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Botanical Medicine Monographs and Sundry

CATECHU AND GAMBIER.<sup>1</sup>

By HENRY TRIMBLE.

QUERY No. 27.— “The U. S. P. denotes as catechu the extract of *Acacia Catechu*; the Br. P. uses the extract of *Uncaria Gambier*. Which of these two is to be preferred?”

The extract of *Acacia Catechu* is known in commerce as *cutch*, and that from *Uncaria Gambier* as *gambier*; the former of these terms, therefore, will be used to indicate that officinal in the U. S. P., and the latter that of the Br. P. Catechu is a term applicable to either or both.

Considerable difficulty was experienced in finding gambier among the wholesale druggists, and such synonyms as “pale cutch” and “terra japonica” were tried, but either ordinary cutch was sent, or I was told they did not keep it.

It must be borne in mind that cutch is not imported primarily for use in medicine, but is brought in by hundreds of tons for the use of dyers. Gambier comes in cubes or masses of indistinct cubes, in equal if not larger amounts than cutch, for the use of both dyers and tanners. Their prices are about the same, ranging from five to eight cents per pound. All authorities agree that the medicinal use of these two remedies is for their astringent and very slight tonic properties; therefore, preference should be given to the one which possesses the greatest astringency.

A chemical examination of representative samples as found in our market, was apparently the only method of solving the problem, therefore the results of the examination of three samples of each will be given as a basis, although a number of others were partly examined in studying adulterations and searching for catechin.

No. 1. Cutch “S. M.” brand, in good repute in U. S.

No. 2. Cutch, “M. M.” brand, in good repute in England, and given me by a Bradford dyer.

No. 3. Cutch, brand not known, purchased of a wholesale drug firm in Philadelphia.

No. 4. Gambier, in masses, from a wholesale drug firm of Philadelphia.

No. 5. Gambier, in cubes, dark, direct from importer.

No. 6. Gambier, in cubes, light, direct from importer.

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<sup>1</sup> Read before the American Pharmaceutical Association at Detroit, and communicated by the author.

One gram of each was powdered and extracted in a Tollens apparatus, successively with boiling stronger ether and boiling absolute alcohol. The residue was percolated with cold distilled water as long as anything dissolved. The following is a summary of results in per cent.

Sample No.....	1.	2.	3.	4.	5.	6.
Soluble in stronger Ether....	33·30	33·65	25·60	45·59	36·45	40·20
Soluble in Absolute Alcohol.	22·08	22·63	31·78	26·80	32·28	28·25
Total by Ether and Alcohol.	55·38	56·28	57·38	72·39	68·73	68·45
Soluble in Water.....	27·40	29·01	20·50	10·13	15·20	16·05
Total Solubility .....	82·78	85·29	77·88	82·52	83·93	84·50

It is usually stated in the books that the important constituents of these two drugs are catechin, soluble in ether, and catechu-tannic acid, soluble in water and alcohol, but insoluble in ether. If this be true, we would have a very ready method of determining the value of a sample; for, by simply adding those portions soluble in ether and alcohol, we would have the total available portion. That soluble in water after the above treatment, and so given in the chart, is mucilage with a part of the inorganic constituents, and forms no part of the most important pharmaceutical preparation the tincture.

The sum by the first two solvents very closely indicates that which would be dissolved in making the tincture, but as will be shown it does not indicate the astringent value of the samples. A more accurate method for estimating the catechin, is to extract it by agitating the aqueous solution with ether. By this process the following percentages were obtained:

Sample No. 1.	2·80.	Sample No. 4.	12·64.
Sample No. 2.	1·70.	Sample No. 5.	7·76.
Sample No. 3.	10·70.	Sample No. 6.	19·76.

The aqueous residue from the agitation was warmed to expel ether, and treated in some cases with gelatin and alum, in others with gelatin and ammonium chloride, to separate tannin. The results in all cases were low and unreliable.

Portions of the original samples were then treated with "hide powder," according to the method of Simand and Weiss (*Dingler's Polyt. Jour.*, 260, 564), and the results for tannin gotten, which, while not entirely satisfactory, are undoubtedly the best to be obtained with our present knowledge. The following are the percentages of tannin :

No. 1.	31·94.	No. 4.	33·34.
No. 2.	33·54.	No. 5.	47·18.
No. 3.	25·50.	No. 6.	45·90.

By adding to these figures the amount of catechin, we get the total available value,

and by then adding the mucilage, ash and moisture, and subtracting from 100, we find the per cent. of inert constituents.

