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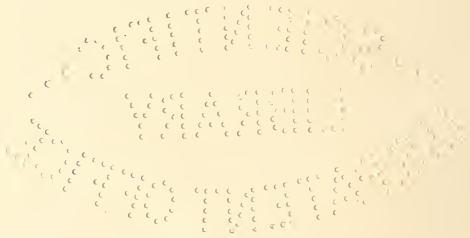

THE AMERICAN
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JANUARY, 1908

THE MICROSCOPICAL AND CHEMICAL EXAMINATION OF BLACK PEPPER.

By Henry Kraemer and Harry E. Sindall.

Black pepper is the fruit of *Piper nigrum*, a shrubby vine indigenous to the India-Malay region, and now cultivated extensively in tropical countries. An illustration of the plant is given by Baillon,[1] and by Engler and Prantl,[2] and an excellent historical account of the uses of pepper is given by Flückiger and Hanbury,[3] and also by Gildemeister and Hoffmann.[4] The fruit of *Piper nigrum* is the source of both the black pepper and white pepper of commerce, the individual fruits being known technically as "peppercorns." The former is the unripe, but full grown, fruit which has been allowed to dry spontaneously, or has been dried by means of artificial heat. White pepper, on the other hand, consists of the mature fruits from which a portion or nearly all of the pericarp has been removed. The parts removed in the preparation of white pepper are known commercially as "pepper hulls," or "pepper shells," of which there are several grades, depending upon the proportion of the different layers of the pericarp which is present. Pepper hulls can be purchased for much less than black pepper, and are frequently used to adulterate ground black pepper, and also enter into the artificial mixtures sold as black pepper.

The amount of pepper imported into the United States annually is estimated to be about 20,000,000 pounds, our importations coming principally through England. The commercial varieties derive their names chiefly from the points of export in the countries where they are produced. The following varieties are the ones

which mostly reach the markets of this country: Tellicherry, Singapore, Aleppi, Acheen, and Lampong. Härtel and Will[5] have recently made complete analyses of these and other commercial varieties, and according to their results Tellicherry and Singapore pepper constitute the better grades of pepper.

Hartwich[6] was one of the first to show that the heavier the pepper corns the greater the value of the particular variety of pepper; and analysts are beginning to take cognizance of the comparative weights, the method being to determine the weight of 100 pepper corns. The following figures show the weights of 100 pepper corns

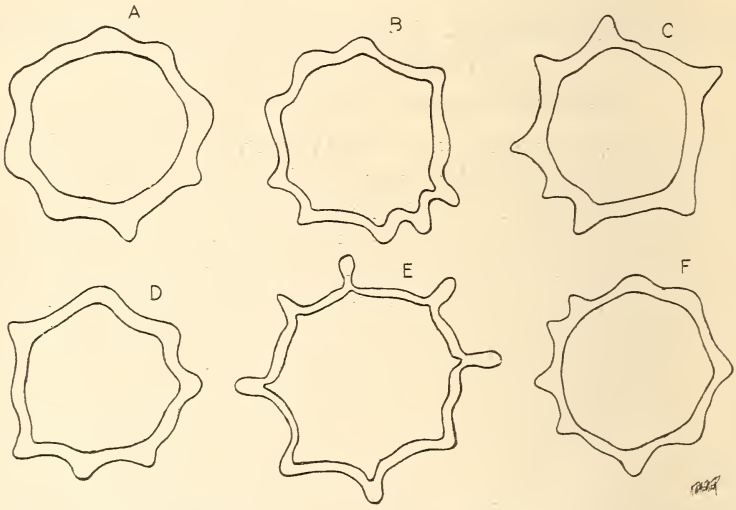

FIG. 1.—Diagrammatic representation of transverse sections of different varieties of black pepper. A, Aleppi; B, Tellicherry; C, Singapore; D, Acheen; E. Lampong; F, Bengal.

of several commercial varieties determined by the authors: Acheen, 4·452 grammes; Aleppi, 3·673 grammes; Lampong, 2·838 grammes; Singapore, (a) 3·935 grammes; (b) 4·013 grammes; Tellicherry, 4·412 grammes; Bengal, 3·527 grammes; unknown pepper corn, 4·272 grammes. These figures accord rather well with the figures obtained by Härtel and Will.[5] It should be said, however, that the specific gravity of the pepper corns would probably furnish a more reliable indication of quality, for the reason that the pepper corns vary in size, those of Lampong pepper being uniformly small. For example, while 100 pepper corns of Acheen, Singapore and

Tellicherry peppers weigh more than those of the Aleppi and Bengal varieties they do not show so large a proportion of oleoresin and piperine cells in the perisperm; and this seems to be borne out by the chemical data obtained by Härtel and Will[5] in the examination of Aleppi, Singapore and Tellicherry pepper.

MICROSCOPIC EXAMINATION.

A number of good monographs on the structure of black pepper have been published, the most important probably being those by Winton and Moeller[7], and by Tschirch and Oesterle[8]. It may be stated for the benefit of the practical worker that the illustrations given by these authors do not correspond in all particulars to sections of the commercial article, the drawings probably having been made from sections of fresh material.

One of the first observations made on the examination of cross-sections of pepper corns of the different commercial varieties is that the margin varies markedly in outline, and it would appear that the different varieties may in a measure be distinguished by this character. (*Fig. 1.*) In sections of Aleppi pepper the contour is undulate; in those of Singapore pepper it is characterized by broadly conical, obtuse or acute projections; and in Lampong pepper the projections are much longer, somewhat cylindrical, more or less rounded at the apex, and not infrequently somewhat narrowed at the base. In sections of the other varieties there are various gradations in the contour as shown in the figures. While an extended examination may show that this feature is merely a feature of different lots of the same commercial variety, we have found that, for example, in Lampong pepper, when the fruit is smooth, the epicarp has been removed in part, the projections always being reduced in height by the abrasions. This structure seems to bear a certain relation to the amount of oil and resin, that is, the pepper corns which have an undulate margin in section, as of the Aleppi variety, have the largest number of oil and resin cells, while sections of the Lampong fruits have the most pronounced projections and contain more undeveloped, and a less proportion of, oil and resin cells.

While there is no indication in the literature to show that there is a difference in the structure of the pepper corns of the different commercial varieties, it should be said that the figures by Moeller,[9]

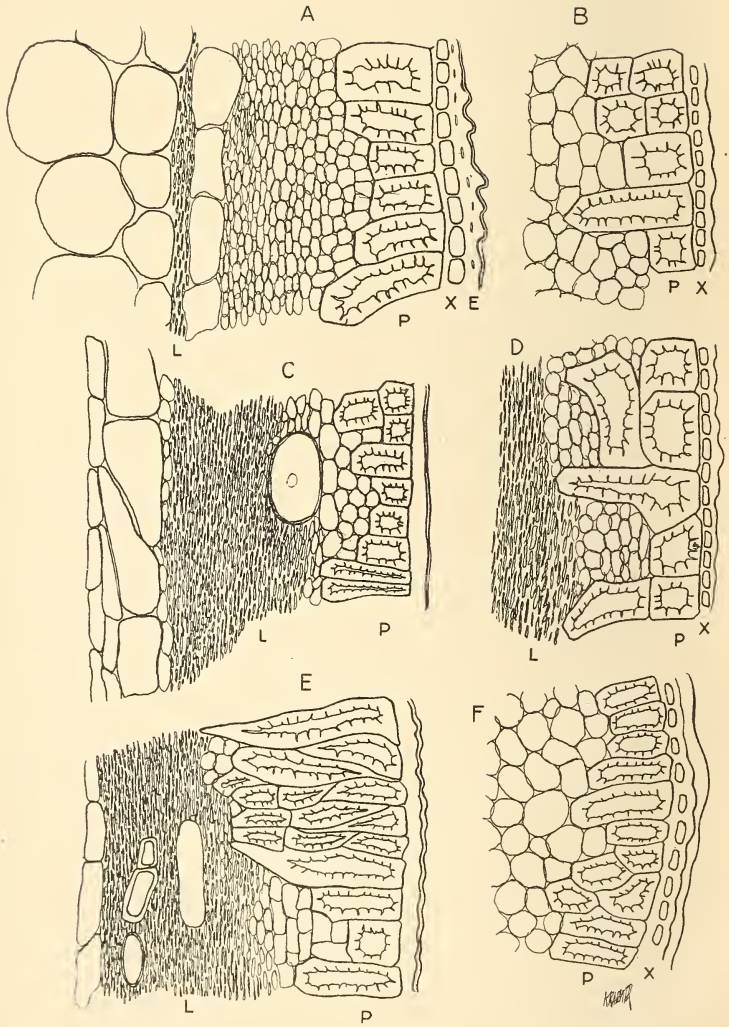

FIG. 2.—Transverse sections of outer portion of pericarp of the following varieties of black pepper : A, Aleppi; B, Tellicherry; C, Singapore; D, Acheen; E, Lampong; F, Bengal.

E, epidermal layer; X, layer of pigment cells; P, stone cells; L, collapsed parenchyma.

Winton and Moeller,[7] and Tschirch and Oesterle[8] can not be considered to be identical, but no statement is made as to the source of the specimens studied.

A careful examination, however, shows that there is considerable difference in structure in the pepper corns from different sources. Certain of the differences noted may be due either to the time of gathering the fruits, or to the manner of preparing them for the market. In Aleppi, Tellicherry, and Singapore peppers there is a sub-epidermal pigment layer, which is almost wanting in Lampong pepper. The lumen of the stone cells of the epicarp have very little pigment in Aleppi pepper, whereas in Lampong pepper the lumen of these cells contains a dark reddish-brown pigment, while in the other varieties the pigment is lighter in color. The stone cells of the epicarp vary both in compactness of arrangement and in the shape of the cells, as shown in *Fig. 2*. They also show a tendency to develop in certain directions, varying from nearly isodiametric or palisade-like cells, as in Tellicherry, Aleppi and Singapore peppercorns, to long tapering, as in Lampong, or somewhat shoe-shaped, as in the Acheen variety. The parenchyma cells beneath, and associated with, the stone cells in some varieties, as Tellicherry and Bengal, resemble ordinary parenchyma cells while in Singapore and Acheen pepper they are more or less collapsed, causing the oleo-resin cells to stand out rather prominently.

The lumen of the stone cells of the endocarp are quite different in different peppers (*Fig. 3*), those in Bengal and Singapore pepper having a reddish-brown content, which is almost wanting in the other varieties. In addition the walls of these cells are variously thickened. The oil cells above the stone cells of the endocarp are large and very distinct in Aleppi, Acheen and Singapore pepper, but much less developed in Lampong pepper.

CHEMICAL EXAMINATION.

The methods of analysis followed in obtaining the data here presented are those given by Leach[10] and adopted by the Association of Official Agricultural Chemists. The principal literature on the examination of black pepper is found in the *Zeitschrift für Untersuchung der Nahrungs- und Genussmittel* and *The Analyst* (London). The papers published by Winton and others during the past ten

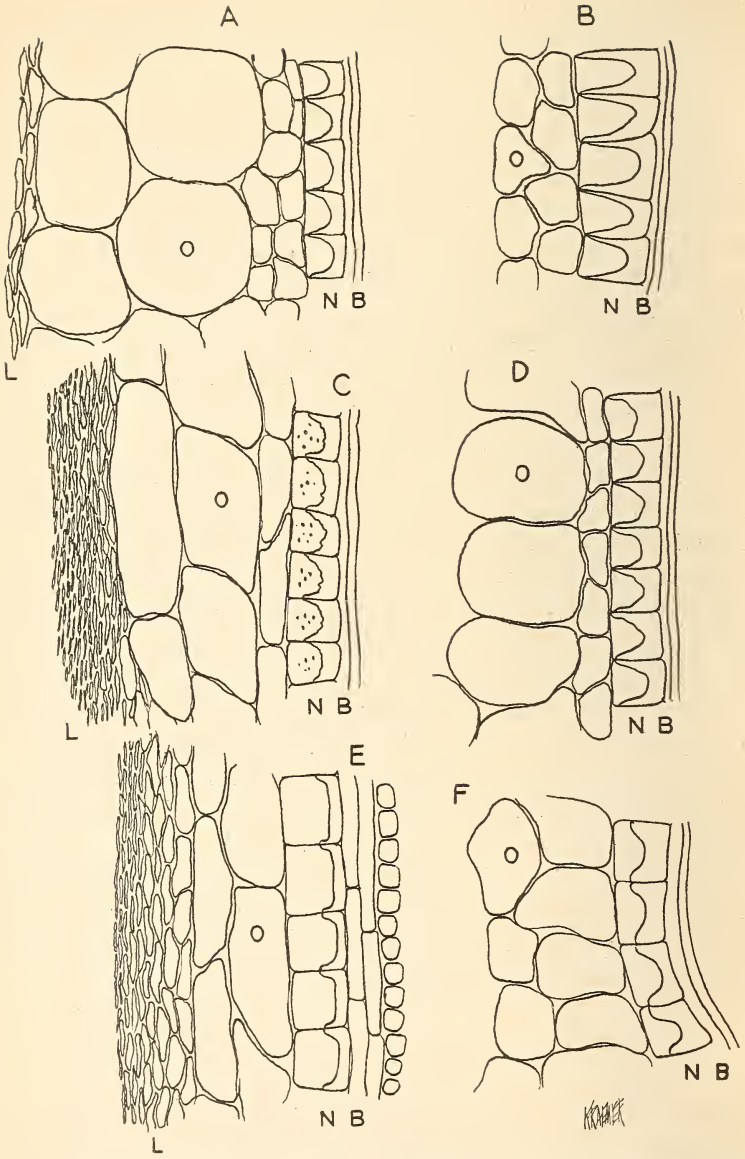

FIG. 3.—Transverse sections of the inner portion of the pericarp of the following varieties of black pepper: A, Aleppi; B, Tellicherry; C, Singapore; D, Acheen; E, Lampong; F, Bengal.

B, pigment layer; N, stone cells of endocarp; O, oil cells; L, collapsed parenchyma.

years in the annual reports of the Connecticut Agricultural Experiment Station furnish the best record of the work thus far done in this country. The only deviation from the methods of the A. O. A. C. made by the writers was in the determination of starch, where Allihn's original method for the determination of dextrose was followed in pursuance of a criticism by Winton.

The following data were obtained in the examination of six samples of Lampong pepper:

	Crude Fiber.	Total Ash.	Ash insoluble in 10 per cent. Hydrochloric Acid.
Maximum	14·50	6·45	1·40
Minimum	10·13	5·62	1·15
Average	12·69	6 05	1·37

The results of a more complete analysis of three samples of Lampong pepper are also given:

	Crude Fiber.	Starch.	Volatile Ether Extract.	Non-volatile Ether Extract.	Total Ash.	Ash insoluble in 10 per cent. Hydrochloric Acid.
1	13·70	. . . . .	0·78	9·82	5·27	1·25
2	11·44	. . . . .	1·25	9·00	5·70	0·90
3	14·48	39·07	. . . . .	8·90	6·36	1·15

The following figures were obtained in the ash determinations of different samples of the same lot of Lampong pepper:

	Total Ash.	Ash insoluble in 10 per cent. Hydrochloric Acid.
1	6·32	1·47
2	6·27	1·15
3	6·23	1·17
4	6·26	1·40
5	6·45	1·25
6	6·20	1·40
7	6·05	1 37

The following figures were obtained in the analyses of samples of ground pepper found on the market:

	Crude Fiber.	Non-volatile Ether Extract.	Starch.	Total Ash.	Ash insoluble in 10 per cent. Hydrochloric Acid.
1	16·66	9·51	35·33	6·49	1·15
2	16·54	10·44	44·62	6·74	1·76
3	18·60	9·37	37·69	6·31	1·03
4	25·56	9·96	37·50	6·50	1·10

The following special data were obtained in the examination of commercial samples of ground black pepper:

Ash.—Forty-one samples gave

	Total Ash.	Ash insoluble in 10 per cent. Hydrochloric Acid.
Maximum	6·91	2·08
Minimum	5·27	0·69
Average	6·15	1·17

Crude Fiber.—Thirteen samples gave

Maximum . . . . . 26·10
Minimum . . . . . 13·38
Average . . . . . 15·10

Starch.—Eight samples gave by direct acid conversion

Maximum . . . . . 44·24
Minimum . . . . . 29·66
Average . . . . . 37·83

Ether Extract.—Eight samples gave

	Volatile Ether Extract.	Non-volatile Ether Extract.
Maximum	1·70	10·44
Minimum	0·50	7·78
Average	0·86	9·27

FIG. 4.—A mixture sold as ground black pepper: A, stone cells of olive endocarp; S, corn and wheat starch grains; B, stone cells of pepper hulls; C, fragments of seed coat and pericarp of cayenne pepper; L, crystals of calcium sulphate which separate on mounting the specimen in 25 per cent. sulphuric acid.

ARTIFICIAL PEPPER.

It is probably only in exceptional cases that attempts are made to sophisticate or adulterate whole pepper, and with the more general enforcement of the Pure Food and Drugs Law, it is likely that pepper adulterated in this manner will not continue to be imported. Heckmann[11] reported having examined a lot of white pepper, over 40 per cent. of which was composed of an imitation pepper consisting of barium sulphate. A number of grains of similar composition were also found in black pepper by Fischer and Grühnhagen.[12]

Bertschinger[13] reports having examined an imitation black pepper, the grains of which were composed of two portions, namely, a central mass consisting of wheat starch and an outer layer made from the residue obtained in the manufacture of olive oil. A recent sophistication that has come to our notice was in the case of some black pepper offered for sale that contained 15 to 20 per cent. of an imitation pepper composed of tapioca which was colored with a bluish-black dye.

ADULTERATED PEPPER.

One factor which affects the quality of pepper to a considerable extent is the neglect properly to garble and clean the fruits. The ash is not only increased by the adhering dirt, but sometimes the whole fruits have been coated with barium sulphate or calcium carbonate.

As is well known to analysts a large number of substances have been used to adulterate ground black pepper, but the number of these are probably on the decrease. The very cheap grades of pepper are usually adulterated, and a recent sample of a pepper examined by the authors, which retailed at 1 cent per box (about 1 ounce), was found to consist of olive endocarp, corn and wheat starch, some pepper hulls and capsicum (*Fig. 4*). A chemical analysis of the sample gave the following figures: Crude fibre, 44·26; total ash, 7·09; insoluble ash, 3·24. A common admixture or adulterant of black pepper is that of pepper hulls, which, as already stated, are obtained as a by-product in the manufacture of white pepper. In addition, ground black pepper may also be adulterated with olive endocarp (olive stone), almond shells or other similar products. Starchy substances are sometimes added, but these are readily

detected by means of the microscope, except in the case of buckwheat middlings, the starch grains of which somewhat resemble those of pepper in size but they do not form compound grains, as in pepper.

