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Botanical Medicine Monographs and Sundry

EXTRACTUM RUBI FLUIDUM.

By CHARLES BORN EVANS, PH.G.

From an Inaugural Essay.

Fluid extract of blackberry, as made by the formula authorized by the Pharmacopoeia, is a preparation which decomposes quite rapidly, and upon standing for a short time becomes very unsightly. I have been experimenting for some time in order to ascertain whether a menstruum could not be found that would prevent this decomposition, and yet extract the medicinal properties of the drug, and have succeeded in making some preparations which have stood very well for a month or two.

It was found impossible to prevent a slight precipitation when the reserve portion and the evaporated soft extract were brought together, but in some cases this residue was quite inert.

Six different preparations were made, using the bark in all cases in No. 60 powder.

For No. I the menstruum was alcohol 9 parts, water 7 parts, with 20 per cent. of glycerin. The drug was moistened, packed and macerated according to the rule specified for the making of fluid extracts. After the portion to be reserved was obtained, the drug was exhausted with a mixture of alcohol and water, in the proportion of 9 parts of alcohol to 7 parts of water.

Different menstrua were used in the other preparations, but the pharmacopoeial rule of manipulation was followed for all, and in each case the menstruum remained unchanged, except that the glycerin was omitted for the percolation of the last portions of tincture. The menstruum consisted for No. 2, of alcohol 2 parts, water 1 part, and 20 per cent. of glycerin; for No. 3, alcohol 3 parts, water I part, with 20 per cent. of glycerin; for No. 4, alcohol 4 parts, water 1 part, with 20 per cent. of glycerin; for No. 5, alcohol 3 parts, water 1 part, glycerin, 30 per cent., and for No. 6, alcohol 4 parts, water 1 part, with 30 per cent. of glycerin.

Shortly after the liquid commenced to drop from Nos. 1 and 2, there was a slight sediment deposited upon the bottom of the bottle; and as the liquid rose in the bottle there was more or less of a deposit upon the sides, the deposit being larger in No. 1 than in No. 2. By the time the drug was exhausted, the bottles which received the weak percolates were entirely coated with a grayish deposit, while there was a thick sediment upon the bottom. After recovering the alcohol from these weak percolates, the residue left in the still was quite large and of a mottled brown color. This improved

as the liquid was evaporated upon a water-bath, and by the time it was in the condition of a soft extract, the color was almost pure black, as it should be. As soon as the reserve portion was added to the evaporated extract, the liquid assumed a brown color, and after standing 24 hours, the brown portion sank to the bottom, while the remainder of the liquid regained its original black color.

All the preparations behaved in the same manner, but in the more strongly alcoholic liquids the original color was regained more rapidly and the deposit was slight, while in Nos. 1 and 2 it occupied fully one-third of the bottle.

Nos. 3 and 4 were very much alike in their behavior. The reserve portions of both stood for several days without any deposit forming upon the sides or bottom of the bottles. There was, however, a slight deposit in the bottle which received the weak percolate from No. 3. In the case of No. 4, the weak percolate was as clear when the drug was exhausted as when the operation commenced. The residue left in the still after recovering the alcohol from Nos. 3 and 4, was quite small compared with that of Nos. 1 and 2, and was of a clear black color. As mentioned before, when the reserve portion was added to the evaporated portion, there was a precipitation, but quite small in both preparations.

The fluid extracts in Nos. 3 and 4 were allowed to stand for some time, and then filtered. The residue collected upon the filter in either case was very small. Washing it with boiling water had very little effect, except to take out the coloring matter in part. What remained was of a white waxy appearance, and soluble in strong alcohol. It was immediately precipitated from its alcoholic solution by pouring it into water. When the water was evaporated and the residue dried it was of a greenish color and entirely tasteless.

Both preparations have been standing for over a month since they were filtered, and as yet show no signs of decomposition, and by their taste one is assured that they have lost little, if any, of their astringency on account of the precipitation which took place when they were first made.

No. 5 and 6 were made of the same alcoholic strength as 3 and 4, but contained 10 per cent. more of glycerin. As far as can be seen they are in no way different from 3 and 4. Their behavior throughout during the process of preparation was the same as that of 3 and 4, and the finished products are apparently the same, and just as likely to remain perfectly clear upon standing.

In all the preparations the menstruum used entirely exhausted the drug. In No. 1, all the coloring matter was removed; in No. 2, nearly all, while in 3, 4, 5 and 6 the liquid continued to drop colored after the drug was entirely tasteless. But the coloring matter is of little moment since astringency is what is required in this preparation.

