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A CHEMICAL EXAMINATION OF POLYGONUM HYDROPIPER.

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(A contribution from the Chemical Laboratory of the Philadelphia, College of Pharmacy)

From recent reports of the medicinal activity of this drug and from the absence of a complete analysis of it, we were induced to undertake an examination with a view, primarily, of determining the nature of the pungent principle. The drug was collected for us in the vicinity of Philadelphia, during the past summer, by a botanist thoroughly familiar with the requirements of the case, so there can be no doubt about the species of Polygonum employed in the following analysis.

About 50 grams of the tops and leaves, free from the larger stems, were powdered and the whole passed through a No. 80 sieve; of this 20 grams were taken, and the scheme recommended in Dragendorff's Plant Analysis followed as closely as the peculiarities of the case would admit.

Petroleum spirit, with a boiling point below 45ºC., extracted 2.7 per cent. of a material which proved to be a wax, melting at 48ºC., soluble in absolute alcohol, ether and chloroform, and saponifying with alcoholic potash. No volatile or fixed oils were found.

The drug, after extraction with petroleum spirit, was dried and exhausted with absolute ether, which extracted 1.54 per cent., a very small portion of which was soluble in water, the remainder was soluble in chloroform, benzol and absolute alcohol; a concentrated solution in the last solvent, when poured into water caused a turbidity due to resin ; from these and some other tests, we were led to believe that the ether-soluble portion consisted of resin and chlorophyll.

The original drug after the ether treatment was dried and exhausted with absolute alcohol, by which we obtained 5.14 per cent. of solid matter. 2.27 per cent. of this was soluble in water; this aqueous solution contained tannin. When made alkaline and treated successively with petroleum spirit, benzol and chloroform, then acidified and similarly treated, no crystalline principle was obtained. The portion of the alcoholic extract insoluble in water proved to be an acid resin. The alcoholic solution contained the pungent principle, but on heating it disappeared.

The remainder of the original drug yielded to water 7.22 per cent. of solid matter. No crystalline principle was found, but there was obtained .55 per cent. of gum and 1.44 per cent. of sugar. That portion of the drug insoluble in water yielded 5.95 per cent. of solid matter to a .2 per cent. solution of potassium hydrate, which was made up to 1 per cent. of albuminoids and some phlobaphene. That which remained from the treatment with dilute alkali gave to hydrochloric acid 6 per cent. of solid matter which consisted principally of the salts found in the ash. Only a very small amount of starch was found. On bleaching the final residue with chlorine water, drying and weighing, 57.45 per cent. of cellulose was obtained. Another portion of the original drug yielded 10.25 per cent. of moisture, and on incineration, 7.4 per cent. of ash of which 3 per cent. was soluble in water, consisting of potassium and sodium salts; the remainder proved to be iron, aluminium and calcium with phosphoric acid.

Two tannin determinations, by the gelatin and alum process, gave very close to 3.46 per cent. A tincture of the drug was made with diluted alcohol, which contained the pungent principle, but on concentrating by distillation that peculiar taste failed to show itself, either in the concentrated residue or in the distillate. The residue on treatment with petroleum spirit, benzol and chloroform, yielded nothing. From these experiments we concluded that the active principle is decomposed on the slightest heating, and that the only proper preparation of the drug would be one made without the application of beat.

In AMERICAN JOURNAL OF PHARMACY for November, 1871, Dr. C. J. Rademaker claims to have isolated the active principle, which be named polygonic acid. We prepared some of this substance according to his method, by exhausting the drug with diluted alcohol, evaporating and adding basic acetate of lead, by which we obtained the yellow precipitate. This, on treatment with H_2S, yielded to the first portions of ether shaken with it a greenish, and to the successive portions a brownish residue. All these portions were acid to litmus paper and gave the reactions stated by the author. We also found this residue to give a precipitate with gelatin, and in many other ways to resemble tannic as well as gallic acid; the latter would account for the crystal-line appearance of the residue. As such treatment of the drug would probably give tannic and gallic acids, we tried a mixture of the two by the same reagents as were applied to the so-called polygonic acid, and found a remarkable similarity. The conclusion naturally follows that polygonic acid is a mixture of impure tannic and gallic acids, together with a small quantity of chlorophyll.