Samples No.....	Cutch.			Gambier.		
	1.	2.	3.	4.	5.	6.
Catechin.....	2.80	1.70	10.70	12.64	7.76	19.76
Catechu-tannic Acid.....	31.94	33.54	25.50	33.34	47.18	45.90
Total Valuable Constituents..	34.74	35.24	36.20	45.98	54.94	65.66
Mucilage.....	27.40	29.01	20.50	10.13	15.20	16.05
Ash.....	2.29	2.27	2.10	4.74	3.37	3.50
Moisture.....	12.50	12.20	15.36	10.33	11.03	9.90
Coloring and other Inert Mat- ter.....	23.07	21.28	25.84	28.82	15.46	4.89
	100.00	100.00	100.00	100.00	100.00	100.00

Dr. A. Lehmann (Dissertation, Dorpat, 1880), examined a large number of samples of cutch and gambier, and found the catechin to vary from 13.8 to 33.8 per cent., and the catechu-tannic acid from 22.6 to 60.8 per cent. He was evidently able to procure better samples than the average that come to this country, although the results given in the above chart indicate the absence of intentional adulteration.

It has long been a statement in the text books that cutch and gambier are identical in chemical composition. It has, however, never been proven, and I am convinced that it is entirely erroneous. In the above samples no crystallized catechin could be obtained from samples 1 and 2, and only a small quantity from 3, while it readily crystallized from the aqueous solution of the ethereal extract of gambier. Both the physical appearance and the analysis indicate that there are important differences in the coloring matter of the two. This is further emphasized when we consider their respective commercial uses. The tanner selects gambier for his purpose because he wishes tanning material without color; the dyer prefers cutch, because he wants coloring matter as well as tannin, the color in some cases being the more important of the two. From the published accounts of the methods of preparing these two drugs, it is impossible to believe they could be chemically identical.

Apart from their different botanical origin, the long continued heating necessary to extract cutch from the hard heart wood, is so different from that required to exhaust the more porous twigs and leaves of the gambier, that the evaporation in the case of the cutch is carried directly to dryness, the decomposition products being such as to prevent the "setting" of the mass as it does in the case of the gambier.

In the latter the concentration of the liquor is stopped when it reaches the consistency of syrup, and the liquid by stirring and cooling "sets" on account of separation of catechin, becoming of such solidity that it can be cut into blocks, and further dried at such a low temperature that comparatively little change takes place. When gambier comes in cubes it precludes a kind of adulteration which is extensively

carried on with cutch, namely the admixture of small stones, pieces of earthenware and bricks.

Such adulteration is liable to be overlooked in selecting samples for analysis, and is best indicated when a large lot is powdered and portions of this analyzed.

Two samples of powdered cutch were examined and yielded 14.01 and 18.20 per cent. of ash, which was made up of sand and crushed stones. These samples had been further reduced in value by the heat necessary to dry them previous to powdering, as is indicated by the following percentage results obtained by treatment with ether and alcohol:

Samples No. ....	7.	8.
Soluble in ether .....	0.90	8.75
Soluble in absolute alcohol.....	9.93	17.50
Total valuable constituents.....	10.83	26.25
Mucilage, etc.....	47.30	29.10
Ash.....	14.01	18.20
Moisture.....	14.10	7.30
Insoluble.....	13.76	19.15
	100.00	100.00

Gambier in cubes could not be so adulterated, and it is so dry as to be readily powdered in a mortar without previous heating to expel moisture. It is stated that gambier is adulterated by the addition of clay, but this admixture is probably not more common than it is with cutch; in both it may be detected by the amount of residue left on burning.

Another important point is to be observed in regard to cutch ; there are on the market for the use of dyers, several preparations under the name of "patent cutch," "purified cutch," etc., made by dissolving the commercial article in warm water, evaporating this aqueous solution, and adding some mordant, often potassium bichromate, to develop the color for the dyer.

These preparations are liable to creep into the drug market, and if used in medicine do much harm. Such accidents would be impossible if cube gambier alone were used. British writers are singularly reticent about their reasons for preferring gambier, but it is probably in view of facts similar to those above given. The Edinburgh Pharmacopoeia, about 1840, was the first to give the option of using the extract of *Uncaria Gambier*, as well as that of *Acacia Catechu*. When in 1864, the three British Pharmacopoeias were incorporated under one name, both were retained under the distinct titles of "Catechu Pallidum," and "Catechu Nigrum," but in 1874 the latter was abandoned. The only English criticism I have been able to find on this change is by Mr. Peter Squire (Companion to British Pharmacopoeia, 10th edition, page 85),

who states that the black is the one adopted by other Pharmacopoeias, and is preferred in the arts and manufactures. It is well known "to be by far superior to the pale in astringency, and always to be had of good quality; it is therefore a matter of surprise and regret that it has been rejected from the British Pharmacopoeia."

