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CANADIAN

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EDITED BY

E. B. SHUTTLEWORTH,

Lecturer on Practical Pharmacy, Medical Department, Victoria University.

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CANADIAN

PHARMACEUTICAL JOURNAL

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Original and Selected Papers.

AN EXPERIMENT IN MAKING FLD. EXT. GENTIAN.

BY PHILO.

Fld. Ext. Gentian is with us more largely sold than any other, consequently we make it pretty frequently, and have, at different times, tried many experiments in its manufacture; some with a view to reduce its cost, and others intended to increase its excellence. We have generally found, however, that if we have tried any plan which made extract at a very much lower cost than usual, that the result was a corresponding decrease in the strength and reliability of the product. Such has been the result of the experiment about to be detailed. But, although I cannot recommend to my brother pharmacists the process in its present form, I think it may, nevertheléss, be of some interest to them. Some time ago a western writer detailed a process for fluid extracts, in which a very small portion of alcohol was used, the strength being extracted

from the drug by water, almost alone. Considering that the solid Ext. Gentian was made with water only, and that this menstruum was thought to exhaust the root pretty thoroughly, the fluid extract was considered a suitable preparation for the first experiment, and it was accordingly tried. But we found an insurmountable obstacle. The powder so swelled and compacted together under the action of the water that the process was interminable, and the materials spoiled on our hands before the drug was exhausted. Mr. Campbell's process (with glycerine) was subsequently tried, but abandoned when we became convinced that however nice looking the product obtained, the drug could not be exhausted within the limits proscribed, even with our utmost care, and if the percolation was pushed to the extent ordered in the U.S.P., the product was more expensive than the officinal, and not any better. A few months ago a writer in one of our professional journals recommended the use of water acidulated with sulphuric acid as a menstruum for ths exhaustion of senega. Acting upon this hint we determined to give the Fld. Ext. Gentian another trial, and with the following results;—

Eight ounces of Gentian were reduced to a suitable powder, slightly moistened with a menstruum composed of one ounce of acid sulph. to a gallon of water, the powder carefully packed in a funnel, and the percolation immediately started with the same menstruum. The first six ounces of percolate were set aside, and the percolation pushed to the apparent total exhaustion of the drug. The percolation proceeded regularly and at a very satisfactory rate. The acid sulph. in the second portion of percolate was then neutralized with carbonate of lime, in the form of common whiting, the percolate raised to a temperature of about 200°, and then evaporated to one-half. It was now found impossible by any process of filtration that we could devise to separate the calcium sulphate from the percolate, and after repeated trials the experiment was abandoned and the product thrown out.

Next, four ounces of gentian were pulverized, moistened with the same menstruum, and the percolation pushed to the exhaustion of the drug, so far as could be judged from the taste. This time the neutralization was effected with small lumps of chalk, the percolate being heated to the boiling point previous to the addition of the chalk. It was then allowed to stand for a few hours, the upper

clear portion decanted and filtered, and then the thicker sediment was carefully washed with water and filtered. Finally, the whole was evaporated to the measure of three-and-a-half fluid ounces, and half an ounce of alcohol added to preserve it. The result was a fluid extract of handsome appearance, of intense bitterness, and yielding, when mixed with water, an infusion of deep color, and perfectly transparent.

On comparison with a sample which I was told was made with proof spirit, and which was purchased from a house which I consider reliable, our product, though apparently as good in respect to color, clearness, and specific gravity, was seriously deficient in bitterness. This may possibly have arisen from the inferior quality of the gentian operated upon, and since the powder, after percolation, seemed to be thoroughly exhausted, this is somewhat probable.

The two fluid extracts compared somewhat as follows:—The specific gravity of the Fld. Ext. made with water was 1285; that made with proof spirit 1261. The Fld. Ext. made with water yielded the clearest and darkest infusion. That made with proof spirit the palest and most opaque. The fluid extract made with water was only half as bitter as that made with proof spirit, for on putting half a dram of each into separate tumblers, and adding eight ounces of water to each it was found that the extract made from proof spirit gave decidedly the bitterest infusion, and that eight more ounces of water could be added to it before the two seemed of equal bitterness. The cost of the extract made with water was about half that made with proof spirit.

There remain now two questions: 1st. Whether this process can by a little more care and skill be made to yield a product representing the drug in all its properties? 2nd. Whether, if success attend our efforts in the first direction, the small quantity of sulphate of lime which must remain dissolved in the extract would be a serious objection to its use? I think also we may learn that color and appearance are not a sufficient guide to the excellence of this class of pharmaceutical preparations, and that even specific gravity is not a reliable test of strength, since the menstrua may vary in density or be loaded with inert matter. In short, I think that the man who shall present us with a set of easy and reliable tests by which we may check off the strength of our productions, will confer an unspeakable benefit upon his brother pharmacists.

COTTON ROOT.

BY PROFESSOR E. S. WAYNE.*

The root of the cotton plant (*Gossypium herbaceum*) has for some time past been accredited with possessing the properties of an emmenagogue, parturient and abortive, and said to promote uterine contractions with as much efficiency and more safety than ergot.

As yet no analysis has been made of the root to determine its proximate principles, and to ascertain whether it contains any of principles found in ergot, such as propylamin, or alkaloids such as ergotina and ecbolia, found in that substance by Wenzell.

The fluid extract of cotton root is a preparation largely used in the west, and highly spoken of as above by some practitioners. It is very prone to deposit a peculiar red precipitate a short time after it is made; and the frequent complaints made respecting this has induced me to make some investigations as to the cause and nature of the deposit, and, at the same time, of some of the proximate principles existing in the root, or, more properly speaking, of the bark of the root.

For this purpose one pound of the root bark, in suitable powder, was exhausted with alcohol of 76°; the resulting percolate was of a pale amber color. This was distilled to separate any resin present in it. After distilling off the alcohol, there was left in the still a dark red aqueous solution of extractive, &c., and a dark red resinous mass.

The resinous mass was removed and reduced to a coarse powder, and washed with water as long as anything was taken up by it, then dried and reduced to a powder. It then resembled very much in appearance powdered cochineal.

The change that had taken place in the color of the original percolate by the action of heat during the distillation, was a matter of much surprise to me; the resulting aqueous solution and separated resin being so different in color to that of the original percolate, from a pale amber color to a dark red, resembling in appearance that of a solution of kino.

The red resin obtained from one pound avoirdupois of bark, weighed 210 grains.

Upon examination of the dark resinous mass it was found to be insoluble in the following menstrua: alcohol, chloroform, ether, aqua ammoniæ, but soluble in solutions of caustic potassa and soda; the solution a dark purplish-red color, and precipitated unchanged on the neutralization of the alkali by acids.

A portion of the precipitate that deposited by standing in the

*Read before the Cincinnati College of Pharmacy, and published in the Am. Jour. Pharm., July, 1872.

fluid extract of cotton root was filtered off, washed and dried, and submitted to the action of the same solvents as the resin mentioned and with like results.

The watery solution left in the still was, as mentioned, also of a dark red color, and gave the following precipitates with solutions of metallic salts. With mercuric chloride, red; with argentic nitrate, purplish-red; with plumbic acetate, purplish-red, and with ferric sulphate, purplish-black.

The remaining portion, after making the above tests, was precipitated with plumbic acetate, which precipitated the red coloring matter, and left it of a light yellow color; then treated with sulphhydric acid to remove excess of lead, and, after filtration, to remove the sulphide of lead, was evaporated to dryness in a water-bath. The extract mass left was of a light yellow color, and exceeding hygroscopic. A portion of it was dissolved in water, and tested for the presence of an alkaloid with solution of iodohydrargyrate of potassium, but gave no indications of the presence of any.

With Trommer's copper test it gave an abundant precipitate of cuprous oxide, indicating the presence of sugar.

A portion was also agitated with ether, and another with chloroform, and, after separation had taken place, the ethereal and chloroform solutions separated and left to spontaneous evaporation, no crystallizable proximate principles were separated. To a quantity of the powdered bark was added a solution of caustic potassa; there was no development of propylamin, as with ergot.

From the above experiments, it would seem that cotton root bark contains no substances similar to those of ergot, upon which its therapeutic value rests, nor any other peculiar alkaloid or proximate principle except the red resinous mass spoken of, or a substance colorless as in the original percolate, and by oxidation changing to this red substance. This red matter seems to be a peculiar one—an acid resin, insoluble in alcohol, chloroform and ether, forming colored precipitates with metallic salts, and soluble in solutions of caustic potassa and soda.

The red color of the watery solution described is also due to this, and held in solution through the solvent action of organic matter present, often the case in such solutions, and sometimes with difficulty gotten rid of.

The substance that produces this red-colored acid resin, seems to exist in all parts of the plant—in the flowers and in the seeds—the purplish tint at the base of the petals is due to it, and in the seeds the dark red spots there found, and which gives to crude cotton seed oil its dark color, and which is removed in the process of refining the oil by the solvent action of caustic alkalies. From the solubility of this substance in alkalies, and forming well-marked and characteristic precipitates with metallic solutions, it has claims to

be classed an acid, and would propose for it the name of gossypic acid.

Having satisfied myself as to the nature of the substance that composes the precipitate in the fluid extract of cotton root, and the identity of the precipitate with the resinous mass that was left in the still, as mentioned, I would say that it is impossible to prevent the same from forming in it, as it is caused by a chemical change taking place in a peculiar proximate principle in the plant, insoluble in the alcoholic menstruum.

Whether the addition of glycerin or sugar would prevent this, I have not determined, and will report experiment at some future time.

Query: Is this acid or the substance from which it is produced the active principle of cotton root?

The cotton seed cake (the mass left after pressing out the oil) contains more or less of it, and I am informed by Dr. John A. Warder, that cows fed upon it will abort, otherwise it is a nutritious food for cattle. Some of the substance I have placed in the hands for practical test, but as yet have had no report concerning it.

THE CALABAR BEAN.*

BY DR. L. VINCENT.

In a sojourn of nearly two years at the Gaboon, during which time he had opportunities of studying the numerous substances possessing medical properties produced in that part of equatorial Africa, Dr. Vincent's attention was particularly directed to the Calabar bean. It is used in that country, together with several other toxic agents, such as the *Icaza m'boundu*, the *Inee*, the *Alchiuse*, etc., by the tribes still plunged in barbarism and fetishism, for the compounding of their ordeal drinks. From a memoir giving the result of his enquiries we are enabled to glean the following particulars:

The first specimens of this drug were sent to Europe by English missionaries from Old Calabar, where the natives called it "*éserê*." About ten years afterwards its botanical position was assigned by Professor Balfour, and at nearly the same time Dr. Fraser, of Edinburgh, while studying its physiological properties, discovered the remarkable property it possesses of contracting the pupil of the eye. In 1866 it was found in the French possessions in the Gaboon, not far from the banks of the rivers Como and Rhamboe. It is also found in abundance on the banks of the Ogo-wai; and as the

* Journ. Pharm. et de Chimie [4], vol. xv., p. 109, in Pharm. Jour.

physostigma prefers marshy and humid soils, it is probable that it occurs on the borders of all the rivers flowing into the Atlantic, from Old Calabar on the north to Cape Lopez on the south.

The Calabar bean is the seed of the *Physostigma venenosum*, Balf., which has been placed by Balfour in the *Leguminosæ*, subtribe *Euphaseolæ*, the only tribe of the *Leguminosæ* that contains poisonous plants.

