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ON *ROTTLERA TINCTORIA* ROXB., AND ITS MEDICINAL PROPERTIES.

BY DANIEL HANBURY.

[Hanbury also at
Pamphlet No. 10]

THE peculiar red powder which is obtained from the capsules of *Rottlera tinctoria* Roxb., a tree of the Natural Order *Euphorbiaceæ*, has long been used in India on account of its valuable properties as a dye for silk.

This substance first claimed my attention in the year 1852, while examining a collection of drugs formed at Aden by my friend James Vaughan, Esq., and I published a few remarks in the *Pharmaceutical Journal* for June, 1853,* pointing out its botanical origin and what I then knew of its economic uses.

Its application as a remedial agent having recently attracted attention in this country, in consequence of the favourable reports made by several practitioners in India, who have found it eminently successful in the treatment of *tænia*, I think it may be not uninteresting if I briefly recapitulate its history, and quote some of the statements that have appeared regarding its medicinal properties and mode of administration.

The genus *Rottlera*, so named in honour of the Rev. Dr. Rottler, an eminent Danish missionary and naturalist, was, as at present restricted, founded by Roxburgh in 1798.

Rottlera tinctoria Roxb.† is a tree of from 15 to 20 feet in height; it is common in the hilly districts of India from Burma to the Punjab, and from Ceylon to the hot valleys of the whole of the Himalaya, where it ascends to an elevation of 5000 feet; it is found in the Phillippine Islands, in China, and in North-Eastern Australia; it appears also to occur in the South of Arabia and in the Somali country, from which regions the dye obtained from it, is carried to Aden for sale.

The fruit of the tree is tricocous and of the size of a pea, covered on the outer surface with minute, sessile, roundish, semi-transparent glands of a bright red colour. According to Roxburgh the fruit ripens in February and March, at which period it is gathered, and the red, glandular powder is carefully brushed off and preserved for use.

Before further describing this substance, I may properly advert to the names by which it and the tree affording it, are known to the natives of India; for some information on which part of the subject, I am indebted to the kindness of Professor H. H. Wilson, of Oxford.

The Sanskrit name of *Rottlera tinctoria* is पुन्नाग *Punnaga*, a word having several synonyms, among which are तुंग *Tunga* and केसोर *Kesora*;—hence in Bengali we have *Punnág*, *Kesor* and *Tung*, and in Hindustani *Punnág*.

The red powder from the capsules is called in Bengali কাশল *Kámálá*, abbreviated to *Kámál*. The Sanskrit word कपिल *Kapila*, signifying tawny or

* On Wurrus, a dye produced by *Rottlera tinctoria*, *Pharm. Journ.*, vol. xii., p. 589.

† Roxburgh, *Plants of the Coast of Coromandel*. No. 168.

dusky red, would appear to be also applied to it. In the Tamil language the substance in question is termed *Kapilapodi*, a name compounded of the Sanskrit *Kapila* and the Tamil கபிலா *Podi*, the latter word meaning the *pollen of a flower*, or *dust in general*.

Vasantagandha, a Sanskrit word meaning *spring-fragrance*, is, according to Roxburgh, a designation in the Telinga or Telugu language of the same red powder. In the bazaar at Aden, it is known as an article of trade under the name of ورس *Waras*, a word properly signifying *saffron*. It is probable, however, that this term has been given by the Indian Mohammadans, and is not used as a designation of the powder elsewhere.

The Hindustani name *Kāmalā* has, with slight variations in spelling, been adopted by the Europeans in India, and I shall therefore employ it (omitting the accents indicating the long quantity of the vowels) as the most convenient term by which to designate the red powder derived from the capsules of *Rottlera tinctoria*.

Kamala, as found in the Indian bazaars, has the aspect of a brick-red powder, possessing from its structure that peculiar mobile character which we notice in *Lycopodium* and *Lupuline*. It also agrees with *Lycopodium* in the difficulty with which it is mixed with water, and in the manner in which it ignites when thrown into the air over the flame of a candle. Examined with a lens, or still better with the compound microscope, it is seen to consist of garnet-red, semi-transparent, roundish granules, of from $\frac{1}{300}$ to $\frac{1}{150}$ of an inch in diameter, more or less mixed with minute stellate hairs and the remains of stalks, leaves, &c.: the latter substances however are easily removed by careful sifting, the drug thereby acquiring a brighter red colour and more uniform appearance.