In addition to the starchy substances already mentioned, it is said that hard-tack and stale bread are sometimes employed. The following substances have been reported as adulterants of pepper by various authors: Mustard-seed cake, flaxseed-meal cake, poppy-seed-meal cake, grape seeds, exhausted coriander fruit and paradise grains.

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[13] A. Bertschinger : *Schweiz. Wochenschr. Chem. Pharm.*, **39** (1901), pp. 215–216 ; Abstract in *Zeitschr. f. Untersuchung d. Nahr.-u. Genussmittel*, **4** (1901), p. 782.

SOME TESTS FOR GURJUN BALSAM IN COPAIBA.

By Charles E. Vanderkleed.

Publicity as to the nature of an adulteration has in many cases been the only thing necessary to put a stop to the practice,—not so in the case of adulteration of copaiba with Gurjun balsam, however, for although that practice is very old and the knowledge that copaiba has been very extensively adulterated with Gurjun balsam is well-known to every one, the practice has been continued up to

the present day, as the adulterators have rested secure in the knowledge that the methods used for the detection of Gurjun balsam in copaiba have not been satisfactory and could not be depended upon to give accurate results. Attempts to solve the difficulty of providing suitable tests for the detection of Gurjun balsam go back a great many years—one test after another has been proposed, used for a time, and then been abandoned—and so to-day we have two or three tests, or modifications of old tests, that have been proposed during the past year, and which are now undergoing a period of probation. It remains to be seen whether or not they will stand or fall.

My coming before you to-day is therefore more in the nature of a discussion of what has already been done, than of an offer of anything new on the subject. I wish simply to make for you a few of the most recently proposed tests as compared with similar tests which preceded them, in order that all chemists reached by this meeting, who are working with copaiba, may be induced to try the tests, so that when the Pharmacopœia is next revised we may have an accumulation of evidence and data to submit to the revision committee to help them in their work.

The earliest official test for Gurjun balsam in copaiba is found in the U.S.P. of 1880, which test was continued unchanged in the U.S.P. of 1890.

This test consisted in adding to 20 drops of a 5 per cent. solution of copaiba in carbon disulphide, one drop of a mixture of nitric and sulphuric acids, when a purplish red or violet color, due to the oxidizing action of the nitric acid on the resins indicated Gurjun balsam. This test, as pointed out by Kebler in the AMERICAN JOURNAL OF PHARMACY about ten years ago (see proceedings A. Ph. A., 1896, page 629), was not sufficiently delicate, although if applied as originally intended (see E. Schmidt's *Pharmaceutische Chemie*, 4th edition, page 1261) to a drop of distillate of highest boiling point from the balsam to be tested, its delicacy is increased. A test involving fractional distillation of the sample, however, is an impractical one for constant use, and so about this time (ten or twelve years ago) there appeared the first of the acetic-nitric acid tests —one modification of which is at present official in the U.S.P. So far as I am able to trace its history, this test first appeared in the *American Druggist and Pharmaceutical Record* of July 10, 1895, as a

contribution from the laboratory of Dodge & Olcott, and the test was made as follows (see proceedings A. Ph. A., 1896, page 628):

Four drops of the sample are dissolved in 15 c.c. of glacial acetic acid, and to the solution is added from 4 to 6 drops of C. P. nitric acid. With pure copaiba, no color, and at most but a slightly cloudy solution results—whereas with pure Gurjun balsam a deep purple color ensues. With mixtures the purple color is supposed to correspond to the extent to which Gurjun balsam has replaced copaiba. According to the authors, as little as 2 per cent. of Gurjun balsam can be detected. My experience with the test indicates that it is really the most satisfactory of the old modifications of the test, but time is required for the development of the color if only small amounts of Gurjun balsam be present.

I will proceed to demonstrate the test, using a pure balsam copaiba and pure Gurjun balsam as well as mixtures of the two in varying proportions. Every precaution has been taken to insure the purity of the balsam copaiba used. The sample answers all the U.S.P. tests for purity, has a specific gravity of 0·984 at 22° C., leaves a residue of 53 per cent. when heated for 48 hours on a water bath, and requires 2½ c.c. of N/2 alcoholic potassium hydroxide solution for each gram, indicating the proper proportion of acid resin. The Gurjun balsam has a specific gravity of 0.96 at 22° C., and was further distinguished from the similar Chinese wood oil by means of the Elaidin reaction. A time limit of six hours or overnight should have been added to this test, but time-limit tests are inconvenient in many ways, and when the eighth revision of the U.S.P. appeared it was found to contain a modification of this test as advocated by Kebler (see proceedings A. Ph. A., 1896, page 629.)

This test consisted in mixing four drops of nitric acid with one c.c. of glacial acetic acid and adding four drops of the sample—first as an upper layer—when no reddish zone should appear. Further on mixing the layers by shaking, no red or purple color should ensue. No time-limit was set for the development of the color.

The Revision Committee was soon informed that this test was not satisfactory since with this strength of nitric acid used, (about fifteen times that of the original D. & O. test) pure copaiba gives a dark-brown coloration which obscures the red or purple color of the Gurjun balsam reaction so as to render it very uncer-

tain with solutions containing as high as 30 or 40 per cent. of the adulterant. I will proceed to show this test with pure balsam copaiba and with the mixtures as before.

Realizing that the entire acid mixture was too strong, the test was changed with the issue of Additions and Corrections of May 1, 1907, the amount of nitric acid being cut from four drops to one drop, and the acetic acid being increased from 1 c.c. to 3 c.c.'s. This decreased the strength of nitric acid used by twelve-fold and approximated the strength used in the original D. and O. method; but the contact method of applying the test was retained, and so with even this improvement, the present official test remains uncertain.

I have been informed on good authority that chemists in certain customhouse laboratories have stated that they cannot apply the test with accuracy to balsams containing less than 30 per cent. of Gurjun Balsam.

In a paper read before the Pennsylvania Pharmaceutical Association last June, at Bedford Springs, I suggested the following modification of this test, which I will endeavor to demonstrate.

Four drops of the sample are dissolved in 3 c.c. of glacial acetic acid in a small flat-bottomed cylinder. T hree or four drops of nitric acid are then added from a pipette in such a way that it mixes but slightly with the solution of the balsam and collects on the bottom in a very thin layer.

Five per cent. seems to be the limit of delicacy of this test with a five-minute time limit. In all these tests greater accuracy is always to be gained by comparing the results with the test made upon a pure sample.

Finally, I wish to show a test which in my laboratory has given the most satisfaction,—a test worked out by Mr. J. L. Turner, and published in the *Pharmaceutische Centralhalle*, volume 48, No. 21, May 23, 1907. The test is also described in my paper above referred to. The test, which I will demonstrate, is as follows:—

Four drops of the sample are dissolved in 3 c.c.'s of glacial acetic acid; one drop of freshly-prepared 10 per cent. aqueous solution of potassium nitrite is added, and the mixture poured carefully on to the surface of 2 c.c. concentrated sulphuric acid. A dark color will always appear at the surface of contact, but in the presence of 2 per cent. or more of Gurjun Balsam a violet color appears in the clear upper layer.

Mr. M. I. Wilbert, in his report on the Progress of Pharmacy (American Journal of Pharmacy, December 1907, page 576) calls attention to the statement of E. J. Parry, that Hardwickia Balsam from *Hardwickia pinnata*, Copaiferae, is being used to adulterate Copaiba (see Schimmel's report for April, 1907). It would be interesting to know whether any of the above tests for Gurjun Balsam would likewise detect this Balsam, but I have not yet had an opportunity to try it.

Analytical Laboratory H. K. Mulford Company.
December 16, 1907.

THE DISTILLATION OF OIL OF CORIANDER.

By Adolph W. Miller., M. D.

In order to dispose of some Mogador coriander fruit, which had become infested with mites, it was determined to subject it to distillation. This was conducted in a vacuum still, steam being used as the source of heat, at a temperature of 150° F., the pump maintaining a vacuum of twenty inches.

The first charge of forty pounds consisted of about one-third of worm-eaten fruit, and about two-thirds of fruit in good condition, both having been previously crushed. The yield of oil was not appreciable, as is generally the case with drugs whose yield of oil is small, the water of this first distillation merely becoming saturated with the oil.

The second and third charges consisted of forty and thirty pounds respectively of crushed Mogador fruit in fair condition. These were subjected to the same vacuum and temperature, the saturated water of the first distillation being used again. The total yield of oil of coriander thus obtained from these seventy pounds was 890 grains, being equivalent to 0.18 per cent.

This oil, a sample of which is submitted, is readily soluble in three volumes of 70 per cent. alcohol, and is also freely soluble in all proportions of 80 and 90 per cent. alcohol at the temperature of 77° F., in so far complying with the United States Pharmacopœia. Its specific gravity is 0·883 at 77° F. being very near the 0.878 prescribed by the United States Pharmacopœia.

A sample of German oil of coriander just received from a prominent importer of essential oils is also submitted. This does not comply with the requirements of the United States Pharmacopœia in respect to being entirely soluble in three volumes of 70 per cent. alcohol at a temperature of 77° F. Only about 25 per cent. of the oil will dissolve at this temperature. It does, however dissolve, in this menstruum, when the temperature is raised to 80° F. It is also soluble in all proportions of 80 and 90 per cent. alcohol. Its specific gravity is 0.866 at 77° F., being still within the limits of the U.S.P. of 0·863 to 0·878.

As linalool is a normal constituent of oil of coriander, this substance has been sometimes used as an adulterant of the oil, as well as oil of cedarwood and oil of sweet orange.

Samples of oil of linaloe, composed in the main of linalool, and of pure oil of coriander, to which 25 per cent., respectively of oil of sweet orange, and oil of red juniper wood (the so-called oil of cedarwood of commerce) have been purposely added, are submitted. Both of these adulterations are noted in the text-books.

The distillation of the oil, and the chemical and physical examination of the specimens submitted, were conducted by Mr. Ralph R. Opie.

A PHARMACOLOGICAL STUDY OF CANNABIS AMERICANA (CANNABIS SATIVA).[1]

By E. M. Houghton, Ph.C , M.D.,
Junior Director of the Biological Laboratories of Parke, Davis & Co.,
Detroit, Mich.
and H. C. Hamilton, M.S.

Much has been said and written by physicians and pharmacists relative to the activity of *Cannabis Sativa* (Cannabis Indica and Americana). It is generally believed that the American grown drug is practically worthless for therapeutic purposes, and that one must employ the true cannabis from India, in order to obtain physiological activity. The best quality of Indian drug, it is claimed, is that grown especially for medicinal purposes and consists of the flowering tops of the unfertilized female plants, care being taken

[1] Read before the Scientific Section of the American Pharmaceutical Association, September, 1907.

during the growing of the drug to weed out the male plants. This notion, according to our experience, is based largely upon error, as we have found repeatedly that the Indian drug which contains large quantities of seed is fully as active as the drug which does not contain the seed, provided the seed is removed before it is percolated, and the experiments are based upon a fluid extract or other pharmaceutical product obtained from an equal weight of drug minus the seeds. The seeds themselves do not contain the active principle upon which the therapeutic properties of the plant depend, but may make up a very large percentage of the weight of the drug as it appears on the market.

Several years ago we began a systematic investigation of American grown hemp. Samples were obtained from the following localities and studied:

(1) August, 1905, Mr. Gaumnitz, of the Department of Agriculture, of the University of Minnesota, sent us samples of hemp grown on the college grounds.

(2) 1906. Also supplied by Mr. Gaumnitz.

(3) Grown in Mexico, 1903. Sent in for examination.

(4) " " " 1904.

(5) " " " 1906.

(6) " " Kentucky, 1905.

(7) " " " 1906.

(8) " near Detroit, Mich., 1907.

From these several samples of *Cannabis Americana*, were prepared fluid extracts and solid extracts according to the U.S.P., which were tested upon animals for physiological activity.

The method of assay, which has previously been called to the attention of this society, is that which one of us (Houghton) devised and has employed for the past twelve years. This method consists essentially of the careful observation of the physiological effects produced upon dogs from the internal administration of the preparation of the drug under test, compared with the physiological effects produced by definite doses of a standard preparation of the drug, according to the following method. It is necessary in selecting the test animals to pick out those that are easily susceptible to the action of cannabis, since dogs as well as human beings vary considerably in their reaction to the drug. Also, preliminary tests should be made upon the animals before they are finally selected for test pur-

poses, in order that we may know exactly how they behave under given conditions. After the animals have been finally selected and found to respond to the standard test dose, ·010 per kilo, they are set aside for this particular work, care being taken to have them well fed well housed, and in every way kept under the best sanitary conditions. Usually we have found it desirable to keep two or more of the approved animals on hand at all times, so there may not be delay in testing samples as they come in.

In applying the test, the standard dose is administered internally in a small capsule. The dog's tongue is drawn forward between the teeth with the left hand and the capsule placed on the back part of the tongue with the right hand. The tongue is then quickly released and the capsule swallowed with ease. In order that the drug may be rapidly absorbed, food should be withheld twenty-four hours before the test and an efficient cathartic given, if needed.

Within a comparatively short time, one to two hours, the dog begins to show the characteristic effects of the drug: First a stage of excitability is noticed, followed sooner or later by a condition of incoordination, the animal behaving as though intoxicated. Experience is necessary on the part of the observer to determine just when the physiological effects of the drug begin to manifest themselves, as there is always, as in the case of many chemical tests, a personal factor to be guarded against. The dogs must be kept perfectly quiet and watched without attracting their attention. The influence of the test dose of the unknown drug is carefully compared with the same dose of the standard preparation administered to another test dog at the same time, under the same conditions. Finally, the dogs become sleepy, the observations are recorded and the animals returned to their quarters.

The second day following, the two dogs are reversed, *i. e.*, the animal receiving the test dose of the unknown receives the test dose of the known, and vice versa, and a second observation made. If one desires to make a very accurate quantitative determination, it is advisable to use not two dogs but four or five, and study the effects of the test dose of the unknown in comparison with the test dose of the known upon each. If the unknown is below standard activity, the amount should be increased until the effect produced is the same as for test dose of standard. If the unknown is above strength, the test dose is diminished accordingly. From the dose of

the unknown selected as producing the same action as the test dose of the standard, the amount of dilution or concentration necessary is determined. The degree of accuracy with which the test is carried out will depend largely upon the experience and care exercised by the observer.

It is best to use the dogs on alternate days, in order that they may completely recover from the influence of the drug. Another point to be noted in the use of dogs for standardizing cannabis is that, although they never appear to lose their susceptibility to the drug, the same dogs cannot be used indefinitely for accurate testing. After a time they become so accustomed to the effects of the drug that they refuse to stand on their feet, and so do not show the typical incoordination which is the most characteristic and constant action.

We have never been able to give an animal a sufficient quantity of a U.S.P. or other preparation of the drug to produce death. When study of the drug was first commenced, careful search of the literature on the subject was made to determine its toxicity. Not a single case of fatal poisoning have we been able to find reported although often alarming symptoms may occur. A dog weighing about 25 pounds received an injection of 2 ounces of an active U.S.P. fluid extract in the jugular vein with the expectation that it would certainly be sufficient to kill the animal. To our surprise the animal, after being unconscious for about a day and a half, recovered completely. This dog received not alone the active constituents of the drug but also the amount of alcohol contained in the fluid extract. Another dog received about 7 grammes of S. E. Cannabis with the same result.

There is some variation in the amount of extractive obtained, as would be expected from the varying amount of stems, seeds, etc., in the different samples. Likewise there has been a certain amount of variation in the physiological action, but in every case there has been elicited the characteristic symptoms from the administration of ·010 grammes, per kilo body weight, of the extract.

The repeated tests that we have made have convinced us that the drug, properly grown and cured, is fully as active as the best Indian Cannabis, which we have sometimes found to be practically inert. Previous to the adoption of the physiological test, over twelve years ago, we were often annoyed by complaints of physicians that certain lots of drugs were inert, in fact some hospitals, before accepting

their supplies of hemp preparations, asked for samples in order to make rough tests upon their patients before ordering. Since the adoption of the test we have not had a single report of inactivity, although many tons of the various preparations of *Cannabis Indica* have been tested and supplied for medicinal purposes.

Furthermore, we have placed out quantities of fluid extract and solid extract of *Cannabis Americana* in the hands of experienced clinicians, and from eight of these men, who are all large users of the drug, we have received reports which state that they are unable to determine any therapeutic difference between the *Cannabis Americana* and the *Cannabis Indica*. We are of the opinion that *Cannabis Americana* will be found equally as good, and perhaps better, than that obtained from foreign sources, as proper directions can be given to the grower, in order to produce a drug of the greatest value. We expect to give this phase of the subject especial attention during the next few years, and see what improvements may be effected.

CONCLUSIONS.

(1) The method outlined in the paper for determining the physiological activity of *Cannabis Sativa* by internal administration to especially selected dogs, has been found reliable when the standard dose, ·010 per kilo body weight, is tested in comparison with the same quantity of a standard preparation of known strength.

(2) *Cannabis Sativa*, when grown in various localities of the United States and Mexico, is found to be fully as active as the best imported Indian grown *Cannabis Sativa*.

KEFIR AND ITS PREPARATION.[1]

By I. V S. Stanislaus, B. Sc., Phar. D.

The name "Kefir" is applied to a beverage prepared from cow's milk with the aid of an appropriate ferment called "Kefir grains."

This beverage has been used from time immemorial by the inhabitants of the northern part of the Caucasian Mountains under various names, as kefir, kapir, kifir, kepu and the like.

Kefir is not an imitation of koumys which the Tartars prepare from mare's milk, but differs from the latter as much as does cow's milk differ in its composition from mare's milk.

[1] Read before the Scientific Section of the American Pharmaceutical Association, September, 1907.

The ferment employed for the preparation has the appearance of crumbs or grains of various sizes, cauliflower-like in form. When in the dry condition these possess a yellow to a brick-red color, while in the moist condition they appear whitish in color.

The Kefir grains examined under the microscope appear to be composed of two morphologic forms—yeast cells (*Saccharomyces Cerevisiae Meyen*) and bacteria proper, having the form of cylindrical threads or rods and of their spores which Kerman and Krannhalls called *Dispora Caucasica.*

H. Struve considers the above bacteria as animal fibers, originating from bags made of hide, the so-called "burdiuk" in which kefir is prepared on the Caucasus.