The following summary shows the amount of the most important constituents:

	Per cent.	
Water	10.25	
Wax	2.70	From petroleum spirit solution.
Resin and chlorophyll	1.54	From ether solution.
Resin, tannin and chlorophyll	5.14	From alcoholic solution.
Sugar	1.44	From aqueous solution.
Gum	.55	
Tannin and extractive	5.23	
Albuminoids	1.00	From alkali solution.
Phlobaphene, etc	5.95	
Salts and a small amount of extractive	6.00	From dilute acid solution.
Cellulose	57.45	
	97.25	

Separately determined: tannin, 3.46 per cent. ; ash, 7.40 per cent.

PHILADELPHIA, December 16, 1884.

NUTMEGS ARE POISONOUS.—Early in December, 1884, one afternoon, a lady here ate one and a half nutmegs. About two hours after, she became drowsy, and remained so nearly an hour, the drowsiness amounting almost to stupor. This was followed by an excited condition, with sharp pain in the brain, then involuntary laughter, wild fancies and incessant talking, without loss of consciousness. Presently pain was felt in the region of the heart, with cold extremities and a depressing sensation. Her face was very pale and her pulse weak and thready. These alarming symptoms lasted more than an hour, during which time two doses of ammonium bromide were administered. Next morning it was necessary to repeat the dose. Since then she has been unusually nervous.

I publish this case because it is not generally known that nutmeg is poisonous; and, being regarded as a valuable domestic remedy, it is well to remember that large doses of it are dangerous. This patient took about 135 grs., whereas from 5 to 20 grs. is the dose.

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PRACTICAL NOTES FROM FOREIGN JOURNALS.

By HANS M. WILDER.

Oils of Cassia and Cinnamon may be distinguished by their specific gravity. The former has 1.0366, and the latter 1.0097.--Rundschau, viii, p. 768.

Musk.—The German Consul-General in Shanghai states that the average annual exportation is about 3,000 catties (one catty contains 15 to 20 pods of Yunnan musk, or 20 to 25 pods of Tonquin musk); this requires 60,000 musk deer. He states further that even the best pods do not contain much more than 60 per cent. of true musk, and 30 per cent. will about represent the average. —*Schweiz. Woch*., xxi, p. 157.

Meat Juice.-Sippel recommends the following as the easiest way to obtain nearly all the juice:

Cut one pound of best lean beef in slices about one-third of an inch thick, and lay the slices one alongside of the other On a strip of muslin, 6 inches wide and 1 yard long, sprinkling with fine salt. Now roll up the whole strip, tie a string several times around, and put in an ordinary press. After half an hour, about half a pint of red, transparent juice will be obtained.—*Pharm. Zeit. Russl*., xxii, p. 600.

Precipitation.—The best way to precipitate is not to pour one solution into the other, but to pour both simultaneously, in a thin stream, into a large quantity of water.

The precipitates obtained in this way are not only in an exceedingly fine state, but also easy to wash out and dissolve.

If the two solutions differ much in specific gravity, the best way is to let the heavier run in near the top of the water, and the lighter near the bottom. If possible, both solutions ought to be brought to the same bulk.—Dieterich, *Pharm. Zeit. Russl*., xxiii, p. 371.

Honey.—Dieterich finds that honey kept in woods very soon ferments, while honey from the same batch kept well in glass or earthenware.—*Pharm. Zeit. Russl*., xxiii, p. 385.

Fixed Oils, Fats and Ointments.-Dieterich strongly recommends benzoinating them; he employs at least 10 per cent. benzoin, although for fats 20 per cent. is better. Only recently rendered fat can be preserved successfully in this way (and all ointments made with it); old and partially rancid fats are not preserved. —*Ibid*., xxiii, p. 386.

CULTIVATION OF CINCHONA IN BOLIVIA.

By MINISTER GIBBS, OF LA PAZ.

I have devoted some time and attention to acquire data and information relative to the next important article, cinchona bark, or quina, of which large quantities are exported yearly. Formerly it was gathered by the Indians, and in such a manner that large forests were destroyed, trees cut down, the bark taken in any way merely to make up large quantities; to-day the quina plantations, or, as they are called here, quinales, are cultivated and nourished with care and agricultural science, the principal planters being Germans, one, Mr. Otto Richter, possessing two million plants; the estate of Mr. John Kraft, a Hollander, lately deceased, two million.