Notwithstanding this adverse opinion, which appears to be only an opinion, if the committee on revision of the U. S. P. will make the change to gambier in cubes, and include in addition to the requirements of the Br. P., that it shall not yield over 5 per cent. of ash, I believe it would be preferable for the following reasons:

1. Gambier has more available astringency.
2. If in cubes it cannot be so easily adulterated.
3. Being more carefully dried it is more easily powdered than cutch, and without the further application of heat.
4. The cubes are more uniform in composition, and are not liable to contain mordants added for the use of dyers.

#### NOTE ON STAR ANISE.

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

The recent publication of a description and figure of the true star-anise plant in the *Botanical Magazine*, by Sir Joseph Hooker, affords an opportunity of adding to the notes on this subject which appeared in a previous volume of the *Pharmaceutical Journal* ([3], vol. xi. page. 489. See also Am. JOUR. PHAR. 1881, pages 335 and 412).

In December, 1880, notwithstanding the publication of *I. anisatum*, as the botanical source of star anise in Bentley and Trimen's "Medicinal Plants," Dr. Bretschneider, then medical officer to the Russian Embassy at Peking, in "Notes on some Botanical questions connected with the Export Trade of China," states "the plant which produces this article is still unknown to botanists," and he then goes on to remark, "The first authentic information concerning the actual habitat of the star anise tree was furnished by Mr. Piry, in his 'Report on the Trade in the Port of Pakhoo' for the years 1878-1879, in which star anise is said to be brought for exportation to Kin-chow and Pakhoi from the province of Kuangsi, two districts in that province producing the article, Lung-chow on the borders of Annam and the country about Po-se on the West River, close to Yunnan."

Dr. Bretschneider adds a translation from the well-known work on Chinese materia medica and natural history "Pen t'sao kang mu," vol. xxvi., fol. 62, in which it is stated that star anise grows in the mountains near the Tso-kiang and Yu-kiang (rivers), and that the kind most valued in China grows in Kuangsi and Kuangtung and in Annam. Dr. Bretschneider remarked that both the above rivers are in Western Kuangsi, the first being a tributary of the West River. The city of Po-se mentioned by Mr. Piry is

situated on it. The Tso-kiang is a southern tributary of the Yu-kiang. These notes appear to have attracted the attention of the late Dr. Hance, who in October, 1881, forwarded seeds of the true plant received from Pakhoi to Kew.

In the same year fruit and fragments of the leaves were forwarded by Mr. C. Ford from the Hong Kong Botanical Gardens to Kew.<sup>2</sup> A few seedlings of the plant obtained by Mr. Kopsch, Commissioner of the Chinese Imperial Maritime Customs at Pakhoi, were grown in the Hong Kong Gardens and flowered in November, 1886, when the plants had attained a height of nine feet. Some seedlings sent by Mr. Ford to Kew in 1883 flowered at Kew in 1887, and from these the excellent plate given in the Botanical Magazine was drawn.

Sir Joseph Hooker points out that the plant must be placed in quite a different section of the genus from that to which *I. anisatum*, L., belongs, since it has broad obtuse perianth segments, and the peduncles are not bracteate at the base. He describes it as a new and hitherto undescribed species, as follows :—

“*Illicium verum*, Hook. f. (*Bot. Mag.*, t. 7005, July, 1888.)—*Illicium verum*: foliis elliptico-lanceolatis v. oblanceolatis obtusis v. obtuse acuminatis in petiolum brevem. angustatis floribus axillaribus breviter pedunculatis globosis, perianthii foliolis ad 10 orbiculatis concavis coriaceis exterioribus majoribus ciliolatis intimis rubris staminibus ad 10 brevibus, filamentis cum connectivo, in corpus carnosum subvoidem confluyente, loculis adnatis parallelis subremotis oblongis, carpellis ad 8 stigmatibus brevibus vix recurvis carpellis maturis ad 8 cymbiformibus longiuscule rostratis.

“*I. anisatum*, ‘Gaert. Carp.,’ vol. i., page 338, t. 69 (Non Linn).”

