himalayas, at an elevation from 7,000 to 13,000 feet. The produce is a common article of food in Kulu. An excellent oil, of a pale-yellow colour, is obtained by expression of the kernels. A considerable quantity of dried apricots are annually imported into India from Afghanistan. The tree yields a gum similar to gum arabic. The fruit is used in medicine as a warm remedy in coughs, skin diseases, flatulency, and putrid fevers.

Raphanus sativus. *Radish.*

Vern.—*Bengali*, Mula; *Hindi*, Muli.

Extensively cultivated in the plains. It is largely used for food in the North-Western Provinces, where the poor people eat it raw. It is also used as a vegetable. In the famine of 1878 radishes were a great help to the people. An oil is extracted

from the seeds, which is used for culinary puposes. In medicine the seeds and the root act as a diuretic and laxative.

Ricinus communis. *Castor seed.*

Vern.—*Bengali*, Reri; *Hindi*, Andi; *Dakhini* Yarandi; *Tamil*, Amanak-kaukottai; *Telugu*, Amudapu-vittulu.

Castor seed is one of the most important oil-seeds of India. It is largely cultivated in Behar and the North-Western Provinces, and is sown with other crops. There are three varieties distinguished from the colour of the seeds,—*viz.*, brown, black, and red. At the Calcutta market the castor seeds brought from Madras and Colgong in Upper Bengal have a good reputation. The seeds if cold-drawn yield about 25 per cent. of oil; if heated at the time of extraction they yield about 35 per cent. The cold-drawn oil is used in medicine as a purgative, and the latter oil for burning in lamps. The exports during the five years ending 1880-81 were as follows :—

				Quantity. Cwts.	Value. £
1876-77	—	...	...	529	239
1877-78	...	...	...	4,521	2,741
1878-79	...	...	...	74,214	50,605
1879-80	...	...	...	237,601	118,076
1880-81	...	...	...	76,461	43,385

Santalum album. *Sandal-wood.*

Vern.—*Bengali*, Chandan; *Hindi*, Sandal; *Tamil*, Shanda-na-kattai; *Telugu*, Gand-hapu, chekk; *Burmese*, Santaku.

A small evergreen tree, found in the dry regions of Southern India. The heart-wood is largely used in perfumery, the oil distilled from it being the basis of all ottos manufactured in the North-Western Provinces. Carved sandal-wood boxes and furniture made in Carnara, Surat, and Ahmadabad are much prized. A paste made by rubbing the wood on a stone with a little water is given as an offering to the gods, and in ancient times Hindus anointed their bodies with it. This paste is used as a local application in swellings, headache, and cutaneous eruptions. The oil is supposed to be a remedy for special

diseases. Mr. J. Deveria, of Manbhoom, says that, in his estate in that district, sandal trees were until recently common in the forests, but every one of them has been cut down, and he is now endeavouring to re-introduce it.

Sapindus detergens and trifoliatus. *The Soapnut Tree.*

Vern.—*Bengali*, Ritha ; *Tamil*, Ponnan-kotai ; *Telugu*, Kukudu-kayam.

S. trifolatus is a large tree, found in Bengal and South India, and *S. detergens* in North-West India. The fruits of both are brought to the market under the name of *Ritha*, and are largely used as a substitute for soap in washing silk and woollen cloths. An oil is obtained from the seeds. In medicine, the fruit is given internally in headache and epilepsy, and is also considered expectorant ; externally it is applied on pimples and abscesses. *See* also *Acacia Concinna.*

Sesamum indicum. *Til Seed ; Gingelly.*

Vern.—*Bengali, Hindi*, Til ; *Tamil*, Ellu ; *Telugu*, Nuvvula ; *Burmese*, Hnan.

Largly cultivated all over India for its produce, which is the Gingelly oil-seed of commerce. Two varieties are common, yielding black and white seeds. The seeds give by expression 40 to 44 per cent. of a pale straw-coloured sweet oil, which in India is largely used for culinary purposes, anointing thebodies, burning in lamps and in the preparation of medicinal oils. It is suitable for the manufacture of soap. The seeds are parched and used as food, and also employed in confectionery. They are considered a stimulating remedy, and applied externally on boils and rheumatic pains. The leaves are an effectual remedy for bowel complaints. The exports of Gingelly seed during the five years ending 1880-81 were as follows :—

	Quantity cwt.	Value £
1876-77	1,307,815	868,293
1877-78	158,802	848,226
1878-79	1,039,681	799,628
1879-80	1,670,185	1167,904
1880-81	1,107,008	1212,693

Terminalia Catappa. *The Indian Almond.*

Vern.—*Bengali, Hindi,* Bádám ; *Tamil,* Natvadam ; *Telugu,* Vadam.

A large deciduous tree, cultivated in parts of India and Burma for its nuts the kernel of which is eaten ; the bark and the leaves are astringent and mixed with iron salts yield a black pigment. The kernels give about 50 per cent. of an oil which may be snbstituted for almond oil. The Tassar silk-worm feeds on the leaves.

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