The cultivation of quina in plantations, systematically, has been carried on for about seven years, hardly long enough to show all the advantages, as there is room for much study and improvement.

Mapire, about sixty leagues north of this place, or about five days' journey, has under cultivation about four million five hundred thousand plants; Longa northeast of this city about twenty leagues, five hundred thousand plants; Yungas, east northeast twenty leagues, one million plants; Guanay, east of Mapire, five hundred thousand plants; total, six million five hundred thousand plants.

Where the principal quinales are it is a very rough and broken country, the Andes being seamed and cut into deep valleys in every direction. The trees are planted on the sides of the valleys or ridges in altitudes of about 3,000 to 4,000 feet above the sea. They will grow higher up, even to 8,000 feet, but are stunted, and will give little or nothing of what is called here the quina salt. The plants want a great deal of sun, heavy rains and fresh winds.

I have conversed with three of the principal superintendents of the large quina plantations, all Germans, and they say that the cultivation of quina is yet in its infancy, and there will be many improvements through time and experience.

A tree will give from fifteen to twenty pounds of seed. The seed collected in November and December (the early summer months here), and planted very thickly in boxes or beds about twelve feet in length and three feet in breadth, and placed on a slight decline or fall and well irrigated. When the plants are about six inches in height and have a few leaves-from five to six (which is about five months) they are transplanted; holes of some eight to ten inches deep are dug about six feet apart, in which they are planted. The plant is covered partly over with twigs and other light stuff, grass and leaves, to keep off the sun for about three months. When the plant is strong and healthy, the undergrowth of other plants is cleaned out and great care is taken. This attention continues for about two years, and then the plants that are left are considered sound. About 25 per cent. of all the plants decay or rot in this time. Afterwards the undergrowth is cleared out once a year, and when the tree is six years old it is productive, grows to about fourteen feet in height, and has a diameter of about six inches, up to six or seven feet. Where the bark is of the most productive kind, the trunk grows straight and slender, and has the form of an orange tree. When a tree is left standing for ten or twelve years, it is over a foot in diameter, the bark is thicker and heavier, but not so productive in quinia. The bark is ready to cut when the tree is about six years old. An incision is made around the trunk of the tree a few inches from the ground, another incision some twenty-four inches above around the tree, and then two incisions opposite, lengthwise. The bark is pulled off in two pieces. Two cuts, and sometimes three, are got off each tree, twenty-two to twenty-four inches in length, and seven to eight inches in width. When removed it curls up like the cinnamon bark. After the tree is stripped it is cut down, leaving a trunk about twelve inches above the ground, and from the base, where the bark has been left, there spring out some fifteen or twenty shoots or sprouts; these are left growing until they are a little higher than the stump, then they are thinned out, leaving two or three; they grow fast and in five years give good bark.

The trees produce on an average about four and a half pounds of bark, and are stripped, in the southern hemisphere, late in the spring, October to January. The bark is placed in paved yards, and is generally cured in four days, but if rain sets in, at times it takes nearly three weeks.

The principal enemy in the insect line is a large black ant, which is very destructive. There are various classes of the quina tree, calysaya, green and purple. The greater part of the quina passes through this city baled and sent to Tacne and Mollendo. Cinchona is the common name for all quina.

The market price is now forty cents per pound, Bolivian currency. It has sold as high as two hundred bolivianos per quintal. It formerly paid a tax of 6.40 bolivianos per quintal; now one half, 3.20 bolivianos, one half to the Government and one half municipal.

As the greater part of the quina forests were destroyed, and until very lately, the cultivation of quina has not been carried out in a proper manner, it is only now that it may be said to be a regular business. The highest exportation of late years has been twenty thousand quintals; but it has dwindled down for various causes, so that this year it will not be more than five thousand quintals, and at present prices leaves no profit, the expenses of getting it to the coast being heavy.—*Phar. Jour. and Trans.*

THE HARVESTING OF CINCHONA BARK.

