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Botanical Medicine Monographs and Sundry

ORIENTAL NOTES.

BY PROFESSOR X. LANDERER.

*Oriental tea plants*, called *tsai*, are quite numerous (see also "Amer. Jour. Phar.," 1875, p. 498, 532; 1876, 193; 1877, 155), some of the most important being the following:

*Tilia argentea*, Desf.—The flowers, deprived of the leafy bracts, are sent from Macedonia and yield a tea of an agreeable taste, which is usually mixed with Hymethus or Thymari honey, collected near the Hymettus mountain, where the bees visit the flowers of *Thymus (Satureja) Thymbra*. In the ancient Hellenian times Apollo was regarded as the protector of bees, and in the temple was adorned with a wreath of thymbra.

*Betonica officinalis* is collected by the monks of Agion Oras on Mount Athos. It was called kestron by Dioscorides,<sup>1</sup> and was, and is still, highly valued as a remedy in many complaints, and as such is frequently sent to friends as a present.

*Adiantum Capillus Veneris*, Lin., is known in Oriental countries as *polytrichi*, and is highly valued for promoting menstruation and in nearly all diseases of women. The name Adiantum is derived from *ou*, not, and *diaino*, to moisten, the plant growing on rocks in moist localities and brooks without being wetted, the water not adhering. It was formerly also called *polytrichon* and *kalliphylon*.

*Greek wines* are now extensively exported to all parts of Europe in consequence of the devastation of numerous vineyards by the phylloxera, which thus far has not made its appearance in Greece. It is more particularly the volcanic island of Santorin where many wines are produced, closely resembling those of Spain, Sicily, Southern France and the Cape wines; these sweet wines are called vino santo. The concentrated, unfermented grape juice, known in Turkey as *betmese* (see "Amer. Jour. Phar.," 1875, p. 534) is now largely exported to Central Europe, where it is fermented with the juice of the native grapes, and thus employed for improving the more acidulous wines of more northern latitudes.

*Viverra Civetta* is known in Abyssinia as *zebad*. This ferocious and rapacious animal is caught by snares and kept in a cage for the purpose of obtaining the civet, which is removed by means of a small spoon from the pouch between the anus and genitals, and is also found adhering to the trunks of trees from the animal rubbing on them. This secretion is a thick liquid, and is put into the horns of goats, or, for the retail

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<sup>1</sup> Kestron of Dioscorides is generally referred to *Betonica Alopecurus*, Lin., which is rather common in Southern Europe. — EDITOR

trade, into small tin boxes. It is extensively used as a perfume, sometimes under the name of *moskos*, the men employing it on the turban and the women on their veils. Civet is also used as a remedy in hysterical and other nervous complaints, and is used for protecting cloths from moths, the cloths being kept in chests made of cedar or cypress wood. The price of a civet cat is from 2,000 to 3,000 piastres, and from 500 to 1,500 piastres are paid for the skins which are used for furs.

## THE JAPANESE PEPPERMINT PLANT.

By E. M. HOLMES, F.L.S.,  
Curator of the Museum of the Pharmaceutical Society of Great Britain.

