REPORT BY DR. M.C. COOKE, ON THE OIL SEEDS AND OILS IN THE INDIA MUSEUM, OR PRODUCED IN INDIA, PP. 2-85

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Trieste

REPORT

BY

DR. M. C. COOKE,

ON THE

OIL SEEDS AND OILS

IN THE INDIA MUSEUM,

OR

PRODUCED IN INDIA.

PREPARED UNDER THE DIRECTION OF THE REPORTER ON THE PRODUCTS OF INDIA.

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NOTE.

THE following Report has been prepared on the same plan as the previous one, "On the Gums, Resins, Oleo-resins, and Resinous Products in the India Museum, "or produced in India." It will be observed that notes and observations have been collected from various sources, in order that their accuracy may be tested, the native names verified, and further information obtained wherever that at present possessed may prove unsatisfactory. It only claims to be a digest of scattered and disconnected memoranda, brought together and compared, as far as possible, with the collection of seeds and oils in the India Museum, and is not presented as detailing the results of original research.

At first it was intended to include within its scope the volatile or distilled oils and Uttars for which India is so famous; but this was found to be a work of so intricate and extensive a character as necessarily to entail considerable delay in the issue of the Report; and therefore the present one has been confined exclusively to *expressed* or fatty oils, leaving for a future Report the volatile oils, which are in reality very different substances, with quite distinct functions.

No attempt has been made to embody statistics of production, of export, or of rates of prices, as these could only have been given for a few of the principal articles, while, unless they were carefully verified, they might prove of but doubtful value.

It will be observed that under each article enumerated the specimens in the India Museum are quoted. This course will enable its friends in India to perceive its deficiencies, and may lead them to render it good service by supplying the desiderata thus indicated.

Oils and oil seeds sent to this department for report should be forwarded in quantities sufficient for testing their qualities and uses. Unless this be attended to, no satisfactory report can be given. New and untried oils can hardly have a value assigned to them until their capabilities are approximately determined.

J. FORBES WATSON.

Department of the Reporter on the Products of India,
India Office, London, September 1876.

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may be brought with distilled water into the form of an emulsion. The potassa and soda soaps and the alkaline sulphurets have a similar effect, but not the bi-carbonates.

The fixed oils in their natural state consist of at least two distinct oleaginous ingredients, one liquid at ordinary temperatures, and the other concrete. The liquid is a distinct proximate principle called *olein*, the concrete consists of *stearin* or *palmitin*, the former being found most largely in animal, the latter in vegetable fats or oils, and the two not unfrequently existing together in the same oil. But several oils have peculiar constituents, differing in properties from either palmitin or stearin, and specially named according to the substance containing them, as *butyrin* in butter, &c.

It is sometimes desirable to deprive the fixed oils of colour. The following process is recommended by M. Brunner. The oil is first brought to a state of emulsion by strongly agitating it with water rendered mucilaginous by gum or starch; the emulsion is treated for each part of oil with two parts of wood charcoal, previously well heated and coarsely powdered, the finer particles being sifted out. The pasty mass is then completely dried at a heat not exceeding 212° F., and exhausted by cold ether in a percolator; finally the ethereal solution, having been allowed to stand in order that any charcoal present in it may subside, is submitted to distillation so as to separate the ether, and the oil remains colourless in the retort. (*Journ. de Pharm.*, 1858, p. 214.)

Some families of plants are much more oleaginous than others in the character of their seeds, and this fact may be kept in view when seeking new sources of oil. We may indicate the most important of these.

Palmaceæ.—Not only are the coco nut (*Cocos nucifera*) and the African palm (*Elais guineensis*) familiar examples, but species of *Attalea*, *Mauritia*, *Astrocaryum Ænocarpus*, &c., and many others have oleaginous seeds.

Compositæ.—This order contains some valuable oil seeds, as the safflower (*Carthamus tinctorius*), Niger seed (*Guizotia oleifera*), the Madia (*Madia sativa*), sunflower (*Helianthus*), and probably many others.

Cruciferæ, containing the numerous species of colza and mustard (*Brassica* and *Sinapis*), as well as radish, cameline (*Camelina sativa*), cress (*Lepidium sativum*), and others, has very oleaginous seeds though usually small.

Euphorbiaceæ.—This order has a large number of oleaginous seeds, such as the purging croton (*Croton tiglium*) and other species of *Croton*, castor-oil (*Ricinus communis*), several species of *Jatropha*, the candle nut (*Aleurites triloba*), the Kamala (*Mallotus Philippinensis*), and others.

Leguminosæ contains some oleaginous seeds, such as *Pongamia glabra*, the ground nut (*Arachis hypogæa*), &c., but the number is small and insignificant as compared with the immense number of species which the order includes.

Meliaceæ.—This order includes the Nim (*Azadirachta Indica*), the Carapa (*Carapa guyanensis*), and other species.

Clusiaceæ contains the cocum butter (*Garcinia Indica*), the Nagkesur (*Mesua ferrea*), several species of *Calophyllum*, and some others.

Sapotaceæ is rich in oil-yielding plants, the most important of which are the species of *Bassia*, *Lucuma*, *Mimusops*, &c.

Cucurbitaceæ.—Many of the species afford oil, but none have yet attained commercial importance.

