No. 1. Read the following letter from J. BROUGHTON, Esq., Government Quinologist, to the Chief Secretary to Government, Fort St. George, dated Ootacamund, 19th December 1872 :—

I HAVE the honour to report on a chemical examination I have, during the past eighteen months, been making on the bark of *Azadirachta Indica*, well known throughout India as the Margosa tree, though in the South more generally called the Nim tree.

2. The use of the bark of this well-known tree is quite general throughout the whole of India as a tonic and febrifuge. It is generally employed in the form of a decoction, though sometimes as powder, and has been stated by certain English authorities to have the same febrifuge qualities as Cinchona bark. The taste of the bark is intensely bitter; the inner layer or liber is, however, by far the bitterest. The tree being very handsome, and the wood of value, it is well known in avenues; the plants generally bearing marks of having been robbed of their bark for medicinal use. The pinnate leaves have also an intensely bitter taste, and are employed in native medicine; though not as a febrifuge, being used as a poultice externally, and are said to have a powerful effect in preventing glandular tumours from coming to maturity. They are also employed by natives in their fresh green state to cover the bodies of patients suffering from small-pox, though, I believe, this is done rather from a religious than a medicinal motive. The seeds yield a considerable amount of oil, which has also a strong bitter taste, is used for lamps, and in medicine. The roots are said to have vermifuge properties but I have not examined them. The main virtues of the tree reside in the bark.

3. The investigation has been a matter of much labour and difficulty from the circumstance of the bitter principle having scarcely any definite qualities, it being a neutral resin. It is slightly soluble in water, and hence the decoctions of the bark are intensely bitter, though water will not extract the whole present. To obtain it in purity the bark is exhausted with spirit of about 60 per cent., the filtered tincture precipitated with water, the dried precipitate again exhausted with benzol, again evaporated, again exhausted with carbonic disulphide, then by dry ether, and finally by absolute alcohol. The last exhaustion causes the separation of a small amount of a white transparent substance crystallizing in fine needles, which is quite insoluble in water, has no taste, and consists of carbon, hydrogen, and oxygen. Obtainable in but small quantities it has not been satisfactorily analysed, and has the general characters of a crystalline fat though fusing at 175° C. It is certainly not the effective principle of the bark nor an alkaloid.

4. The resin purified by the successive solvents is a dark brown somewhat soft resin of agreeable smell, resembling that of the bark. It is slightly soluble in water and entirely in all the foregoing solvents, but not in fixed oils. In any dilute solution its bitter taste is strong, but not disagreeable. It is soluble in strong boiling solutions of the fixed alkalies, from which acids again precipitate it apparently altered, likewise in strong sulphuric acid by which it is also altered. It fuses at 92° C.

5. The determination of its true chemical formula has been a matter of great difficulty and labour from the circumstance of its refusal to combine with other substances in a definite manner. It was finally determined by the discovery of a nitro-compound which yielded a silver salt, not however crystalline. From

the analyses of these I ascribe to the resin the formula $C_{36}\ H_{50}\ O_{11}$. Its nitro-compound is formed in the usual manner by nitric acid and precipitation with water, is yellow, uncrystallizable, somewhat soluble in water, more readily in alkalies, and having the formula $C_{36}\ H_{40}\ (NO_2)_4\ O_{11}$.

6. The resin is, therefore, not in any respect an alkaloid, as it contains no nitrogen. Its chemical constitution appears to me scarcely to confirm the ascribed anti-periodic febrifuge qualities of the bark, though doubtless the bitter solution of the resin may be a good tonic. If required for medicinal purposes it will be most conveniently employed in alcoholic solution. As the bark varies very considerably in its content of the bitter resin, a direct tincture would be unsuitable, but the impure resin after the application of benzol in the foregoing process of preparation would be fit for solution in alcohol and employment in medicine.

7. It is singular that native physicians never appear to have employed a tincture of the bark instead of an aqueous decoction. From some conversation I had with a native physician in Bengal I believe it is the native religious dislike in that country to the use of alcohol which has prevented its use for this purpose.

8. The leaves contain a small amount of bitter substance of a similar nature, but which is far more soluble in water. The same substance is also contained in the bark in addition to the one described. It has very similar properties to the resin, of which it is a hydrate. No peculiar alkaloid is contained in the leaves. The oil contains a small amount of the bitter substance of the leaves, not the resin of the bark. The powerful smell of the tree is well known, but it is not due to the presence of a sulphuretted oil as has been surmised; indeed, I have not succeeded in obtaining an essential oil from the tree. If the bark is distilled with water, the distillate has the perfume of the tree, but no oil is perceptible, though it has the power of decolourizing potassic permanganate.

9. A condensed account of our present knowledge of the therapeutics and chemistry of *Azadirachta Indica* is to be found in the Indian Pharmacopœia, p.p. 53 & 443, from which, however, I differ in some points. My conclusions are given in the preceding pages.

No. 2. ORDER THEREON, 3rd February 1873, No. 133.

Miscellaneous.

ORDERED to be communicated to the Inspectors-General, British and Indian Medical Departments.

2. Copy will be forwarded to the Secretary of State and Government of India.

3. Mr. Broughton is thanked for this report.

(True Extract.)

(Signed) D. F. CARMICHAEL,
Secretary to Government.

To the Inspector-General, Indian Medical Department.
" the " British Medical Service.
" J. Broughton, Esq.

Ed. F. R. Bantleman.

Gobt. of {1873} Madras.

REVENUE.

To

THE INSPECTOR-GENERAL, INDIAN MEDICAL DEPARTMENT,

&c., &c., &c.

Dated February 3rd.

Recd. Esqr.

G. O., 3rd February 1873, No. 133.

FEBRUARY.

Nos. 1-2.

Azadirachta Indica.—Report on a chemical examination of it by Mr. Broughton ordered to be communicated to the Inspectors-General, British and Indian Medical Departments, and to the Secretary of State; and Mr. Broughton thanked for it.

Proceedings of the Madras Government, Revenue Department, 29th January 1873.

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Revenue 1872 Dept.

From, No. 4078.

The Govt Principal
Collector
Vizagapatam

To, The Chief Secretary
to Government
Fort Saint George

Dated 19th Dec. 1872
Rece 23rd

Enclosures — none

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