When examining some leaves of this plant, presented, together with a series of Japanese drugs, to the Museum of the Pharmaceutical Society, by Messrs. Christy & Co., in 1879, I thought it desirable to compare them with those of the plant which is stated to yield the Chinese oil of peppermint. Through the courtesy of the keeper of the Kew Herbarium, I was permitted to taste a fragment of a leaf of the Chinese plant and one of Blume's specimens of *M. arvensis*, L., var. *Javanica*, the plant to which this peppermint is referred in "Pharmacographia." To my surprise I found that neither Blume's specimen nor any others of the same plant from various localities had the taste of peppermint, but possessed a flavor similar to that of the garden mint (*M. viridis*). Judging that the Japanese plant could not belong to *M. arvensis*, var. *Javanica*, I referred to the Japanese work "Zo Mokou Zoussetz," in which the Japanese peppermint plant is stated to be *Menthaarvensis*, var. *vulgaris*, Benth. On tasting the type specimen of this plant at Kew, I found that this also did not possess the taste of peppermint, but only that peculiar to European specimens of *M. arvensis*. I therefore wrote to China and Japan for specimens of the peppermint plants of those countries. After the lapse of more than a year, Mr. C. Ford, the Director of the Botanical Gardens at Hong Kong, was able to procure a flowering specimen of the Chinese plant for me, but no specimens of the Japanese plant could be procured by my correspondents. Mr. T. Christy, however, after having first obtained seeds of the plant, attempted to grow them, without success, but was ultimately, and after considerable difficulty, able to procure from Japan living plants which flowered this year in his garden at Sydenham, and a specimen of the plant was exhibited for the first time, I believe, in this country, at the meeting of the Pharmaceutical Conference, at Southampton. On careful examination, both the Chinese and Japanese plants thus obtained were found to possess the botanical characters of *Menthaarvensis*, as defined in DeCandolle's "Prodromus;" the leaves being stalked, ovate lanceolate, and the hairs on the stems and pedicels reflexed, those of the calyx being erecto-patent, and those of the upper surface of the leaf appressed, the calyx being bell-shaped with acute lanceolate or narrowly-triangular teeth. The Chinese plant differs from the Japanese one in the leaves being narrower in proportion to their length and in the calyx teeth being shorter and more broadly triangular. In outline, the leaves of both plants taper more to the base and have a longer petiole than the English forms of *M. arvensis*, coming very near to *M. canadensis* in this feature. The latter plant however, has spreading hairs on the stem. The Chinese plant appeared to so nearly resemble *M. canadensis*, var. *glabrata*, that I applied to Professor Asa Gray for specimens of that species for comparison. The specimens of *M. canadensis* which he kindly

forwarded to me were derived from. different localities in the United States, and varied considerably in taste and appearance, some having the flavor of pennyroyal, others that of *M. viridis*, and others again that of peppermint, in a feeble degree. The specimen having a peppermint flavor is labeled *M. canadensis*, var. *glabrata*; it has reflexed hairs on the stem, and differs from the typical plant in having more triangular and shorter calyx teeth, which, as well as the petioles, have erect hairs; in fact, it appears in every respect to be the same plant as that grown at Canton. It is not surprising, however, to find Japanese or Chinese plants extending to North America.

It appears, then, that there are two plants possessing a widely different taste and both referred to *M. arvensis*, var. *Javanica*, by botanists. This might lead to confusion if the Chinese or Japanese peppermint plants ever came into demand for purposes of cultivation, unless a special name be given to the form which possesses the peppermint flavor, even although it does not possess characters sufficiently definite to separate it from *M. arvensis*. The mints are well known to form an uninterrupted series of plants which it is difficult to separate into species. Deeming it advisable, therefore, before giving it a name, to consult those botanists who have critically studied the mints, specimens of the Japanese peppermint plant were forwarded to several authorities on the genus, and the following opinions have been expressed: Mr. J. G. Baker, of the Kew Herbarium, considers it to be a form of *Menthasativa*, Sm. (It may be here remarked that this form, as recognized by Hooker and Babington in their "British" Floras, is a species differing from *M. arvensis* in the smaller upper leaves and longer calyx teeth, while De Candolle includes it under *M. arvensis*.) Professor Baillon, of Paris, expresses the opinion that it must be referred to *M. arvensis*, var. *Javanica*, unless it be a hybrid between *M. arvensis* and *M. piperita*. Dr. Garcke, of Berlin, finds the plant to be nearly allied to *Menthacanadensis*, D.C., and also to *M. aquatica*, var. *subspicata*, D.C. Dr. Franchet, one of the authors of the most recent "Flora" of Japan, believes the Japanese plant to be "a form of *M. arvensis*, characterized by the acuminate calycine segments, a feature which constantly occurs in specimens from eastern Asia." He adds, "After carefully comparing your specimen and having vainly sought an analogous taste in the different forms of the *M. arvensis* of Europe, I have found in them only an insipid and herbaceous flavor; I can say the same of *M. arvensis* from the neighborhoods of Pekin and Chefu, in the province of Shantung, and from the neighborhood of the lake Sitau, in the province of Sche-kimy; but I find the taste of peppermint developed in a very high degree in a specimen gathered at Voosung, near Shanghai. From Japan I possess specimens of *M. arvensis* gathered in very many localities, and I have found the taste of peppermint in all my specimens, without exception. This taste is absolutely the same as that furnished by your plant. I remark, however, that the taste is more pronounced in proportion as the plants are more robust; puny specimens with small leaves from Kanasawa (in Nippon) possess it only in a feeble degree." He thinks that the peppermint flavor is not the result of hybridity, since no other species has hitherto been observed in Japan, either in a cultivated or wild state, except *M. crispa* ("So Mokou Zoussetz," xi, pl. 29) (which no botanist, that he is aware of, has ever brought back from that country), and *M. gentilis*, which is well delineated under the name of *M. arvensis* on the same page as *M. piperita*, after information probably furnished by the Dutch. M. Malinvaud remarks that the name *piperita* cannot be appropriated to the Japanese plant, as it is already applied to a form of *M. arvensis* with flower spikes. He therefore suggests