It is a perennial woody climber, attaining sometimes a height of from forty to fifty feet. It twines from right to left round the neighboring trees, and in spite of any obstacles that may temporarily prevent its progress in this direction, it will after a time resume its course. The leaves are alternate, trifoliate, the middle leaflet ovate, very acute at the tip, regular at the base, stipulate, the lateral leaflets unsymmetrical. There are also two short stipules at the base of the general petiole. The flowers are disposed in clusters, and rose-colored, with magnificent purple veins. The calyx is unequally five-toothed; the corolla papilionaceous with vexillary æstivation; stamens ten, perigynous and disposed in two fascicles, one consisting of nine stamens and the other of one vexillary stamen; anthers bilobed, introrse, and dehiscing by two longitudinal slits. The ovary is stipitate and surmounted by a very long style, bearing a globular stigma, the surface of which is slightly hairy and covered with conical papillæ. Immediately below the stigma, on the convex part of the style, is a prominence having the shape of a falcate crest, which Professor Balfour appears to have looked upon as empty and vesicular, and therefore named the genus "*Physostigma*." The author, however, asserts that this prominence is full, and cannot be said in any way to justify the designation. The fruit is a pod 4½ inches to 6 inches long, attenuated at both ends, a little compressed at the sides, bluish in color; the valves are thickish, striated and rugose on their external surface, and smooth on their internal face, which presents in the intervals between the seeds a sort of whitish cellular tissue. Each pod contains two or three seeds, most commonly two. The seeds, which are the active part of the plant, for neither the leaves nor the stems are poisonous, are oblong, convex, and slightly reniform, a character which is more marked in the beans proceeding from Ogo-wai than in those collected in the neigborhood of the Como and Rhamboe. They are from one to one and a quarter inch long, and about two-thirds of an inch broad. The hilum, which surrounds nearly half the circumference of the bean, has the appearance of a long cicatrice, bounded by a slightly projecting line; is reddish and divided into two equal parts by a furrow that runs its entire length. The external tegument is testaceous, rather rough, and of a chocolate brown color. In the interior is found a large fleshy embryo, with conical radicle accumbent to the cotyledons, which are ellipsoidal, hard, white, plano-convex, perfectly joined to each other at first,

afterwards retracting, and leaving between them an empty space that constitutes a kind of central cavity.

Chemical analysis and microscopical examination have shown that the nucleus is formed of loose cellular tissue, containing large granules of amylaceous matter. These starch grains are oval or reniform, or sometimes assume the form of parallelograms with rounded angles; the margin is sometimes toothed. The spermoderm contains several coloring matters, which have recently been studied by M. Grassi, who thinks they might be utilized in the dyeing of silk. The active principle of the bean is the alkaloid discovered in 1864 by Jobert and Hesse, which has been variously designated physostigmine, calabarine, and eserine, from the name *éséré* given to the plant by the Cameroons. It is amorphous, brownish-yellow, nearly insoluble in cold water, rather soluble in ammonia carbonate of soda, ether, benzine, and alcohol. Its solutions in acids are generally deep red, but sometimes intensely blue.

The plant is also called by the Gaboonese *n'Chogo*, and by the Fans, *d'Itounda*. By the last mentioned people the bruised seeds are made up into an ointment with palm oil, or some other excipient, and used to rid their bodies from the parasites with which they are covered.—*Pharm. Journ., Lond., May* 11, 1872.

ANALYSIS OF COMMERCIAL SAMPLES OF IODINE.*

BY PROF. J. A. WANKLYN.

Owing to the high price of iodine and its numerous applications in the chemical arts, its analysis is very important, and at the same time frequently very difficult.

The process is to dissolve a known weight of the sample in a solution of sulphurous acid, and to precipitate the iodine by means of a solution of the nitrate of silver in presence of an excess of ammonia to keep chloride of silver from being thrown down. All this is exceedingly simple in theory, but it requires a number of minute precautions for its successful execution.

1. *Weighing.*—Iodine cannot be weighed in an open capsule, since it evaporates so rapidly that the loss of weight would be appreciable. A quantity is therefore placed in a small tube closed at one end and capable of being stoppered with a cork at the other. This is then carefully weighed. The tube is then rapidly opened, and a portion of the contents shaken into the solution of sulphurous acid. The cork is then quickly re-inserted and the tube re-weighed.

*From the American Chemist, May, 1872.

The difference between the first and second weighing shows the quantity of the sample actually taken for analysis.

2. *Determination.*—Prepare beforehand a large glass capable of holding a litre. Pour into it 40 cubic centimetres of a solution of sulphurous acid, concentrated and recently prepared. When the iodine has been thrown in, it is stirred with a glass rod till entirely dissolved. Should there remain an appreciable residue of insoluble matter, it becomes needful to filter the solution. This is performed by means of a funnel fitting into a flat-bottom phial. The funnel should be covered with a plate of glass during this process, which, however, is not generally necessary. Pour into the glass at least half a litre of boiling water. Then add ammonia in excess, and lastly a solution of the nitrate of silver. Iodide of silver is formed, and falls down as a yellowish precipitate, whilst chloride of silver remains in solution. The precipitate on stirring, collects at the bottom of the glass when the liquid is hot enough. The beaker is then covered over with a plate of glass, and set aside for half an hour. The precipitate is then washed by decantation, with abundance of hot water, the liquid being allowed to pass through a small filter of the best Swedish paper, without folds. It is then thrown upon the filter, and collected as far as possible at the bottom. When the precipitate is perfectly washed, *i.e.*, when a drop of the liquid, on being tested with hydrochloric acid, is found to contain no silver, the filter is taken out of the funnel and carefully dried at 110°C. Before weighing it is necessary to fuse the precipitate, but it is also necessary to avoid heating it in contact with the carbon of the filter, which might reduce an appreciable quantity of silver. When the filter, therefore, is dry, it is laid on a sheet of glazed paper, the precipitate of iodide of silver is detatched with a small platinum spatula, and the paper carefully scraped. Still a little iodide of silver remains on the lower part of the filter. This portion is cut out with scissors, and ignited in a small porcelain capsule of about 12 millimetres diameter, the weight of which must previously be carefully determined. When the filter is burnt and the ash is perfectly white, the iodide of silver is thrown into the capsule and heated till it begins to fuse. It is then cooled and weighed. The excess of weight gives the iodide of silver, of which 54 per cent. is iodine.

Determination of Chlorine.—The mother liquor, decanted from the iodide of silver, contains all the chlorine held in solution by the ammonia. It is mixed with pure nitric acid in excess, filtered and weighed in the usual manner.

Ash.—Weigh out about five grammes of the sample of iodine by means of the tube, as described above. Put it in a small porcelain capsule and volatilize it by exposure to a moderate heat. The residue is then weighed. It is generally very small, and consists of silica, alumina and traces of alkaline chlorides.

Moisture.—This may amount to 20 per cent., and even up-

wards. It is generally determined as difference, as the moisture cannot be driven off by heat without at the same time volatilizing the iodine also. The following method may be adopted, which, though not absolutely accurate, is useful as a check. Weigh out 1 gramme of the iodine, and put it in a glass tube of narrow bore, graduated to tenths of cubic centimetres. Pour into the tube 20 cubic centimetres of the bisulphide of carbon, which will of course occupy 200 of the divisions. Shake the tube until all the iodine is dissolved, keeping the aperture closed with the finger. Then let it stand two or three hours, well corked. The water present in the sample separates out and floats above the bisulphide of carbon as a slightly yellow liquid. If it occupies the space between two divisions of the tube it is 1-10 of a cubic centimetre in bulk, and weighs consequently one decigramme. The iodine, therefore, in this case, if exactly 1 gramme was operated upon, contains 10 per cent of water. A fair average sample of commercial iodine contains about :—

Iodine	88·61
Ch orine	0·52
Ash	0·72
Water	10·15
	100·00

An inferior sample, on the other hand, may contain :—

Iodine	76·21
Chlorine	0·88
Ash	1·11
Water	21·80
	100·00

THE MICROSCOPE IN PHARMACY.*

BY HENRY POCKLINGTON.

(Continued from page 389, Vol. V.)

ADULTERATIONS OF, OR WITH, PRODUCTS OF UNDERGROUND STEMS.

The readiest thing of the sort for the beginner in microscopical analysis to try his 'prentice hand upon is chicory. He may, in the first instance, restrict himself to attempting to detect its presence in coffee. The difference between the tissues of the coffee berry and

*Reprinted from the Phar. Jour. and Trans.

those of chicory are well marked. First, as to the salient features of the tissues of chicory. The cells of the parenchyma are somewhat varied; in the looser portions of the root they are rounded, almost spherical; in the neighborhood of the vascular system they are much elongated, but nowhere much modified by secondary deposits. Treated with iodine solution, these cells are rapidly stained yellow (I speak of the unroasted root), and their contents (protoplasmic) intensely brown, and the subsequent addition of sulphuric acid† produces the characteristic reaction of cellulose.

The "porous" or "dotted ducts" (Henfrey, I think justly, prefers the term "pitted") are particularly abundant, and, being large, easily discernible by the unassisted eye. Their arrangement is eminently radial. The pits are boldly marked, and oblique with reference to the long axis of the cell. The size of the pits varies much with the age of the stem or portion thereof, but they are never absent. The laticiferous vessels are of the chief diagnostic value, and should be carefully examined. They are, of course, in appearance tubes, small in diameter and frequently anastomosed. Their contents are not met with in the roasted article, and have not been, as far as I know, satisfactorily determined. The points to be borne in mind are their size, distribution and number. Sections made in each of three directions from the fresh root should be mounted in glycerine, but powder from roasted specimens, *prepared by the analyst himself*, should be mounted in "dammar" and also in glycerine. The structure of the coffee berry should be noticed here, before we discuss further its adulterations and those of its chief adulterants. The structure of the coffee berry consists of somewhat angular cells, whose walls are much thickened by sclerous deposits, the primal wall having apparently been absorbed, so that it is difficult to isolate the several cells of which the berry is composed. In these cells there may be found, in its "raw" state, numerous globules of essential oil. The quantity of the coffee may be estimated from the quality of these oil globules present. The *testa* of the berry is very different in structure from this, and can hardly be confounded with any other substance likely to be used as an adulterant; and is composed of somewhat irregularly shaped cells, in at most two layers, having indistinct traces of secondary deposits (in an interrupted spiral) upon their walls. Between the testa and the berry is a very fine membrane, of somewhat undecided structure. A very slight familiarity with the structure of the coffee berry is sufficient to enable one to

†The use of strong acids is attended with some risk of injury to the front lens of the objective, and also to the brasswork of the stand or stage. To obviate these risks. Mr. J. E. Winspear, of Derringham Street, Hull, has devised, at my suggestion, a "medical" microscope, in which the "limb" carrying the "body" is made to fall back, and the lenses thus removed from the fumes of the acids until they are actually required for observing the effect produced. The stage plate in this instrument is of glass.

detect the presence of all ordinary adulterants, and a more careful observation will enable the detection of any attempted substitution of an inferior berry for the high class so-called "Mocha" or "Plantation." It is hardly necessarry to say that specimens should be "put up" of various sections of the berry in its raw state, and also of different varieties in a roasted and powdered condition. Glycerine and dammar are the best media.

The analyst must familiarize himself with the microscopic character of the most common adulterants of coffee and chicory. These are, in addition to chicory, roasted cereals (wheat, beans, etc.), roasted sawdust, acorns, caramel, mineral matter to give color, roots, as mangold wurzel, etc. (Hassall). As to the frequency of the adulteration of coffee, there can be little doubt. But that either coffee or chicory are largely adulterated with roasted cereals or the like at the present time, I am not able to say of my own personal knowledge. Of the great number of specimens of coffee that I have examined during the past few years, but *one* has contained anything besides chicory. The one referred to contained nothing worse than roasted beans. Chicory is largely used, and often in such a way as hardly to constitute an adulteration; but more often, in low-class shops, in so large a proportion as quite to justify the appellation chicory and (a little) coffee. My friend Mr. C. P. Gibson has turned his attention to this subject somewhat closely of late, and informs me that the experience accords with mine, that whilst in "cheap" coffee a large quantity of chicory is always present, there is seldom anything beyond.

We will now attack the "roots" of the Pharmacopœia.

GLYCYRRHIZÆ RADIX.—A microscopic examination of the root of the liquorice plant which will follow the same general course as that of chicory. My description applies to a medium-sized stem of good quality.