Kamala has but little smell or taste. It is insoluble in cold water, and nearly so in boiling water. It is soluble in a solution of an alkaline carbonate, and still more so in one of caustic alkali, a deep-red solution being in either case produced. The addition of an acid to these solutions occasions a precipitate of resinous matter.

Treated with alcohol or ether, Kamala affords a large proportion of soluble matter and a solution of a beautiful deep-red colour. The alcoholic solution upon the addition of water becomes turbid from the precipitation of resin. By repeated digestions in hot alcohol, the whole of the resinous colouring matter of Kamala may be removed, a pale-whitish substance being the only residuum.

Dr. Thomas Anderson, Regius Professor of Chemistry in the University of Glasgow, who has made Kamala the subject of special investigation,* finds that if a concentrated ethereal solution of Kamala be allowed to stand for a couple of days, it solidifies into a mass of granular crystals. If these be drained, pressed in bibulous paper, and purified from adhering resin by repeated solution and crystallization in ether, the crystalline substance is obtained in a state of purity. It then consists of yellow crystals having the form of minute plates and a fine satiny lustre. This substance has been named by Dr. Anderson *Rottlerine*.

Dr. Anderson states that *Rottlerine* is insoluble in water, sparingly soluble in cold alcohol, more so in boiling. In ether, it is readily soluble. It dissolves in an alkaline solution with a dark-red colour. Its alcoholic solution is not precipitated by acetate of lead.

Bromine instantly decolourizes it, with formation of a substitution-product, which dissolves readily in spirit, and is thrown down by the addition of water. This compound does not crystallize, and could not be obtained in a state of purity. Nitric acid oxidizes *Rottlerine*, forming at first a yellow resinous matter, and by longer continued action a quantity of oxalic acid. Concentrated

* On the Colouring Matter of *Rottlera tinctoria*, *Edinburgh New Philosophical Journal*, Jan.—April, 1855, p. 296.

sulphuric acid in the cold dissolves it with a yellow colour, which, on the application of a gentle heat, becomes first red, and finally very dark, sulphurous acid being evolved. Heated on platinum it fuses into a yellow fluid, which decomposes at a higher temperature, giving off pungent fumes and leaving a bulky charcoal.

The mean result of four analyses gave the composition of Rottlerine as

		Calculation.		
Carbon.....	69.112	69.47	C ₂₂	132
Hydrogen	5.550	5.26	H ₁₀	10
Oxygen	25.333	25.27	O ₆	48
	99.995	100.00		190

The attempts made to confirm this formula have not led to any definite result, Rottlerine forming no compound with the metallic oxides, and that with bromine not having been obtained sufficiently definite.

A concentrated alcoholic solution of Kamala deposits upon cooling a pale flocculent matter, sometimes in such abundance as completely to fill the fluid. This substance is soluble in boiling alcohol, but sparingly in cold; hardly soluble in ether, and insoluble in water. It appears to have no crystalline structure. It gives no precipitate with the salts of lead or silver, and does not appear to form a compound with any other substance. In drying it shrinks much, resembling hydrate of alumina coloured with oxide of iron. The quantity obtained was, however, too minute for a full investigation of its properties.

From Professor Anderson's experiments, the composition of Kamala may be thus stated:

Resinous colouring matters (including Rottlerine)	78.19
Albuminous matters	7.34
Cellulose, &c.	7.14
Water.....	3.49
Ash.....	3.84
Volatile oil.....	trace
Volatile colouring matter	?
	100.00

Kamala is used throughout India as a dye for silk, its colour being extracted by boiling it in a solution of carbonate of soda. I have a specimen of silk dyed with it, which is of a rich orange-brown. The root of the tree is said to be also used in dyeing. In Indian medicine, Kamala is considered as "of a warm nature," and is given as an anthelmintic in very small doses.* It has also some repute as an application in certain cutaneous complaints. Among the Arabs of Aden, it is administered internally in leprosy, and is used in solution to remove freckles and pustules.† Dr. William Moore, of Dublin,‡ Physician to the Institution for the Diseases of Children of that city, has made some trials of it in *Herpes circinatus*, by rubbing the powder over the eruption with a piece of moistened lint. Dr. Moore states that two or three applications, accompanied with the internal administration of alterative doses of Rhubarb and Grey Powder, sufficed for the removal of the disease.