ASPIDIUM MARGINALE, WILLDENOW.

By CHARLES DEWALT KEEFER, PH.G.

From an Inaugural Essay.

The drug was collected in September along a hillside, facing northward, of South Mountain, Franklin County, Pa., and on being dried by artificial heat at a temperature of about 31º C., lost 64.824 per cent. Two years ago 185 rhizomes were collected and dried, the loss being 60.454 per cent.

For analysis 50 gm. of the drug reduced to No. 60 powder were used. It was exhausted with petroleum spirit, and the liquid distilled, evaporated and kept at 100ºC., when the oily residue weighed 4.40 per cent. This, on exposure to 110ºC., lost 0.40 volatile oil, and by treatment with hot absolute alcohol was separated into 1.0 wax and 3.0 fat, the latter dissolving in the hot alcohol, melting at 40ºC., and saponifying with soda solution.

The ethereal extract consisted of 0.61 per cent. of resin and chlorophyll, was free from tannin and sugar, and like the petroleum extract, had an offensive odor and nauseous bitter taste.

The alcohol extract weighed 3 per cent., was yellowish-brown, sweetish and astringent, and was partly soluble in water. From the aqueous solution 0.60 filitannin was precipitated by lead acetate (0.54 by copper acetate), and the filtrate contained 0.2848 cane sugar, which, after boiling with hydrochloric acid, was estimated with Fehling's solution. The portion insoluble in water contained phlobaphene and a bitter principle.

Treatment with distilled water yielded a liquid from which, with three volumes of wood alcohol, 0.24 per cent. mucilage was precipitated. The filtrate contained 2.40 dextrin, glucose and other carbohydrates.

The liquid obtained from the partly exhausted drug by treatment with 0.20 per cent. solution of caustic soda, yielded with acetic acid and wood alcohol a precipitate of 7.50 per cent. of pectin and albuminoids (ash deducted), while the filtrate still retained 6.82 per cent. organic substances dissolved from the drug.

Diluted hydrochloric acid now dissolved from the drug 0.84 per cent. calcium oxalate, 0.71 parabin and 0.80 albuminoids; and by further treatment with chlorine water, and with nitric acid with theaddition of potassium chlorate, the lignin and hydrocellulose were separated, leaving 50 per cent. of the original weight of the drug, representing resistent carbohydrates including cellulose. The starch, 7.186 per cent., was determined separately from a fresh portion of the powder.

Not having separated any filicic acid in the foregoing experiments, one pound of the powdered drug was exhausted with ether, and the resulting oleoresin was exposed to

cold, but the acid did not crystallize out.[1] On treating a portion of the oleoresin repeatedly with warm alcohol, a few yellowish crystals formed which, however, appeared to, be prone to oxidation, and could not be retained. Attempts to separate the acid with lead acetate, ammonia, fixed alkalies or lime water, were unsuccessful. With the last named agent a filtrate was obtained which with very dilute sulphuric acid produced a pinkish precipitate, insoluble in petroleum spirit, but dissolving in ether. This solution bad an acid reaction, and on evaporation left an amorphous residue, giving no reaction with ferric chloride; its solution in alcohol, on being allowed to evaporate spontaneously, developed an ethereal odor.

Oleoresin of aspidium.—Two commercial samples were obtained, one of which had an odor of acetic ether, was of a dark color and of a pilular consistency, and was found to be soluble in that menstruum, and only partly soluble in ether, petroleum spirit, alcohol and absolute alcohol. The other sample was liquid, of a greenish color, had the odor of ether, and was more freely soluble in the liquids named above.

CASSIA MARILANDICA, LINNE.

By HERMANN J. M. SCHROETER, PH.G.
Abstract from an Inaugural Essay.