Medulla.—Present and occupies from one-fifth to one-third of the diameter. Cells of medulla moderately large, thickened by increments of cellulose, not lignine. Shape globose modified and irregularly compressed; outline in transverse section sinuous; inner cellular spaces small and irregular. Contents: starch, crystals, and a viscid fluid, probably uncrystallizable sugar; starch-granules oblate, nearly egg-shaped; hilum distinct, often seen as an elongated cavity, gives no cross with polarized light, and is but very doubtfully doubly refractive; crystals probably of oxalate of lime, and give very beautiful and characteristic rings with polarized light.

MEDULLARY SHEATH.—Absent. Vascular wedges of woody zone takes its place.

WOOD ZONE.—Extends ⅓rd of diameter of root, consists of nearly equal radial vascular wedges and interposed medullary rays.

Vascular system.—Dotted vessels of varying size, completely perforate in some of the older roots; more or less perfectly septate

(divided by complete or incomplete septa); larger vessels thickened by sclerogenous deposits, which are deeply stained by magenta, and are situate in elliptical bundles of woody fibre (which take the magenta stain less deeply); the dotted vessels and woody fibres appear to serve as the receptacula of the yellow coloring matter of the root; the woody fibres have relatively large central cavities, and their walls appear little consolidated by secondary deposits.

Parenchymatous cells of wood zone are smaller, somewhat similar in shape to the cells of the medulla, and have similar contents.

Medullary rays.—Elongated prismatic cells.

Outer zone.—Consists of cellular tissue, with regularly distributed ligneous bundles, with an investing membrane of flattened bark-cells; the ligneous (liber) cells little consolidated with secondary deposits; tissue of this zone loose, and corresponds to bark layers of above-ground stems.

The student will find the use of magenta-staining fluid of great service in making out these details of structure. I generally use Judson's magenta, one or two drops to an ounce of alcohol. The section should be immersed in the fluid for a few minutes (the more dilute the fluid the longer the time required and the better the results), then well washed in alcohol before mounting in glycerine or glycerine jelly. In a successfully stained specimen the whole of the wood-cells, vascular vessels, and other sclerogenous structures will be intensely stained, whilst the other tissues will be unaffected by the dye.

The characteristics to be borne in mind in examining the powder of the root are chiefly the size, shape, and optical characters of the starch granules, the shape, size, and nature of the "raphides," and the relative proportions of woody fibre, medulla-cells, vessels, anc cellular tissue of the outer zone.

The principal adulterants of powdered liquorice are wheat and other flours, foreign woody-fibre (Hassal), turmeric, various starches with turmeric for color, mineral matter and cane sugar, and starch sugar. The whole of these, with the exception of the mineral mattea and starch sugar, are easily to be detect.d, even if only present in small quantities. The adulterants of liquorice in the form of pipes, lozenges, paste, confections, and extracts are not so easy of detection, when they go beyond the common-place addition of starches, turmeric, etc. to the paste form. Of the extracts, I may have occasion to say something, with certain tinctures, in connection with other apparatus than the microscope *pur et simple*, by-and-by.

Rhei Radix.—The structure of the root of the English rhubarb is the easiest to make out.

Medulla—Absent or indistinguishable, the centre of the root being chiefly occupied by a system of dotted vessels.

Middle zone.—Parenchyma, large, irregular, thin-walled cells, contour of transverse section sinuous, and containing great quantities of compound starch granules. The compound granule is somewhat oval, and comprises usually four granules, each with a distinct hilum, and giving a very distinct cross with polarized light; the size of the granules is tolerably uniform in any given sample, but varies over a few specimens from the same locality very considerably. Certain special cells contain large aggregate crystals of oxalate of lime (?). The coloring matter and active principle are contained in specialized cells, which radiate from the centre outwards, and do not seem to have any immediate connection with the somewhat limited and very irregularly distributed vascular system of dotted vessels.

The structure of Continental rhubarb is closely similar to that of English grown, the chief difference being in the relative proportions of starch, crystals and receptacula. The differences between the true B. P. rhubarb are in degree rather than in kind.

The old-fashioned Turkey rhubarb is remarkable for its paucity of starch, the quantity of crystals, the distribution, size, and individuality of its receptacula.

Indian rhubarb differs from the Turkey in having fewer, often very few, crystals, a *little* more starch, and fewer but larger receptacula. As "Turkey" of the old school is not procurable, the tug of war chiefly lies between the true tropical varieties and the inferior home or European grown ones.

In the lump the several kinds can be easily distinguished. In examining the powder the chief questions to be asked are,—Are the starch granules numerous in proportion to the rest of the powder; if so, are they clearly those of rhubarb? Are the coloring matter receptacula in a fair proportion to the particles of fibre, starch and other grannles? If so, are they well formed but somewhat irregular, moderately-sized single cells, or at most a few attached together: or are they (English and European of bad quality) in somewhat long poverty-stricken vessels? The size and number of the crystals is a character of some diagnostic importance; but it must not be forgotten that English-grown rhubarb often contains an extraordinary quantity of very large crystals, much more, in fact, than even the old Turkey. To sum up. The receptacula in the true B. P. rhubarbs are well-formed, individualized cells of moderate size; in English and poor European samples are thin, narrow vessels. The raphides in the true are smaller and more elegant crystals, and are not so numerous as in English. Starch forms a small proportion in the true, a large proportion in the false; the proportion of starch is by far the most important diagnostic characteristic.

Oleum anisi forms the best medium in which to immerse the sections of rhubarb root for examination, and also for the examination of pulvis rhei. If the operator can succeed in keeping it in, the

same medium will answer well for the preservation of his specimens; but, although dammar has answered well so far, I have doubts whether any of the ordinary cements can be depended upon for a permanent luting with this medium. On account of its high index of refraction and low dispersive power, it is invaluable in the examination of certain objects. English rhubarb treated with it and magnesiæ carb. levis. strikes an intense rose red, these act apparently either upon some matter contained within the investing membrane of the starch granule, or upon something contained within the starch-bearing cells. This reaction is rather slow, but is of considerable service. The most common adulterant of pulv. rhei is, of course, the substitution of the powder of English growth for that of the foreign. Other adulterants are,—Starches, turmeric, woody fibres and mineral matter, all of which I have frequently found. They are, of course, easily recognizable under the microscope, as would be the substitution of other roots in powder in company with potato starch and turmeric, which a friend tells me he has come across, but which I certainly have not found, although I have found samples in which the rhubarb, or the useful part of it, was in a very small minority, and that English.

IPECACUANHA RADIX.—The microscopical characters are quite as strongly marked as the botanical ones. The stem may be divided into two zones, the outer and the inner.

Inner Zone.—This may be regarded as the woody zone, the *medulla* being absent. Woody fibres long in proportion to their length, large central cavities filled with starch corpuscles; walls of wood cells much pitted; pits small and irregularly distributed. In transverse section these fibres appear an angular starch-bearing cells. Starch granules compound, 2, 4, 6, and even more; each with distinct hilum, and giving a decided black cross with polarized light. Size of granule very variable. Aggregated granule muller-shaped and very variable.

Outer Zone.—Cells much larger, more angular, and contain great quantities of starch and some acicular raphides; the latter being very doubly refractive. The structure of the external investing membrane is not characteristic. The characteristics to be sought in the powdered root are, the *starch-bearing* wood-cells, a very infrequent occurrence in other roots, the acicular raphides, and the peculiarly large numbers of starch granules aggregated into one starch granule. This point will distinguish them from those of maize, to which they are otherwise somewhat allied. Of the adulterants, chalk may be detected by adding a drop of acid at the edge of the thin cover whilst the powder is under observation, starches in the usual way, woody fibres by their not containing starch, or by the absence of the peculiar "pitting" of ipecacuanha wood-cells.

The structure of "striated ipecacuanha" requires study, but must be postponed for consideration in a future paper.

(To be continued.)

OUR WRITING FLUIDS.*

BY A. PATTERSON.

There are few substances with which the druggist is brough more frequently in contact than the contents of the ink bottle: ye the substances are fewer still upon which he allows his thoughts tc rest less frequently.

Beyond the act of dipping the steel tongue into the colored fluid, and lifting as much as will write the directions on a label, or make an entry into the prescription-book, the druggist's thoughts seldom dwell on this useful liquid, at least concerning either its composition or mode of production. It will be the object of this paper to treat of the various substances used in writing, and as far as possible to show the processes by which "our writing fluids" are produced.

The writing fluids of the present day are the result of our commercial requirements, and are altogether unlike, in composition and properties, the ink of the ancients. They wrote; but their ink was what we should term a varnish, or paint, being composed of carbon in very fine division, say either ivory or lamp-black, held in suspension by any drying oil which was most approved of, or mixed with glue after the manner of Chinese ink, which required to be dissolved in water before being used. The ingredients were combined by being rubbed together between stones, as we see painters of the present day grinding their paints. We are even told that the pleasing process of grinding was in schools placed as a punishment on the most indolent; or failing this, the poorer scholars were pressed with the honorable task of keeping the school in ink. There can be no doubt that the carbon contained in these inks, and which is well known to possess peculiar properties of durability, is the cause of the fresh and black appearance which many ancient manuscripts retain, even after several centuries, while those written by our grandfathers fifty or sixty years ago, have in many cases almost disappeared. Even the best modern inks in that time show decided symptoms of old age.

From the care taken in the formation of the letters in ancient manuscript, it is very evident they were not written in a hurry; neither indeed could they be, seeing that the pens used were small brushes, and the ink itself a varnish.

To produce a good modern ink we must bear in mind certain qualifications, viz., a good ink ought to be so thin as to flow freely from the pen: it should be so thick as not to spread or blur on the

*Read before the Glasgow Chemists' and Druggists' Association, in Anderson's University, 204 George Street, Glasgow, 21st Feb., 1872, and published in the *Chemist and Druggist*.

paper, and it should possess sufficient depth of color to retain its blackness after many years.

Much of the permanency of even an A 1 ink depends on the material upon which it is written, for if we write on paper which has been bleached with chlorine, and the gas imperfectly removed, it has a most deleterious effect on the beauty and durability of the writing.

Concerning the composition of ink. When we look at the usual source, viz., galls, one would at first imagine that gallic acid wrought a most important part in its manufacture, but such is not the case. The galls are used in the process, not because they are rich in gallic acid, which they are not, although it is from them we obtain most of the gallic acid of commerce, but because they contain a high percentage of tannic acid.

A paper on the commercial value of dyestuffs, which appeared in the *Pharmaceutical Journal* of last January, says, in speaking of galls, that the following may be considered as the composition of an average sample of gall nuts:—

Tannic acid	65·0
Gallic acid	2·0
Ellagic acid Luteo gallic acid	2·0
Chlorophyll and volatile oil	·7
Brown extractive matter	2·5
Gum	2·5
Starch	2·0
Lignine	10·5
Sugar, albumen, etc., and ash	1·3
Water	11·5
	100·0

Thus we see that galls only contain a very small proportion of gallic acid. This substance is obtained by exposing the galls for a number of weeks, thereby inducing fermentation, in which the tannic acid becomes oxidised, and converted into gallic acid. The action that takes place is: the protosalt of iron, say the sulphate, is decomposed, the iron combines with the tannic acid, forming a dark bluish-black precipitate, called the tanno-gallate of iron, while the sulphuric acid is set free, and remains as such in the ink. The term "tanno-gallate of iron" is apt, as already shown, to cause a misrepresentation of the quantity of gallic acid. which although it may, and frequently does exist in ink, must be in very small proportion.

If the salt of iron be pure, which is seldom the case in commerce, the protosalts alone should give the black characteristic

precipitate with tannin, while it requires a persalt of iron to produce the same result with gallic acid. As this tanno-gallate of iron (?) is a precipitate, and not soluble in the ink, it becomes necessary to add something to give the fluid a body or consistence which keeps this precipitate in suspension; hence the use of gum arabic, which invariably forms part of the formula for ink.