It is however in its character of an anthelmintic that Kamala appears most to deserve the attention of the medical man and pharmacist.

Referring to the reports that have been published, we find that the anthelmintic powers of Kamala have been investigated in India by Drs. Mackinnon, Anderson, Corbyn, and Gordon.

* Irvine, *Materia Medica of Patna*, Calcutta, 1848, p. 48.

† Vaughan in *Pharm. Journ. and Trans.* Vol. xii. p. 386.

‡ On the value of the *Rottlera tinctoria* (Kameela) as a local application to *Herpes circinatus*, by Wm. Moore, M.B., &c. *Dublin Hospital Gazette*, Nov. 15, 1857, p. 345.

Trials of the drug in this country, have as yet been very few. Dr. Arthur Leared, who has been one of the first to prescribe it in London, has recorded one successful case,* since which he informs me he has had four others also successful.

Dr. C. Mackinnon,† Superintending Surgeon, Bengal Medical Establishment, in introducing to notice the new remedy, states:—

“My attention was first called to it by a gunner of the brigade, affected with tapeworm, in whom both turpentine and kousso had failed to expel the worm. He stated that a companion of his affected with tape-worm, had taken the remedy with success. I immediately sent for some, and, without any previous preparation of the patient, gave him 3 drachms. He was a large powerful man, and this producing no effect, in 4 hours afterwards the same dose was repeated. It now operated very freely and frequently, and with the fourth stool a large tapeworm, 6 yards long, was passed.

The result was so satisfactory, that I have continued to employ the remedy whenever a case presented itself; and I have now given it in 16 different cases, and in all without a failure. As far as my experience goes, I have found it a better and more certain remedy than either turpentine or kousso, and much less disagreeable to take than either of these remedies.

In none of my cases subsequent to the first, did I ever exceed for a single dose 3 drachms. This usually purges from five to seven times, and the worm is usually expelled dead in the fourth or fifth stool.

In two of the later cases in which I administered it in Hospital, both patients recently recovered from fever, and still weak, the dose of 3 drachms purged very violently,—from a dozen to 14 times. In three subsequent cases I reduced the dose to 1½ drachms, and no action on the bowels succeeding it, I gave in six hours afterwards half an ounce of Castor-oil. This acted four or five times, and in each case the worm was passed dead.

In almost every case the long slender neck of the worm appeared in the motion.

To a native child of five years of age, I gave a dose of 40 grains, and a tapeworm was duly expelled. The drug usually purges speedily. In about half the cases, some degree of nausea and slight griping were experienced; in the remaining half, no inconvenience whatever was sustained, some of the patients declaring it to be the easiest purge they had ever taken in their lives. * * * *

Dr. Mackinnon gives the following summary as the result of his experience:

1. That *Kamala* is a safe and efficient remedy for tapeworm, and more certain than either turpentine or kousso.
2. That to a strong European 3 drachms may be safely given as a dose.
3. That to a person of feeble habit or to a female, 1½ drachms, followed, if necessary, by half an ounce of castor-oil, is a sufficient dose.

Since the paper from which the foregoing are extracts, was published, Dr. Mackinnon has stated‡ that in subsequent more extensive trials of *Kamala*, during which he has administered it to nearly 50 patients, in two instances only was no worm expelled.

Dr. Anderson, Assistant Surgeon, 43rd Regt. Light Infantry,§ states that the occurrence of tapeworm is very common among the Europeans serving in the Punjab, and that it is also prevalent among the Mussulman population of that province.

“The vermifuge properties of *Kamila*,” writes Dr. Anderson,

“are as well marked as those of any of the best reputed anthelmintics, not excepting the Abyssinian remedy *Kousso*. The only objection to it is, that

* *Medical Times and Gazette*, Dec. 19, 1857, p. 628.