The leading features in the plant appear to be the solitary axillary globular flowers, which do not expand fully, the segments remaining convex, the inner segments being red, and the ten stamens, in which the filament forms with the connective an ovoid body. The peduncles are curved and barely half an inch in length. It may be here remarked that a very similar plant, but with smaller and yellowish flowers, has been grown at the Botanical Gardens at Regents Park for the last eighteen years under the name of *I. anisatum*, but the leaves of this species have a sassafras taste. They differ from those of *I. religiosum* in having the midrib prominent below and depressed on the upper surface of the leaf, while in *I. religiosum* the midrib is prominent on the upper and not on the lower surface, and the taste is astringent and terebinthinous.—*Phar. Jour. and Trans.*, August 11, page 101.

## MODE OF FORMATION OF GUMS AND GUM-RESINS.

Although these two classes of substances differ, as a general rule, in their mode of formation—the former being the result of chemical changes in the cell-wall, the latter a secretion in the interior of cells—this is not altogether without exception. In some species of *Orchis* true gum or mucilage is secreted in the interior of cells. Intercellular passages or canals are known as “schizogenous,” when they result from the simple separation or parting of cells, “lysigenous” when they are formed by the absorption or

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<sup>2</sup> *Bot. Magazine*, t. 7005.

disappearance of cells or cell-walls. Essential oils and gum-resins are generally formed in a layer of so-called "epithelial" cells lining the cavity or receptacle, which may be either of schizogenous or lysigenous origin, and into which they are diffused through the very thin cell-walls of the epithelial cells. There are, on the other hand, instances in which the cell-wall takes part in the formation of essential oils and resins, as in the lysigenous oil-passages of the Aurantiaceae.

In a recent paper in the *Berichte* of the German Botanical Society, Herr A. Tschirch describes the mode of formation of a number of essential oils and gum-resins. Copaiva balsam, derived from *Copaifera Langsdorffii* and *officinalis*, is not formed, as is sometimes stated, in schizogenous, but in lysigenous canals. The absorption of the cell-walls and the formation of the resin commences in the parenchyma of the wood, advancing from there to the medullary rays, the libriform and the vessels. The resin-passages in species of *Dipterocarpus*, which yield gurjun balsam, and those in *Eperna falcata*, which yield *Balsamum antharthriticum*, are formed in the same way. In *Styrax Benzoin* also, the source of the benzoin of commerce, the resin is not formed in schizogenous, but in lysigenous canals. The formation originates in the medullary rays, advancing from there to the surrounding phloëm-parenchyma, and finally to the bast-cells and selereïdes.

The same is, in general terms, the history of the formation of the resin in *Abies* and *Thuja*. But in the various kinds of myrrh, derived from species of *Balsamodendron* and *Boswellia*, the gum-resin is always formed in schizogenous receptacles or in true cells. In *Laurus Camphora* also, in the formation of camphor oil, actual absorption of the cell-walls could not be detected. In young branches it is contained in thin-walled cells situated in the wood near to the medullary rays. The large fissures in old wood filled with camphor are probably of lysigenous origin, like those of the wood of *Andira*, which contain "araroba," and those which contain catechu in *Acacia Catechu*.—*Phar. Jour. and Trans.*, August 11, page 108.

## AMERICAN PHARMACEUTICAL ASSOCIATION.

The city of Detroit having been selected for holding the thirty-sixth annual meeting, the local Secretary, Mr. James Vernor, efficiently aided by a local committee, had made ample preparations for the accommodation of a large number of visitors, and for a very extensive exhibition of drugs, chemicals, galenicals and other objects of interest to pharmacists and druggists. The exhibition was held in the Detroit Rink, on Larned street, a spacious building which was handsomely fitted up for the purpose, the various collections being shown to advantage. Numerous visitors were constantly in attendance examining the interesting, and in many instances, instructive exhibits.

The sessions were held in the armory of the Detroit Light Infantry, located on Congress street, the entire building having been secured for the use of the Association. The parlors were specially reserved for the ladies; but one of the parlors was subsequently used for holding the meetings of the Sections while the general sessions took place in the large hall on the top floor, which was also utilized for the reception tendered to the officers of the American and of the Michigan State Pharmaceutical Associations, and for the hop following the reception on Wednesday

evening.

At the Hotel Cadillac the Council hold a short meeting on Sunday evening and a protracted session on Monday morning for the reception of the various reports and for arranging the business which was to come before the Association.

The first general session was held on Monday afternoon at 3.30 o'clock, when President J. U. Lloyd called the Association to order, and was followed by Rev. Dr. Henderson, who opened the sessions with prayer.