Drs. L. Nencki and A. Fabian, in their work on kefir, discredit the above assertions of Struve as unfounded, claiming in turn that besides the fibers described by him they found the kefir grains to contain Hay bacteria (*Bacillus subtilis*) the so-called mildew grains of the Oidium variety and the bacteria of butter (*Bacillus butyricus.*)

The ferment described above is variously styled by the Tartars thus—"Kefir mildew," "kefir grains," or the "millet-seeds of the Prophet;" in continental Europe as "kefir champignons" or "kefir mushrooms."

The origin of kefir grains is not generally known; the mountain tribes of the Caucasus consider them as of sacred origin and hence the name "millet seeds of the Prophet." This is based on the Oriental legend purporting that the first Mohammed conferred this blessing upon his chosen people.

At the present time the purchase of the grains is possible everywhere—not so twenty years ago. No one of the Caucasian tribesmen dared to offer it for sale or even as a gift, and this not only to the "infidels" but to their own kin as well, because there existed a strong belief that by parting with some of the grains, the remaining grains would lose their fetichic power to ferment.

The legendary custom of parting with the grains, according to a Russian authority, was closely adhered to: The daughter upon being married did not receive her dowry of the grains outright, but upon the first visit her mother would leave her alone in the room where the grains were stored, this as a sign that in her absence the daughter could follow the American custom, "help yourself."

The probability of the origin of the kefir grains Professor Pod-

wysocki, of Riga, explains as follows: The koumys-forming ferment was known in times immemorial as history shows. When, however, the tribes occupied as horse-raisers and traders of the plains were compelled to migrate into the mountains, owing to the different condition of the soil and geographical distribution they were obliged to raise more bovine cattle than horses, which fact caused a shortage of mare's milk. The next step was to add the koumys ferment to a mixture of cow's and mare's milk. As the outgrowth of this in time the koumys ferment acquired a different form and composition, and such we now call "kefir grains."

This theory Professor Podwysocki further augments by the statement that outside of the Caucasus neither in Switzerland nor any other mountainous localities were the cattle-raisers fortunate in arriving at the kefir ferment; and by the fact that the most select koumys can only be prepared from mare's milk when kefir grains are employed, and not with yeast as ordinarily practised.

When Kefir grains are added to cow's milk two kinds of fermentation occur—alcoholic and lactic. Besides this, they peptonize albuminous substances, giving rise to physiologically highly beneficial compounds.

The main components of kefir may be classed as fat, lactose, alcohol, carbondioxid, lactic acid (which should not exceed 0.7 to 1 per cent.), inorganic salts, and albuminous bodies which exist here as casein, albumin, acidalbumin, hemalbumose and peptone.

The comparative analyses of cow's milk and twenty-four hours old kefir prepared therefrom are highly interesting and instructive:

	In parts per hundred.	
	Kefir.	Cow's milk.
Specific gravity at 15·4° C.	1·032	1·030
Total albuminous bodies	4·150	4·080
Casein	2·760	
Albumin	0·680	
Acidalbumin	0·300	
Alcohol	0·490	
Acid lactic	0·520	
Carbondioxid	0·045	traces.
Lactose	2·050	4·923
Fat	traces	3·701
Ash	0·630	0·622
Reaction	Slightly acid.	Slightly alkaline.

The prepared kefir is of a whitish color, pleasant and slightly cooling to the taste.

The quantity of the compounds formed through the so-called "starter" is closely dependent upon the quantity of lactose present in the milk employed and on the quantity of the "starter" added.

It should be stated that after the kefir is complete and ready for use, further changes still occur. Thus, in the preparation twenty-four hours old, hemalbumoses are absent but develop only on the third day, and the same may be said of peptone, which can be detected only after the third day.

There are several methods known for preparing the beverage. Some of these, however, give unsatisfactory results and are unduly tedious, and these I have omitted in this outline.

Before we proceed to the preparation of kefir, the grains should carefully be examined as to their condition, whether healthy or otherwise, and for freedom from adulterants, which is not an uncommon occurrence of late.

Good, healthy grains are recognized by their irregular form and size, hardness and yellow, to a brick-red, color. Macerated in water, they soften, acquire a whitish color, and swell up considerably, becoming rubbery masses branched on one side and almost smooth on the reverse concave side.

Nefarious varieties of the grains which are prepared from bread-crumbs with the addition of brewers' yeast and thus falsified, added to the genuine variety can be readily differentiated from the latter upon maceration with water. When so treated they are devoid of the rubber-like springiness and when rolled between the fingers become dough-like. When treated with a solution of iodine they acquire the characteristic blue color.

Having assured ourselves of the quality of the grains, we begin with the preparation of the "starter." This is done by macerating them in warm water for twenty-four hours, changing the latter at least four times. The well soaked grains are next separated from the water by straining, and in the proportion of two tablespoonfuls for every one and a half glasses of milk (350 c.c.) are added to the latter.

The vessel containing the mixture of the grains and milk is covered with muslin and set in a warm place at 15° C. to 18° C. until the grains begin to float upon the surface. It should be

remembered that the mixture requires occasional stirring during the first few hours.

The grains can be separated and used in the preparation of several lots.

When used for the first time the grains begin to float, but very slowly, sometimes requiring from three to eight hours and occasionally even more. But when they are used repeatedly for preparing kefir without intermediate drying, they float to the surface after three to four hours.

After a quantity of the grains rise to the surface, the mixture is strained, when a liquid is obtained which is called the "starter." The grains can now be covered with milk and set aside in a cool place until the next day.

"The "starter" prepared as above is mixed with three-quarters of a glass (188 c.c.) of previously boiled milk agitated thoroughly and poured into a clean bottle, which, however, should not be filled completely, corked immediately and securely, and set aside at a temperature of 20° to 23° C., until it begins to thicken, which process requires from eighteen to twenty-five hours in the winter, and from fourteen to twenty hours in the summer. The mixture acquires the consistency of cream, which can readily be seen through the walls of the bottle. The thickened mixture is now agitated vigorously, laid upon the side in a cool place (preferably the cellar where the temperature should not exceed 9° to 12·5° C. and agitated every two hours.

Kefir prepared as above is called "day-old," and is the weakest. It contains a slight quantity of CO_2, is viscous, possessing a very pleasant, refreshing and slightly acid taste. It should not contain "cheesy masses."

If allowed to rest in the cellar for a longer period the "two-day-old" and "three-day-old" are respectively obtained. But it should always be remembered that the contents be thoroughly shaken at least once every three hours.

We have stated above that the grains after being used are covered with milk and set aside until the next day. These, now carefully washed with water, can be used further to obtain new quantities of kefir by covering them with one and a half glasses of milk and repeating the operation as above.

The first lots of kefir are usually of inferior quality; the longer the grains are used the better the product. It should be remem-

bered that the grains must be thoroughly and carefully washed in cold, distilled water from the deposit of curd which accumulates upon their surface, causing subsequent acid fermentation which is highly detrimental to their quality and fermentative power.

Second Method: Kefir may be prepared by taking a tablespoonful of the dry grains, covering them with warm water and changing the latter several times during twenty-four hours. Next the grains are daily covered with fresh milk until they become "springy." The so-prepared grains are placed in a decanter covered with three glasses (750 c.c.) of milk and agitated frequently during six to eight hours. The grains are now strained off, the colate placed in bottles which should not be filled too full—and these latter are proceeded with as described in the first method.

Third Method: This method depends upon the employment of "three-day-old" kefir. Thus the contents of a bottle of the latter is divided equally into three bottles, these are filled within an inch of the top with cold, previously boiled milk, corked securely, agitated occasionally at the room temperature during three days or until the mixture thickens, when one of the bottles is again divided into three fresh bottles and proceeded with as above. This method has one disadvantage in that the third and the fourth attenuations spoil quickly.

The following points should be observed in the preparation of kefir: The milk should be fresh, previously skimmed and boiled; the latter condition is imperative to prevent butyric fermentation. It is also advantageous to sometimes add a teaspoonful of lactose to the milk, as in this wise more alcohol and CO_2 is formed and the albuminous bodies undergo peptonization much more readily. Good kefir should be homogeneous, viscous fluid not readily separating into two layers. Ferrated kefir for anæmics is prepared by adding to each bottle 0·1 gramme of ferric lactate. Pepsinated kefir is made by adding 0·75 gramme of powdered pepsin to each bottle.

THE EVIL INFLUENCE OF MYSTERY IN THERAPEUTIC AGENTS UPON THE SCIENCE OF MEDICINE.

By J. H. Musser,, M.D., Philadelphia.

The high level of present-day medicine has been attained by a process of gradual growth secured only by daily valuation of the facts in biology, whereby those of seeming truthfulness were cast aside, and those of truth fastened upon as with hooks of steel.

No scientific groupings of any biological truths can be made in which falsehood and truth are intermingled. The Science of Medicine rests upon biological laws which are as immutable as those of physics or of mathematics. The prosecution of the study of medicine and, I may also say of the art of medicine, can be conducted only by methods, which the scientific habit of mind can employ. Accurate observation, logical deduction and precise action mark the efforts of the scientific physician. True inference can follow only upon observations which attain the truth. If, therefore, it is essential in the first steps of our art—in diagnosis—to seek and to accept the truth only, how is it possible we can succeed in the practical application of the science, if we depart from truth and take as our handmaids, mystery, and falsehood in therapeutic action? If precision and accuracy are required in diagnosis, why are they not essential in therapeutics? To employ agencies, the composition of which is a mystery, is as much a method of the dark ages as to employ witchcraft, magic and other methods of that era. We must all admit that empirical treatment is a mode that had to be employed in the past. Happily, the day is rapidly coming, when the problems of the action of some remedies, as for example, of Iodide of Potassium in syphilis will be solved. Nevertheless, the use of this remedy, of Quinine in malaria, of Lemon juice in scurvy, was based on scientific inference. How can it be possible to draw such inference, when combinations of remedies made without regard to the traits and characteristics of individuals, are employed willy-nilly, for the treatment of disease? Even if we knew the composition of the various nostrums, how can we employ them when we admit our great advance in therapeutic action is dependent upon the broad principle that we treat the patient who is ill and not the disease? When, therefore, I am handed this combination for one disease; another for another, and so along the whole list I have the right to

say, I do not pretend to treat or cure any disease. My effort is to safeguard the individual, to see that there is no departure from the biological laws which control his life or to correct such as may exist, and to aid and abet the physiological processes by which the organism defends, resists, or adapts itself in that departure from the normal, in function or structure, which we call disease. Have we under these circumstances any use for mysterious agents?

The greater harm in the use of these agents is in their retro-active effect. That state of mind, which permits itself to be subordinated to those who think for them, will silently but surely lessen in vigor and virulence. That success in medicine which alone is self satisfying, which grows with the possessor's growth in power, which reaches its acme with his maturity, and continues in the fulness of his power, is only attained by a scientific habit of mind. Precise observation and true inference, truth sought and it alone retained as of value, belong to this habit. Any acceptance of the false, any compromise with mystery will surely impair it. In scientific labors one must constantly be "girding up the loins;" a high standard must always obtain. It is most easy, from perhaps fatigue, from stress of work, from eagerness to indulge in the pleasures of the day, to lapse. How hard it is for one to compel himself, not to make a "snap" diagnosis! Just as a snap diagnosis is vicious in its effects on the faculties of observation and the processes of reasoning, so is a "snap" therapeusis in its effects on the art of treatment. Any slipshod method of action begets its kind and soon in diagnosis and treatment a charlatanism arises, worse even than that of the ignorant quack or the credulous enthusiast in therapy.

The profession should take a stand for its own sake against haphazard, trivial, unscientific prescribing, which dwarfs the mind of the actor and later the conscience, far more frequently than it does harm to the victim of such conscienceless procedures. It is too often one of the seductive agents which leads the poor fellow who has attained a success, which is but a "flash in the pan." Nostrum prescribing as tallow on the ways, launches the physician into the seething sea of irresolution in diagnosis and irresponsibility in practice. To such a one success has come early, in part from fortuitous circumstances, or in part from a fortunate personality (another snare for many) and does not have for its foundation, the power which comes from labor in the laboratory and hospital ward,

and with the midnight oil of the library. A stronger Junior comes along and the success of the other is challenged; it fades and the struggle for its continuance leads the fading power to grasp at the many "will-o' the-wisp," political, social, religious, lodge and other vicarious methods of support. Such are among the men who are the nostrum prescribers of the profession. Had they pored over their labors and planned therapeutic campaigns on proper lines and not by slipshod methods, their success would never have been threatened; snap diagnosis and snap therapeutics would not have been of their stock in trade.

The profession ought to know that the public are wiser than they realize, and that some day the worm may turn and pour its vials of wrath upon the irresponsible and reckless, who without conscience, empty ad nauseam vial upon vial of unknown ingredients down credulous throats. It is to save us from this fate that the altruistic of our profession, Simmons, Billings, Cohen,—Professor Remington and Wilbert, and his colleagues are laboring. Let us bid them God speed in their efforts, and take heed.

Let me venture one prediction:—if pharmacists and physicians alike do not have a care, the day will come when pharmaco-therapy somewhat effaced at present will, if it has not already, give way to physiologic and psychic therapeutics.

Finally, it can never be said better than it was said by Emerson: "what a man does unto others, he does unto himself. If he does not play fair with others, he plays false to himself."

PROPRIETARY PREPARATIONS APPROVED BY THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION.

(*Continued from page 432, Vol. 79.*)

GUAJASANOL.—DIETHYLGLYCOCOLL-GUAIACOL HYDROCHLORIDE.

Guajasanol, $C_6H_4(OCH_3).(CH_2N(C_2H_5)_2.COO).HCl = C_{13}H_{19}NO_3HCl$, is the hydrochloride of diethylglycocoll-guaiacol.

Actions and Uses.—It is antiseptic and anesthetic. It is readily absorbed and splits off guaiacol in the organism with marked facility. Its antiseptic power is said to be about equivalent to that of boric

acid. Guajasanol has been recommended for the treatment of tuberculosis, both internally and subcutaneously. It is also recommended as a deodorant and is said to have given good service in putrid cystitis. Dosage.—1 to 3 grammes (15 to 45 grains) in wafers; subcutaneously, 3 to 4 grammes (45 to 60 grains) in 20 per cent. aqueous solution; locally it may be used in from 0·1 to 2 per cent. solutions. Manufactured by Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a. M. (Victor Koechl & Co., New York). U. S. patent No. 624,722.

HEDONAL.—METHYLPROPYLCARBINOL URETHANE. PENTAN-2-OL-URETHANE.

Hedonal, $CH_3.CH_2.CH_2.CH(CH_3)O.CO.NH_2 = C_6H_{13}O_2N$, is a urethane differing from ethyl carbamate, U.S.P., in that the ethyl radicle has been replaced by the radicle of methylpropylcarbinol (pentan-2-ol). $CH_3.CH_2.CH_2.CHOH.CH_3$.

Actions and Uses.—Hedonal appears to have a greater hypnotic effect than ethyl carbamate. It is said to be followed by no after-effects and is oxidized in the body to urea and carbon dioxide. It is recommended in insomnia due to mental overwork or nervous excitement occurring in the course of neurasthenia or hysteria. It is claimed to be particularly useful preliminary to anesthesia, a hypnotic dose being given and anesthesia effected with chloroform after the patient has been asleep for an hour. Dosage.—1 to 2 grammes (15 to 30 grains), administered dry, followed by a swallow of water, or in wafers or capsules. Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Continental Color and Chemical Co., New York). U. S. patent No. 659,202; German patents Nos. 11,496, 120,863, 120,864, 120,865.

HELMITOL.

A name applied to Hexamethylenamine Methylencitrate (which see).

Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Continental Color and Chemical Co., New York). U. S. patent. U. S. trade-mark No. 39,580.

HEROIN.—DIACETYL-MORPHINE.

Heroin, $C_{17}H_{17}(C_2H_3O_2)_2NO = C_{21}H_{23}O_5N$, is a synthetic alkaloid obtained by the acetylization of morphine.

Action, Uses and Dosage.—See heroin hydrochloride. Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Continental Color and Chemical Co., New York). U. S. trade-mark.

HEROIN HYDROCHLORIDE.—DIACETYL-MORPHIN HYDROCHLORIDE.

Actions and Uses.—When given in small doses, heroin hydrochloride has apparently no effect on any of the vital functions except respiration, which it renders slower, the volume of the individual respirations being increased, but usually not sufficiently to compensate the slowing, the result being a diminution in the total amount of air respired. In large doses it may produce dizziness, nausea and occasionally constipation, and, in poisonous amounts, twitching of the extremities, great exhaustion, and dimness of vision may be added. The temperature becomes subnormal and the pulse rapid and thready. The habit is readily formed and leads to the most deplorable results. It is said not to produce costiveness. (This is not true, according to some observers.) It is readily absorbed from all mucous membranes. It lessens irritability of the respiratory center, thus allaying cough, but does not depress the respiration as much as morphine. On withdrawing the drug from habitués, there is said to be a tendency to respiratory failure which may be dangerous. Heroin and its hydrochloride are recommended chiefly for the treatment of diseases of the air passages attended with cough, difficult breathing and spasm, such as the different forms of bronchitis, pneumonia, consumption, asthma, whooping cough, laryngitis and certain forms of hay fever. It has also been recommended as an analgesic, in the place of morphine in various painful affections. Toxic symptoms should be treated by the administration of caffeine hypodermically and of hot coffee by the stomach. To avoid respiratory failure in the treatment of heroin addiction, it has been suggested to substitute morphine for the heroin and then treat the patient for morphine additions. Dosage.—0.0025 to 0.005 gramme ($\frac{1}{24}$ to $\frac{1}{12}$ grain) to adults 3 to 4 times a day, the maximum dose being 0.01 gramme $\frac{1}{6}$ grain. To children it may be given in doses varying from 0.0002 to 0.001 gramme ($\frac{1}{300}$ to $\frac{1}{600}$ grain), according to the age. Hypodermically it may be administered in the form of a 2 per cent. solution in the same doses. It has been applied locally to the throat, to the

uterus on tampons, and by suppository for painful pelvic affections generally; but there is no evidence that it produces any local anesthetic action. Manufactured by Farbenfabriken, vorm. Friedr. Bayer & Co., Elberfeld, Germany (Continental Color and Chemical Co., New York). U. S. trade-mark.

HEXAMETHYLENAMINE METHYLENCITRATE.[1]

This substance, $C_6H_8O_7(CH_2)_6N_4 = C_{12}H_{20}O_7N_4$, is a compound of hexamethylenamine with anhydromethylencitric acid.