General characters.—American senna, as seen in commerce, consists of leaflets varying in length from one to two inches, and in breadth from one-quarter to one-half inch. In shape they are ovaloblong or oblong-lanceolate, entire or broken; of a pale green color, a feeble odor, and a bitterish sweet, nauseous taste, resembling that of Alexandria or East India senna somewhat. It is commonly found in the shops in the form of oblong or square cakes, which usually consist of leaflets, petioles and flowers compressed together in a compact form,

The investigation of this drug was conducted in the chemical laboratory of the Philadelphia College of Pharmacy, for the purpose of comparing its composition with that of Cassia nictitans, similarly examined by Mr. C. S. Gallaher. The leaves investigated were collected in this vicinity during the past month of August, and upon being air-dried, were subjected to the following analysis:

Proximate chemical analysis.—The scheme recommended by Dragendorff was used as a basis for the analysis of the drug. The drug was reduced to a number eighty powder. The moisture present was determined to be 8.90 per cent., and the inorganic constituents 6.80 per cent. The ash contained carbonic, phosphoric, hydrochloric and. sulphuric acids. It yielded to water 1.4 potassium and sodium salts, and to hydrochloric acid 4.8 salts of calcium, magnesium and iron, the undissolved, 0.6, being silica.

The extract obtained with petroleum spirit (boiling point 45ºC.) lost on heating to 110º C., 0.04 per cent. of volatile oil; the residue left, 3.60 per cent., was soft, fatty, dark-green in color, due to traces of chlorophyll, and fused at 59ºC. Boiling absolute alcohol dissolved all but 0.1 per cent., which was regarded as caoutchouc. On cooling this

1 Crystals having the behavior of Luck's filicic acid were obtained by Mr. Jas. L. Patterson (See AMERICAN JOURNAL OF PHARMACY, 1875, p. 293) from the oleoresin of Aspidium marginale by setting it aside for several weeks.—EDITOR.

solution separated out 0.30 per cent. of wax, which was white and soluble in chloroform. The fixed oil was also soluble in stronger ether and chloroform. On treatment with concentrated potash and soda solutions and heating, it would not saponify, but on dilution with water, it rapidly mixed with same. The soap obtained on the addition of sodium chloride to this mixture, was of a greenish-brown color; the mother-liquor having a reddish color.

The ether extract of 2.87 per cent. was less soft than that obtained with petroleum; of a dark green color, resinous and possessing the odor of the drug. Almost all of the chlorophyll was in this extract. It was soluble in chloroform and benzol, and partly so in absolute alcohol; the melting point was 63ºC. Water dissolved but 0.03 per cent., including a trace of tannin. To this aqueous solution, alkaloidal tests were applied to both alkaline and acid solutions, but with no results. Absolute alcohol dissolved 1.98 per cent., leaving a residue of 0.86 per cent.

The extract with absolute alcohol, representing 7.40 per cent., was mostly soluble in water; the portion insoluble was weighed as phlobaphene. This aqueous solution was found to contain 0.625 per cent. of tannin, and 0.558 per cent. of glucose. The tannin was estimated by precipitation with acetate of lead, and also with acetate of copper; both results varied only slightly, showing the presence of tannic acid alone. The solution after precipitation with lead acetate, and decomposing the excess of lead with H_2S gas, was treated with Fehling's solution, and the amount of glucose determined gravi metrically. The aqueous solution was also tested for alkaloids by agitating successively with petroleum spirit, benzol and chloroform, both in alkaline and acid solutions, but with negative results in all experiments.

The water extract, after deducting the ash (3.60 per cent.), amounted to 20.24 per cent., was of dark-brown color, and had the odor of burnt sugar. The mucilage was precipitated with two volumes of absolute alcohol, and by further concentration and precipitation with four volumes of absolute alcohol, dextrin, etc., was separated and estimated. The mucilage obtained was not all redissolved in water, showing the presence of some albumen in this extract, which was also estimated. The filtrate from the mucilage and dextrin after evaporation of the alcohol was precipitated with acetate of lead; the precipitate, after weighing, igniting and deducting the inorganic substances, was calculated as total organic acids and allied substances. From another portion of this filtrate was estimated quantitatively the glucose from the cuprous oxide obtained in an alkaline copper solution by igniting it and multiplying by 0.45. Another portion of the filtrate was boiled with dilute hydrochloric acid, and then treated with Fehling's solution; from the total amount of saccharoses thus estimated, that of the glucose previously found was deducted, leaving the amount of cane sugar present.

The powder was further treated in succession with caustic soda (0.2 per cent.) for determining albuminoids and extractive; with hydrochloric acid (1 per cent.) for determining pararabin, etc.; with chlorine water for determining lignin; and with nitric acid and potassium chlorate for determining hydrocellulose. The remaining residue was weighed as cellulose after deduction of the ash.