the name *Mentha arvensis*, var. *piperascens*.

The weight of opinion is, therefore, on the side of considering the Japanese plant as a form of *Mentha arvensis*, D.C. If *M. sativa*, Lin., and *M. arvensis*, as defined by Babington, as well as *M. Javanica*, D.C., are to be considered as forms of one species, then the Japanese plant might, I think, also rank as a form under the name of *M. arvensis* f. *piperascens*, differing from *M. arvensis* as described by Babington in having the calyx teeth longer than broad, and in the upper leaves being gradually smaller; from *M. sativa*, in the leaves having longer stalks and tapering below; from *M. Javanica*, in the uppermost leaves being more than twice (usually six or eight times) as long as the verticillasters, and in the veins being hairy on the under surface of the leaf whilst those on the calyx are erecto-patent; and from *M. canadensis*, in the reflexed pubescence of the stems.

With respect to the Chinese peppermint plant, it so exactly agrees with the specimen of *Mentha canadensis*, var. *glabrata*, furnished to me by Dr. A. Gray, that if the latter be a typical specimen<sup>2</sup> I can only consider that it should be referred to *M. arvensis*, under the name of *M. arvensis*, var. *glabrata*.

Dr. Gray's specimen has the calyx teeth much shorter than those of the typical *M. canadensis* sent at the same time, and the hairs on the stem and pedicels are reflexed, while those of the calyx tube are erecto-patent.

There are some other points in connection with peppermint which are extremely suggestive, and to which I desire to call the attention of those who have greater ability and more time for investigation than myself.

A number of varieties and forms of so-called species possess the same odor and flavor, as shown in the following list:

*Mentha piperita*, *Mentha arvensis*, var. *piperascens*, *M. canadensis*, var. *glabrata* (!), and *M. incana* (!), cultivated near Bombay for producing peppermint oil (Dymock).

Spearmint, *Mentha viridis*, L., *Mentha sylvestris* (!), *rotundifolia* (!), *sylvestris* (!), *canadensis* (!), *M. arvensis*,<sup>3</sup> var.

The questions then arise:

1st. Do the oils of these species differ among themselves, as has been shown to be the case with those of *M. piperita* and *M. arvensis*, var. *piperascens*?<sup>4</sup>

2d. If so, is this difference dependent on degree of development, on climate, soil,<sup>5</sup> or

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<sup>2</sup> Dr. Franchet notes, in his "Flore du Japon," the reflexed leaves in some specimens of *M. canadensis*.

<sup>3</sup> Those marked (!) have been tasted by myself—E. M. HOLMES.

<sup>4</sup> "Pharm. Jour." (3), 11, p. 321.

<sup>5</sup> Mr. J. Lloyd found a variety of *M. aquatica* possessing a lemon odor on calcareous soil near the sea, and M. Malinvaud a specimen of *M. arvensis* with a lemon odor in a ditch near Ivry, where other plants of the same species possessed only the usual odor of the plant.—*Bull. Soc. Bot.*, 1881, p. 370.

sex?

3d. Is the oil in each case a mixture, in which one ingredient is present in variable quantity in the different plants?

4th. Do the oils of spearmint and peppermint bear any chemical relation to each other?

5th. Which species, containing the oil of peppermint, yields the largest quantity and which the most valuable one for medicinal purposes ?

To recapitulate: The writer would recommend that for convenience the name of *Mentha arvensis f. piperascens* should be retained for the Japanese peppermint plant and that of *Mentha arvensis f. glabrata* for the Chinese one.—*Phar. Jour. and Trans.*, Nov. 11, 1882.