Actions and Uses.—It is a urinary antiseptic and germicide claimed to be more prompt and energetic in its action then hexamethylenamine, acting equally well whether the urine be alkaline or acid in reaction, rapidly clearing it up and allaying pain. It is recommended in cystitis, pyelitis, prostatic diseases and urethritis. It is also recommended as an efficient urinary antiseptic in infectious diseases in which bacteria are present in the urine, as in typhoid fever. It is regarded as a useful urinary antiseptic in the later stages and chronic forms of gonorrhœa. It may be used as a prophylactic against infection in case of operations or instrumental manipulation of the genitourinary tract. Dosage.—0·6 to 1 gramme (10 to 15 grains).

HOLOCAINE HYDROCHLORIDE.—ETHENYL-PARADIETHOXY-DIPHENYL-AMIDINE HYDROCHLORIDE.

Holocaine hydrochloride, $CH_3.C(:N.C_6H_4.OC_2H_5)(.NH.C_6H_4.OC_2H_5).HCl = C_{18}H_{22}N_2O_2.HCl$, is the hydrochloride of a basic condensation product of paraphenetidin and acetparaphenetidin (phenacetin).

Actions and Uses.—It is a local anesthetic like cocaine, but having the advantage of quicker effect and an antiseptic action. Five minims of a 1 per cent. solution when instilled into the eye are usually sufficient to cause anesthesia in from 1 to 10 minutes. It is more toxic than cocaine and without effect on the pupil or blood vessels. It is not so useful as cocaine when the vaso-constrictor effect of the latter is desired. It is said not to cause the scaliness of the cornea which sometimes results after the use of the older remedy. Dosage.—It is applied in a 1 per cent. aqueous solution

[1] This is the chemical name for a preparation on the market under the names of helmitol and urotropin, new.

prepared in porcelain vessels. Manufactured by Farbwerke, vorm. Meister, Lucius & Bruening, Hoechst a. M. (Victor Koechl & Co., New York). German patents Nos. 79,868, 80,568.

ICHTHALBIN.—ICHTHYOL ALBUMINATE.

A compound of ichthyolsulphonic acid and albumin analogous to tannalbumin.

Actions and Uses.—Its actions and uses are the same as those of ichthyol, with the asserted advantage of freedom from such side effects as nausea, eructations, etc. It is recommended for the same purposes as ichthyol. Dosage.—For infants, 0·13 to 0·3 gramme (2 to 5 grains), in gruel; older children, 0·6 to 1 gramme (10 to 15 grains), mixed with scraped chocolate; adults, 1 to 1·3 gramme (15 to 20 grains), in chocolate tablets. Manufactured by Knoll & Co., Ludwigshafen, a. Rh. and New York. English patent No. 11,344. U. S. trade-mark No. 31,114.

NOTES ON ESSENTIAL OILS.[1]

AMERICAN PHARMACOPŒIA (U. S. P.).

On the part of the American Pharmacopœia Committee, Supplements to the U. S. P. have been published on May 1 and June 1, 1907, which contain partly corrections of various statements, and partly additions to the individual articles. In the case of the essential oils, various alterations have also been made, but unfortunately not to such an extent as in our opinion appeared desirable. We quote the various data below without comment, as all further particulars are found in our previous discussion of the Pharmacopœia[2] to which we here beg to refer.

Anise Oil.—$d_{25°}$ 0·975 to 0·988; $a_{D\,25°}$ to — 2°.

Caraway Oil.—$d_{25°}$ 0·900 to 0·910.

Copaiba Oil.—The requirement of solubility has been cancelled.

Erigeron Oil.[3]—$a_{D\,25°}$ not below + 45°.

[1] From the Semi-annual Report of Schimmel & Co., October, 1907.

[2] Comp. Report, April 1906, 69. Am. Jour. Pharm., 78 (1906), p. 253.

[3] It should be mentioned here still that in recent times we have had to deal repeatedly with authentic erigeron oils, which had a distinctly higher specific gravity than that allowed by the American Pharmacopœia. The specific gravities of the oils in question amounted up to 0·887 at $\frac{15°}{15°}$ corresponding to 0·881 at $\frac{25°}{25°}$.

Eucalyptol.—$d_{25°}$ 0·921 to 0·923.

Eugenol.—$d_{25°}$ 1·066 to 1·068.

Oil of Juniper Berries.—The requirement of solubility is left out.

Lavender Oil.—$d_{25°}$ 0·875 to 0·910.

Lemon Oil.—$a_{D\ 25°}$ not below + 58°.

Nutmeg Oil.—$d_{25°}$ 0·884 to 0·924. The requirement of rotation has been left out.

Peppermint Oil.—$a_{D\ 25°}$ — 20° to — 33°; ester content (menthyl acetate) at least 6 per cent.

Pimenta Oil.—$d_{25°}$ 1·028 to 1·048.

Rosemary Oil.—Ester-content (bornyl acetate) at least 2·5 per cent.; total borneol at least 10 per cent.

Safrol.—$d_{25°}$ 1·098 to 1·100.

Sandalwood Oil. $d_{25°}$ 0·965 to 0·980.

Sassafras Oil.—Special requirements of solubility exist no longer.

Thyme Oil.—Colorless or reddish.

Wormseed Oil, American.—Requirements of specific gravity, rotation, and solubility have been cancelled.

DANISH PHARMACOPŒIA (PHARMACOPŒIA DANICA, 1907).

A new edition of the Danish pharmacopœia has now also made its appearance, a fact which induces us to discuss here the articles dealing with essential oils in a like manner as in a case of the other pharmacopœias of which, up to now, new editions have been published.

As compared with the old Pharmacopœia danica, 1893, no additional directions for testing have been given, so that generally only the color, odor, specific gravity, and solubility are taken into consideration. On the other hand, a whole number of erroneous statements in the old Pharmacopœia have been corrected, and the requirements specified by the new edition may be characterized almost without exception as being to the point.

No oil has been newly added, but several oils hitherto official are now no longer included, for example bergamot oil, cajeput oil, cassia oil, oil of juniper berries, mace oil, oil of sweet marjoram, mustard oil, and crude oil of turpentine.

The alcohols which come under consideration for testing the oils, are alcohol (Vinaand, Spiritus concentratus) with 90 to 91 per cent.

by volume, and dilute alcohol (Fortyndet Vinaand, Spiritus dilutus) with 68 to 70 per cent. by volume.

The individual oils may now follow:—

Anise Oil. (*Aetheroleum anisi*).—At low temperatures, a white crystalline mass, which commences to melt at 15°, and at about 20° represents a colorless or faintly yellowish, strongly refractive liquid; $d_{15°}$ 0.980 to 0.990[1]; soluble in 1.5 to 5 volumes alcohol.

Clove Oil (*Aetheroleum caryophilli*).—In the fresh state bright yellow, in the course of time acquiring a brownish color; $d_{15°}$ 1.045 to 1.070; soluble in 2 volumes dilute alcohol.

Fennel Oil (*Aetheroleum foeniculi*).—Colorless or faintly yellow; $d_{15°}$ 0.965 to 0.975; soluble in an equal volume alcohol; when cooled to about + 5°, it should solidify to a crystalline mass.[2]

Lavender Oil (*Aetheroleum lavandulae*).—Light yellow or greenish yellow; $d_{15°}$ 0.885 to 0.895; soluble in every proportion in alcohol, and in 3 volumes dilute alcohol.

Lemon Oil (*Aetheroleum citri*).—Light yellow; $d_{15°}$ 0.859 to 0.861;[3] with 5 volumes alcohol it forms a not quite clear solution; lemon oil must not show a strong acid reaction.

Menthol (*Mentholum*).—Colorless, brittle, needle-shaped crystals, not moist. M. p. 43°[4]; b. p. 212°[5]; only very slightly soluble in water; very readily soluble in alcohol, ether, chloroform, and fatty oils. When heated in an open dish on a water-bath, menthol should evaporate completely.

Oil of Parsley Seed (*Aetheroleum petroselini*).—Viscid, yellowish to brownish yellow; $d^{15°}$ 1.050 to 1.100; soluble in an equal volume alcohol.

Peppermint Oil (*Aetheroleum menthae piperitae*). Colorless, yellowish or greenish yellow; $d^{15°}$ 0.900 to 0.920[6]; at 20° soluble in

[1] It is recommended to determine the specific gravity at 20°, as anise oil sometimes solidifies already spontaneously at 15°; the above limits of value also apply to 20°.

[2] Solidification must sometimes be started by inoculation with a small quantity of solid anethol, as under certain conditions fennel oil may be cooled much below its solidification point without actually solidifying.

[3] It would have been better to have given 0.857 as lower limit of value.

[4] The m. p. of menthol, taken exactly, lies between 43.5 and 44.5°.

[5] Menthol boils about 217° if the mercury thread of the thermometer is entirely placed in the steam.

[6] According to the specific gravity, both English and American oils are allowed.

3 to 5 volumes dilute alcohol; when more solvent is added, at most a slight cloudiness may occur.

Rose Oil (*Aetheroleum rosae*). Light yellow, sometimes greenish yellow and fairly viscid. At a temperature below 18 to 21°, pointed or laminated crystals separate out from the oil, and if cooled further, the oil solidifies completely; $d^{20°}$ 0·855 to 0·870; only partly soluble in alcohol.

Rosemary Oil (*Aetheroleum rosmarini*). Colorless, or yellowish to greenish yellow; $d_{15°}$ 0·900 to 0·920; soluble in 0·5 and more volume alcohol.

Sandal Oil, East Indian (*Aetheroleum santali*).—Fairly viscid; light yellow to yellow; $d_{15°}$ 0·975 to 0·990[1]. at 20° soluble in 5 volumes dilute alcohol, the solution must also remain clear if more alcohol is added.

Thyme Oil (*Aetheroleum thymi*).—Colorless or yellowish, subsequently red-yellow; $d_{15°}$ 0·900 to 0·930; soluble in half its volume alcohol.

Thymol (*Thymolum*).—Colorless, transparent crystals; m. p. 51 to 52°[2]; b. p. 228 to 230°[3]; completely volatile at the temperature of the water-bath. Molten thymol floats on water, crystallized thymol sinks in it. Soluble in 1100 volume water, very readily in alcohol, ether, and chloroform, also in 2 volume caustic soda liquor (containing 10 per cent. NaOH). Identity reactions and test for carbolic acid.

Turpentine Oil, purified (*Aetheroleum terebinthinae.*) Colorless; $d_{15°}$ 0·860 to 0·870; soluble in about 10 volume alcohol. If the oil is shaken with an equal volume water, the latter must not take an acid reaction; 10 cc. oil, when evaporated on a water-bath, may leave behind only a trace of solid residue.

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[1] The upper limit of value of the specific gravity is given too low; it should be 0·985.

[2] The melting point lies between 50·5 and 51·5°.

[3] Thymol boils between 233 and 234°, if the mercury thread of the thermometer is placed entirely in the steam.

BOOK REVIEWS.

THE INTERNAL SECRETIONS AND THE PRINCIPLES OF MEDICINE. By Charles E. de M. Sajous. Volume II. With 25 illustrations. Philadelphia: F. A. Davis Company. 1907.

This work is a contribution of pathological biology to normal biology. It is a refreshing contribution to the development of scientific medicine. By taking cognizance of the researches in botany, zoology, biology and physiology, as well as medicine, the author shows the efficiency of our therapeutic resources. He has, as a result of an immense amount of work, shown the true relation and influence of medicines on the cardinal functions of organs.

In this volume Dr. Sajous "aims to replace the empirical and hazardous use of remedies which has undermined increasingly the confidence of our best observers in them, by a system of therapeutics based on solidly established facts which make it possible to trace every phase of their action to its source. The centers influenced may thus be used by the physician as so many levers through which he can regulate the defensive agencies of the organism and the mechanisms which distribute them, precisely as a general can give the defensive movements of an army in the field. As the disease-causing substances, toxins, endotoxins, toxic wastes, etc., are also shown to produce their effects through a morbid action upon the centers influenced by our remedies, they may thus be met directly where they strike and antagonized before they can destroy life."

In this volume are considered: (a) the secretion of the adrenals in respiration; (b) the adrenal active principle as the ferment of ferments; (c) the adrenal active principle as the dynamic element of life and the granulations of leucocytes as the living substance; (d) the pituitary body as governing center of vital functions; (e) the leucocytes, pituitary, thyroid, parathyroids and adrenals as the fundamental organs in pathogenesis, immunity and therapeutics; (f) the internal secretions in their relations to pharmacodynamics; (g) the internal secretions in their relations to pathogenesis and therapeutics. Then follows a treatment of poisoning as interpreted from the standpoint of the views advanced in the present work. In a supplement is given a list of the diseases in which the adrenal system and the nerve centers of the pituitary body play a leading part.

THE MICROSCOPY OF TECHNICAL PRODUCTS. By T. F. Hanausek. Revised by the author and translated by Andrew L. Winton with the collaboration of Kate G. Barber. With 276 illustrations. 8vo., xii and 471 pages, 276 figures. Cloth, $5. New York: John Wiley & Sons. London: Chapman & Hall, Limited. 1907.

It is very fortunate for American students of technical products that Dr. Winton and Dr. Barber have taken the pains to translate the valuable text-book of Hanausek. The translation has been carried out with the cordial co-operation of the author. "Much new matter has been added to the chapters on textile fibers, and the number of practical examples increased from eight to eighteen. The analytical key for woods has been revised so as to include the most important North American species." A number of cuts in the German edition have been dropped but nearly fifty other illustrations have been added.

The work consists of the following chapters: 1, The Microscope; 2, Microscopic Accessories; 3, Microtechnique and Reagents; 4, Starch and Inulin; 5, Vegetable Fibers and the Microscopic Examination of Paper; 6, Animal Fibers, Mineral Fibers and Textiles; 7, Wood of Dicotyledons and Gymnosperms, Monocotyledonous Stems, Subterranean Organs and Barks; 8, Leaves; 9, Insect Powder; 10, Fruits and Seeds, including Oil Cakes; 11, Teeth, Bone, horn, etc.; 12, Microchemical Analysis.

The work is creditable to the authors and is welcome to analysts and students of technical products. It is a reliable, scientific guide to the student and of great value to the investigator of raw materials.

PLANT ANATOMY, from the standpoint of the development of functions of the tissues and handbook of micro-technique. By William Chase Stevens. With 136 illustrations. Philadelphia; P. Blakiston's Son & Co. 1907.

As stated by the author "the book attempts to point out in a brief and elementary way how plants arrive at this achievement by the evolution of the different physiological tissue systems from a primitive undifferentiated embryonic tissue, and how the tissue systems are adapted by their character and relation to each other to carry out the plant's vegetative functions."

A very good idea of the subjects treated may be had from the titles of the seventeen chapters: 1, The Plant Cell; 2. Differentia-

tion of the Tissues; 3, Secondary Increase in Thickness; 4, Protection from Injuries and Loss of Water; 5, The Plant Skeleton; 6, The Absorption of Water and Minerals; 7, Circulation of Water and Soil Solutes; 8, Intake and Circulation of Gases; 9, Construction of the Plant's Food; 10, Circulation of Foods throughout the Plants; 11, Storage of Food and Water; 12, Secretion and Excretion; 13, The Preparation of Sections; 14, The Use of the Microscope; 15, Reagents and Processes; 16, Microchemistry of Plant Products; and 17, Detection of Adulteration in Foods and Drugs.

It is a good book of fundamental principles in plant anatomy and will be found valuable to the student who is desirious of preparing himself for the study of drugs, foods and technical products. Indeed, the course of work, as outlined in this volume, is required for the microscopical examination of commercial vegetable products.

AN INTRODUCTION TO VEGETABLE PHYSIOLOGY. By J. Reynolds Green. Second edition. Philadelphia: P. Blakiston's Son & Co. 1907. $3.00 net.

This work has apparently been prepared as a companion to the one on "Plant Anatomy," by Stevens. It is an excellent book on elementary vegetable physiology. The following subjects are treated: 1, the general structure of plants; 2, the differentiation of the plant body; 3, the skeleton of the plant; 4, the relation of water to the protoplasm of the cells; 5, the transport of water in the plant; 6, the transpiration current, root pressure and transpiration; 7, the aeration of plants; 8, the food of plants; 9, absorption of food materials by a green plant; 10, the chlorophyl apparatus; 11, the construction of proteins; 12, the constituents of the ash of plants; 13, other methods of obtaining food; 14, translocation of nutritive materials; 15, the storage of reserve materials; 16, digestion of reserve materials; 17, metabolism; 18, the energy of the plant; 19, growth; 20, temperature and its conditions; 21, the influence of the environment on plants; 22, the properties of vegetable protoplasm; 23, stimulation and its results; 24, the nervous mechanism of plants; and 25, reproduction.

The work contains nearly 200 illustrations, is well written and can be used not only by students of botany, but by the general reader who wishes to be informed on the physiological processes in plants.

ASSAYING ERRORS.

When the Manufacturers' Committee, called together by the Pure Food and Drug Act Commissioners, met in New York, September, 1907, we called attention to the fact that certain conditions, likely to make errors in returns, might be met when certain preparations on the market were assayed, one of these being a change in alcoholic strength, *without any evaporation of alcohol whatever*, which would take place in securely sealed containers. Our experience in a study of "*Precipitates in Fluid Extracts*," thirty years ago, had brought to our attention the fact that whenever an alcoholic liquid casts a precipitate, the liquid becomes stronger in its percentage of alcohol. Consequently, a fluid extract that contains 50 per cent. alcohol when freshly made, and which throws out a sediment, will assay above 50 per cent. after precipitation. The alcoholic proportion increases with the amount of the precipitate that separates. In order to establish the result of precipitation, a number of resin-bearing liquids of known alcoholic strength were recently mixed with their own bulk of water, the sediments allowed to separate, and the overlying liquids then assayed, the result being multiplied by two in order to bring them back to the proper proportion, they being now only half the strength of the original liquids. In each instance there was a decided increase in the proportion of alcohol, as shown in the accompanying table.

Name.	Freshly Assayed.	After Precipitation has Occurred.
	Per cent.	Per cent.
Podophyllum	53	65
Eriodyction	77	86
Leptandra	61	62
Jalap	83	98
Grindelia	83	90
Cimcifuga	68	70
Hydrastis	71	72

This is one of the features that will be investigated carefully by the Government, and proper allowance made therefor. We take it, no dealer or manufacturer need expect prosecution by reason of an occurrence indicated by such problems as this.—John Uri Lloyd, *Eclectic Medical Gleaner*, Vol. III (1897), No. 6, p. 505.