The proportions which appear most suitable, and upon which most dependance can be placed, are—bruised galls, one pound; to this add one gallon of boiling water, and one-third of the weight of the galls, viz., five ounces and a third of sulphate of iron, in solution; also three ounces of gum arabic previously dissolved, and a few bruised cloves, or a few drops of creosote or carbolic acid dissolved in methylated spirit. It is better to allow the galls to macerate for twenty-four hours, then to strain the infusion, and add the other ingredients.

I cannot do better at this part of the subject than offer you a formula used and recommended by that eminent chemist, the late Dr. Penny, of Anderson's University in this city.

Take of bruised galls twelve ounces, macerate for a week, in one gallon of cold water, then add six ounces of sulphate of iron in solution, also six ounces of mucilage of gum arabic, and five or six drops of creosote.

The learned doctor has here taken advantage of a fact well known to chemists—viz., that tannic acid is more soluble in cold than in hot water—hence the cold maceration is prescribed, which I believe is pretty generally employed by first-class ink manufacturers.

The celebrated blue-black ink prepared by Messrs. Duncan, Flockhart, and Company, of Edinburgh, is said to be prepared by the process of cold maceration. A formula, said to be that of Messrs. Duncan, Flockhart and Company, was printed and circulated some years ago by an Edinburgh gentleman, of which the following is a copy, and which explains the process more fully:—

RECEIPT FOR PREPARING BLUE-BLACK WRITING INK

(Which also serves well for Copying Ink).

Blue Aleppo galls (free from insect perforation)	4½ ounces.
Bruised cloves	1 drachm.
Cold water	40 ounces.
Purified sulphate of iron	1½ "
Pure sulphuric acid (by measure)	35 minims.
Sulphate of indigo (in the form of a thinnish paste, and which should be *neutral*, or nearly so)	¼ ounce.

Place the galls, when bruised, with the cloves, in a fifty-ounce bottle, pour upon them the water, and digest, often daily shaking

for a fortnight. Then filter through paper in another fifty-ounce bottle. Get out, also, the refuse of the galls, and wring out of it the remaining liquor through a strong clean linen or cotton cloth into the filter, in order that as little as possible be lost. Next put in the iron, dissolve completely, and filter through paper. Then the acid, and agitate briskly. Lastly the indigo, and thoroughly mix by shaking. Pass the whole through paper. Just filter out of one bottle into the other till the operation has been completed.

On a large scale this fine ink may be made by percolation, as Duncan, Flockhart, and Company, and others in Edinburgh, do it, the above being said to be their recipe.

The weights used are avoirdupois, and the measures used are apothecaries' measures.

Note.—No gum or sugar is proper, and on no account must the acid be omitted. When intended for copying, 5½ ounces galls are the quantity.

You will observe that there are several peculiarities about this writing fluid, viz.:—First, the cold process is used. Second, the want of gum. The use of sulphate of indigo, which is a solvent for the black precipitate, the tanno-gallate of iron; hence the gum arabic is not required, as it is only used to suspend this precipitate. Fourth, the deficiency of iron, which may be accounted for by the *pure* protosulphate being used, which cannot contain, or should not contain any oxide, so that all the iron is free to combine with the tannin. Fifth, the use of free sulphuric acid, which is generally looked upon as detrimental to writing fluids, but which must be introduced here for some purpose, of which I am as yet ignorant.

Thus far I have only spoken of high-class inks, but it frequently occurs that an article is required which is to be sold at a cheaper rate than that wholly made from galls; and the vegetable world gives us an ample range of materials to select from, many of which contain tannin in fair quantity.

In this case other ingredients may be substituted instead of part of the galls; thus we often see logwood substituted, and catechu, sumach, and oak bark may be used for the same purpose. Many other substances, such as elm-wood, elder, chestnut, beech, willow, plum, cherry, and poplar, all contain a certain amount of astringent properties, but none of them are to be compared to galls, and are not likely to supersede them in the manufacture of ink, so long as galls can be had for anything like a fair price. The chemist cannot decide in fixing the proportions required for making ink as he would do almost any other chemical problem, as the substances used are not all of the same relative value, nor, indeed, may two samples of the same substance be equally rich in the material required, viz., tannin: so that he must make an analysis every time he prepares his ink, to estimate the value of his tannin producer, or what is more convenient, he must fix on certain propor-

tions which are known to produce (by experiment) good results, and do his best in selecting his materials up to a fair average standard.

Thus we see, that although galls are used at present as the most suitable substance for making ink, still any failure or stoppage of supply in the production of galls can never now leave us entirely dependent on that source for the preparation of "our writing fluids."

It would be impossible, and, if possible, would be uninstructive, to mention all the substances which have found their way into formulæ for inks, many of which are not only foolish, but incompatible, showing a want of chemical knowledge.

Let us now glance at the properties of the various ingredients used in the process. If we use an excess of galls we simply throw away money, and render the ink more liable to mould. If we use an excess of iron, the galls being insufficient to decompose it, the charteristic color of its oxide is soon shown by the writing becoming brown. The use of an excess of gum causes the ink to clog the pens, and the writing to be wanting in fluency. About twenty-five years ago an ink named *Japan ink* was very much in use; it produced a beautiful glossy appearance when written, but clogged the pen so much that it soon fell into disuse; its defect was too much gum. The water should be as soft as possible—that is, it should contain no lime, or other earthy matter; hence rain water, or, better, distilled water, is frequently prescribed in receipts for making ink. The cheapest ink which has hitherto been introduced, is one composed of a saturated solution of logwood, obtained by boiling twenty-two pounds of logwood in a sufficiency of water to produce, after being strained, fourteen gallons of liquor; to this decoction one pound (avoirdupois) of yellow chromate of potash (not bichromate) is added in solution; the proportions are one thousand parts of solution to one of chromate; the change of color is not an immediate one, but gradually becomes darker. The experiment may be tried, on the small scale, by using logwood a quarter of a pound boiled in water to produce two pints, to which, when strained, add twenty grains of chromate of potash in solution.

We will now glance at the composition of "writing fluids" used for special purposes; thus we know that writing which is intended to be copied is written with ink containing either gum, sugar, treacle, glycerine, or some such substance, which causes the writing to retain moisture, so that a copy of it may be produced even after the original writing has become dry, by being simply damped and pressed.

The following formula requires no press, but may be copied by placing a damp sheet of copying paper on the writing intended to be copied, above this sheet of copying-paper a sheet of ordinary writing-paper must be placed, and then pressed with a paper-knife.

COPYING-INK.

Mix—Thirty grains of extract of logwood.
Seven grains crystal soda.
Half an ounce of water.

Boil till dissolved; then, while stirring well, add thirty grains of glycerine, one grain of chromate of potash, previously dissolved, and four grains of powdered gum arabic.

INDESTRUCTIBLE INK FOR DEEDS, &c.

Dissolve twenty-five grains of powder gum copal in two hundred grains of lavender oil by the aid of a gentle heat; then add two-and-a-half grains of lamp-black, and half a grain of powdered indigo.

Another for the same purpose.

In eighteen fluid ounces of water boil shellac, two ounces, and borax, one ounce; when cold filter and mix with one ounce of gum arabic dissolved in two ounces of water, to which add powdered indigo and lamp-black as much as may be required.

RED INK

Is commonly prepared by boiling brazil wood, two ounces, in thirty-two ounces of water, to which add, after the decoction has been strained, half an ounce of chloride of tin, and one drachm of powdered gum arabic; then evaporate to sixteen fluid ounces.

Or,

Dissolve carmine, one drachm, in half a drachm of liq. ammon., fort., (sp. gr. 880), then dissolve twenty grains of powdered gum arabic in three ounces of water, which add to the dissolved carmine.

BLUE INK

May be prepared by dissolving two or three ounces of sulphate of indigo in a gallon of water; or by rubbing together one ounce of oxalic acid, and two ounces of fine Prussian blue, to which add one quart of boiling water.

INK POWDER

May be prepared by mixing—

Powdered galls, four ounces.
Powdered sulphate of iron, one ounce.
Powdered gum arabic, one ounce.
Powdered white sugar, half an ounce.
Powdered cloves, one drachm.

To these proportions add of water one quart, and macerate for an hour or two.

Note, the quantity of sulphate iron is small because it has been dried, and has thus lost the weight of water evaporated.

INK IN CAKES

May be prepared by evaporating good ink to dryness in shallow dishes, but the best results are obtained by dissolving Chinese ink in water.

MARKING-INK.

This substance is so well known, that little may be said on the subject. The process is founded on the chemical fact, that by applying heat to a salt of silver in combination with other ingredients, the writing becomes immediately, and should remain permanently black; the formula of Professor Redwood is a good one:—

Dissolve separately—nitrate of silver one ounce, crystal carbonate of soda one and a half ounces; mix the solution, and collect the precipitate on a filter; wash well, then introduce the moist precipitate into a mortar, and add eight scruples of tartaric acid; triturate till effervecence ceases; then add of liq. ammonia fort. a sufficient quantity to dissolve the tartrate of silver, to which add four fluid drachms of archil, four drachms of powdered white sugar, and twelve drachms of powdered gum arabic, and make up to six fluid ounces, if required, with distilled water.

CRIMSON MARKING-INK

Is prepared by adding six grains of carmine to the liquor ammonia of the above formula, but it soon loses its crimson color, and becomes, like other marking-inks, a black color.

In conclusion, I cannot lay aside this subject without referring to the beauty, brilliancy, and variety of color produced from aniline, whereby we can procure any shade from the most brilliant scarlet to the most sombre black, and should we at any time be deprived of ink from the present sources, we may rest content that so long as our coal fields yield their sparkling riches, so long may we, without fear, look forward to an unlimited supply of "Our Writing Fluids."

NOTE ON CANTHARIDES AND A BLISTERING LIQUID.*

BY EDWARD R. SQUIBB, M.D.

The important investigation of cantharides in 1852 by Professor Procter, has served as a basis for many able researches, and notably those of Fumouze, and of Massing, and Dragendorff, in 1867, and Delpech in 1870, so that now the older labors of Robiquet and others are rather matters of history than guides in practical application.

In an attempt to utilize still further the labors of these recent writers on cantharides, it was determined to make a solution of cantharidin in some convenient menstruum better than collodion, and to make this so strong as to be as nearly certain as possible.

* From the Proceedings of the Am. Pharm. Association, 1871.

A hundred and twenty pounds of good cantharides was freshly powdered, and the powder carefully assayed yielded the full proportion of 0.466 per cent. of cantharidin. Twenty pounds of this powder very thoroughly exhausted by sixty-eight pounds of chloroform by percolation, and the chloroform recovered by distillation, left a black, oily residue, weighing twenty-eight ounces, avoirdupois. This, while warm, treated repeatedly and copiously with bisulphide of carbon to remove the oily matters, left a residue of very light-colored cantharidin, which in proportionate quantity came but little short of the assay. The bisulphide of carbon distilled off should have left the oily and waxy matters free from cantharidin, but upon trial upon the writer's arm, this oil proved to vesicate most promptly and actively. Another portion of this oil, separated from the cantharides in another way, proved equally active. Supposing this activity to be due to its still holding some cantharidin in solution, the oil was repeatedly heated and washed with a solution of potassa so dilute as not to saponify the oil, yet strong enough to render the cantharidin soluble, and to wash it out. Still the oil blistered as actively as before, and the writer was thus forced to the conclusion either that this oil held a portion of the cantharidin too obstinately for easy practical separation, or that the oil itself was vesicant, and therefore that the cantharidin was not, as heretofore believed, the only active or vesicating principle of cantharides. This latter explanation is that which the writer is now inclined to accept in preference to the former.