The starch was estimated quantitatively from five grams of a fresh portion of the powdered drug. This was mixed with a 4 per cent. solution of caustic potash in alcohol,

and heated to boiling for one day, using an upright condenser. After filtering and washing, the residue was exhausted with water to remove mucilage, etc. The remaining residue was then boiled with dilute HCl to convert the starch into glucose, which was then calculated from the cuprous oxide formed in an alkaline solution of copper; upon ignition and multiplying by 0.408, the amount of starch was obtained.

The results of the proximate chemical analysis are tabulated as follows:

Soluble in *petroleum spirit:*		
Fixed oil	3.200	
Volatile oil	.040	
Wax, soluble in chloroform	.300	
Insoluble residue—caoutchouc	.100	
		3.640
Soluble in *stronger ether:*		
Extractive soluble in H_2O—trace of tannin	.030	
Extractive soluble in alcohol (chlorophyll)	1.980	
Insol. residue (decomposed chlorophyll)	.860	
		2.870
Soluble in *absolute alcohol:*		
Tannin	.625	
Glucose	.558	
Other extractive and coloring matter, soluble in H_2O	4.867	
Phlobaphenes, soluble in NH_4OH	1.350	
		7.400
Soluble in *distilled water:*		
Mucilage	7.740	
Dextrin and allied carbohydrates	2.760	
Albumin	.240	
Glucose	5.230	
Saccharose	3.245	
Organic acids and allied substances	.200	
Undetermined—active principle, coloring matter, etc.	.825	
		20.240
Soluble in *caustic soda solution:* (0.2 per cent).		
Albuminoids	3.200	
Extractive, not ppt. by acetic acid and alcohol	5.180	
		8.380
Soluble in *dilute hydrochloric acid* (1 per cent.):		
Pararabin	.960	
Starch	5.270	
Oxalate of calcium	.140	
Albuminoids and extractive matter	2.350	
		8.720
Lignin	1.820	1.820
Hydrocelluloses, etc	2.760	2.760
Cellulose	23.270	23.270
Moisture	8.900	8.900
Ash	6.800	6.800
Loss	5.200	5.200
	100.000	100.000

Other experiments.—50 grams of the powdered drug were distilled with milk of lime, the distillate tested for volatile alkaloids, but with negative results. Similarly another 50 grams were distilled with a 1 per cent. solution of sulphuric acid, but no results were obtained.

Yellow coloring matter.—A yellow coloring matter, obtained in ail orange-yellow mass, was found to be present in the drug, soluble in ether and chloroform, but sparingly soluble in alcohol. It was obtained by concentrating a decoction from the powdered drug, precipitating the mucilage, etc., by alcohol, and further concentrating to a syrupy liquid, which was then agitated with several portions of ether. The ether extractions, upon evaporation, left a yellow oil, which, by treatment with cold alcohol, yielded an orange-yellow mass. In Alexandria senna, this yellow coloring matter is supposed to be chrysophanic acid; so probably in American senna, it is identical with same, or some similar body.

Active principle.—A complex body was found to be present in this drug, responding to cathartic acid, both in properties and its action. It was obtained by the following process: 250 grams of the powdered, drug were digested with water at a moderate temperature, the decoction obtained concentrated to a syrup, and the mucilage, etc., precipitated with alcohol. The solution being again concentrated, and several volumes of absolute alcohol added, the crude cathartates were obtained.The albumen was precipitated from this by dissolving in water and adding a few drops of HCl. The precipitate obtained, on addition of' more HCl, was treated with hot 60 per cent. alcohol. From this solution the purified cathartic acid was obtained by precipitation with ether. The active principle so obtained is insoluble in water, absolute alcohol, chloroform, and ether, soluble in warm diluted alcohol, is of a brownish-black color, amorphous, soluble in alkalies with darkbrown color, and reprecipitated by acids. Tannin, antimonial salts, yellow and red prussiates, have no effect upon it. Color tests, with strong acids, were following: With H_2SO_4, green brown: H_2SO_4 and $K_2Cr_2O_7$, greenish black; with HNO_3 and HCl, no change.

Physiological action.—The medicinal properties of the drug were experimented with fully. The ethereal and alcoholic extracts were taken internally, representing in each case up to 20 gm. of the drug; the latter produced some griping effects, but neither, cathartic results. An aqueous infusion produced cathartic effects, but in half times larger dose than the officinal senna. The active principle obtained from the drug was also taken, producing decided cathartic effects.

In conclusion, the writer would state as his belief, that American senna does contain an active principle, which responds to the cathartic acid of Alexandria senna in all respects, existing in the former drug only in smaller quantity.

GLEANINGS IN MATERIA MEDICA.