CONFERENCE OF PHARMACEUTICAL FACULTIES.

Synopsis of the meetings of the American Conference of Pharmaceutical Faculties, held at Hotel Astor, Wednesday and Thursday evenings, at 8 P.M. The meeting was called to order by President James H. Beal. The secretary called the roll of the Conference, showing a representation of twenty-one of the twenty-nine members of the Conference.

Vice-President McGill took the chair during the reading of the president's address, which had for its title, "The Purpose of the Conference." The recommendations in the president's address were as follows:

1. That a new by-law be adopted to read substantially as follows:

"Conditional members shall consist of such institutions as shall be recommended for election to conditional membership by the Executive Committee, and shall receive the affirmative votes of two-thirds of the members of the Conference represented at any annual meeting."

The conditional membership of an institution shall terminate in one year, unless the same shall be renewed by re-election. Institutions holding conditional membership may be elected to complete membership at any annual meeting, after the expiration of one year or more from the date of their election to conditional membership, in the manner and upon the terms prescribed by Article IV of the constitution.

2. That the incoming president appoint a committee of three to extend to the N.A.R.D., at its next convention, the greetings and good wishes of the American Conference of Pharmaceutical Faculties, and the said committee be especially instructed to express our cordial approval of the N.A.R.D. propaganda in favor of the more extended use of U.S.P. and N.F. preparations, and in favor of greater co-operation between the medical and pharmaceutical professions.

3. To amend Article IV, of the constitution as follows: Change the words "three-fourths" in the third line to "two-thirds." Also to add to said article the following: "If a majority of the members represented at any meeting of the Conference shall vote in favor of a candidate's admission, but the affirmative votes shall number less than the majority required for election, the votes of the members not represented at such meeting shall be taken by mail."

4. To amend Article XI of the constitution as follows: Change the words "three-fourths" in the eighth line to "two-thirds." Also add to said article the following: "Should such amendment receive the affirmative votes of a majority of the members represented at any meeting, but less than two-thirds of the total membership, the votes of the members not represented at said meeting shall be taken by mail, providing the affirmative votes of all the members not so represented would be sufficient to carry such amendment."

The president's address was referred to a committee consisting of Professors Remington, Anderson and Koch, who recommended that proposition No. 1, relating to conditional membership, should lay over for one year, although the committee favored the principle involved in its adoption. The committee concurred in the recommendations of the president in regard to the amendments to the constitution in Articles IV and XI, and the recommendation that delegates be again sent to the annual meeting of the National Association of Retail Druggists be carried out. They further recommended that the proceedings of the Conference be published in a cloth-bound volume and that the colleges represented in the Conference be assessed a sufficient amount to pay for them.

The report of the committee was unanimously adopted.

The report of the secretary-treasurer was read and adopted.

The report of the Executive Committee was made by the chairman, Professor W. A. Puckner, who announced the programme of the meeting, and also that the Buffalo College of Pharmacy, the New Orleans College of Pharmacy and Notre Dame University Department of Pharmacy had been elected to membership during the year by mail vote.

The committee appointed to consider the amendment with reference to the status of night-schools reported adversely upon action being taken at this time.

A communication from the Syllabus Committee was read by Professor Gregory, and on motion received and ordered published in the proceedings.

Dr. J. T. McGill read a paper entitled, "A Resolution in Regard to Pharmaceutical Degrees," in which the following was presented:

Resolved: That the American Conference of Pharmaceutical Faculties recommends:

1. A minimum preliminary educational requirement of high-school

work of four years for the degree of Doctor of Pharmacy, Phar.D., two years for the degree of Pharmaceutical Chemist, Ph.C., and one year for the degree of Graduate in Pharmacy, Ph.G.

2. That this standard be raised as rapidly as practicable to the preliminary requirement of four years of college work, *i. e.*, graduation in a college, for the degree of Doctor of Pharmacy, and four years of high-school work, *i. e.*, graduation in a high school or preparatory school of equal grade, for the degree of Pharmaceutical Chemist or the degree of Graduate in Pharmacy.

Discussion on this resolution was postponed until after the report of the Committee on President's Address, which report recommended that this subject be given more time for the framing of restrictions, and therefore advised that final action be postponed until the next annual meeting.

Professor Remington made a short report of the visit of the delegates to the meeting of the N.A.R.D., and urged that it was very important that another committee of delegates be sent to the next annual meeting. The report was accepted and the committee discharged.

At the second meeting of the Conference, there not being a sufficient number of members present to transact business, action upon the amendments to the constitution and by-laws was ordered to be taken by mail vote.

The Nominating Committee submitted the following names as nominees for officers for the ensuing year:

President, Dr. J. T. McGill, of Vanderbilt University, Nashville, Tenn.

Vice-President, Dr. C. B. Lowe, Philadelphia College of Pharmacy, Philadelphia, Pa.

Secretary and treasurer, Professor J. O. Schlotterbeck, School of Pharmacy, University of Michigan, Ann Arbor, Mich.

Chairman of executive committee, Professor W. A. Puckner, Illinois University, Department of Pharmacy, Chicago, Ills.

New members of the Executive Committee: Professor H. H. Rusby, of the New York College of Pharmacy, New York City, and Professor J. A. Koch, Pittsburg College of Pharmacy, Pittsburg, Pa.

They were unanimously elected.

PHILADELPHIA BRANCH OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

NOVEMBER MEETING.

The November meeting of the Philadelphia Branch of the American Pharmaceutical Association was devoted to a discussion of "The Official Standards and Tests."

The first paper to be presented on the subject was one entitled: "Comments on Some Official Standards and Tests," by Mr. L. Henry Bernegau, who discussed a number of observations that he had made relating to the purity rubric of the U.S.P.

He had encountered considerable difficulty in connection with the determinations of optical rotation of the essential oils. The specimens that he had seen differed widely from the official requirements in not a few instances.

Mr. Bernegau also discussed a ready method for the assay of solutions of nitro-glycerin and asserted that the loss of nitro-glycerin, in the making of tablets, was no doubt due to the evaporation in the process of granulation.

Mr. William M. Cliffe presented a communication on "Official Standards and Tests from the Standpoint of the Retail Druggist." He said: From the point of view that I have been requested to take in the discussion of the topic of the evening, the question of the standards and tests of the Pharmacopœia is one that is very important.

Through the position held by the retail pharmacist, as the distributor of pharmacopœial drugs and their preparations to the public, he is the one to whom the public will look for the maintenance of the standards that may be properly expected and exacted under existing laws.

It therefore follows as an absolute necessity that a retail pharmacist should be able and willing to accept the responsibilities of his position, logically occurring as a result of his relation to his customers.

While, owing to economic conditions, it is probable that alkaloidal assays will not be extensively performed in retail establishments, it still remains a fact that the retailer should possess the qualification necessary for this important branch of his work, if for nothing else than his own protection in cases where there is suspicion of deviation from required standards.

Another very practical feature of this question is that a reputation for ability, and proper espionage in the application of these tests protects the retailer from imposition on the part of jobbers and manufacturers, who may be unscrupulous enough to take advantage of a condition of laxity or ignorance; the return of goods on the verified grounds of non-conformity with legal standards is bound to make even the man who obeys the law as a matter of legal necessity, and not as a matter of abstract right, cautious about his dealings with one who is known to be an able stickler for the quality of the goods he buys.

Equally important with other phases of this question is the direct financial returns that come from ability and application on the part of the retailer. We have frequently seen the professional reputation that is a very important essential of a successful pharmacist's business seriously impaired by the inability or disinclination to effectively meet responsibilities of the character under discussion; and, on the other hand, have noted direct pecuniary returns and enhanced professional standing for one who was particular, even in the case of such a simple matter as the tests of the Pharmacopœia for a pure vegetable oil soap.

Mr. Charles E. Vanderkleed read a paper by Dr. A. R. L. Dohme and Dr. Herman Engelhardt, entitled "The U.S.P. Eighth Revision and its Relation to Some Drugs and Chemicals." This paper discusses at some length the changes that have been made in the eighth edition of the U.S.P., in the recently published corrections, and the authors also point out a number of instances in which the standards that have been established are not being complied with by the drugs on the market.

Among the substances that have been found to deviate from the established standards they enumerate: acetphenetidin, acid boric, asafetida, cerium oxalate, copaiba, jalap and a number of the volatile oils.

Prof. Henry Kraemer, in discussing the papers that had been presented, called particular attention to the need for retail druggists adapting themselves to changing conditions. Referring to the optical rotation of essential oils differing from the standards that had been established, he thought that it would be readily possible for this factor to be materially changed by a number of conditions, or the presence of materials, not necessarily contaminations, readily overlooked.

Professor Kraemer also referred to a number of changes in drugs and other substances that had come under his observation, evidently caused by the growth of micro-organisms or other of the lower vegetable forms of life. Taking all of these possible factors into consideration the wonder was that the Pharmacopœia has come as near being right as it has.

Prof. Joseph P. Remington, speaking as a member of the Committee on Revision, said that the experiences that have been gained during the past year will be of incalculable value to the committee in its future work. He laid considerable stress on the need for standards being such as are attainable and not too high. Essential oils he believed to be the most frequently adulterated of all medicinal substances.

Dr. F. E. Stewart, discussing the question of standards, said that he quite agreed with Professor Remington that standards for medicinal substances should be reasonable and attainable. For scientific progress in therapeutics doses must be founded on something substantial, and this could only be secured by having reasonably high standards that are guarded and complied with by pharmacists.

He believed, however, that pharmacists should go a step further than apply the tests of the Pharmacopœia to the materials that they themselves dispense. Having equipped themselves to do this work they should acquaint physicians with the need for such control and advise them to send their prescriptions to pharmacists who are in position to guarantee the genuineness and purity of the materials that they dispense.

Mr. M. I. Wilbert called attention to the fact that manufacturers could not be expected to guarantee their products after the original package had been broken and that the retailer, whether he wanted to or not, would be obliged to assume responsibility for all substances sold or dispensed other than those sold in the original package.

He also called attention to the fact that manufacturers and dealers are selling essential oils and other substances that are guaranteed to be compounded, or fit only for technical use, and that some retail druggists are buying these products for use in their prescription departments.

Dr. A. W. Miller, in discussing the labelling of adulterated or impure substances, called attention to the fact that at least one manufacturer of magnesium carbonate labelled his product as being

for technical use only, and was marketing another quality seven or eight times the price, as being of U.S.P. grade. So far as he could learn retail druggists were still buying the ordinary quality of magnesium carbonate for pharmaceutical uses.

The subject was further discussed by Messrs. Vanderkleed, Turner, Kraemer, Bernegau, Wilbert, Cliffe, Stanislaus and Pearson, also by Drs. Stewart and Miller.

At the suggestion of Professor Remington, the Executive Committee was instructed to consider the advisability of securing a larger hall for the next meeting, which is to be devoted to a discussion on "Nostrums and Newspaper Advertisements."

M. I. WILBERT,
Secretary.

DECEMBER MEETING.

The stated meeting of the Philadelphia Branch of the American Pharmaceutical Association, held on the evening of Tuesday, December 3, 1907, was devoted to a discussion of nostrums and newspaper advertisements.

Dr. John H. Musser discussed the "Evil Influences of Mystery, in Therapeutic Agents, upon the Science of Medicine," and made a strong plea for the elimination of all mystery, and falsehood from the practice of medicine. (See page 26.)

Dr. John B. Roberts, in discussing the physician's breach of trust—the use of secret remedies, asserted that the trust and confidence of the public in the physician, is truly phenomenal and it would appear as though it must be the primal duty of one who represents himself as a healer of the sick, that he fully knows what he essays to do. The physician who does not fully live up to this requirement, and particularly the prescriber of secret nostrums, is a dangerous quack, and is more to be shunned than the charlatan who has never had the advantage of medical training.

Dr. Henry W. Cattell, in a paper entitled, "The accurate knowledge of the composition of medicines prescribed by physicians is demanded," asserted that this requirement was axiomatic and referred not alone to the composition and uses of proprietary remedies, but of all remedies used in the treatment of disease.

He believes that the one predominating reason for the wide spread use of nostrums by physicians, is the fact that materia

medica is not properly taught in medical schools, and suggested that it might be well to effect an interchange of professors between colleges of pharmacy and medical schools, so as to give coming generations of physicians the advantage of having some knowledge of the resources and possibilities of modern pharmacy.

Dr. James M. Anders, in opening the general discussion, asserted that only in exceptional cases was secrecy of any kind permissible in the treatment of disease. One reason for the widespread use of secret or semi-secret proprietaries by physicians was the fact that the detail man usually presents his remedies, and the information that he may have to offer in connection with them, in a much more interesting manner than does the learned college professor. There is great need for controlling this really serious problem, and active missionary work must be taken up by the leading men of the medical profession, who must, themselves, become virtuous in this regard.

Dr. H. C. Wood, Jr., expressed the belief that the greatest sinners, so far as prescribing nostrums was concerned, were to be found among the leading men of the medical profession.

Mr. Edward Bok, the editor of the *Ladies Home Journal*, said that, as a layman, it was a pleasure to him to learn that the medical profession had realized that this problem is a matter for their very serious consideration. He believes that the people of this country are awakening to the dangers and the disgrace of the nostrum. Literary magazines, farm journals, religious papers and the better class of publications in all lines are ridding themselves of the advertisements of nostrums, which, he believes, will soon be restricted to the daily papers and the advertising pages of medical journals.

Mr. Bok severely arraigned the members of the medical profession for their widespread and evidently increasing use of nostrums, and enumerated a number of instances which appeared to evidence a degree of incompetency and inconsistency, on the part of medical practitioners, that is all but appalling.

Dr. David L. Edsall ventured the opinion that surface indications do not fully reflect the true value of the work that is being done. He believes that members of the medical profession are being influenced, changes are taking place and advances are being made. With the elimination of mystery from the art of medicine, and the possibility of pointing to a rational foundation for the use of drugs and other medicinal agents there must follow marked advances in the practical application of therapeutic measures.

Mr. Frank E. Morgan believed that the use of nostrums by medical men is rapidly decreasing, and that no man is more entitled to the respect of the community than the honest, earnest physician.

The subject was further discussed by Drs. Eaton, Lowe and Roberts, and by Messrs. Apple, Blair, Gabell, Osborne and Lemberger.

M. I. WILBERT,
Secretary.

DECEMBER PHARMACEUTICAL MEETING.

The regular Pharmaceutical Meeting of the Philadelphia College of Pharmacy was held on Tuesday afternoon, December 17th, with Wm. L. Cliffe in the chair; and was devoted to the consideration of analytical tests and methods.

Dr. A. W. Miller presented a communication on "The Distillation of Oil of Coriander," and exhibited several samples of the oil, and one of pot pourri made with crushed coriander fruit as one of the ingredients. The speaker stated that some of the coriander of the market is bleached, but said that he did not know whether the bleaching process affected the yield of oil (p. 15).

Mr. Weikel, of the Weikel and Smith Spice Company, Philadelphia, stated, that sometimes, when other commercial varieties of coriander are scarce, Russian coriander comes into the market, and that it is characterized by a heavy odor.

Reference having been made to the adherence of the mericarps of coriander fruit, Dr. Miller said, that he had frequently seen fruits in which the mericarps had separated, and thus become unsalable. Mr. Weikel said, that in the larger fruits, as the Italian, the separation of the mericarps is more likely to take place.

Dr. Miller stated that the amount of coriander used in pharmacy is very small as compared to that used in other ways, it being chiefly used in the manufacture of porter and brown stout, and also in sausage making, as a flavoring. He then spoke of the so-called "black caraway," which is largely used by the Russians as a flavoring material, and stated that it is composed of three-angled seeds, which yield a volatile oil that appears to contain a sulphur compound.

Mr. W. A. Pearson, of the analytical department of the Smith, Kline, and French Company, said that a yield of 1·1 per cent. of oil of coriander was reported by Eck (Gildemeister and Hoffmann's

"Ethereal Oils," English translation, page 542), but that as high a percentage of oil did not appear to be obtainable with the commercial fruits.

Mr. Charles E. Vanderkleed read a paper on "Some Tests for Gurjun Balsam in Copaiba," and demonstrated the manner of applying them (see page 11).

During the discussion of his paper Mr. Vanderkleed stated that the fluorescent property of copaiba is not regarded as a reliable indication of its quality. Mr. Pearson remarked that his experience with the tests for Gurjan balsam in copaiba coincided with that of Mr. Vanderkleed, except that he had always thought that the United States Pharmacopœial test was sensitive to less than 10 per cent. of Gurjun balsam. The D. and O. test he had found quite reliable if the solution were allowed to stand overnight. He said that he was making an analysis of African copaiba, which was low in acid resin and total resins, but otherwise answered the U. S. P. requirements. Mr. Pearson then alluded to the recent paper on copaiba by E. J. Parry, in which he stated that the optical rotation cannot be relied upon to indicate the quality of copaiba and that he had found the United States Pharmacopœial tests satisfactory.

A conjoint paper on "The Microscopical and Chemical Examination of Black Pepper," was presented by Henry Kraemer and Harry E. Sindall, the latter being the chemist for the Weikel & Smith Spice Company (see page 1). Professor Kraemer stated that this was the first of a series of similar papers which he and Mr. Sindall intended to present. Then taking up the subject of the paper, he said that while pepper is official in several of the pharmacopœias, little of it is used in medicine, its chief use being as a condiment, and it is being dropped from the pharmacopœias. He pointed out that there are a number of products official in the United States Pharmacopœia which are used as spices or for flavoring purposes, for which no definite standards are given, while the United States Government has adopted exact standards relating to the quality of these products. This, the speaker said, emphasized the desirability of the revisers of the Pharmacopœia taking advantage of scientific investigations pertaining to every official product, and of fixing high standards for them. Professor Kraemer demonstrated the histological structure of the pepper fruit by means of blackboard drawings, at the same time calling attention to the microscopical characters

distinguishing the chief adulterants of pepper now employed, after which he called upon Mr. Sindall to discuss the analytical data which he had obtained in the examination of samples of ground black pepper of known purity, and of commercial samples.

In commenting upon the paper Mr. Weikel stated that since the passage of the Pure Food and Drugs Law pepper hulls are the principal adulterant of black pepper, and that hulls low in ash are selected for this purpose. He said that some of the ground black peppers of the market are composed of cheap grades of white pepper and pepper hulls.

Others taking part in the discussion were Dr. C. B. Lowe, Ambrose Hunsberger, M. I. Wilbert and the chairman.