## THE KOLA-NUT TREE.

By THOMAS CHRISTY, F.L.S.

I introduced the Kola Nut (*Sterculia acuminata*) into England about eight years since, and it has lately been subjected to European analysis,<sup>6</sup> and the results obtained made it exceedingly likely that a large European demand will soon exist. It has been found to contain the same active principle, viz., caffeine, and more of it than the best coffee, and to contain also the same active principle as cacao, but less fatty matter. Possessing the same qualities as these favorite beverages, it only needs proper treatment to develop a special flavor, and it would then probably be able to compete successfully with those beverages. The nuts are used to form a refreshing and invigorating drink throughout a large portion of tropical Africa, their use being said to support the strength, allay inordinate appetite, assuage thirst, and promote digestion, and to render those using them capable of prolonged fatigue. The negroes prefer them to tea or coffee, and when they can obtain Kola nuts, will not touch coffee. Dr. Daniell says of them: "It would be difficult to find any product which constitutes such an important article of commerce in Soudan as the Kola nut." Wherever the negro has been transplanted to a foreign country he has taken the Kola nut with him.

As a medium of exchange for the products of Central Africa no article could be more advantageous, and on this account alone the tree will well repay cultivation. Moreover, if once introduced as a beverage in civilized countries, the demand for it would soon become enormous.

I have recently been informed by Mr. Espeut, a well-known sugar planter of Jamaica, that the negroes use the Kola nut as a remedy for drunkenness; that swallowing a single nut, ground up and made into cream or paste with water or spirit, no sign of intoxication remains half-an-hour afterwards.

Confirmatory evidence of this property in the Kola nut is given by a surgeon, Mr.

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<sup>6</sup> See "New Commercial Plants," Nos. iii and vi.

Papefio, who tells me that alcoholic drinks do not produce intoxicating effects when the Kola nut is eaten at the same time.

It appears, therefore, that the craving for drink, which is such a strong incentive to drunkenness, may be subdued by the use of this valuable stimulant and tonic, as after chewing Kola nut great disinclination is felt to all forms of alcohol. It has also been found to possess a beneficial action on the liver, its continual use preventing attacks of despondency to which negroes are peculiarly liable. Dr. Daniell records a case of this kind, in which the Kola nut put a stop to an epidemic of suicidal mania, which threatened at one time to depopulate the estate on which it occurred.

It is also used by the natives when in a low state of health, suffering from the skin cracking and peeling on the hands and feet.

I have just received from a native gentleman on the west coast of Africa a fair quantity of fruit in splendid order, as fresh as if just gathered from the tree.

Planters will be able to send them off for seed at once to their estates.

Some have been sent to the leading medical men in London for further experiment, and I am endeavoring to ascertain the best plan of preserving their medicinal properties.—*Chemists' Journal*.

## RESEARCHES UPON THE JALAPS.

By A. BOURIEZ.

In commercial specimens of any kind of true jalap (tuberous, fusiform, or Tampico) several varieties of tubercles can be distinguished by their external characters. Those which constitute the greater part of the jalap, and which I designate under the name of "typical tubercles," always present at one of their extremities (the upper) the remains of aerial organs. Sometimes they terminate in a point at both their extremities; sometimes one of the extremities only becomes slender, whilst the other presents a large surface of insertion. There are met with, besides, tubercles inserted on other tubercles, and very small fragments [*grabeaux*] showing tubercles inserted upon an organ which is most frequently slender and cylindrical, but sometimes fusiform and more or less swollen. The question presented itself to me, whether these tubercles of the different varieties answered to variations in appearance of one and the same organ, or whether they represented organs of a different morphological nature.

An examination with the naked eye, and aided by a glass, of transverse sections made at different points of these tubercles, yielded me some useful information, but not sufficient to answer the question with certainty. I then submitted the same sections to a microscopical examination.

As a basis for this micrographic study I selected a typical tubercle of the tuberous or official jalap.