(excerpted papers follow)

*Calycanthus seed.*—The seeds of *Calycanthus glaucus*, Willd., are reported in the Southern states, to be poisonous to animals, producing symptoms resembling those following the use of strychnine. Dr. R. G. Eccles has isolated from the seeds a minute quantity of a new alkaloid, *calycanthine*, which is slightly soluble in water, but very soluble in ether or chloroform, while the salts are insoluble in the latter liquids, but freely soluble in water. Strong nitric acid colors the alkaloid green; and potassa saponifies it, producing a crystallizable alkaloid and a strong sweet odor resembling ylang-ylang. The bark, leaves and flowers of calycanthus contain essential oil, but the seed is free from it.

*Aromatic Elixir of yerba santa.*—It is made by agitating together 8 fluidounces each of compound elixir of taraxacum and syrup with 240 grains of powdered pumice, then adding 1 fluidounce of fluid extract of yerba santa; after a few hours decant and filter through cotton; agitate the filtrate with 80 grains of magnesium carbonate, and after several hours filter. A fluid drachm of this elixir, mixed by agitation with 5 grains of quinine sulphate, completely covers the taste of the latter. The elixir, as well as its mixture with quinine, improves with keeping.

In the discussion following the reading of this paper it was stated that the compound elixir of taraxacum of the National Formulary covered the taste of quinine completely, but that its taste was not very agreeable.

*Peppermint Oil.*—Prof. A. B. Stevens found the polarizing power of menthol, both Japanese and American, to be from  $-95^{\circ}$  to  $-100^{\circ}$ ; the dementholized oil of peppermint has a polarizing power lower than that of the oil from which it was obtained. The volatile oils of camphor, pennyroyal and turpentine have a right rotation, and when mixed with oil of peppermint lessen the levogyre rotation of the latter. A drachm of nitric acid agitated with a drop of pure oil of peppermint will produce a permanently yellow mixture, which in the presence of oil of camphor becomes red in 15 or 20 minutes. Experiments were also made with the decolorizing of iodine by oil of peppermint, the reaction being interfered with by the presence of alcohol.

Professor Trimble's papers on Catechu and on precipitated ferrous sulphate are published in full in this number.



*Loco-weed.*—*Astragalus mollissimus* is the plant which in Kansas and other localities is known as loco weed, and which has been believed to be poisonous to horses and cattle. Occasionally a similar plant, having a hairy pod—probably *Astragalus Bigelowii*—is said to be equally poisonous; and in certain localities, where these species do not grow, *Oxytropis Lamberti* is regarded as loco- or poison weed. Professor Sayre's investigations, extending over a period of three years, render it very doubtful whether these plants really possess any poisonous properties, since chemical investigation has thus far failed to reveal the presence of a poisonous principle, and the plant or extract given to animals, or taken by man, produced no bad effects. Occasion is taken in the paper to point out the importance of scientific investigation, and reference is made to an enactment of Colorado, offering a bounty of 1<sup>1</sup>/<sub>2</sub> cents for each pound of loco-weed (dried) dug up at least three inches below the surface of the ground, with the view of eradicating it. About \$200,000 have thus far been expended by the State for this purpose, and now it seems probable that the plant is harmless, and that the animals have died from some other cause. Reference was also made in the discussion on this paper to different species of *Kalmia* and other plants, which are reputed to be poisonous to animals, but of whose deleterious effects satisfactory evidence has not been produced.

Subsequently a resolution was passed earnestly recommending to the legislatures of Kansas and other States in which the loco-weed grows, that they give Professor Sayre their hearty endorsement for support for the further investigation of the loco poison .

*Natural and Artificial Spring Waters* was the title of a paper read by Mr. Enno Sander, who spoke also of the attempts made by a New York firm to prevent the manufacture and sale of artificial Carlsbad water and salt. Mr. Hallberg offered a resolution declaring it to be the right and privilege of pharmacists of this country to prepare and sell any preparation for which a formula is contained in the "National Formulary." The expediency of passing such a resolution was questioned by Messrs. Sayre and Remington, and it was finally withdrawn.

*A Still for Volatile Oils* was described by Mr. A. M. Todd, who exhibited also a model for such an apparatus. Stills and condensers, and the conditions for distilling and condensing properly, were discussed, and in reply to a question, Prof. Prescott stated that in many of the charcoal furnaces in Michigan provision was made for the condensation of vapors. which in other localities were allowed to escape, and that large quantities of wood alcohol were thus obtained.