Attention was directed to some books and journals presented by Mrs. Shinn, widow of the late James T. Shinn; a series of botanical charts, presented by Mr. George M. Beringer. Professor Kraemer presented a copy of his recent text book on Botany and Pharmacognosy.

A vote of thanks was tendered the donors, and also the speakers of the afternoon.

FLORENCE YAPLE,
Secretary pro tem.

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SANDALWOOD OIL REQUIREMENTS.

By A. R. L. Dohme, and H. Engelhardt.

We have been studying East Indian sandalwood oil for many years, and since presenting our paper on the subject to the A.Ph.A. last year, we have continued the same and have come to some definite conclusions. We stated in our former paper[1] that many genuine East Indian sandalwood oils would not meet the requirements of the U.S.P., nor will they of the B.P. or any other pharmacopœia. Despite this fact there are genuine unadulterated sandalwood oils distilled properly from sound healthy logs grown in India, even in the Mysore district. The only conclusion to be drawn from this is that the U.S.P. requirements should be modified. In the U.S.P. requirements there occur at least four separate and distinct requirements that must be met to make a sandalwood oil entitled to the soubriquet "U.S.P." These are:

1. Specific gravity 0·965–0·975 at 25° C. (changed later to 0·965–0·980).

2. Angle of rotation upon polarized light should be not less than —16° nor more than —20° in 100 mm. tube at 25° C.

3. Soluble completely in 5 volumes of 70 per cent. alcohol.

4. Should contain not less than 90 per cent. of alcohols calculated as santalol.

As to which of these requirements is the most important a difference of opinion exists, but there should not, since a careful study of them all eliminates all of them but one as being crucial, decisive and reliable. We have found, as have other investigators,

[1] Proceedings A.Ph.A., 1906, or *American Druggist*, **49**, page 145.

that no definite relation exists between any two of these requirements, that all four of them vary widely, totally independently of one another; thus, an oil may contain 92 per cent. santalol and yet have specific gravity 0·963, be insoluble in 5 parts of 70 per cent. alcohol, and have rotation of —14° (see sample IV under first distillate in table below.)

The first criticism we have to make of the requirements is that a temperature should have been given for determining the solubility in 70 per cent. alcohol. It makes all the difference in the world if this is determined at 15°, 25° or 30° C. While it is understood perhaps that the temperature should be 25° C., this should have been stated just as much as it is stated for the specific gravity and rotation. We think the solubility should be taken at 30° C. rather than 25° C., as the latter temperature eliminates about 25 per cent. of oils that should be official, as they contain ample santalol and are not adulterated.

The second criticism is that the angle of rotation in the requirements is too high for the minimum limit and should be—12° to —20°; even then it will exclude many unadulterated, genuine, pure oils that are amply rich in santalol and hence amply efficient therepeutically (see samples IV and V of main distillate in table below.) Schimmel & Co.[1] state that they "consider the optical rotation and also the acid and ester numbers very useful factors in judging the oil." This is only true if you are looking for adulterations, when we grant that they will detect castor oil, rosin, etc. In our opinion, it is more important to have your requirements so that you do not exclude pure, efficient, genuine oil than have them so that to recognize adulterations you forsooth compel rejections of a genuine, Simon-pure product, containing over 90 per cent. of santalol, and hence therapeutically efficient. Both W. J. Bush & Co.[2] and Evans Sons, Loescher & Webb[3] find that the B.P. or U.S.P. requirements are so unjust that they prevent many genuine oils from being allowed to sail under the B.P. or U.S.P. flags, although they are in every way genuine and efficient. Bush & Co., express themselves forcibly on this subject and we agree with them fully—"It is obvious that the inclusion in the B.P. of such fallacious standards as those at

[1] Schimmel & Co., Semi-Annual Report, April, 1907, page 92.

[2] W. J. Bush & Co., *Chemist and Druggist*, 1907, Vol. LXXI, page 448.

[3] Analytical Notes, February, 1907, page 28.

present official defeats the object for which they are framed—namely, to ensure that only genuine, unmanipulated articles are offered for medicinal use. As they stand at present, they must have a directly opposite effect."

The real efficient and crucial test and requirement for the value and purity of a santal oil is the content of santalol, which is the efficient agent in the oil. As long, hence, as a santal oil contains at least 90 per cent. of santalol by assay, it matters little what the remaining 10 per cent. are, so long as they are obtained from sandalwood by distillation. The point we wish to make is that contrary to the views of Messrs. Schimmel & Co. we consider the optical rotation, acid and ester numbers as distinctly secondary in importance to the requirement of 90 per cent. santalol. Since our last publication, we have among others studied the distillation of oils from the following lots of santal oil imported by us from India direct:—

I. Seringapatam Panjam.
II. Sagar Banjam.
III. Chickmaglur Ghat Badala.
IV. Tarikere Ghat Badala.
V. Fraserpett Panjam.

Lot.	Specific Gravity.	Soluble in 70 per cent. alcohol.	$\alpha D.\ 25°$.	Santalol. Per cent.	Acid number.
		FIRST DISTILLATE.			
I.	·951	Insoluble.	—15·7	77·7	2·06
II.	·962	"	—14·7	77·0	1·8
III.	·951	"	—18·1	70·0	2·7
IV.	·963	"	—14·0	92·0	·3
V.	·967	"	—14·0	82·4	—
		MAIN DISTILLATE.			
I.	·978	5	—12	89	·122
II.	·976	5·0	—11·8	93	1·1
III.	·975	3·75	—14·5	95	1·9
IV.	·979	Insoluble.	— 9·5	97·7	·25
V.	·978	6	—11	95·0	—
		LAST DISTILLATE.			
I.	·984	Insoluble.	—8	90	·124
II	·988	"	—9·2	—[1]	2·2
III.	·988	"	—4·2	—[1]	·4
IV.	·978	"	—5·7	90	·34
V.	·984	"	—10	90	·5

[1] The acetylized oil could not be separated, as it had almost the same specific gravity as water.

Some of the conclusions to be drawn from these results are:

(1) That the optical rotation as given in the U.S.P. is too high and should be changed to read —12° to —20° as in the main distillate, which makes up over 90 per cent. of the distillate, none of the products run anywhere near the limits of the U.S.P., although they are fully up to and most of them above the standard in santalol and in specific gravity, and two of them are all right in solubility. This almost proves, in our opinion, the fallacy of the optical rotation standard.

(2) That the solubility in 70 per cent. alcohol is not a safe criterion, since an oil that contains 95 per cent. of santalol (see lot V Main Distillate) still falls below the allowed standard, with a solubility of 1 to 6 instead of 1 to 5 volumes, and an oil (see lot IV Main Distillate) that runs as high as 97·7 per cent. santalol is insoluble in 5 volumes of 70 per cent. alcohol.

(3) That although all the acid numbers are low and show freedom from admixture of any adulteration, they serve no value as an indication of the quality of the oil; their purpose being, hence, only negative.

These results were obtained by distilling the sandalwood logs in at least 1,000 pounds lots in each case, and in most cases in much larger lots, so that the end product was a representative average product in each case. Although in all we tried about thirty varieties of wood from the most expensive to sandalwood sawdust, only about half of the oils obtained possessed an optical rotation high enough to pass U.S.P. requirements. Fully 90 per cent., however, passed muster as to specific gravity within the limits 0·965 to 0·980, as to solubility in 70 per cent. alcohol at 30° C. and percentage of santalol.

We also examined two samples of domestic santal oil from reputable firms bought on the open market and found that they both answered U.S.P. requirements, save the optical rotation, which in both cases was only —13°. Similarly W. J. Bush & Co.[1] found that of oils obtained from sixteen different parcels of genuine East Indian sandalwood only five gave a specific rotation higher than —16°, and they further state that this result confirms their previous experiences. Add to this the experience of Messrs. Evans Sons,

[1] *Loc. cit.*

Loescher & Webb,[1] that their oils have rotatory powers as low as —14·36° on the average, and we have, in our opinion, ample evidence to justify the lowering of the optical rotation of santal oil to —12° to —20°, and above all the passing of optical rotation as of crucial value in determining the value of santal oils. Let us take lots III First Distillate with specific gravity 0·951 insoluble in 70 per cent. alcohol, containing only 70 per cent. santalol, and hence to be rejected, as first distillates usually are, and yet this has an optical rotation of —18·1° higher than any other oil in above table, and should on this rotation be acceptable. Dozens of similar cases could be given to show the same thing, viz., an acceptable optical rotation for an inferior oil. Again, West Indian sandalwood oils or cedar-wood oil would be detected because they decrease the solubility in 70 per cent. alcohol or materially reduce the percentage of santalol in the oil. It might still be possible to make a sophisticated oil pass muster as to santalol percentage, provided the oil originally contained 98 per cent. santalol and were diluted with cedar-wood oil to reduce it to 90 per cent., but this could be detected by the solubility in 70 per cent. alcohol at 30° C., as it would not be soluble. In fine, in our opinion, the requirements calling for a content of 90 per cent. sanatol and a solubility of 5 volumes of 70 per cent. alcohol, at 30° C., and a specific gravity of 0·965 to 0·980 at 25° C., are ample to insure efficient santal oil to the buyer, and we would even dispense with the specific gravity and feel perfectly safe. We see no objection, further, to determining the acid number, as that will tell us at once if any fixed oil or rosin has been added as an adulterant.

COMPARATIVE COMPOSITION OF MILKS.

By Joseph W. England.[1]

On examining the chemical analyses of milk published, one is impressed with the enormous amount of work that has been done, and the apparent discrepancies in the results. These latter are due, partially, to technical difficulties in chemical analysis, but largely, to the fact that milk is an organized tissue, so to speak, as much so as blood, and that it varies in composition, not only during the act of nursing, but also, during the entire period of lactation.

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[1] From the Research Laboratory of Smith, Kline & French Co.

Hence, it has come to pass that widely varying results have been obtained by different workers. The chemical work was, in many instances, undoubtedly accurate, but the samples examined were not representative, and the deductions drawn not justified by the facts. Chemical data alone are not sufficient to properly interpret analytical findings, in the study of milk as a food; they must be accompanied by the consideration of physiological principles, also.

It has been with this thought in mind—the physiological chemical point of view, so to speak—that the writer has prepared the following chemical data, and endeavored to interpret their physiological significance.

PERCENTAGE COMPOSITION OF HUMAN MILK DURING THE ACT OF NURSING (FORSTER)

	First part of nursing act	Intermediate part of nursing act	Last part of nursing act
Fat.....	1.70	2.77	4.51
Proteids.....	1.13	0.94	0.71
Sugar.....	5.56	5.70	5.10
Ash	0.46	0.32	0.28
Water.....	90.24	89.68	87.50

Colostrum, the milk given by mammals for three or four days after the birth of their young, differs radically in composition from normal milk. It is a yellow, oily liquid of pungent taste, containing a very high percentage of an albumin similar to blood albumin, abundant fat globules, and numerous large circular cells called colostrum corpuscles.

According to Chapin, colostrum contains the same food elements as milk, but in different forms; its proteids are soluble, and its sugar dextrose, and not sugar of milk. Its function is to furnish readily-absorbable nutriment (since the stomach of the infant contains no gastric juice during the colostrum period) and to stimulate the development of the absorptive powers of the digestive tract.

The laxative action of colostrum in removing the meconium may be due, as Rotch claims, to a disturbance of the equilibrium of the mammary glands, and of the digestive tract of the infant, the disturbances in the latter amounting, at times, to acute conditions of fermentation in the intestinal tract, with laxation (a result facilitated by the presence of the readily fermentable sugar dextrose); but, it is much more probably due to the high percentage of fat in the fecal residue.

PERCENTAGE COMPOSITION OF COLOSTRUM

	Human (Pfeiffer) Average of 5 analyses; first three days	Cow (Engling) Average of 5 analyses; first three days
Fat	2.04	4.25
Proteids	5.71	Casein 3.60 Albumin 7.09
Sugar	3.74	2.97
Salts	0.28	Ash 1.10
Water	88.23	80.99

As shown above, the composition of human milk varies according to the time when it is drawn. The first portion suckled is rich in proteids and poor in fat. There is a physiological significance in this, the intent of nature obviously being that proteid-digestion shall precede fat-digestion, just as in adult digestion. "Gastric

PERCENTAGE COMPOSITION OF HUMAN MILK

Authority		Fat	Proteids	Sugar	Ash
Koenig, 200 samp's	Minimum	1.43	0.69 { A. 0.32 C. 0.18	3.88	0.12
	Maximum	6.83	4.70 { A. 2.36 C. 1.96	8.34	1.90
	Average	3.78	2.29 { A. 1.26 C. 1.03 (A-Albumin; C-Casein)	6.21	0.31
Leeds, (84 samples)	Minimum	2.11	0.85	5.40	0.13
	Maximum	6.89	4.86	7.92	0.37
	Average	4.13	2.00	6.94	0.20
Simon	14 samples, same woman	2.53	3.42	4.82	0.23
H. Gerber	6 samples, average	3.82	2.04	5.93	0.42
Marchand	Average	3.68	1.70	7.11	0.20
Clemm	12 days after delivery	3.34	2.91	3.15	0.19
Clemm	9 days after delivery	3.53	3.69	4.30	0.17
Clemm	4 days after delivery	4.30	3.53	4.11	0.21
Blyth	Average	2.90	3.07	5.87	0.16
J. Bell	Woman age 18 years	3.20	2.39	6.83	0.29
J. Bell	Woman age 33 years	2.99	2.51	6.51	0.30
Chevalier & Henry	Average	3.55	1.52	6.50	0.45
Hammarsten	Minimum	3.00	1.00	5.00	0.20
	Maximum	4.00	2.00	8.00	0.40
Mendel	Minimum	2.50	1.10	5.80	0.20
	Maximum	5.40	1.70	6.70	0.30
Babcock, Russell and Vivian	6 samples, different women				
	Minimum		1.68		
	Maximum		1.75		
Camerer and Soldner	Average	3.14	1.62	6.26	0.27
Backhaus	Average	3.50	1.75	6.20	0.25
Bunge	Average	3.80	1.70		0.20

juice does not act on fat, but, on the contrary, on fatty tissue, dissolving the cell membrane, and setting the fat free." (Hammarsten's Ph'y Chemistry, 1896, 166.) The percentage of sugar remains practically stationary, the sugar evidently not being an interfering factor in the digestion of proteids or fat.

To determine accurately the composition of human milk, a sample of the entire quantity from both breasts should be analyzed, which is rarely done; hence, to a degree, the widely varying results published of analyses of human milk.

PERCENTAGE COMPOSITION OF THE FATS OF MILKS

(Fats as Fatty Acid Glycerides, Olein, Palmitin, Stearin, etc.)

		Fat of Human Milk (Stern)			Fat of Cows' Milk (Brown)	
Volatile Fatty Acids	Acid Butyric,	$C_4H_8O_2$	1.4		5.45	8.35
	" Caproic,	$C_6H_{12}O_2$			2.09	
	" Caprylic,	$C_8H_{16}O_2$			0.49	
	" Capric,	$C_{10}H_{20}O_2$			0.32	
Non-Volatile Fatty Acids	Acid Lauric,	$C_{12}H_{24}O_2$	49.2		2.57	53.90
	" Myristic,	$C_{14}H_{28}O_2$			9.89	
	" Palmitic,	$C_{16}H_{32}O_2$			38.61	
	" Stearic,	$C_{18}H_{36}O_2$			1.83	
	" Dioxystearic,	$C_{18}H_{36}O_4$			1.00	
	" Oleic,	$C_{18}H_{34}O_2$	49.4			32.50

Fat of Human Milk.—Very small amount of volatile fatty acids; oleic acid forms, practically, one-half of the non-volatile acids; of the solid fats, myristic and palmitic acids occur in larger amounts than stearic acid.

Fat of Cow's Milk.—Volatile fatty acids, about six times that of human milk; oleic acid constitutes nearly one-third of the non-volatile acids; of the solid fats, palmitic and stearic acids predominate.

The "rancidity" of milk-fat (butter) is due to the oxidation of the glycerides of the volatile fatty acids.

The fat of human milk is always incompletely absorbed by the infant economy, the fat content of dry feces ranging between 10 and 20 per cent. The younger the infant the larger the amount of unabsorbed fat. "During the first week of life the dried feces contain (Die Faeces. Schmidt and Strasberger, 1903; by Blauberg) 40 per

cent. of fat when mother's milk, and fully 50 per cent. when cow's milk has been ingested (the moist feces contain, of course, less fat—J. W. E.). The function of the fecal fat is probably to protect the mucous surfaces of the intestinal tract, and to facilitate the expulsion of the feces." ("The Fat Question in its Relation to the Production and Cure of Infantile Marasmus," by Heinrich Stern, *Arch. of Ped.*, 1905, 431.)

PERCENTAGE COMPOSITION OF THE SALTS OF MILKS

	Human Milk Harrington and Kinnicutt, quoted by Rotch	Cow's Milk Soldner, quoted by Leach
Sodium Chloride, NaCl	21.77	10.62
Potassium Chloride, KCl	12.05	9.16
Mono-potassium Phosphate, KH_2PO_4		12.77
Di-potassium Phosphate, K_2HPO_4		9.22
Potassium Citrate, $K_3C_6H_5O_7$		5.47
Di-magnesium Phosphate, $MgHPO_4$		3.71
Magnesium Citrate, $Mg_3(C_6H_5O_7)_2$		4.05
Di-calcium Phosphate, $CaHPO_4$	Calcium Phosphate	7.42
Tri-calcium Phosphate, $Ca_3(PO_4)_2$	23.87	8.90
Calcium Citrate, $Ca_3(C_6H_5O_7)_2$		23.55
Lime combined with proteids		5.13
Calcium Silicate, $CaSiO_3$	1.27	
Calcium Sulphate, $CaSO_4$	2.25	
Calcium Carbonate, $CaCO_3$	2.85	
Magnesium Carbonate, $MgCO_3$	3.77	
Potassium Carbonate, K_2CO_3	23.47	
Potassium Sulphate, K_2SO_4	8.33	
Iron Oxide and Alumina	0.37	
	100.00	100.00

Rotch gives an analysis of the ash of human milk (six quart sample) by Harrington and Kinnicutt, and a statement expressing an approximation to the relative proportions of salts *in the form in which they occur in milk* (as stated above), but it is very obvious that the conclusions from the analysis are practically valueless, because no account whatever was taken of the organic matter present in the salts of the milk.