BY THE EDITOR.

Scopolia japonica.—Martin stated in 1878 that Japanese belladonna root contains solanine, but does not yield atropine. In 1880 Langgaard announced the presence of two alkaloids resembling atropine in physiological action, and which were designated as scopoleine and rotoine. Eykman, in 1883, regarded scopoleine as probably identical with one of the alkaloids of the atropine group, and isolated the glucoside scopolin and its derivative scopoletin. E. Schmidt and H. Henschke have recently examined the alkaloids (*Archiv d. Phar.*, March, 1888, p. 185-202) which were with difficulty separated by fractional precipitation with gold chloride into atropine, hyoscyamine and hyoscine, the mother liquor containing tropine; choline was likewise isolated from the extract. The three mydriatic alkaloids are present in the commercial root in very variable proportion, and in some of the samples hyoscine was wanting. Commercial scopoleine, was ascertained to consist of the same alkaloids varying in proportion and not entirely soluble in ether.

Henschke (*Archiv*, 1888, p. 203-211) has also isolated the fluorescent compound scopoletin which is soluble in alcohol, ether, chloroform, acetic acid and in boiling water. The aqueous and alcoholic solutions show a quinine-blue fluorescence, changing to bright blue-green on the addition of alkalies. Scopoletin melts at 199ºC. and is identical with the chrysatropic acid of Kunz. The aqueous solutions of both compounds are colored black-green by strong nitric acid; by gold chloride cobalt-blue, followed by reduction; by ferric chloride green, gradually forming a dingy-green precipitate; by potassium permanganate dark-green with blue fluorescence, changing on the further addition of a little sulphuric acid to indigo-blue. These compounds have a composition very similar to that of methyl-aesculetin; but the latter prepared from aesculetin melts at 184º and is not colored green by ferric chloride. Henschke did not succeed in obtaining from the extract a notable quantity of scopolin; but by boiling the extract with acid the yield of scopoletin was increased to 0.156 per cent.

Commercial rotoine (*Archiv*, 1888, p. 211-214) was ascertained by Henschke to be not Langgaard's alkaloid, but simply the soda soap of the fat contained in the Japanese scopolia root.

Scopolia Hardnackiana.—The cultivated root, collected in May, contains an alkaloid which according to Ernst Schmidt (Archiv, 1888, p. 215) is identical with hyoscyamine; a fluorescent compound, possibly scopoletin, was likewise present. Atropine and hyoscine could not be isolated from the gold double salt.

Asarum europaeum.—The volatile oil has been examined by A. S. F. Petersen. It contains a terpene $C_{10}H_{18}$ boiling between 162º -and 165º C., and in its properties agreeing with the pinene of Wallach. The principal constituent is an oil, boiling between 247º and 250º, having the empirical formula $C_{11}H_{14}O_2$ and being identical with the methyl-ether of eugenol, which has hitherto not been observed in plants, but has been repeatedly prepared synthetically; by oxidation with potassium permanganate it yields dimethyl-protocatechuic acid, and, on treatment with hydriodic acid, methyl-iodide is produced. Near 300º a green or blue oil is obtained; the

green fractions contain a considerable quantity of the stearopten asaron (boiling point 296º), the presence of which materially interferes with the investigation of the higher boiling portion.

In the volatile oil of *Asarum canadense* Petersen found the same terpene, and the oil boiling between 245º and 250º, which is probably identical with the asarin of Power; a blue oil with a high boilingpoint is likewise present, and compound ethers particularly of acetic acid, which are absent from the European oil. The American oil does not contain asaron.—*Archiv d. Phar.*, Feb., 1888, p. 89-123.

Composition of Mastich.—Prof. E. Reichardt reports (*Archiv d. Phar.* 1888, p. 154-163) the results of investigations undertaken by Klemm with recently obtained clear and with old dusty mastich. The specific gravity of the former was 1.068, and of the latter 1.072. Benzol dissolved from old mastich 66 per cent., and from the recent article 90 per cent.; the elementary analyses of these portions render it likely that they consist mainly of $C_{10}H_{16}O$ mixed with $C_{10}H_{16}O_2$ in variable proportions, depending upon age and exposure. The portion, insoluble in benzol contains less carbon, and as obtained from recent mastich, agrees with the formula $C_{10}H_{15}O_3$, and that from old mastich, with $C_{10}H_{15}O_4$. On dry distillation old mastich only yielded a distillate of a very slight acid reaction; the tar commenced to boil at 75º, and yielded a colorless fraction, boiling at 108º, a yellow portion boiling at 220º, and a dark green oil, boiling at 350º. All contained oxygen and possessed an odor recalling that of thyme, lavender or rosemary.