A transverse section made at the lower extremity of the tubercle enabled me to conclude that the organ there presents the structure of a root. Towards the centre of the section there were observed four primary woody layers, symmetrical around the centre, and convergent in pairs. Each of these layers is formed of some spiral vessels, the most slender of which are nearest the exterior, the largest being nearest the centre. The differentiation has therefore proceeded in each of these primary ligneous layers from the centre of development (indicated by the most slender spiral vessels) towards the centre of the organ. It may thence be concluded that the centre of the organ is occupied, by a single tetracentral primary bundle, the centre of which coincides with the centre of the organ, and it may be inferred from this conclusion that the organ, at this stage, is a root.

Among the histological details presented by this root, I will refer here only to the formation of the elements of the liber. Among the young cells with tangential divisions belonging to the cambial zone the most external present very early longitudinal septa, which subdivide them into a number of narrow elongated cells, such as are seen in the Asclepiadaceae, Apocynaceae, Solanaceae and Acanthaceae. The transverse septum which separates two superposed cells is reabsorbed, following the meshes of the tissue, and in this way are originated the perforated plates of cells characteristic of the liber. The elements of the cambial zone which do not present these septa make up the liber parenchyma, in the midst of which occur numerous resiniferous cells and glands containing crystals.

The resin-cells would appear to be parenchymatous elements, hypertrophied and gorged with resin. Generally they are superposed end to end, so as to form rather long vertical rows; but in no case have I observed the reabsorption of the wall common to two successive cells. There is therefore no formation of a canal, and I look upon these resin cells as unicellular glands distributed in the mass of the liber.

The crystal-bearing glands consist of parenchymatous cells, subdivided into as many compartments as they contain groups of crystals. These groups are sphaeraphides of oxalate of lime. A radial section, treated with a mineral acid which dissolves the oxalate of lime shows readily the subdivision of these glands.

I will now briefly sketch the structure of the part of the tubercle comprised between the lower extremity and the point which corresponds to the maximum volume of the organ, setting forth the mechanism of the formation of the tuber.

In sections which follow those which presented the structure of a well-characterized root, there is observed, in proportion as they rise towards the central part of the tuber, the interposition, among the hardened and characteristic elements of the root, of a parenchymatous tissue, supplied at first solely by the cambial zone. The interposition of this tissue, which I will call the "muriform parenchyma," results in separating the woody layers from each other, and quickly interfering with the primitive symmetry of the organ. The spiral layers, carried away and twisted in every direction by the secondary ligneous lobes, quickly disappear, so that at a very short distance from the lower extremity of the tubercle it is already impossible to recognize, them.

Higher up the muriform parenchyma which surrounds the indurated ligneous masses splits up parallel to the surface of these masses, and thus originate true secondary generating zones, which produce, on the side of the wood some rows of muriform parenchyma, and, on the other side, secondary liber, with numerous glands containing resinous, and crystalline matter.

In the most swollen parts are seen important layers of muriform parenchyma, divided tangentially in every direction, and furnishing, at the same time, liber products on the one side and parenchymatous elements on the other. All the parenchymatous cells are gorged with starch, and the tubercle constitutes an important alimentary reserve for the plant.

In studying the upper portion of the tubercle I have followed the reverse order, and starting from the upper extremity descended towards the centre.

The transverse section made at the top extremity of the tubercle shows that the organ, at this point, has the structure of a stem. The primary ligneous mass forms, in fact, an annular zone around the centre of the organ, but at a certain distance from the centre. It is formed of radiating layers grouped in badly defined bundles. Each layer of primary wood comprises three or four contiguous spiral vessels disposed radially, the most slender being inside. The differentiation of the primary ligneous elements, therefore, has proceeded from the centre of the development (indicated by the most slender spiral vessel) in a direction which passes by the centre of the organ, but which leaves the centre of development between the centre of the organ and the ligneous layer. The centre of the organ presents, therefore, a central crown of bundles with centrifugal differentiation. From this it may be concluded that the organ at this level is a stem.

Moreover, at the top of the cicatrices, to which I have referred before, is observed the issue of four bundles, in two opposite appendages on each side. At the axil of each of these appendages a bud that is frequently developed is placed between the two bundles in relation with the bundles of the stem. In the interval comprised between the point of issue of the appendages and the swollen middle portion of the tubercle occurs the extinction of the primary ligneous layers of the stem. The organ becomes tuberized in this region by the same process as in the inferior portion.