Rejecting the oil and its vesicating properties, however, it was next sought to get the cantharidin into a definite solution which could be made uniform and thus far trustworthy. A variety of menstrua were tried, including most of those which have been commonly suggested, and glycerin and chloroform and their mixtures in addition. None of these proved to be sufficient solvents, or properly applicable, thus realizing the observations of Prof. Procter as to the peculiar intractability and unmanageable nature of this substance when separated. Many of the cold solutions were vesicant, but all appear to be sluggishly so, and much less active than the oil. These trials all seemed to strengthen the conclusions of Massing and Dragendorff that cantharadin is an anhydride, which in combination fixes two equivalents of water, and then plays the part of an acid to alkaline bases. The salts thus formed are far more soluble than cantharidin, and are soluble in other menstrua, but these solutions are still very dilute when saturated, and appear feeble and sluggish in vesicating effect when compared with the activity of the oil. All this inclined the writer, after much labor, to go back to the beginning, and by the light and general drift of these trials, seek for some definite liquid representative of the crude drug like a fluid extract, wherein the active principles, as in fluid extract of ergot, may be rendered more fixed and permanent by new combination. After

preliminary trials of various menstrua for exhausting the powdered cantharides, the officinal diluted alcohol, containing one-sixteenth of its volume of officinal liquor potassæ, seemed to succeed well. But when the liquid obtained and the residue after exhaustion were tried, the first was found rather sluggish in action, and loaded with an unnecessary amount of inert extractive matter, whilst the residue produced some irritation of the skin, and persistent itching after eighteen hours' application. After standing three weeks, the liquid was covered with a film of wax and fatty matter, and had become turbid. All this was accepted as evidence that the menstruum did not contain sufficient potassa and alcohol, and a new menstruum was made containing one-eighth of its volume of liquor potassæ, one-eighth water, and three-fourths stronger alcohol. This menstruum applied to the powder by repercolation yielded a percolate, which when in the proportion of a minim for each grain of powder, was very active in producing vesication. Even when diluted to one-half this strength, its action was energetic and prompt, producing a blister in less than six hours. This percolate contained no free potassa, and the alcohol appeared to be in sufficient proportion to hold all the oil in solution. On standing exposed for some days it became turbid, and a film of waxy matter formed on the surface. This turbidity and waxy matter did not disappear on the addition of alcohol unless the liquid was heated. The percolate was miscible with water and with alcohol in all proportions, but with turbidity from the separation of waxy matter, with perceptible separation of oil. This percolate was accepted as the blistering liquid sought after. It is really a fluid extract of cantharides in the normal proportion of minim for grain, and as an example of how fluid extracts may be made by weight, and without measures, the formula by which it is practically made will now be given.

FLUID EXTRACT OF CANTHARIDES OR BLISTERING LIQUID.

Take of

Cantharides in fine powder..... 16 troy ounces.
Solution of potassa,
Stronger Alcohol,
Water, ... of each a sufficient quantity.

Make a menstruum consisting of two troy ounces and thirty-two grains (= 2 f℥) of solution of potassa, and four troy ounces and three hundred and twenty grains (=6 f ℥) of stronger alcohol, to moisten the powder with.

Make another menstruum with which to percolate, consisting of 6¼ troy ounces of solution of potassa, 6 troy ounces of water, and 28 troy ounces of stronger alcohol. Divide the powdered cantharides into four equal parts, and moisten each part as it is wanted for percolation with one fourth of the first menstruum. Then percolate the first part to exhaustion with the second menstruum. Re-

serve the first troy ounce of the percolate from this first part, and receive the remainder of the percolate in separate portions of about two or three troy ounces each. Re-percolate the second part of the moistened powder with the percolate from the first part, excepting the reserved portion, and follow the percolate from the first part with about two troy ounces of new menstruum. Reserve three troy ounces of the first of the percolate from this second part, and separate the remainder of the percolate in fractions as before. Re-percolate the third part of the moistened powder with the percolate from the second part, excepting the reserved portion, and follow the percolate with fresh menstruum as before. Reserve five troy ounces of the first of the percolate from this third part, and separate the remainder of the percolate in fractions as before. Re-percolate the fourth and last part of the moistened powder with the percolate from the third part, excepting the reserved portion, and follow the weak percolate with fresh menstruum to exhaustion as before. Reserve five troy ounces of the first of the percolate from this fourth part and separate the remainder of the percolate in fractions as before, to be carried on to a future process. Add the reserved portions of percolate together, and mix them as the finished fluid extract. When a new process is to be undertaken, four troy ounces of the powder is to be treated in exactly the same way as each of the above parts, and three and a half troy ounces of the first part of the percolate is to be reserved as finished fluid extract, and the remainder of the percolate is to be carried on to a future operation as before.

A pint of the first menstruum, at 25° C. = 77° F., weighs 6520 grains, and a pint of the second menstruum, at the same temperature, weighs 6482 grains. A pint of the finished fluid extract, at the same temperature, weighs 6850 grains, or 14 troy ounces and 130 grains. The normal difference for this lot of powdered cantharides is therefore 6850—6520=330 grains.

The officinal liquor potassæ always contains lime and silica, which are precipitated upon admixture with alcohol, and these weights will vary from these figures if this precipitate be left in the mixture. As the officinal liquor potassæ contains about 5.8 per cent. of hydrate of potassa, and as each fourteen troy ounces of the fluid extract contains about two troy ounces and thirty-two grains of liquor potassæ, it follows that the total quantity of hydrate of potassa represented in the fourteen troy ounces is about 57.5 grains or 0.85 per cent. This is, however, entirely saturated by the cantharidin and by the oil, and is present in the fluid extract as cantharidate of potassa and as a soap, both being held in perfect solution by the alcoholic menstruum, the turbidity on standing and by dilution consisting of inert matter in inconsiderable quantity. The only thing which appears undetermined in the preparation is its permanence. All the published researches on this point and all the analogies that are available, however, are in

favor of its permanency, and as it proved very prompt and effective when reduced one-half in strength, it has a very good margin to secure its certainty.

It is therefore believed to be an excellent fluid extract of cantharides, and available for all therapeutic uses of the drug, internal as well as external, while it is both convenient and economical. It is, of course, an active poison, and should, therefore, bear a red label, and be dispensed with due care. As it can only be needed in small quantities, it should only be put up in one and four ounce bottles.

For internal use it may be diluted to any desired extent, and may be given in any simple vehicle.

As a rubefacient, or mild and continuous counter-irritant, it may be added in any definite proportion to plasters, cerates, ointments, liniments, &c., to obtain any desired degree of effect.

As a vesicant, it is, perhaps, best applied by means of thin bibulous paper, such as common filtering paper or newspaper, covered by oiled silk or adhesive plaster. One minim of the fluid extract sufficiently moistens one square inch of such paper, and this is a good proportion in use,—a fluid drachm for an eight inch blister, for example. The paper should be cut of the shape and size required, and a piece of oiled silk or oiled muslin, or a piece of common adhesive plaster, of the same shape but larger size, should be cut as a covering. The paper is then folded upon itself several times, and while lying on the middle of the oiled silk the fluid extract is dropped upon it until the paper is thus thoroughly moistened or saturated, so that none of the liquid can drain out and spread over more of the surface than is desired. If it be accidentally or incautiously wetted too much, a few minutes exposure will remedy this, by the evaporation of the alcohol. Paper thus moistened may be entirely dried, and be preserved for use in the dry state, to be moistened with water, as required for use, but although likely to be more permanent, as shown by M. Delpech, than any of the common blistering tissues, its permanency has not yet been ascertained. It is, therefore, for the present, considered safer and better to keep the blistering substance in the liquid form, and to moisten the paper with the liquid as it is required for use. The paper, thus moistened, is simply applied to the skin and covered with the oiled silk. In dispensing a blister of this kind, it is simply necessary to wrap the folded moistened paper up in the oiled silk, and then the whole in paper, with written directions for the simple mode of application. The skin should be cleansed from secretions before the paper is applied, but this is less necessary with this than with the ordinary forms of cantharides, because the active principles are here in a far more soluble condition. Of course, some means must generally be taken by bandage or by light compression to keep the paper in con-

tact with the skin. A gentle pressure over the oiled silk for a few minutes, until it becomes warm and soft, will cause its margin to adhere to the surface around the paper, and usually this will be all that is needed. Narrow strips of adhesive plaster or isinglass plaster or a bandage may occasionally be required. Three to five hours' contact is generally sufficient to produce full vesication, but the cuticle will not generally be raised into a blister for six or seven hours, whether the paper be left in contact or not. The common practice of removing the blister at the end of five hours and substituting a water-dressing is excellent practice. If the blister be very painful and irritating to a patient, the water-dressing may be made with a half per cent. solution of carbolic acid, as in treating a superficial burn, instead of simple water, when the pain and soreness will promptly subside. This dressing, however, will lessen the counter-irritant effect of the blister somewhat, and to that extent will interfere with its object.

A collateral advantage of this fluid extract may be expected from the circumstance that the active principles are soluble in water, and may be easily washed from the surface by simple sponging after the blister is removed, thus lessening the absorption and the liability to strangury. It is also easily washed off the hands and other parts to which it becomes accidentally applied, and from the surfaces to which it is purposely applied, at any stage of its action. This should give it a great advantage over the cantharidal collodion in many of its applications, and should nicely adapt it to use about the os uteri. It should also be far more certain than the cantharidal collodion.

The writer regards this preparation as a striking example of the conservative ground which he has taken for some years past, that the search for, and the isolation of so-called active principles of drugs in therapeutics and pharmacy, may be easily, if it be not generally, carried too far. He believes that he has proved by the labor which is epitomized in this paper, that a well-constructed fluid extract of cantharides is in every practical sense better than any preparation of cantharidin, or of cantharidate of potassa, and is all-sufficient for every known use of the drug it represents.

Therefore, as good fluid extract of ergot is far better for practical use than any of the so-called active principles of ergot: and as fluid extracts of aconite root, belladonna root, conium seed, and nux vomica, are better for therapeutic uses than aconitia, atropia, conia, and strychnia, so is a fluid extract of cantharides better than the drug itself, and better than its active principles. At least such is the conviction of this writer.

Brooklyn, September, 1871.

Editorial.

OUR EXAMINATIONS.

The semi-annual examinations in connection with the College will be held on Tuesday, August 6th—the day preceding the meeting of the Council. The number of candidates who have entered their names is exceedingly small, amounting only to some five or six. We cannot think that this represents with any degree of correctness the sum of those who should seek certificates of competency. It is true that a large number of assistants have already registered by virtue of having concluded their term of apprenticeship previous to the passing of the Pharmacy Act, and have, consequently, escaped the terrors of a compulsatory examination. If, however, we take into consideration the fact that eighteen months have elapsed since the new law came into force, it must at once be seen that the number of those who have presented themselves must be multiplied many times before the true sum of those who ought to have attended is arrived at. A list of druggists of Ontario would comprise, at the lowest estimate, some four hundred names; allowing one apprentice, or unqualified assistant to each druggist, and taking the longest term of apprenticeship at four years, we have an average of one hundred persons to be examined annually, or one hundred and fifty for the period during which the College has been in existence. The actual fact is that the entries have not amounted to more than twenty, including those going up to the coming examination.

It may be said that an examination is not compulsatory except the candidate desires to carry on business on his own account. Adhering strictly to the letter of the law this is perfectly correct, but it may be urged that the ambition of the apprentice should be sufficiently powerful to carry him over this the last and highest step of his probationary career. The adoption of such a course would be only just to his future employers, who may rightly expect that the time of an assistant will not be taken up in attempting to master those rudimentary studies with which he is supposed to be perfectly familiar.

As an aid in procuring employment, a certificate of competency will always be of great value. There are few employers who would not prefer an assistant whose qualifications are guaranteed to be up to the standard, and were two candidates to present themselves for a vacant situation, one of them the possessor of a diploma, and the other less fortunate in this particular, we are well convinced that other circumstances being equal, the preference would, at once, be given to the former.