† *Indian Annals of Medical Science*. Ed. 2, No. 1, p. 284. Calcutta, 1854.

‡ *Indian Annals of Medical Science*, vol. iii. (1856), p. 86.

§ On *Rottlera tinctoria*, as an article of the *Materia Medica*. *Indian Annals of Medical Science*, vol. iii. (1856), p. 82.

when the powder is used, considerable nausea occasionally follows, but certainly not more than what is produced by the sickening preparation of pomegranate root and other anthelmintics.

"After three drachms of the powder have been administered, the worm is usually expelled in the third or fourth stool. It is generally passed entire, and almost always dead, and in all the cases I have examined (about 15), I was able to detect the head. In only two cases do I know of the worm being passed alive. The advantage of the tincture over the powder consists in its action being more certain and milder, and in it being rarely accompanied by nausea and griping. In two or three cases, only two or three stools followed the dose usually given, and the worm was expelled in the second stool; in one patient, only one stool was caused by the medicine, and in it, the worm came away dead."

Dr. Anderson alludes to 95 cases of tapeworm in which *Kamala* was prescribed, and of this number he was aware of only two in which no worm was expelled. Of these 95 cases, 86 were European soldiers, 8 were Mussulman natives, and one was a Hindu of the lowest class. All these persons were in the habit of indulging freely and constantly in animal food, and among this class tapeworm is common: those, on the other hand, whose animal diet is less copious are less liable to *tænia*, while among several native regiments, Hindu Sepoys and servants, says Dr. Anderson, whose food is entirely vegetable, the parasite is unknown.

Dr. C. A. Gordon's experience of the efficacy of *Kamala* corresponds entirely with that of Drs. Mackinnon and Anderson. He observes,*

"With Kameela there is no unpleasant effect. It is not even necessary to take a dose of purging medicine as a preparative; and beyond a trifling amount of nausea and griping in some instances, no unpleasant effects are experienced; while by far the greater number of persons to whom it is administered suffer no inconvenience whatever beyond what they would from a dose of ordinary purging medicine."

The observations of Dr. Gordon relative to the occurrence of *tænia* are confirmatory of those of Dr. Anderson, and are to the effect that the free use of animal food of very indifferent quality among the British troops in the N.W. Provinces, must be regarded as the cause of the prevalence of the malady. In the case of soldiers stationed at Peshawur, tapeworm is so common, that it is believed that every third man suffers from it during the two years that the regiment usually remains there. To give Dr. Gordon's own words:—

"Those who have escaped the misfortune of having had to pass some years in India, can form no idea of the vast herds of lean, half-starved pigs that roam over the fields and waste grounds in the vicinity of villages; neither can they have any conception of the nature of the food on which these pigs subsist."

After some revolting details as to the habits of swine in India, Dr. Gordon continues:

"Pigs, however, are not the only animals that live in this filthy manner in India. Cattle and sheep, that are so particular in their food in Britain, acquire degenerate tastes in India; and it is needless to enter into similar particulars regarding ducks, fowls, turkeys, and pigeons, all of which are more or less used as food by our countrymen there."

The dose of *Kamala* may be stated as from $\frac{1}{2}$ a drachm to 3 drachms suspended in water: a single dose is frequently found sufficient, and in general it is not necessary to give any other medicine before or after. In some cases, however, where but a small dose of *Kamala* has been administered, castor-oil has been afterwards given with good effect. Dr. Gordon has prescribed *Kamala* in the dose of 1 drachm, repeated at intervals of three hours.

* *Medical Times and Gazette*, May 2, 1857, p. 429.

Kamala may also be given in the form of Tincture; the formula for which, recommended by Dr. Anderson, is as follows:

R Kamalæ, ʒvj.
Spiritus rectificati, fʒxvj.
Macerate per biduum et cola.

An ethereal tincture may be prepared of the same strength, but it is said to offer no particular advantage over the alcoholic.

The dose of *Tinctura Kamalæ* is from ʒj to ʒiv, diluted with some aromatic water.

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