The extinction of the primary ligneous layers of the stem shows that there is here a lower termination of the principal stem. Therefore, the stem which forms the upper portion of the typical tubercles of jalap is a principal stem, its inferior appendages are cotyledons, and their axillary buds correspond to creeping branches.

The secondary elements of the stem are in direct continuation with the secondary elements of the root; from this it follows that the root which forms the lower end of the tubercle below is the principal root. The part comprised between the points where the cotyledons issue and the point of insertion of the principal root corresponds therefore to the hypocotyledonous axis.

This investigation allows of the conclusion that the typical tubercles of jalap

represent the stock of the convolvulaceous plants which produce them, and that the tuberized portion corresponds to hypertrophy: (a) of the base of the principal stem ; (b) of the hypocotyledonous base; (c) of The region of insertion of the principal root upon the hypocotyledonous axis; and (d) of the upper part of the principal root.

I have studied in the same manner the various tubercules of jalap that never present the remains of aerial organs at one of their extremities, and I have in this way recognized that

(1) Most of the varieties of tubercules represent tuberized roots of different orders ;

(2) Some tubercules represent subterranean stems, which, having to play the same physiological role as the radical tubercules, are tuberized by the same process and present a nearly identical structure.

Finally, comparison of the three commercial kinds has shown me, that in respect of structure there is no difference, however slight, between the different kinds of true jalap.

From the materia medica point of view the jalaps are therefore principally formed of tubercules which correspond to the stocks of the convolvulaceous plants that produce them; they include, besides, a certain number of tubercules which represent tuberized roots of different orders; lastly, tubercules are met with derived from tuberized subterraneous stems.

I will now add some pharmaceutical observations upon jalap and the resin extracted from it.

In none of the published analyses of jalap is mention made of oxalate of lime, but a microscopic examination and microchemic tests detect it in considerable proportion in the tubercules.

I am unable to accept the opinion of M. Andouard, according to which the small roots of jalap would be generally more rich in resin than the large tubercules from the same plant. This does not agree with what is revealed by the microscopic investigation, and, moreover, is not in accord with the amounts found by M. Guibourt. Would not M. Andouard consider as "small roots" the slightly tuberized fragments which are met with in the debris, which are derived from subterranean stems and which in fact contain much resin?

With the object of adding something new to the results already known, I have extracted the resin, by the Codex process, from nine specimens of jalap. In order to utilize the products of the aqueous macerations involved in this process, I prepared extracts evaporated in a water-bath to a pilular consistence, of which I have given the yield.

	Resin dried at 100°. Per cent.	Aqueous Extract. Per cent.
<b>I. TYPE SPECIMENS OF JALAP.</b>		
Supplied by the "Pharmacie Centrale."		
Tuberous or official jalap, . . . . .	12·5	38
Light jalap (small specimens), . . . . .	2·0	35
Digitate major jalap, . . . . .	7·0	12
Digitate minor jalap, . . . . .	9·0	11·5
<b>II. PICKED COMMERCIAL JALAP.</b>		
No. 1, . . . . .	12·5	35
No. 2, . . . . .	10·5	33
No. 3, . . . . .	7·5	23
No. 4, . . . . .	8·0	17
<b>III. DEBRIS,</b> . . . . .	8·5	27

It follows from the investigation of different authors that jalap owes its purgative properties to two homologous resinous glucosides, convolvulin and jalapin. I have, however, nowhere met with mention of clinical experiments made with the pure glucosides. Might there not be, if not an alkaloid, as alleged by Hume, at least a principle other than the resinous glucosides, and which has hitherto escaped analysis? If the opinion of La Maout and Decaisne is to be accepted (*Traité général Botanique*) the resin of the Convolvulaceae owes its purgative properties only to the aroma which accompanies it, for the rhizomes lose them when powdered and exposed for a long time to the air, although they preserve the purely resinous principle. The odorous oleaginous substance which floats at the top towards the end of the distillation, when nearly all the alcohol is removed from the tincture of jalap from which it is desired to extract the resin, would deserve attention from this point of view.