The practice of putting off the time of examination is one that seldom results satisfactorily to the student, and this is more particularly the case with druggist's assistants who have ended the term of apprenticeship and have entered upon the active duties of assistants. A course of three years in any well appointed drug store, supplemented by careful reading and diligent study should, at the outside limits, be sufficient to qualify *anyone* to pass examination; a longer time should not expire before the trial is made.

The anticipation of an examination is, with most persons, a subject of anxiety, fraught with feelings the reverse of nerve-inspiring. Truly it is a time of trepidation, an ordeal beset with many terrors. But if imaginary difficulties are removed we find nothing that a true student need dread. As far as the examination here is concerned, we can, with all certainty, say that it is attended with no difficulties to those possessing anything like a fair amount of knowledge of the subjects embraced.

There is little need for caution on the score of over-confidence, but occasionally a student is met with who places his attainments at a higher estimate than the Board of Examiners feel disposed to allow. To such persons, a little "setting down" is perhaps more advantageous than success, as no condition is more hopeless than that of being too wise to learn.

We hope that our remarks will not be lost on our young friends and that the examinations for the next term may be marked by a numerous attendance.

THE COMING COUNCIL MEETING.

The regular half-yearly meeting of the Council will be held in the rooms of the College, on Wednesday, August 7th. It is parti-

cularly desirable that there be a full attendance, as in addition t ordinary routine business, several questions connected with the vit interests of the organization will have to be disposed of. To son of these it may be opportune to call attention. Most prominer amongst them stands forth the matter of pharmaceutical educatio Something must be done to meet the requirements of student during the coming term. Our College has already lain in inactivit for a longer period than can be readily excused. Due time ha been allowed for the maturing of plans, nor can the unsettle condition attending the commencement of any new enterprise b longer put forward as an apology for inaction.

Three projects present themselves for consideration: the cen tralization of educational facilities in Toronto and the establishmen of an organized body of teachers in connection with the College here; affiliation with the College of Technology as far as the facilities afforded by that institution can be taken advantage of; or the formation of local societies in our cities and larger towns and the organization of classes in connection with them.

We think that in any case, the institution of local societies should claim the best consideration of the Council. Some steps have already been taken in this direction and the formation of such societies has been authorized. There yet remains to be devised a scheme for the working of these societies, and to decide whether they could exist as legitimate branches of the College, or would have to maintain a separate position.

The subject of infringements of the Act demands immediate attention. As intimated in a late number of the Journal, complaints on this score are coming in from all quarters, and if it is within the province of the Council to take any action further than has already been taken, it will certainly tend to the satisfaction of the many and the general interests of all.

It is to be hoped that members of the Council will think over these matters, and come prepared to offer some well-digested scheme for action, so that no time may be lost in uncertain or unless discussions.

POWDERED CANTHARIDES.—There appears amongst druggists, to be a widely spread prejudice against purchasing cantharides in

fine powder. Anything finer than what will pass through a No. 30 seive is almost sure to be rejected, or, at best, viewed with suspicion. We have searched all the authorities at our command, and, in the vain hope of finding some good reason for such a common belief, have questioned many of the upholders of coarsely ground flies, but so far have searched in vain. To be candid, we never expected to find any valid reason, but were curious to know on what fallacy the prejudice was founded. The only information which by the most liberal interpretation could be construed into anything favoring the supposition is found in Wood and Bache, where it is stated that the insects should be purchased whole, and powdered as they are wanted for use, as the powder rapidly deteriorates by age, and the liability to adulteration is greater. Since the powdering of cantharides is an operation attended with considerable discomfort, it is more than probable that the directions of the *U. S. Dispensatory* will be more honored in the breach than the observance, and that pulv. lyttæ will still continue to be an article of commerce. In this case it behoves us to secure that commodity in its most eligible form, and then look well to its preservation. We hold that these conditions are best fulfilled when the flies are in the finest possible powder, and when such is kept in dry bottles, carefully stopped. Attention to this, and a watchful eye for the appearance of mites, and the timely addition of a few drops of acetic acid in case these little salamanders are observed, will keep the powder in a state of activity, for any reasonable length of time. It is apparent that for the preparation of blisters—and it is for this dirty and inelegant preparation that cantharides are principally consumed—the finer the powder is, the greater extent of surface it will cover, and the greater activity will a given weight display in a given time. For blisters, one of the chief requisites is immediate effect, and this can be best secured by the employment of a fine powder. In order to illustrate this point, if indeed it requires illustration, let anyone test the apparent strength of ground capsicum by placing on his tongue a grain of cayenne pepper, and a grain of pulv. capsici in impalpable powder, the latter will appear by far the most powerful. So it is with the cantharides. For the preparation of cantharidal collodion the fine flies are indispensable as it is practically impossible to exhaust the commercial powder with ether or chloroform. If druggists prefer the coarse powder on account of the detection of adulteration being easier, an ordinary magnifying glass will easily overcome the difficulty.

Editorial Summary.

POISONING BY EXTRACT OF VANILLA.—In last month's jou nal we published an item regarding several cases of poisoning sai to be attributable to the eating of ices, &c., flavored with vanill: It was stated by Schroff that this effect might have been produce by cashew nut oil, used to smear the vanilla pods. A writer in late number of the Philadelphia *Medical and Surgical Reporte* having at one time been similarly poisoned—together with eight o nine other persons belonging to his family—arrives at the conclu sion that vanilla extract becomes poisonous by being long kept Referring to the subject he says :—"The food which sickened thos of my family who eat of it was custard flavored with the extract o vanilla. The bottle from which the extract was taken had beer opened some months previously, and a part of it used at that time without producing any ill effects. By inquiring among my friends, I learned that one of them, together with a large family of which she was a member, had been poisoned by food flavored with vanilla extract, which was stale and which had been exposed to the air for some time. As the same manufacturer's extract of vanilla had been used in my family for years without bad effects, and a portion of the same bottle had been consumed some months before without producing any sickness, and as we have since used the same flavoring for ices and food, prepared by the same parties, taking care always to use it fresh, and only in the above instance having been made sick by it, I have come to the conclusion that a change takes place in the extract when exposed for a time to the air, and that this developes some poisonous properties.

PREPARATION OF ABSOLUTE ALCOHOL.—E. Erlenmeyer, *(Annal. der Chem. and Pharm., in Am. Jour. Pharm.)* refers to the difficulties attending the production of large quantities of absolute alcohol, and proposes a modification of the method of Mendelejeff, in which caustic lime is used, the pieces of lime projecting above the surface of the spirit. In this way the dehydration is complete in two or three days. It is stated that the alcohol to be employed must not have a higher specific gravity than ·792 at 20° C. (68° F.). This is an evident mistake—probably a typographical error—at any rate it may be concluded that the strongest spirit obtainable by ordinary processes of distillation should be used. The method referred to is modified so that the lime and spirit are boiled upon the bath for one-half to one hour, in a still connected with a return cooler; afterwards the cooler is reversed and the alcohol distilled, when the entire distillate is obtained in the anhydrous condition. If the alcohol contains over 5 per cent. of water, it is merely requisite to subject it twice or three times to the same treatment.

Should it contain much water, then the lime must not, on the first boiling, project above the surface of the alcohol. It is better to fill only half of the space occupied by the latter, with pieces of lime, otherwise its rapid hydration endangers the safety of the still. Several litres of spirit may by this method be converted into absolute alcohol within a few hours.

FIRE AT MESSRS. ELLIOT & Co's.—We are sorry to have to record a most serious fire, which took place between two and three o'clock in the morning, July 11th, at the wholesale drug establishment of Messrs. Elliot & Co., of this city. Seeing the dangerous character of the premises, the alarm was at once given; and, as soon as it was possible, all the engines were on the spot and at work. The fire appeared to be principally on the first floor, and in the rear of the store, where it burned with great fierceness. Fortunately the water supply was ample, and the firemen succeeded in holding the conflagration well in check and eventually subduing it before a very great injury was done to the building. It was for some time a question of the first moment whether the fire would be prevented from reaching the cellar, where a quantity of highly inflammable material was stored; and this fortunately was accomplished. Some time was lost at the outset from the difficulty in getting into the premises, the iron shutters of the windows in rear resisting for a time all efforts to break them open. This, however, being accomplished a plentiful supply of water was poured into the flames, which, in a short time, were subdued.

The fire appears to have originated at the back of the store which was set apart for the bottling of oils, essences, &c. Owing to the prompt and energetic action of the fire brigade the flames were confined to this part of the building.

An examination of the scene of the fire reveals the fact that comparatively little loss has been suffered by actual combustion, but rather from the effects of water and smoke. The entire building, and even the interior of the drawers and cupboards, was permeated by a dense smoke, or rather vapour, arising from the heated and imperfectly consumed oil, which was confined to the interior of the building by the closely fitting iron shutters with which the windows were fitted. To this deficient supply of air the safety of the building, if not the entire block, may, in great part, be attributed.

The Messrs. Elliot are not yet able to give the extent of the loss they have suffered, but we are pleased to state that the insurance, which amounts to some $70,000, will be amply sufficient to cover the damage sustained.

The work of reorganization and refitting is being rapidly pushed forward, and it is hoped that business, which has never been entirely suspended, will, in a short time, resume its ordinary course.

Practical Formulæ.

Phosphorus Paste.—

Take of Starch, 8 ounces.
Flour, 24 ounces.
Glycerin, 24 fluidounces.
Water, 3 pints.
Phosphorus, 2 ounces.

Upon the unpulverized starch placed in a convenient vessel, pour one pint of water, stir up the mixture and pass it through a No. 60 sieve into a cast iron enameled dish having the capacity of a gallon; add one and a half pints of water, then the flour, and mix thoroughly, now introduce the glycerin and apply heat, best by means of a sand bath, until the plasma begins to form, stirring in the meanwhile constantly with a suitable pestle; then take the vessel from the fire and stir as before while the plasma forms, so as to evenly divide it. After a few minutes re-apply heat, stirring briskly until the plasma has completely formed, and then set it aside to cool, stirring it up occasionally. Now place six ounces of the plasma, gradually mixed with eight fluidounces of water, into a porcelain measure having the capacity of two pints; set this into nearly boiling hot water, and when the mixture has become sufficiently hot, drop in about two drachms of the phosphorus. When this has fused, agitate the whole thoroughly with a spatula or pestle, and incorporate the remainder of the phosphorus in the same manner. By this manipulation the phosphorus is effectively extinguished, without the risk of coming in contact with the air in an inflammable condition. After this thicken the phosphoric emulsion with more of the reserved plasma, and finally incorporate it thoroughly with the remainder. The finished preparation is best preserved in small wide-mouthed bottles, protected from the air.—R. ROTHER in *Pharmacist*.

To Obtain Perfect Crystals.—According to Professor Schulze, such crystals may be obtained from solutions of salts containing gelatine. He exhibited splendid crystals of borax, sugar, etc., which had formed in such solutions, suspended in the fluid without touching the vessel.

Cochineal Colour.—

Take of Cochineal	℥j.
Carb. potassa	℥ss.
Powd. alum	℥ss.
Cream of tartar	℥j.
Water	℥viij.

Reduce the cochineal to a fine powder, add the carbonate of potassa, and triturate with three ounces of water. Allow the mixture to stand one hour, add the alum and cream of tartar succesively, and, when the effervescence has ceased, the remaining water; filter. This solution imparts to elixirs a fine red colour; but is in some respects unsatisfactory, as it soon spoils.—*Pharmacist.*

Vienna Yeast.—Previously-malted barley, maize and rye are ground and mixed; next put into water at from 65° to 75° F.; after some hours the sweet liquor is decanted from the dregs and caused to ferment by some yeast. The fermentation becomes very strong and the yeast globules are carried to the surface, forming a scum which is skimmed off, placed on cloth filters, drained, washed with a little distilled water, and pressed into any desired shape by means of strong hydraulic pressure and covered with tight, stoutly-woven canvas, This yeast keeps from eight to fourteen days, and produces much better bread or beer than the ordinary variety.—*Chemical News.*

Transparent Cement.—A very strong transparent cement, applicable to wood, porcelain, glass, stone, etc., may be made by rubbing together in a mortar two parts of nitrate of lime, twenty-five parts of water, and twenty parts of powdered gum arabic. The surfaces to be united to be painted with the cement, and bound together until completely dry.—A. Selle in *Dingler's Polytechnisches Journal.*

Shaving Fluid.—

1. Take of

White hard soap (in shavings	¼ lb.
Alcohol	1 pt.
Water	¼ pt.
Perfume	q. s.