Lupinus albus.—Campani and Grimaldi isolated from the seeds vanillin, and proved its identity by the crystalline form and by its chemical properties.—*Chem. Repert.* 1888, p. 76.

Anagyris foetida.—The seeds yielded to Nicola Reale, with ether, a fixed oil, resin, resinous anagyric acid, and a lemon-yellow substance, probably a glucoside. Alcohol extracted yellow coloring matter, glucose, sugar and an alkaloid, anagyrine, $C_{11}H_{34}NO_8$, which is amorphous, deliquescent and bitter.—Chem. Repert, 1888, p. 77.

NOTES ON GAMBIER.[2]

The shrub *Uncaria Gambier* was first described by Rumphius, but attention to its practical application originated with Dr. Campbell, one of the earliest medical officers stationed at Bencoolen. This gentleman made a study of the useful plants of his district, and was very anxious that a trial of the tanning powers of gambier should be made. After mentioning that gambier was chewed by the Malays with *pinang* and *siren*, Dr. Campbell thus describes the methods of preparing it for consumption. “The young shoots and leaves are shred and bruised in water for some hours until a feculum is deposited; this is inspissated in the sun to the consistence of a paste, is thrown into moulds of a circular form, and it is in this state the gambier is brought to market.” Substitute boiling in an iron pan for inspissation in the sun, and there is not any really great difference between the primitive principle described by Dr. Campbell, and that of to-day, by means of which gambier is turned out in thousands of tons for

2 From the *Straits Times*. Reprinted from the *Phar. Journ. and Trans.*, April 14, 1888, p. 369.

shipment to Europe and America.

Before going into the question of manufacture, however, a few lines should be devoted to the growth and cultivation of gambier. The main points in gambier planting which are so attractive to Chinamen, are the great rapidity with which they get a crop out of the ground, and the small original outlay which is required. The history of the majority of these plantations will show that pepper has been planted out of gambier profits. Of course pepper is a great hit when all goes well, but it wants a considerable capital to start with, and it takes some years before it gets into anything like full bearing. It is altogether a plant of slower growth and longer life than gambier as it is now cropped. The leaf of the young gambier plant is thick and fleshy, and yields a large quantity of extract ; but as the shrub ages the leaves become thinner and more fibrous in texture and lose their characteristic fleshiness. In a little over ten years a plantation is almost valueless, and as a general rule is abandoned within fifteen years. This result is certainly due to the savage treatment to which the shrub is subjected. The Chinaman commences cropping his gambier about eighteen months after he has put it into the ground, after which he will go on cropping it two, three, or even four times a year, being guided more by financial considerations or market rates than by the fitness of his plantation for the cropping. The shrubs are cut down with no sparing hand; leaves, shoots, and twigs are all lopped off by the Chinaman's knife, and the plant is well nigh reduced to the condition of a mop-stick and left with barely sufficient leafage to enable it to carry on its existence. No attempt is made to manure the plantation. The soil, deprived of its natural shade, is left either to be burned into the consistency of a brick, or else the whole place is overrun with *lalang*. The only wonder is that a gambier plantation is not used up sooner. It is quite an error to suppose that the plant exhausts the soil like indigo. With similar treatment gambier would last as long as pepper. The spent leaves from the gambier pans are said to be very good for pepper; these leaves are quite exhausted by the time they leave the *bangsal*, and cannot possibly stimulate or nourish the vines, but they form a useful shade for the roots, and they are very serviceable in keeping off both white and red ants; the bitter principle of the spent leaves repels these destructive insects which are otherwise attracted to the vines when they blossom.

The manufacture of gambier is as barbarous as its cultivation. The green leaves and shoots are roughly chopped with a *parang* and thrown into a *qualli*, which is then filled up with water; the furnace below the iron pan is of the roughest possible construction, and consumes an immense quantity of firewood. While the leaves are boiling they are incessantly prodded with a sort of wooden trident in order to break them up, and assist the process of maceration. When the, amount of “gutta” which has exuded from the leaves causes the liquor to be thick and syrupy, the leaves are taken out and placed in a wooden trough which overhangs the pan at such an angle that the liquor drains freely back into the pan from the steaming mass in the trough. The liquor in the *qualli* is then ladled into small and shallow wooden tubs; the leaves in the trough are once more swept into the pan and reboiled, after which they are taken out and thrown outside to be afterwards carried off to the pepper garden. The liquor left in the *qualli* from the second boiling is too weak to be converted into gambier, but is an excellent extract in which to boil up the next lot of green leaves.