The old idea that for the collection of the bark it was necessary to sacrifice or fell the whole tree, when grown to maturity, bad long made way for a better view. In English India, Broughton had begun, in 1866, to pollard the trees, in order to be able to lop the new shoots after four to five years (coppicing system) as is done in Europe with oak and ash coppice. But, besides the trees receiving a serious shock by this treatment, from which they do not so speedily recover, the bark thus obtained is not nearly so good as the stem bark.

It was, therefore, an ingenious idea of Mr. McIvor, in the Neilgherries, to cover the stems with moss, in order to improve the quality of the bark. He was led to this by observing that the best—the so-called crown-cinchona—always occurs covered with moss. He made experiments in this direction and the result was that, not only was the quality of the bark improved, but that in this way it was possible to strip the stem of a part of the bark and to heal the wound thus made by covering it with moss, in other words, to renew the bark by artificial means.

By experiments on a large scale the new discovery was crowned with the best success.

The “mossing system” is almost universally practised in Java since 1879, and numerous chemical analyses have shown that the proportion of quinine in the renewed bark increases, and is even trebled. The “coppicing system” is now only practised when a rapid production of bark is required, or when the sort does not allow of the “mossing system;” the filling, or rather uprooting, of the tree, is still practised exceptionally, when it withers, or when the plantation requires thinning.

Lastly, by way of trial, another method has been followed for a short time, viz., scraping off the outer bark; but though this product offered a precious and valuable material for the quinine manufacturer, the “scraping system” has not been continued on account of culture and commercial considerations. If I do not mistake, the Ledgeriana (in chips) realized at the sales in Amsterdam, in 1879, the enormous price of 10.44 *f.* per 1/2 kilogram. The quinine proportion was 13 per cent.

The “Coppicing system” in a modified form, by leaving one shoot on the stem, is now generally and successfully practised in Java with the *C. Ledgeriana.*

The harvest of cinchona bark deserves a moment’s further attention, as so little is known about it. Do not expect a description like “Les Vendanges” in Provence or Languedoc, or a mill-feast in a sugar-works in East Java, or of the padi-cutting in Java described by Multatuli. The reaping of the cinchona bark is unattended by poetical accessories, and the work-people are all quiet. In those elevated regions, sparsely populated, and then only temporarily, no clamor whatever prevails. All nature bears an appearance of monotony and gloominess. In the gardens and woods the sun can hardly penetrate; the trees mostly dripping with rain, or from the clouds floating above, it breaks down in a dreadful thunderstorm. Then the laborers—among whom are not unfrequently mothers with infants at the breast—experience all the miseries of a mountain climate at an elevation of 7,000 feet. Shivering with cold, the women sit, sheltered as much as possible by a screen of plaited dried leaves, peeling the lopped branches, and cutting the wet bark to measure; the small slivers, or so-called refuse, is carefully collected in baskets.

The heavier work is performed by men; they lop the branches, or, if the “mossing System” be followed , they make incisions lengthwise in the stem, at intervals of 3 to 5 or more centimetres, according to the thickness of the tree, and then strip the stem from below upwards to where the branches begin, but in such a manner that strips of bark of equal breadth are left alternately on the stem, by which it assumes somewhat the appearance of a fluted column. The strips of bark are then cut into lengths of 50 centimetres , and the stem, which is partially denuded lengthwise, is entirely enveloped, as is done in Europe to some trees that could not bear exposure to our winters. McIvor at Madras did this first with moss, and hence the name “mossing;” but as this material was soon exhausted in Java, recourse was had to alang-alang, indjoek or dried grass, which occurs in great abundance.

In the course of one year this envelope is removed, then the healing—granulation we should say—the renewing of the bark is begun, and now comes the turn of the strips left on the tree the preceding year to be stripped off. Then the stem. is again bandaged.

The wet bark, after being cut to measure, is dried either in the sun, or artificially, by which the pieces roll up in their breadth and thug form the familiar pipes. The packing is generally in jute-bags. They weigh about 75 kilograms.

From chemical investigation it has been proved that drying in the sun or by artificial beat is the same for the bark, and has no influence on the proportion of quinine.-*Phar. Jour. and Trans.*, Nov. 22, 1884, p. 410.