Put them in a strong bottle, cork it close, set it in warm water for a short time, and occasionally agitate it briskly until solution is complete. After repose, pour off the clean portion from the dregs into clean bottles for use, and at once closely cork them. If the solution be not sufficiently transparent, a little alcohol should be added to it before decantation.

2. Take of

White soft-soap	¼ lb.
Liquor potassa	2 fl. dr.
Alcohol	1 pint.
Perfume	q. s.

Proceed as before. The product of both is excellent. By simply rubbing a few drops on the skin, and applying the shaving-brush, previously slightly dipped in water, a good lather is produced.

Selections.

DETECTION OF ARSENIC AND SULPHUROUS ACID IN HYDROCHLORIC ACID.—Hager puts a little hydrochloric acid, diluted if necessary, with an equal volume of water, in a long test-tube, adds a little pure zinc, and closes the tube with a loosely fitting cock, to which two strips of parchment paper are attached, previously moistened on one side (the outside) with solution of nitrate of silver and acetate of lead. If arsenious acid is present, the former only will be blackened; if sulphurous acid is likewise present, both papers will turn black in the current of the escaping gas. A second experiment becomes then necessary in a tube similarly arranged. The sulphurous acid is first oxidized by permanganate of potassa, until the liquid acquires a yellowish or brownish tint, or until a faint smell of chlorine is perceptible. After the addition of zinc, the arseniuretted hydrogen contained in the gas evolved will blacken the silver paper only, without affecting the lead paper.—*Pharmac. Centrahalle*, 1872, *No.* 11 *in Am. Jour. Pharm.*

HYDRATE OF CHLORAL AS A REDUCING AGENT.—It is stated that the hydrate of chloral can be employed as a reducing agent to great advantage. All of the noble metals are at once reduced by it, in the presence of caustic potash or soda; as the chloroform is evolved in the process, and this envelopes the reduced powder, the precipitate can be readily washed out. When the solutions of gold, or the metals of the platinum group, are treated with hydrate of chloral, warmed, and an excess of caustic soda added, and the whole boiled for a minute, a complete reduction of the metals takes place, probably in consequence of the formation of some formic acid by the splitting up of the chloroform. In the case of silver salts, the reduction is also complete, and chloride of silver is formed. Mercury salts are not acted upon. These properties of the hydrate of of chloral suggests its possible application for metal plating on glass, and possibly in photography. Let some one try the experiment, and report the results.

INSECTICIDES.—Many of the *Anthemidæ*, such as chrysanthemums, chamomiles etc., possess in the sexual parts of the flower a narcotic matter which has a great effect upon insects, and will even kill small ones. In *Pyrethrum roseum* and *P. carneum*, just within the disk, this matter is found in considerable quantity. In order to prepare the powder to advantage, only the centre of the flower must be used, which must be cut before the seed is fully formed. The Spaniards, to keep off gnats, burn the centres of the horse daisy (*Chrysanthemum leucanthemum*); and the powder of the mayweed (*Anthemis Cotula*) has also been used for destroying insects. In some parts of Belgium this plant is fastened by the country people to branches where swarms of bees have settled (after they have been secured), to prevent them from leaving the hive. The Mahommedans and Tartars have long employed the powder of the *Pyrethrum* against all insects indiscriminately. To destroy flies, gnats and bugs, they burn it on an iron plate, which they heat slowly, in order to produce more smoke.—*Phila. Med. and Surg. Rep.*

CHANGES IN THE U. S. TARIFF ON DRUGS.

The U. S. tariff, as recently amended, comes into operation on the first of August. A large number of important changes have been made, all of them on the side of a reduction of duty. On some classes of goods, for instance that of flowers, leaves, plants, roots, barks, and seeds used for medicinal purposes, the customs duties have been altogether abolished. This is also the case with most of the essential oils.

Sulphuric acid, on which 1c. per pound was formerly levied is now admitted free. It is to be hoped that this arrangement will be appreciated by Canadian manufacturers.

We have appended a list of the principal articles enumerated in the new tariff, and for comparison, publish the old rates side by side with those now coming into operation :

ARTICLES.	Tariff Rates by Act of Dec. 22, 1870, and preceding acts	By Act of June 6, 1872.
Acetates, lead,		
brown	5c per lb	5c per lb
do., white		10c per lb
potassa	75c per lb	25c per lb
soda	50c per lb	25c per lb
zinc	50c per lb	25c per lb
Acids, acetic, sp. gr. 1,047 or less	25c per lb	5c per lb
do., sp. gr. over 1,047	80c per lb	30c per lb
acetous, sp. gr. 1,047 or less	10 p c	5c per lb
do. sp. gr. over 1,047	10 p c	30c per lb
boracic	5c per lb	Free
carbolic liquid	10 p c	10 p c
gallic	$1.50 per lb	$1 per lb
pyroligneous, sp. gr. 1,047 or less	25c per lb	5c per lb
do, sp. gr. over 1,047	80c per lb	30c per lb
sulphuric	1c per lb	Free
do, fuming (Nordhausen)	1c per lb	1c per lb
tannic	$2 per lb	$1 per lb
tartaric	20c per lb	15c per lb
Anotta extracts	20 p c	Free
do. seed	Free	Free
Antimony, ore	Free	Free
do, crude sulp.	Free	Free
Aquafortis	10 p c	Free
Argol dust	10c per lb	Free
Balsam, copaiva	20c per lb	Free
Canada or fir	30 p c	Free
Peru	50c per lb	Free
Tolu	30c per lb	Free
Bay rum, first proof	$1.50 per gal	$1 per gal
(greater strength in proportion) do, essence or oil	$17.50 per lb	50c per oz
Blue vitriol	5c per lb	4c per lb
Borax, crude	5c per lb	Free
Burgundy pitch	20 p c	Free
Camphor, crude.	30c per lb	Free
do, refined	40c per lb	5c per lb
Cinchona bark	20 p c	Free
Cobalt, ore of	10 p c	Free
Corks	50 p c	30 p c
Cork bark, manufactured	50 p c	30 p c
Cowage down	20 p c	Free
Cubebs	10c per lb	Free
Curry and curry powders		Free
Dried and prepared flowers		Free
Elecampane root		20 p c
Emery ore	Free	$6 per ton
do. grains	1c per lb	2c per lb
Ergot	20c per lb	Free
Farina		Free
FLOWERS, leaves, plants, roots, barks and seeds for medicinal purposes, in a crude state, n.o.p	20 p c	Free

Ginger, essence of	50 p c	35 p c
do. root	2c per lb	Free
Ginger, ground	5c per lb	5c per lb
Gentian root	20 p c	Free
Ginsengroot	20 p c	Free
Helebore root	20 p c	Free
Indian hemp (crude drug)	20 p c	Free
Isinglass	30 p c	Free
Jalap	Free	Free
Lime, chloride of	30c per 100 lb	Free
Liquorice paste	10c per lb	9c per lb
do. juice	5c per lb	4½c per lb
Madder, ground or prepared	Free	Free
do, extracts	10 p c	Free
Manganese, oxide of		Free
do. ore	10 p c	Free
Mineral waters	3c per qt & 25 @30 p c	Free
Mustard seed, brown	3c per lb	Free
do. white	3c per lb	Free
Oils, almond, essential	$1.50 per lb	Free
do. expressed or fixed	10c per lb	Free
amber, crude	10c per lb	Free
do, rectified	20c per lb	Free
anise	50c per lb	Free
bergamot	$1 per lb	Free
cajeput	25c per lb	Free
carraway	50c per lb	Free
cassia	$1 per lb	Free
cinnamon	$2 per lb	Free
citronella	50c per lb	Free
fennel	50c per lb	Free
juniper	25c per lb	Free
lavender		Free
mace	50c per lb	Free
attar of roses	$1.50 per oz	Free
poppy		Free
rosemary		Free
sesame	30c per gal	Free
thyme, red	25c per lb	Free
do, white	30c per lb	Free
Pellitory root	20 p c	Free
Peruvian bark	Free	Free
Plumbago	$10 per ton	Free
Potash, chlorate of	6c per lb	3c per lb
Quinia, sulphate of	45 p c	20 p c
Rochelle salt	15c per lb	5c per lb
Saffron	Free	Free
do. cake	10 p c	Free
Sago, crude or refined	1½c per lb	Free
do, flour	1½c per lb	Free
Salacine		Free
Saltpetre, crude	2½c per lb	1c per lb
do, refined	3c per lb	2c per lb
do, partially refined	2c per lb	2c per lb
Sassafras bark	20 p c	Free
do, root	20 p c	Free
Seeds, anise	5c per lb	Free
do, star	10c per lb	Free
do, canary	$1 per bush	Free
do, sesame	10 p c	Free
Soda, sal	½c per lb	½c per lb
do, ash	½c per lb	½c per lb
Santonine	$5 per lb	$3 per lb
Strychnia	$1.50 per oz	$1 per oz
Tamarinds		Free
Terra-alba, aluminous	20 p c	Free
Tonqua beans	20 p c	Free
Tripoli	Free	Free
Vanilla beans	$3 per lb	Free
Venice turpentine		Free

ERRATA.

In the business changes published last month it should be Mr. J. Walker Cull who succeeded to Cull & Engels, of Mitchell. Mr. J. A. Garlick has removed from Mitchell to Millbank.

Omitted in list of Registered Druggists—Massie, Jas., Smith's Falls,

ADDITIONS TO REGISTER.

McKnight, R., Meaford.
Ellis, F., Brantford.
Williams, John, London.
Hacking, J., Listowel.
Bond, John, Goderich.
Ross, Dr. H. M., Tiverton.
McKinnon, L., St. Williams.
Stewart, Robert, Rawdon.