Other genera might be enumerated which contain one or two oil-yielding plants of considerable importance, such as the *Papaveraceæ*, including the poppy, the *Linaceæ*, to which linseed belongs, the *Pedaliaceæ*, including the gingelly or sesame plant, and others of a similar character. Undoubtedly a very large number of vegetable seeds contain oil, the question at issue being simply whether the seeds could be obtained in sufficient quantity, or the extraction rendered remunerative.

Many years since the manager of a large establishment in London sent out instructions as to the most practical method of testing seeds for oil, and although these instructions have been widely circulated, they may be introduced here, especially as they have not been superseded.

It must be remembered that these remarks were made in 1853, and that all references to prices were made with regard to the condition of the market at that period:—

"Every oil or grease, whether solid or liquid, if not poisonous or acrid, like croton oil, or viscid and gummy, like castor oil, or drying, like linseed oil, must be worth in London at least 30*l.* a ton. Among greases, solid at above 60° Fahrenheit, the higher the melting point (other things equal) the greater the value. For example, the

vegetable tallow of Borneo melting at about 90° Fahrenheit, is worth at least 5*l.* a ton more than the cocoa-nut oil of Ceylon melting at 70°. The effect of the soap duty having been taken off, may probably, before long, materially change the relative values of greases; but at present liquid oils, like the ground nut (*Arachis hypogea*), are worth more than soft solid oils, like the Bassia butter of India, as they require less manufacturing to fit them for use, the liquid oils, after a simple treatment in a cheap apparatus, being fit for burning in lamps, while the soft solid oils, being neither hard enough for use in candles or liquid enough for use in lamps, require to go through a press before they are saleable, except for soap making. Greases may have particular advantages, such as being little acted upon by the air, and therefore not easily becoming rancid, good qualities, which can only be ascertained by experiments; which your correspondents had perhaps better leave to us.

"Since I last had the pleasure of writing to you, we have been engaged in some experiments upon oils, for use in medicine, in which it seems probable they will take an important place. Already one vegetable oil has been found to be almost as efficacious as cod liver oil, with the advantages of being less unpleasant and cheaper. On account of this new use, it might be well to collect small quantities of oils, even if they did not obey the conditions mentioned above. The value of oil must depend a little (especially when found in out-of-the-way places) upon the way it is held in its matrix; for example, the oil of the Lumbang-nut (*Aleurites triloba*) can be separated with much less labour and simpler machinery than the cocoa-nut oil, which requires very great pressure to extract it from the copperah, or dried cocoa-nut kernel.

"Waxes are worth more than greases, on account of their very high melting points; their relative values depend upon colour, transparency, and freedom from resinous matter. Resin may be easily detected by lighting a small piece of the wax; the more smoke the greater proportion of resin, and therefore less value; the paler and more transparent the wax the better. The most valuable tree wax known is the beautiful insect wax of China.

"A simple way to try an oil nut is to crush it with a stone, and then squeeze it between your finger and thumb; if it contains any considerable quantity of grease, enough will be pressed out to judge of colour, hardness, and sweetness; if the nut tastes oily, and yet oil does not come out by this treatment, it is well to dry the kernel before squeezing; and, in the case of nuts containing grease solid at a high temperature, like that of the *Myristica sebifera*, it is well also to heat the nut. Where a stearic candle can be got, and is burned down a little until it has formed a cup, and then blown out, if into this a little of the material to be tried is placed, after a moment's burning the candle material with which the wick is saturated is burnt out, the new material to be tried in the cup takes its place, and becomes the material supplying the wick until the cup is emptied, and so can be judged of; or a piece of string dipped in the oil or melted grease makes a very tolerable wick; or, simpler still, where the nut is very full of oil, if lighted at one end it will at least show what tendency to smoke there is, and the colour of the light.

"Some of the resins ought to come in for candle making, though I believe that they have never been extensively used, except for the commonest sorts of candles, on account of their giving off so much smoke; but as some descriptions smoke less than others, there is a hope that new ones may be found smoking still less; these would then be very serviceable in candle making. The points connected with new greases, &c., that we should be most thankful for information upon are, the manner of growth, probable expense of collecting, means of transport, and quantity likely to be obtained, with small specimens of the grease, if manufactured, and of the fruit, with both its husk and hard shell where these exist."

The expression of oil is almost universal in India; as Mr. Bingham observes, "every village has its *Talee, i.e.*, oil presser, who, after a most primitive and laborious fashion, extracts probably $\frac{1}{5}$ of the extractable oil, and as he considers the labour of himself and family, with the solitary bullock which patiently does his work, well paid if they earn their daily food, and, like the animal he works with, asks for no more, the process if an imperfect is a tolerably cheap one."

"The village oil-crushing machine is a very simple one indeed, which it is unnecessary to describe further than to say that by the weight of the seed crusher himself, seated upon a movable horizontal lever, pressing in its turn on a perpendicular beam (or nearly so) rising from it and working with a headpiece upon the rough piece of wood in a sloping position, aided by the eternal round of the bullock most primitively attached without harness, the oil seed is crushed into paste and eventually hard cake in the large stone or wooden mortar in which this large pestle works, while the un-