As Soldner has shown, nearly one-third of the salts of cow's milk are alkali-citrates and alkali-earth citrates, and, as Leffmann states "Citric acid (as citrates) is a normal constituent of the milk of various animals. In human milk the quantity is about 0·5 gramme to the liter; in cow's milk, from 1 to 1·5 grammes. It is not dependent upon the citric acid present in the food."

Harrington and Kinnicutt themselves obtained, as they report, 7 97 per cent. of carbonic acid gas after incinerating the salts of human milk, and yet no statement is made of the presence of any organic acid salts.

With reference to the Soldner analysis, it should be noted that while the citrates embrace one-third of the salts, the chlorides approximate nearly one-fifth, and the phosphates nearly one-half. The ash of the milk does not represent the salts of milk in the form in which they occur in milk; it represents only the incinerated salts, the incineration destroying all organic matter and altering the chemical form of the salt.

PERCENTAGE COMPOSITION OF COWS' MILK DURING THE PERIOD OF LACTATION. (Farrington, quoted by Chapin)

	Number of Samples	Fat	Proteids
Holstein Cow	278	Minimum, 1.50 Maximum, 6.60	Minimum, 2.64 Maximum, 4.11
Short Horn Cow	428	Minimum, 2.50 Maximum, 7.90	Minimum, 2.92 Maximum, 3.89
Jersey Cow	614	Minimum, 2.90 Maximum, 12.30	Minimum, 2.98 Maximum, 5.30

Cow's milk, like human milk, varies in composition during the act of suckling or milking. Thus, as Leach reports, the "fore-milk" of cows contains from 1·07 to 1·32 per cent. of fat, and the "strippings" from 9·63 to 10·36 per cent. of fat, while the non-fatty solids range in the "fore-milk" from 10·20 to 10·51 per cent., and in the "strippings" from 9·27 to 9·55 per cent.

It should be observed also, as Farrington shows, that cow's milk varies in composition during the period of lactation, and the milk of a mixed herd is, therefore, much more uniform than the milk of a single cow, because the milk of cows for calves of different ages is mixed, and the minimum and maximum percentages, due to the individual factor, are equalized. And so, when large numbers of analyses are added together and averaged, the individual differences, which are sometimes extreme, become equalized in the general averages.

PERCENTAGE COMPOSITION OF COWS' MILK

Authority		Fat	Proteids	Sugar	Ash
Koenig, (800 samples)..	Minimum	1.67	2.07 { A. 0.25 C. 1.79	2.11	0.35
	Maximum	6.47	6.40 { A. 1.44 C. 6.29	6.12	1.21
	Average	3.64	3.55 { A. 0.53 C. 3.02 A-Albumin; C-Casein	4.88	0.71
Babcock	Average	3.60	3.80	4.50	0.70
Hutchison	Average	3.50	3.00	4.00	0.70
		-4.50	-4.00	-5.00	
N. Y. Experiment Station, (Chapin).....	Holsteins	3.46	3.39	4.84	0.74
	Jerseys	5.61	3.91	5.15	0.74
	Average Herd	4.00	3.50	4.50	0.75
Rotch.....	Durham	4.04	4.17	4.34	0.73
	Devon	4.09	4.04	4.32	0.76
	Ayrshire	3.89	4.01	4.41	0.73
	Holstein-Friesian	2.88	3.99	4.33	0.74
	Brown-Swiss	4.00	4.00	4.30	0.76
N. J. Agricultural Station, (Bulletin 77, 1890).....	Ayrshire	3.68	3.48	4.84	0.69
	Guernsey	5.02	3.92	4.80	0.75
	Holstein-Friesian	3.51	3.28	4.69	0.64
	Jersey	4.78	3.96	4.85	0.75
	Short-Horn	3.65	3.27	4.80	0.78
American Experimental Station Record (v. No. 10, p. 945)...					
(238 samples)	Jersey	5.61	3.91	5.15	0.743
(112 samples)	Guernsey	5.12	3.61	5.11	0.753
(72 samples)	Devon	4.15	3.76	5.07	0.760
(252 samples).....	Ayrshire	3.57	3.43	5.33	0.698
(124 samples)	American-Holderness	3.55	3.39	5.01	0.698
(132 samples)	Holstein-Friesian	3.46	3.39	4.84	0.735

PERCENTAGE COMPOSITION OF COWS' MILK
(VIETH & RICHMOND). (Allen's Organic Chemistry 4, 122)

Year	Number of Samples	Specific Gravity at 15° C.	Total Solids	Fat	Solids Not Fat	Analyst
1881.....	6,592	1.0315	12.80	4.12	8.68	P. Vieth
1882.....	9,190	1.0319	13.03	4.22	8.81	"
1883.....	9,650	1.0323	12.97	4.10	8.87	"
1884.....	10,399	1.0323	12.96	4.08	8.88	"
1885.....	11,389	1.0322	13.06	4.19	8.87	"
1886.....	12,181	1.0322	12.92	4.07	3.85	"
1887.....	12,663	1.0322	12.94	4.07	8.87	"
1888.....	12,682	1.0323	12.94	4.06	8.88	"
1889.....	12,617	1.0321	12.83	4.01	8.82	"
1890.....	11,816	1.0322	12.84	4.00	8.84	"
1891.....	11,361	1.0322	12.76	3.91	8.85	"
1892.....	13,196	1.0320	12.71	3.91	8.80	H. D. Richmond
1893.....	14,643	1.0318	12.68	3.91	8.77	"
1894.....	12,633	1.0322	12.67	3.86	8.81	"
1895.....	11,081	1.0322	12.66	3.84	8.82	"
Average	172,093	1.03215	12.86	4.02	8.84	

While there is a marked difference in the fat-percentage of the milks of different breeds of cows, and in individuals of the same breed, there is a fairly uniform difference in the averages of several individuals. "It is largely owing to this influence that we find the milk of one country differing from that of another, or the milk of one section of the country differing from that of another section. For example, the average amount of fat in milk in Germany and Holland is fully one-half per cent. lower than in this country, because the prevailing breeds there are those producing milk comparatively low in fat." (Modern Methods of Testing Milk and Milk Products, L. L. VanSlyke, 1907, 6.)

COMPARATIVE COMPOSITION OF HUMAN MILK AND COWS' MILK

(At Intermediate Period of Lactation)

	Human Milk			Cows' Milk	
Glycerides of the non-volatile fatty acids	Olein	2.00	4.00 (Fat)	1.40	4.00 (Fat)
	Palmitin, Stearin, Dioxystearin, Laurin, Myristin	2.00		2.25	
Glycerides of the volatile fatty acids	Butyrin, Caproin, Caprylin, Caprin	trace		0.35	
Proteids	Casein	0.75	1.75	3.00	3.50
	Albumin	1.00		0.50	
	Opalisin	trace		trace	
	Globulin	trace		trace	
	Galactin			trace	
	Fibrin			trace	
Milk Sugar			6.50		4.50
Citric Acid (as Citrates)		(0.05)	trace	(0.125)	trace
Salts			0.25		0.75
Total Solids			12.50		12.75
Water			87.50		87.25
			100.00		100.00

American pediatrists generally accept the following standard of percentages for human milk: Fat, 3 to 5 per cent.; proteids, 1 to 2 per cent., and sugar, 6 to 7 per cent., the average being, fat, 4 per cent.; proteids, 1·5 per cent., and sugar, 7 per cent. The data, submitted, however, would seem to indicate that, generally, at the inter-

mediate period of lactation, at least, the fat is nearer 4 per cent. than 3, the proteids nearer 2 per cent. than 1, and the sugar between 6 per cent. and 7, or a ratio of 4, 1·75 and 6·50.

As to the standard of percentages for cow's milk, American pediatrists generally accept the following: Fat, 4 per cent.; proteids, 3·5 per cent., and sugar, 4·5 per cent., though for the purpose of ready calculation, it is often assumed that cow's milk contains fat, 4 per cent.; proteids, 4 per cent., and sugar, 4 per cent.

PERCENTAGE COMPOSITION OF VARIOUS MILKS

(From Koenig's Chemie der mens. Nahr. u. Genuss.; by Leach)

		Fat	Proteids	Sugar	Ash
Goat's Milk, 200 samples....	Minimum	3.10	3.22 (A. 0.78, C. 2.44)	3.26	0.39
	Maximum	7.55	5.95 (A. 2.01, C. 3.94)	5.77	1.06
	Mean	4.78	4.29 (A. 1.09, C. 3.20)	4.46	0.76
Ewe's Milk, 32 samples....	Minimum	2.81	4.42 (A. 0.83, C. 3.59)	2.76	0.13
	Maximum	9.80	7.46 (A. 1.77, C. 5.69)	7.95	1.72
	Mean	6.86	6.52 (A. 1.55, C. 4.97)	4.91	0.89
Mare's Milk, 47 samples....	Mean	1.21	1.99 (A. 0.75, C. 1.24)	5.67	0.35
Ass's Milk, 5 samples.....	Mean	1.64	2.22 (A. 1.55, C. 0.67)	5.99	0.51

A word or two should be said with reference to the subject of the proteids of milks. These are almost wholly casein and albumin. The milks of those animals whose digestion is principally gastric, contain, in their total proteids, a much larger proportion of casein to albumin, than do the milks of those animals whose digestion is principally intestinal. Thus, Koenig's analyses show that in the *mean*, of the minimum and maximum percentages of cow's milk, the ratio of casein to albumin is about 6 to 1, in goat's milk 3 to 1, and in sheep's milk 3 to 1, while in mare's milk it is 1·5 to 1, and

in ass's milk 1 to 2·3. Human milk is intermediate, being nearly 1 to 1. It is important to note, also, that the maximum ratio of casein to albumin in cow's milk is about 7 to 1, and the minimum 4·5 to 1; the maximum of goat's milk is 3 to 1, and the minimum 2 to 1; and the maximum of sheep's milk is 4 to 1, and the minimum 3 to 1.

These variations in the ratios of casein to albumin in the milks of different animals are not accidents of nature. They are in direct obedience to the law of supply and demand. They mean simply that the proportion of food-material that is digested with difficulty (casein) to the food-material that is digested with ease (albumin), is adjusted by nature to meet the needs of the individual animal for the proper development of the motor and chemical functions of its stomach and intestines. Naturally, with the larger animals, more casein and less albumin is required, than with the smaller animals. So far as the food-value of the two proteids to the body is concerned, they are probably of equal value. Not only does the ratio vary with different animals, but in the same animals of the same age, in obedience to individual needs, though the latter variations are within much narrower limits than the former. A sixteen pound infant, for example, requires more casein than a twelve pound one, though both may be six months of age. Hence, it follows that human milk is a food of constantly changing composition. At birth much albumin, and little casein is needed, and then as the child grows and develops, more and more casein is required, and less and less albumin.

As to the chemical reactions of milks with gastric juice, the formation of curds, the kinds of curds, and the functions of curds, and the mechanical and chemical modifications of curds—these are questions of the deepest scientific interest to the pediatrist, but wholly outside the province of this paper.

The composition of cream varies greatly according to the method used in obtaining it. It is obtained (1) by setting milk in shallow pans and removing the cream by hand-skimming, or (2) by placing it in deep vessels surrounded by cold water, the skimmed milk being drawn off from below (both of these are gravity creams), or (3) by means of the centrifugal separator. The United States standard for cream (U. S. Dept. of Agri., Office of Sec., Cir. 10) is 13 per cent. milk fat.

PERCENTAGE COMPOSITION OF CREAM

Authority		Fat	Proteids	Sugar	Ash
Gravity Cream; Koenig, (46 samples)	Average	22.66	3.76	4.23	0.53
Centrifugal Cream, Heavy; Leach, (18 samples).....	Minimum	38.10			
	Maximum	46.40			
	Average	42.02			
Centrifugal Cream, Light; Leach, (18 samples)	Minimum	8.60			
	Maximum	21.60			
	Average	13.86			
Centrifugal Cream (from Milk 4.00, 3.50, 4.50).....					
Centrifugal Cream, (8%) Holt.		8.00	3.40	4.50	
Centrifugal Cream, (12%) Holt.		12.00	3.30	4.20	
Centrifugal Cream, (16%) Holt.		16.00	3.20	4.05	
Centrifugal Cream, (20%) Holt.		20.00	3.05	3.90	
Centrifugal Cream, (40%) Holt.		40.00	2.20	3.00	
New York Creams, Holt.....		8-40			
Very Rich Centrifugal Cream, Holt..		35-40			
Ordinary Centrifugal Cream, Holt...		18-20			
Gravity Cream, Holt.....		16-20			

Skimmed milk is essentially whole milk with the larger part of its fat removed. By separation with shallow pans the fat content is from 0·54 to 1·co per cent.; with deep pans, from 0·43 to 1·05 per cent., and with the modern centrifugal separators, from 0·10 to 0·25 per cent. (Vieth; quoted by Allen.)

PERCENTAGE OF FAT IN TOP MILKS FROM QUART BOTTLES

	Sherman, quoted by Winters	Chapin (Fat of Whole Milk, 4.1%)	Chapin (Fat of Whole Milk, 3.1%)	England and La Wall
½ ounce.....	24.80			24.00
1 "	23.10			22.00
2 "	21.40	24.00		21.75
3 "		22.50		
4 "	20.10	21.40		18.80
5 "		19.20		15.80
6 "	18.60	16.80	13.40	
7 "		15.00	11.60	
8 "	16.70	13.30	10.20	13·20
9 "		11.50	9.20	
10 "		10.50	8.40	
12 "	12.10	9.00	7.10	9.60
14 "		7.80	6.20	
16 "	9.40	7.00	5.50	7.00
18 "		6.30		
20 "		5.80		
22 "		5.40		
24 "		5.00		
26 "		4.70		
30 "		4.30		
32 "		4.10	3.10	4.30

Top milks are the upper portions of a quart bottle of cow's milk that has stood in a cool place until a creamy layer has formed. They are obtained with the use of the tin or aluminum dipper devised by Chapin. The dipper, which holds 1 fluidounce, is gently immersed in the liquid, filled, removed, and the contents emptied into another vessel and mixed. The first two dippings, mixed, constitutes 2-ounce top milk; or the first four dippings, 4-ounce top milk, or the first eight dippings 8-ounce top milk, etc. Little or no disturbance of the different layers of the liquid results from the act of dipping. The creamy layer usually constitutes about 5 or 6 fluidounces, varying according to the original fat percentage of the milk, and the length of time standing. It includes, practically, all the fat of the milk. Eight-ounce top milk, or over, contains not only the cream, but some nearly fat-free milk, also.

The top-milk system of infant feeding is rapidly coming into medical favor. By diluting top milks with water, or with water and whole milk, it is possible to obtain mixtures for infant feeding that contain a higher percentage of fat with a normal percentage of proteid, than is possible to obtain with any dilutions of cow's milk.

The top milks are much superior to creams, not only because the fat percentages are more uniform, but also, what is equally or more important, the dilutions (especially those made with whole milk and water) do not readily separate on standing into strata of differing fat-percentages. Infants fed with stratified mixtures are fed an excessive amount of fat in the first portions of the food, which is just the reverse of what obtains in the feeding of human milk. Stratification is especially liable to occur with the centrifuge creams, as these, during the process of centrifuging, are partially disorganized, and hence, mixed with water, readily stratify.

RECENT PROGRESS IN THE CHEMISTRY OF ALKALOID ESTIMATIONS.[1]

By W. A. Puckner.

While chemistry ranks as a science, analytical chemistry is often spoken of as the "art of analysis." And this with some justice, for the attention to details which a successful analysis makes

[1] Read before the Philadelphia Branch of the American Pharmaceutical Association, January 7, 1908.

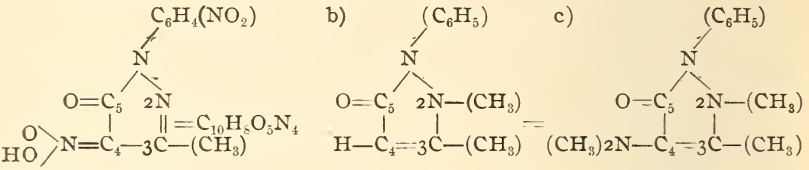
necessary requires the deft touch, the accurate eye, and the patient mind of an artist. Especially does the elaboration of new and more exact methods of estimating the alkaloid content of vegetable drugs and pharmaceutical preparations require much attention to detail. So much experimentation of an apparently empirical character must be done that the scientific nature of such investigations is not always evident. To emphasize that analytical chemistry employs the same fundamental conceptions and facts that are used in other branches of chemical research some recent progress in the estimation of alkaloids may be of interest. The writer therefore begs to present, divested of all analytical detail, some of the advances made in recent years in this important field of research.

Alkaloidal Precipitants.—Some fifteen or twenty years ago, especially in the United States, the standard method of estimating alkaloids in drugs and pharmaceutical preparations was based on their precipitation with a standard solution of potassium mercuric iodide, commonly known as Mayer's solution. The precipitates which alkaloids formed with this reagent were supposed to be definite compounds of alkaloid iodide with mercuric iodide containing for every molecule of mercuric iodide one, two or three molecules of alkaloid iodide. Attempts were made to determine for each alkaloid the composition of the precipitate obtained and to calculate from the volume of Mayer's solution used in each case the amount of alkaloid present. That the composition of these alkaloidal precipitates was variable and that the amount of alkaloid could not directly be calculated from the volume of Mayer's solution used was soon demonstrated, especially by A. B. Lyons and A. B. Prescott. To-day this method of estimating alkaloids is almost forgotten. Only occasionally is reference made to it—as was recently done when Lyons, at a meeting of the American Pharmaceutical Association, stated that, in his opinion, it should still be given preference in the valuation of ipecac.

Ten to fifteen years ago the estimation of alkaloids by means of iodine solution (Wagner's reagent) was proposed by Kippenberger in Germany and by Prescott, Gordin and Gomberg in this country. But, again, while at first the periodides were supposed to be definite in composition it was soon found that the composition of these precipitates, consisting of alkaloid iodide plus iodine, and corresponding to the composition of the potassium compound contained in Lugoll's

solution—that is potassium iodide plus iodine—was in most cases variable and depended upon conditions of concentration, etc. To-day this method of estimating alkaloids by the amount of iodine consumed in their precipitation is rarely mentioned.

The fact that these general alkaloidal precipitants, while valuable in the detection and the isolation of alkaloids, are no longer used for their quantitative determination, makes of especial interest the recent publications in regard to a new precipitant which is claimed to form very insoluble compounds of definite composition with nearly all alkaloids. The reagent has been called picrolonic acid from the fact that its behavior with alkaloids closely corresponds to that of trinitrophenol or picric acid. It was first investigated by Knorr, the discoverer of antipyrin. The following structural formulas indicate its relationship to antipyrin and pyramidon:



(a) Picrolonic acid or 1–paranitrophenyl–3–methyl–5 keto–1, 2–diazol–4–nitric acid;

or 1–paranitrophenyl–3–methyl–pyrazolon–nitric acid.