DRUGS, MEDICINES, &c.—*Cont'd*	$ c.	$ c
Orange Peel, opt.	0 30	0 36
" good	0 12½	0 20
Pill, Blue, Mass	0 80	0 85
Potash, Bi.chrom	0 23	0 27
Bi-tart	0 30	0 32
Carbonate	0 14	0 20
Chlorate	0 65	0 70
Nitrate	10 50	11 00
Potassium, Bromide	1 50	1 60
Cyanide	0 75	0 80
Iodide	11 50	11 75
Sulphuret	0 25	0 35
Pepsin, Boudault's...oz	1 50	—
Houghton's.... doz.	8 00	9 00
Morson's....oz.	0 85	1 10
Phosphorus	0 75	0 85
Podophyllin	0 50	0 60
Quinine, Pelletier's	—	2 25
Howard's	2 35	—
" 100 oz. case.	2 35	—
" 25 oz. tin..	2 30	—
Root, Colombo	0 13	0 20
Curcuma, grd	0 12½	0 17
Dandelion	0 17	0 20
Elecampane	0 16	0 17
Gentian	0 10	0 12½
" pulv	0 15	0 20
Hellebore, pulv	0 17	0 20
Ipecac, "	2 20	2 30
Jalap, Vera Cruz	1 10	1 25
" Tampico	0 90	1 00
Liquorice, select	0 12	0 13
" powdered	0 15	0 20
Mandrake "	0 20	0 25
Orris, "	0 20	0 25
Rhubarb, Turkey	2 80	3 00
" E. I	1 10	1 20
" " pulv	1 20	1 30
" " 2nd	0 90	1 00
" French	0 75	—
Sarsap., Hond	0 40	0 45
" Jam	0 88	0 90
Squills	0 10	0 15½
Senega	1 35	1 50
Spigelia	0 40	0 45
Salt, Epsom	2 25	3 00
Rochelle	0 30	0 35
Soda	0 02½	0 03
Seed, Anise	0 13	0 16
Canary	0 05	0 06
Cardamon	3 50	3 75
Fenugreek, g'd	0 09	0 10
Hemp	0 06½	—
Mustard, white	0 14	0 16
Saffron, American	2 00	2 50
Spanish	16 00	17 00
Santonine	9 00	10 00
Sago	0 08	0 09
Silver. Nitrate.....Cash	14 85	16 50
Soap Castile, mottled	0 11	0 14
Soda Ash	0 04	0 05
Bicarb. Newcastle	6 00	6 25
" Howard's	0 14	0 16
Caustic	0 05¼	6 00
Spirits Ammon., arom	0 25	0 35
Strychnine, Crystals	2 20	2 50
Sulphur. Precip	0 10	0 12½
Sublimed	0 03½	0 05
Roll	0 03	0 04½
Vinegar, Wine, pure	0 55	0 60
Verdigris	0 35	0 40
Wax, White, pure	0 75	0 80
Zinc. Chloride.....oz	0 10	0 15
Sulphate, pure	0 10	0 15
" common	0 06	0 10
DYESTUFFS.		
Annatto	0 35 @	0 60
Analine, Magenta, cryst	3 00	4 00
" liquid	2 00	—
Argols, ground	0 15	0 25
Blue Vitrol, pure	0 09	0 10
Camwood	0 06	0 09
Copperas, Green	0 01½	0 02½
Gudbear	0 16	0 25
Fustic, Cuban	0 02½	0 04
Indigo, Bengal	2 40	2 50
Madras	0 05	1 10
Extract	0 30	0 35

DYESTUFFS—*Continued.*		
Japonica	0 05½	0 06½
Lacdye, powdered	0 33	0 38
Logwood	0 02	0 03
Logwood, Camp	0 02	0 3½
Extract	0 10	0 12
" 1 lb. bxs	0 14	—
" ½ lb. "	0 15	—
Madder, best Dutch	0 15	0 17
2nd quality	0 14	0 16
Quercitron	0 03	0 05
Sumac	0 06	0 08
Tin, Muriate	0 10½	0 12½
Redwood	0 05	0 06
SPICES.		
Allspice	0 8½@	0 10
Cassia	0 38	0 40
Cloves	0 15	0 16
Cayenne	0 18	0 25
Ginger, E. I	0 12	0 14
Jam	0 20	0 30
Mace	1 75	1 75
Mustard, com	0 20	0 25
Nutmegs	1 05	1 10
Pepper, Black	0 22½	0 23
White	0 40	0 42
PAINTS, DRY.		
Black, Lamp, com	0 07 @	0 08
" refined	0 25	0 30
Blue, Celestial	0 08	0 12
Prussian	0 65	0 75
Brown, Vandyke	0 10	0 12½
Chalk, White	0 01	0 01½
Green, Brunswick	0 07	0 10
Chrome	0 16	0 25
Paris	0 30	0 35
Magnesia	0 20	0 25
Litharge	0 07	0 09
Pink, Rose	0 12½	0 15
Red Lead	0 07	0 08
Venetian	0 02½	0 03½
Sienna, B. & G	0 10	0 15
Umber	0 07	0 10
Vermillion, English	1 25	1 30
American	0 25	0 35
Whiting	0 85	0 90
White Lead, dry, gen	0 08	0 09
" " No. 1	0 07	0 08
" " No. 2	0 05	0 07
Yellow Chrome	0 12½	0 35
" Ochre	0 02½	0 03½
Zinc White, Star	0 10	0 12
COLORS, IN OIL.		
Blue Paint	0 12 @	0 15
Fire Proof Paint	0 06	0 08
Green, Paris	0 30	0 37½
Red, Venetian	0 07	0 10
Patent Dryers, 1 lb tins	0 11	0 12
Putty	0 03¾	0 04½
Yellow Ochre	0 08	0 12
White Lead, gen. 25 lb. tins	2 30	—
" No. 1	2 10	—
" No, 2	1 90	—
" No. 3	1 65	—
" com	1 30	—
White Zinc, Snow	2 75	3 25
NAVAL STORES.		
Black Pitch	5 00 @	5 25
Rosin, Strained	5 25	—
Clear, pale	7 80	—
Spirits Turpentine	0 73	0 75
Tar Wood	5 00	5 25
OILS.		
Cod	0 60 @	0 62
Lard, extra	0 95	—
No, 1	0 90	0 95
No. 2	0 85	0 90
Linseed, Raw	0 80	0 85
Boiled	0 85	0 90
Olive, Common	1 15	1 35
Salad	1 80	2 30
" Pints, cases	4 20	4 40
" Quarts	3 60	3 00
Seal Oil, Pale	0 80	0 80
Straw	0 75	0 80
Sesame Salad	1 30	1 35
Sperm, genuine	2 15	2 40
Whale, refined	0 90	0 95

DRUGS, MEDICINES, &c.	$ c.	$ c.
Acid, Acetic, fort	0 12	@ 0 14
Benzoic, pure	0 25	0 35
Citric	1 15	1 20
Muriatic	0 04	0 06
Nitric	0 11½	0 15
Oxalic	0 35	0 55
Sulphuric	0 03¾	0 07
Tartaric, pulv	0 50	0 50
Ammon, carb. casks	0 21	0 22
" jars	0 21	0 22
Liquor, 880	0 20	0 25
Muriate	0 12½	0 15
Nitrate	0 45	0 60
Æther, Acetic	0 45	0 50
Nitrous	0 35	0 37
Sulphuric	0 48	0 50
Antim. Crude, pulv	0 13	0 17
Tart "	0 56	0 60
Alcohol, 95 per ct.....Cash	1 60	1 72
Arrowroot, Jamaica	0 18	0 22
Bermuda	0 45	0 65
Alum	0 02¾	0 03½
Balsam, Canada	0 40	0 42
Copaiba	0 77	0 80
Peru	3 80	4 00
Tolu	0 90	1 00
Bark, Bayberry, pulv	0 18	0 20
Canella	0 17	0 20
Peruvian, yel. pulv	0 42	0 50
" red "	2 10	2 20
Slippery Elm, g. p.	0 15	0 20
" flour, packets	0 28	0 32
Sassafras	0 12	0 15
Berries, Cubebs, ground	0 20	0 25
Juniper	0 06	0 10
Beans, Tonquin	0 62	1 10
Vanilla	20 25	21 00
Bismuth, Alb	3 50	4 00
Carb.	4 10	4 50
Camphor, Crude	0 38	0 40
Refined	0 50	0 55
Cantharides	2 80	3 00
Powdered	2 90	3 10
Charcoal, Animal	0 04	0 06
Wood, powdered	0 10	0 15
Chiretta	0 20	0 30
Chloroform	1 25	1 65
Cochineal, S. G.	0 80	0 95
Black	1 10	1 20
Colocynth, pulv.	0 50	0 60
Clolodion	0 67	0 70
Elaterium.....oz	4 50	5 00
Ergot	0 65	0 75
Extract Belladonna	2 20	2 50
Colocynth, Co	1 25	1 75
Gentian	0 50	0 60
Hemlock, Ang	1 12	1 25
Henbane, "	1 70	2 00
Jalap	5 00	5 50
Mandrake	1 75	2 00
Nux Vomic.....oz	0 60	0 70
Opium.....oz	1 10	—
Rhubarb	7 50	—
Sarsap. Hon. Co	1 00	1 20
" Jam. Co	3 25	3 70
Taraxicum, Ang	0 70	0 80
Flowers, Arnica	0 25	0 35
Chamomile	0 32	0 40
Gum, Aloes, Barb. extra	0 70	0 80
" " good	0 38	0 50
" Cape	0 16	0 20
" " powdered	0 20	0 30
" Socot	0 51	80
" " pulv	0 60	90
Arabic, White	0 60	0 65
" " powdered	0 50	0 75
" sorts	0 28	0 30
" " powdered	0 42	0 50
" com. Gedda	0 13	0 16
Assafœtida	0 32	0 42
British or Dextrine	0 13	0 15
Benzoin	0 48	0 55
Catechu	0 12	0 15
" powdered	0 25	0 30
Euphorb, pulv	0 32	0 40
Gamboge	1 05	1 20
Guaiacum	0 25	0 28
Myrrh	0 42	0 60

DRUGS, MEDICINES, &c.—*Contd.*	$ c.	$ c.
Sang Dracon	0 60	0 70
Scammony, powdered	6 50	6 75
" Virg. "	14 50	—
Shellac, Orange	0 55	0 60
Gum, Shellac, liver	0 50	0 52
Storax	0 65	0 75
Tragacanth, flake	1 10	1 40
" common	0 35	0 40
Galls	0 27	0 32
Gelatine, Cox's 6d	1 10	1 20
Glycerine, common	0 30	0 35
Vienna	0 30	0 40
Prices	0 60	0 75
Honey, Canada, best.	0 15	0 17
Lower Canada	0 14	0 16
Iron, Carb. Precip	0 17	0 20
" Sacchar	0 40	0 55
Citrate Ammon	1 45	1 50
" & Quinine, oz	0 56	0 60
" & Strychine "	0 17	0 25
Sulphate, pure	0 08	0 10
Iodine, good	12 50	—
Resublimed	16 25	—
Jalapin	1 40	1 60
Kreosote	1 60	1 70
Leaves, Buchu	0 25	0 30
Foxglove	0 25	0 30
Henbane	0 35	0 40
Senna, Alex	0 30	0 60
" E. I.	0 12½	0 20
" Tinnevilly	0 20	0 30
Uva Ursi	0 15	0 15
Lime, Carbolate.....brl	5 50	—
Chloride	0 06	0 07
Sulphate	0 08	0 12½
Lead, Acetate	0 14	0 15
Leptandrin.....oz.	0 60	—
Liq. Bismuth	0 50	0 75
Lye, Concentrated	1 75	2 00
Liquorice, Solazzi	0 50	0 55
Cassano	0 23	0 40
Other brands	0 14	0 25
Liquorice, Refined	0 35	0 45
Magnesia, Carb. 1 oz.	0 20	0 25
" 4 oz.	0 17	0 20
Calcined	0 65	0 75
Citrate.....gran.	0 45	0 50
Mercury	1 00	1 15
Bichlor	1 00	—
Chloride	1 25	—
C. Chalk	0 60	—
Nit. Oxyd	1 25	—
Morphia Acet	3 65	4 00
Mur.	3 65	4 00
Sulph	3 80	4 20
Musk, pure grain.....oz	22 00	—
Canton	0 90	1 20
Oil, Amonds, sweet	0 50	0 52
" bitter	14 00	15 00
Aniseed	4 25	4 50
Bergamot, super	5 25	5 50
Carraway	4 00	4 20
Cassia	2 20	2 50
Castor, E. I	0 15	0 15
Crystal	0 22	0 25
Italian	0 26	0 28
Citronella	1 20	1 50
Cloves, Ang	1 15	1 30
Cod Liver	1 10	1 50
Croton	2 00	2 10
Juniper Wood	0 80	1 00
Berries	6 00	7 00
Lavand, Ang.....oz.	0 90	1 00
Exotic	1 40	1 60
Lemon, super	5 25	5 50
ord	3 20	3 40
Orange	5 25	5 50
Origanum	0 65	0 75
Peppermint Ang	13 00	14 40
" Amer.	3 25	3 50
Rose, Virgin	6 50	7 00
" good	5 00	5 50
Sassafras	1 15	1 40
Wintergreen	6 00	6 50
Wormwood, pure	4 00	6 50
Ointment, blue	0 76	0 80
Opium, Turkey	6 50	6 75
pulv	9 00	10 00