As soon as the extract in the small wooden tubs already spoken of is sufficiently cool

to allow of the hand being placed in it, a very curious process of agitation is adopted by the Chinese, which it is difficult to clearly describe. The coolie squats before the tub, and plunges his half-closed hand into its semi-fluid contents, and in the hollow thus formed by his band he incessantly works up and down a piece of light wood shaped like an elongated dicebox. The immediate effect of this treatment is to cause the gambier extract to thicken. In fact it sets up a process of crystallization; the extract assumes a concrete form and becomes *gambier*. When it is quite cool it is turned out from the tub as from a mould and cubed with a knife, which, as a rule, is made out of the iron hooping of' a Manchester bale. The cubes are then put on coarse bamboo tray's with wide meshes, the trays are placed in rudely constructed racks over the dapur and should be left there four or five days to get smoke-dried. The cubes at the end of this time will have thrown off an immense percentage of water, and have become greatly reduced in size. It is then packed in mats and sent off to one of the gambier houses fronting on Boat Quay, each of which possesses a capacious well of moderately dirty water.

It is easy to distinguish good gambier. If sound ripe leaves are boiled for a sufficient number of hours, and if the cubes are made not too large and are properly smoke-dried, then the gambier will be delivered into the godown in a hard compact mass weighing as near fifty catties as possible. There is some difficulty in stripping off the mat; the cubes are distinct and are of a good brownish-black color externally, and when broken will exhibit a deep mahogany red with an occasional streak of dark-yellow; there is a total absence of steaminess about such gambier, and when it has been put through the press, the pools of water near the bed plate and pump will not be covered. next morning with a milky-white surface.

In the ordinary run of gambier which merchants are now content to receive, there are no traces of cubing, and when cubes are to be discerned they are of an extraordinary size, the color is of an unclean white to a dirty pale yellow, and the mass frequently steams. There is a farce gone through at the press of “rejecting” bad stuff, which is worse than useless, because it costs money, the “rejections” are all worked over again with mat scrapings, and are rushed through the godown, with unfailing success. Any one who will take the trouble to walk along Boat Quay, between Elgin bridge and Coleman bridge, will see CC “rejections” being worked over by the ton; not a catty of this beastly stuff is lost by the Chinese. “Rejections,” of which our shipments are now so largely composed, are simply nothing much more than masses of putrescent boiled vegetable matter; it frequently shows large patches of a black or dirty blue color, it cannot hold together, but drops to pieces when handled, and often has a sour fetid smell. The fact is that the Chinamen, finding that anything will be accepted, boil down leaves which may be either too old or too young, mixed up with useless shoots and twigs; the *bangsal* proprietors save as much firewood as they possibly can, it being one of their principal items of expenditure; the extract is not sufficiently boiled and the crude stuff will not crystallize properly. It is doubtful whether it can stand a few days smoke-drying, but it is not put to this test, however, for after a very brief course of *asap*, it is bundled up in mats and delivered in all haste to the merchant, who accepts it with results which must be best known to himself.

A few words as to the general chemistry of gambier may be interesting. Roughly speaking, good gambier may be said to contain between 40 per cent. and 50 per cent.

of tannic acid, the other chief ingredient of gambier being a soluble gum: its action upon hides is to precipitate all their fatty and fleshy matter, leaving nothing but the imputrescible substance, that is to say, leather. Notwithstanding this precipitation, the hides take up so much gambier as to gain in weight by the process.

There is no space in this rapid sketch for any details about the working of the "hongkek," or of adulteration of gambier with foreign matter, but the overloading of gambier with water, combined with what can only be called the fraudulent method of its preparation, constitute adulteration of the worst and most destructive type.

ON GUARANA.

By DR. H. H. RUSBY.

From a lecture at the Philadelphia College of Pharmacy, December 1, 1887, stenographically reported by Dr. C. H. Morgan.