When jalap resin is prepared by the Codex process, and, in following the mode of operation prescribed, the residue from the distillation of the alcoholic liquor is poured into boiling water, the resin precipitated agglomerates under the form of a thick turpentine, which adheres strongly to the sides of the vessel and can only be collected completely -with great difficulty. I have found that if, on the contrary, the residue from the distillation be poured into well-cooled water, the precipitated resin will remain on the sides of the vessel in a very divided form; the resinous particles are separated one from another by drops of water, and it is very easy to collect the product with the aid of a flexible spatula. Upon placing all the resin together in a small capsule the water gradually floats to the top whilst the resinous particles agglutinate.

Finally, I have compared, in respect to yield, the Codex process, which gives an odorous greenish-brown resin, and M. Nativelle's process, which gives an inodorous resin, as white as starch. The following are the results I have obtained:

	Codex process.		Nativelle's process.	
	Resin.	Extract.	Resin.	Extract.
No. 1, . . . . .	7	11·5	3·0	9·0
No. 2, . . . . .	12·5	33·0	6·0	27·0
No. 3, . . . . .	7·5	23·0	3·3	17·0

This enormous difference in the yield of resin is due to the use of 65° alcohol, as recommended by M. Nativelle, which does not dissolve all the resin removed by 90° alcohol, as ordered in the Codex.

It is worthy of notice that more aqueous extract was obtained in evaporating the products of the macerations yielded by the Codex process than in evaporating the products of the decoctions necessitated in following the process of M. Nativelle.—*Phar. Jour. and Trans.*, Nov. 11, 1882; from *Jour de Phar.*

## POISONOUS PROPERTIES OF JUICE OF THE CASSAVA ROOT.

The sweet cassava (*Manihot Aipi*) and the bitter cassava (*M. utilissima*) are very extensively grown in the West Indies and South America for their edible tubers, much used as a culinary esculent, and for the starch obtained by grating and washing, which is converted into tapioca. The milky sap of the latter species has long been known to be a strong vegetable poison, which is destroyed through pressing the grated root in the first instance, the remaining acidity being expelled by the heating process.

In 1796 Dr. Clark, of Dominica, describing the fatal effects resulting to negroes from drinking bitter cassava juice, compared the action of the poison to prussic acid, and Dr. Fennon, by experiments made at Cayenne, proved that the poison, like prussic acid, was volatile, and could be isolated by distillation.

Subsequently Messrs. Henry and Boutron-Charlard, by analyzing bitter cassava juice imported into France, ascertained that the poison was prussic acid. In 1838 Dr. Christison confirmed their discovery, by an examination of some well-preserved juice from Demerara.

Notwithstanding this early identification of the poison, no attempt had apparently been made to determine the quantity yielded by the plant until 1877, when Mr. E. Francis, F.C.S., undertook an inquiry into the subject, the results of which he has recently published in the journal of the Royal Agricultural and Botanical Society of British Guiana.

An examination was made, not only of bitter cassava, but also of a number of samples of sweet cassava, and, contrary to expectation, the latter were found to contain nearly as much prussic acid as the former. Fifteen samples of sweet Cassava were obtained from different cultivators in Trinidad, and every one of them contained prussic acid, nine out of the number (or 60 per cent.) yielding sufficient, from 1 lb. of the root or half pint of the juice, to kill an adult. The following summary shows the average, as well as the highest and lowest quantities of prussic acid, that were met with in 15 samples of sweet, and 10 samples of bitter cassava:

*Sweet Cassava (15 Samples).*

	Per cent. of prussic acid.	Grains of prussic acid per lb.
Average, . . . . .	. 0168 . . . . .	. 1.175
Highest, . . . . .	. 0238 . . . . .	. 1.666
Lowest, . . . . .	. 0113 . . . . .	. 0.791

*Bitter Cassava (10 Samples).*

	Per cent. of prussic acid.	Grains of prussic acid per lb.
Average, . . . . .	. 0275 . . . . .	. 1.927
Highest, . . . . .	. 0422 . . . . .	. 3.094
Lowest, . . . . .	. 0132 . . . . .	. 0.924

The juice of the bitter cassava, mixed with molasses and fermented, has been made into an intoxicating liquor, which is much relished by the negroes and Indians. The concentrated juice, known in the colony of British Guiana as cassareep, is an Indian preparation. One of its most remarkable properties is its highly antiseptic power, preserving meat that has been boiled in it for a much longer period than can be done by any other culinary process.—*Chem. and Drug.*, Nov. 15, 1882.