The home of the Guarana is a very different region from that of the coca, although it forms part of the same great region. The great forest plains of Brazil, if they were grass-covered would present an appearance very similar to that of our own prairies, except that over the greater portion the surface of the country is so level that there is little to separate the rivers. During part of the year very little travelling occurs in this country. The rivers, which unite to form the Madeira, in this section at certain seasons of the year all unite to form one vast lake and a greater part of the country is under water. It is no uncommon occurrence to see the water flowing up streams as the level of a stream is raised higher than that of the other which ordinarily flows into it, by means of additions higher up. The smaller streams have an almost imperceptible current. They are extremely deep and narrow. I have parted the brush from the mouth of a stream which was narrow, but which had a depth of fifteen or twenty feet. The banks of this stream would be so covered with vines that you could hardly land. You could hardly penetrate for a single foot. Progress is prevented by the rushes, the driftwood and the brush. After this region is passed there is a belt of peculiar trees called Ambaibas, about the size of our ordinary forests of maple, poplar, and small oaks, yet it is noticeable only as a fringe to the neighboring frowning forest which towers up behind it. Vines fall down over the trees of smaller growth, covering them like a mantle, and in many places failing into the water. Back of that occurs the cane brake of various species of bamboo three miles in width, and then you reach the forest proper. Here there are no such obstacles as you find in the mountains. The travel is not so difficult. There will be long stretches where we can thread our way with success, then we come again to the jungle where the tangle, commences. Once there we have to force our way; cutting our way is not practicable, for every time you cut something else falls in your way. There is nothing to do but to place your shoulders against the mass and simply push your way through. Among this cane brake run several species of deer, and a great number of tapirs, and it is the home of the prowling jaguar, which lies in wait for other animals, as does the alligator. Here, too, we are liable to encounter enormous anacondas.

Once you get to an instalment of the forest proper, instead of having bright butterflies

and singing birds, you reach a region which is more like a region of death. The surface of the earth is covered, it is true, with vegetable growth, but it is at the summit of the trees one hundred and fifty feet above us. If you could look on the surface of this forest it would be a mass of green, but you are below and it is like a subterranean region with only a dark twilight, and it is all silent like the grave. There is a damp earthy smell to the air, which is never penetrated with the rays of the sun. The trees are often as thick as in our own forests. We can only imagine what scientific treasures we could secure were this upper region accessible to us. After all, the region is richer in vegetable growth than the mountain region, but it is so far above us we can't see it.

Such is the home of the Guarana. This is one of the smallest vines which border the watercourses above described. Unlike coca, its origin is easily apprehended. The Sapindaceae family is largely represented in Brazil, especially by three genera of climbing vines. I have no specimens of this with me. It is found wild in many parts of this region. The stem appears like three cylindrical pieces amalgamated into a triangular stem. Its branches are long and slender, climbing by their tendrils.

With the wild plant we have nothing to do. The collection of the drug from the wild plant in this region presents insuperable difficulty. The plant has long been cultivated in the region of the lower Madeira. Guarana is cultivated in this district about here (indicating), it is also a little further south and perhaps a little east. Here it presents a very different aspect from what it does in the wild state. It is planted out just as a vineyard is planted, except that it is planted wider apart and trained to poles the same as hops. The plant is kept within bounds by pruning. The ripening of the seeds is shown by the opening of the pods. Immediately upon this the fruit is gathered to prevent the inevitable loss which would occur from its falling. This fruit resembles the hickory nut. It is contained in a husk, which husk consists of three instead of four parts. From these the seeds are shelled out by hand as hickory nuts are. First they are washed free from a phlegmy substance and then subjected to a roasting process of six hours' duration, which loosens from them a papery shell which is removed by placing them in sacks, and beating them with clubs. The best varieties of Guarana are those in which the seeds have not been very finely broken. A small amount of water is then added, just sufficient to form a mass. It is kneaded by hand into a mass of the consistency of dough. I have been informed that the common belief in this country is that other materials are added to this mass by which it is adulterated. The fact is that other things are not generally so added. A large building is then utilized for the drying purpose. Upon the upper floors of this building this material is spread out and subjected to a slow fire of fuel, selected with a view of making no smoke, the object being to keep the temperature equable, maintaining at the same time sufficient heat. It is exposed in this way for a certain number of' weeks when it is ready for the market. Great experience is necessary to carry on this process. This is the manner in which it is prepared in its own home It is used there by the natives, a portion being grated off with a large file, and it is served in a glass full of cold water. Its effects are very refreshing, but its excessive use is deleterious. It contains two or three times the quantity of caffeine that coffee does, producing a happy effect on the nervous system, but if used in excess bringing on trembling and a palsied condition of the limbs.