(b) Antipyrin or 1–phenyl, 2, 3–dimethyl, 5–keto, 1, 2–diazol or 1–phenyl, 2, 3–dimethyl–pyrazolon.

(c) Pyramidon or 1–phenyl, 2, 3–dimethyl, 4–dimethylamino–5–keto,–1, 2 diazol;

or 1–phenyl, 2, 3–dimethyl, 4–dimethylamino–pyrazolon.

The substance may be looked upon as a nitrate in which one oxygen atom of nitric acid has been replaced by the organic radicle. If this is done its behavior with alkaloids is evident.

Just as ammonia combines with nitric acid to form ammonium nitrate, or, in accordance with present theories of chemistry, just as ammonia combines with water to form ammonium hydroxide and ammonium hydroxide reacts with hydrogen nitrate to form ammonium nitrate and water, thus:

$$NH_3 + HNO_3 = NH_3.HNO_3;$$
$$\text{or } NH_3 + H_2O = NH_4OH$$
$$NH_4OH + HNO_3 = NH_4NO_3 + H_2O.$$

And just as morphine combines with nitric acid to form morphine nitrate, or, more correctly, as the free base morphia reacts with water to form morphium hydroxide, and as morphium hydroxide reacts with hydrogen nitrate to form morphium nitrate and water, thus:

$$C_{17}H_{19}O_3N + HNO_3 = C_{17}H_{19}O_3N \cdot HNO_3$$

morphine;

or $C_{17}H_{19}O_3N + H_2O = C_{17}H_{20}O_3N \cdot OH$

$C_{17}H_{30}O_3N \cdot OH + HNO_3 = C_{17}H_{20}O_3N.NO_3 + H_2O$

So, in the same way, morphine combines with picrolonic acid to form morphine picrolonate, or, more correctly, morphia combines with water to form morphium hydroxide, and this morphium hydroxide then reacts with hydrogen picrolonate to form morphium picrolonate and water, thus:

$C_{17}H_{19}O_3N + HN(C_{10}H_7O_3N_3)O_2 = C_{17}H_{19}O_3N \cdot HN(C_{10}H_7O_5N_3)O_2$

morphine picrolonic acid;

or $C_{17}H_{19}O_3N + H_2O = C_{17}H_{20}O_3N \cdot OH$

$C_{17}H_{20}O_3N \cdot OH + HN(C_{10}H_7O_5N_3)O_2 =$

$C_{17}H_{20}O_3N \cdot N.(C_{10}H_7O_5N_3)O_2 + H_2O.$

A considerable number of investigations of the composition of the precipitants which alkaloids form when treated with this reagent have been made. Especially have H. Mathes and O. Rammstedt at the University of Jena studied the value of this reagent for the valuation of vegetable drugs. Beyond the claim that the composition of these precipitates is constant and exceedingly insoluble, the reagent is claimed to be of special value because of the high melting point of the precipitate, which melting point therefore may be taken as a proof of the identity and the purity of the alkaloidal precipitate.

Another reagent, the adaptability of which has been studied in recent years, is a solution of potassium bismuth iodide. Just as potassium iodide forms a double compound with bismuth iodide so alkaloids react to form the alkaloid bismuth iodides. And just as the compounds which potassium iodide forms with bismuth iodide are of a variable composition so the alkaloid bismuth-iodides are variable and this reagent has been used only as a means of separat-

ing alkaloids from other bodies and not as a means of directly estimating them.

As reagents which have been used for the precipitation of certain alkaloids the following may be mentioned: It has been proposed to precipitate quinine by means of ammonium sulphocyanide in presence of a zinc salt and the precipitate under definite conditions is claimed to have a constant composition—viz., 4 molecules of quinine, + 3 molecules zinc sulphocyanide, + 2 molecules ammonium sulphocyanide, + 4 molecules hydrogen sulphocyanide. While quinine oxalate is insoluble in ether, the remaining oxalates of the cinchona alkaloids are soluble in ether. It is therefore proposed to obtain an etheral solution of the cinchona alkaloids and to determine by titration with the standard etheral solution of oxalic acid the amount of total alkaloids contained in the drug and to collect and weigh the insoluble quinine oxalate.

The Solubility of Alkaloids in Immiscible Solvents and the Hydrolysis of Alkaloid Salts.—At the present time nearly all estimations of alkaloids in vegetable drugs and their preparations are based upon two properties of alkaloids—viz., free alkaloids are generally insoluble in water but soluble in chloroform, ether and similar solvents, while the alkaloid salts are soluble in water but insoluble in ether, chloroform, etc. To this general ruling a few exceptions have been generally recognized. Thus, it is well known that caffeine and colchicine can be extracted from acid solutions by means of chloroform. It is generally said that these alkaloids are too weak to form salts, although a more correct explanation would be to say that, while these alkaloids do form well defined salts, these compounds are decomposed by water (hydrolyzed) to such an extent that the free alkaloid may be extracted from acid solution by means of ether or chloroform. Just as we have inorganic salts that are very largely, very slightly or practically not at all decomposed by water (hydrolyzed), so with alkaloids, all gradations of hydrolysis are known. This has been studied quite extensively within recent years, especially by C. Kippenberger and Professor Edward Schaer, of the University of Strasburg, and his students. These experiments have shown that in the presence of a considerable excess of the strong acids the hydrolysis of most alkaloid salts is slight so that no alkaloid is extracted when such a solution is shaken with chloroform or ether. When weak acids are used, such as phosphoric

and tartaric, or when only sufficient strong acid is present to just neutralize the alkaloid, extraction with chloroform will remove an appreciable amount of alkaloid from its aqueous solutions.

It has also been shown that many alkaloidal salts, as such, are soluble in chloroform, especially the salts of hydrochloric and hydrobromic acid. The alkaloid sulphates were not found to be appreciably soluble in chloroform or ether.

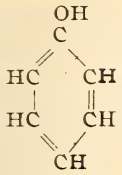
The practical lesson to be drawn from this is that, in the estimation of alkaloids, sulphuric acid should be given preference whenever possible. This is especially true when in forensic estimations small amounts of alkaloids are to be detected. Where tartaric or phosphoric acid is now generally used, sulphuric acid should be given the preference.

Interference of Ammonia, Volatile Bases and Fats in the Estimation of Alkaloids.—It was first pointed out, especially by Professor Thoms, that drugs—particularly leaf drugs—contain volatile bodies of alkaline reaction. These in some cases are ammonium salts; in other cases they are volatile amines. To this factor are due the variable results formerly reported for the mydriatic drugs, especially henbane, and which are still obtained with methods such as those of the German pharmacopœia, in which the volatile bases, or ammonium hydroxide, whichever is present in the drug, is carried over into the ether used to extract the drug. Although it is directed that a portion of this ether be distilled off before the remaining etheral fluid is titrated for its alkaloid content, yet these methods often give high results because the volatile bases are not completely eliminated. In some cases even, where a complete evaporation of the ether is directed, high results are obtained unless special precautions are taken to insure the complete evaporation of the volatile basic bodies. Several attempts have been made to eliminate errors of this kind. Thoms precipitates with potassium bismuth iodide, which reagent precipitates the vegetable bodies commonly classed as alkaloids and eliminates the volatile organic bases, ammonium salts and free ammonia. Another way of eliminating this error, at least in so far as it is due to the presence or formation of ammonium hydroxide, has recently been proposed by H. M. Webster. Webster finds that while alkaloid-hydrogen tartrates are quite insoluble in alcohol, just as are ammonium-hydrogen tartrate and potassium-hydrogen tartrate, the alkaloid-hydrogen tartrates

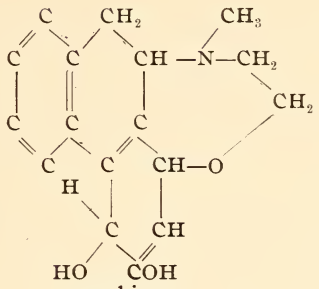
differ in that they dissolve when more tartaric acid is added. Upon this fact is based the elimination of ammonium compounds in the estimation of alkaloids. Finally, Fromme has claimed that fats and waxes may interfere in the estimation of alkaloids; thus, when a drug is treated with ammonia water and ether, the fat contained in the drug is converted to soap by the alkali used and passes into the etheral solution. If in this etheral solution the alkaloid is estimated with standard acid a part of the acid will be used to decompose the soap, but will be calculated as having been used to neutralize alkaloid.

Decomposition of Chloroform by Alkaloids.—Recently A. Panchaud reported that cinchona alkaloids readily decompose chloroform with formation of hydrogen chloride. He reported that in the assay of cinchona the extracted cinchona alkaloids were dissolved in chloroform one evening, and when these were titrated, the following morning, from 20 to 100 per cent. of the alkaloid was found to have been neutralized by the hydrogen chloride produced in the decomposition of the chloroform. Since the decomposition of ·0229 gramme chloroform will yield an amount of hydrochloric acid sufficient to neutralize ·120 gramme alkaloid, the possible error is obvious. A. Simmer, working at the University of Strasburg under Professor Schaer, has studied this question in detail and has not confirmed Panchaud's results. While he found that a number of alkaloids do decompose chloroform with formation of chloride the amount of chloroform so decomposed is slight, even when the alkaloids are in contact with the chloroform for a prolonged time and when the chloroform is heated to boiling. The danger of error in the estimation of alkaloids due to the decomposition of chloroform therefore does not appear to be very great, but the report of Panchaud nevertheless remains that chloroform is a body easily decomposed, especially by alkaline substances.

Morphine a Phenol.—In the present United States Pharmacopœia the purity of morphine, obtained in the assay of opium and its preparations, is judged by its solubility in lime water. This test is based on the phenolic character of morphine. That is, the morphine molecule contains two hydroxyl groups, one of which is of the same character as the hydroxyl group in phenol (carbolic acid), thus:



phenol.



morphine.

This "phenolic hydroxyl" gives to morphine the many properties of a phenol, such as the coloration produced by ferric salts, its reducing effects on iron and on iodates, which reactions permit the ready distinction of morphine from codeine, dionin (ethyl morphine) and heroin (diacetyl morphine hydrochloride), in which the phenol group has been replaced and which therefore no longer give the reactions of a phenol. When morphine dissolves in lime water, it again shows phenolic character. That is, phenols in general are dissolved by strong bases with formation of phenolates. It may not be out of place to recall that upon this phenolic character also depends one of the difficulties in the valuation of opium; that is, while morphine is precipitated from its solution as the insoluble morphine by means of ammonium hydroxide, a large excess of this base must be carefully avoided since by it morphine is re-dissolved to a considerable extent with formation of ammonium morphinate.

Separation of Strychnine from Brucine.—In 1889 Gerock first proposed a method of separating strychnine from brucine based on the ease with which brucine is oxidized by nitric acid and the relative resistance of strychnine to such oxidation. Since then many modifications of this method have been proposed. A modification proposed by Gordin has been made official in the United States Pharmacopœia. Largely because of this, the process of estimating strychnine has lately again been studied by chemists.

At a recent meeting of the American Pharmaceutical Association, where the assay methods of the new Pharmacopœia were discussed, J. M. Francis remarked that, in his opinion, the now official process of determining strychnine had been dried out and condemned years ago. This remark was, at that time, not without justification. All

those who have tried the official process of estimating strychnine no doubt experienced that at times the method "works," while at other times it is plainly seen that the oxidation of brucine does not proceed as it should. It is well known that the oxidizing effect of nitric acid depends largely on conditions of concentration and temperature under which it acts; thus, Gordin has pointed out that the often incorrect results obtained with the official process are due to the fact that the method adopted directs the use of a nitric acid having a lower concentration than that which he proposed. Farr and Wright, in England, have studied the method and propose to increase the oxidizing effect of nitric acid by allowing the reaction to go on at a somewhat elevated temperature. In the United States, H. M. Webster and R. C. Pursel have studied the method in detail. They apparently have solved the difficulties experienced with this method by adding to the nitric acid a small quantity of sodium nitrite whereby the oxidation of brucine is insured.

The Assay of Coca.—It is well known that cocaine is the methyl-benzoyl-ester of ecgonine and that it is very readily decomposed with formation of the mother substance, ecgonine. While, formerly, in the manufacture of cocaine great care was taken to avoid the decomposition of this alkaloid, at the present time coca leaves are treated in such a way that the alkaloids are decomposed so that ecgonine is obtained. This body, after its isolation, is then treated so as to reintroduce the methyl and the benzoyl group so as to again yield cocaine. When coca leaves are used for the manufacture of cocaine their commercial value depends on the amount of ecgonine which may be obtained from them, and accordingly methods have been proposed for the assay of coca leaves based on their ecgonine content. A method recently proposed extracts the total alkaloids from coca leaves and then converts them to ecgonine chloride by boiling with very dilute hydrochloric acid. After removal of bodies other than ecgonine chloride, the liquid obtained is evaporated to dryness and the ecgonine chloride is weighed.

THE PHARMACOPŒIA FROM THE VIEW POINT OF AN ANALYTICAL WORKER.[1]

By W. A. Pearson.

The Pharmacopœia has been called the pharmacist's Bible. In it he finds directions for preparing, tests, and standards for his most important wares.

Our national standard has been well compiled. Much praise and little condemnation belong rightfully to the Revision Committee. This publication represents the combined efforts of competent men. Being the result of human effort it cannot possibly be infallible, nor can it be ideal for the varied needs of the retail druggist, manufacturing chemist, wholesaler and analyst.

To the analyst certain requirements present themselves in the examination of pharmaceuticals by U.S.P. methods, that allow of some flexibility and might be made more definite by the use of methods I will outline later. To a few changes and additions that might prove advantageous, I will ask your attention.

Acacia.—Four grades, A, B, C and D, are sold, depending largely on color and general appearance. Some more definite color standard would be valuable.

Acetic Acid.—Strength could be raised materially without loss to manufacturer.

Hydrochloric Acid.—Standard strength could be raised to 35 per cent.

Salicylic Acid.—Special tests should be introduced for limit of ortho and meta creasotic acids which may be present in synthetic acid.

Aconite.—The criticism that the pharmacopœial assays of this drug and its preparations are unworkable, is false, yet there is plenty of room for improvement. It requires a great deal of time to filter and wash the concentrated extractive, and the evaporation at a temperature below 60° C. is tedious. The physiological dilution test is of some value in quickly approximating the value of this drug. This test is based on the assumption that six milligrammes of prime aconite root, when mixed with 4 c.c. of water and held in the anterior portion of the mouth for one minute and then discharged, will give

[1] Read before the Philadelphia Branch of the American Pharmaceutical Association, January 7, 1908.

a tingling sensation in fifteen minutes which will continue for about half an hour. Of course it is necessary to determine the individual sensitiveness of the operator, when comparative results may be approximated. A more satisfactory assay is needed and the solution of this problem may be found in the Pharmacological Laboratory.

Aconitine is so variable that uniform results from its use can only be hoped for after physiologic assay.

Aloin.—The statement has been made that the tests are too stringent, and one manufacturer has marked his brand "U.S.P. quality commercially unobtainable."

Asafetida.—It has been found difficult to obtain this drug with less than 15 per cent. ash. The rejection of many cases by the Government chemists has materially decreased the ash content on recent consignments.

Balsam Peru.—U.S.P. tests must be followed in detail as there are artificial products that conform to nearly every requirement. A limit should be inserted in regard to length of time the green color in the rosin test may remain without being called permanent.

Belladonna, Hyoscyamus, Stramonium, Scopolia, and their preparations are quite accurately and satisfactorily assayed by U.S.P. methods. In the assay of the liquid preparations it is quite difficult to see the line between the liquid and the solvent. In percolating the crude drugs for assay, and in the case of extract of hyoscyamus, more menstruum is advantageous.

Chloroform.—Are tests given sufficient to detect harmful products in lots that are to be used for anæsthesia? A small per cent. of ethyl chloride seems to be advantageous.

Colchicum and its Preparations.—Here we have a delicate alkaloid and a tedious assay method, which may be necessary, but I agree with Professor LaWall, who says that he wishes the man who originated the method had to use it continually to make his living.

Collodium.—A test for tensile strength might well be introduced.

Copaiba.—A shorter test for turpentine and the addition of Turner's test would be advantageous.

Convallaria and its Preparations.—Physiologic assay should be introduced.

Cresol and its Compound Solution.—Color standards and germicidal tests should be adopted.

Digitalis and its Preparations.—Physiologic assay should be introduced.

Ergot.—As this drug is often partly or completely inert, physiologic assays should be introduced.

Fluid Extracts.—The popular idea that 1 c.c. of a fluid extract represents 1 gramme of drug is fallacious in the case of assayed fluid extracts. Very rarely does this class conform to this standard, as they are adjusted to the alkaloidal assay strength, irrespective of the amount of drug. On a large scale, the formulae and proportions given in the Pharmacopœia are not always ideal for larger quantities.

Gelsemium.—This drug seems to vary in wide limits both in action and in alkaloidal strength. An assay should be introduced.

Thyroid and Suprarenal Glands should both be tested physiologically.

Malt.—An assay for starch converting power should be introduced, as many commercial grades are inert.

Musk.—An odor limit test is advisable.

Nux vomica.—This assay is long and tedious and perhaps not ideal, especially where the oxidation of brucine takes place. Even with great care and seemingly like conditions, one sample may turn red much faster, and this has led us to modify the method to the extent of adding 1 c.c. of a 5 per cent. solution of sodium nitrite immediately after adding the nitric acid. This insures complete destruction of brucine.

Ethereal Oil.—The yield is so variable by U.S.P. method and the value so questionable, that it might be eliminated.

Oils of Birch and Wintergreen.—More efficient tests for artificial methyl salicylate are imperative. Tests for ortho and meta creasotic acids which may be present in synthetic products, might aid in the detection.

Oil of Hedeoma.—It is said that pure oils have an optical rotation as high as + 25°. Certain it is that if the maximum of + 22 were raised 3°, it would include many more samples that are now being offered.

Oil of Linum.—The solubility in absolute alcohol is given far too high. The freshness of the oil seems to render it more soluble, but from oil expressed and immediately tested, the solubility will not come in the limits. Many samples require over 25 parts for solution.

Oil of Tar.—A specific gravity of ·892 is exceedingly low, and the yield of this grade of oil is very meager.

Oil of Turpentine.—The test for petroleum benzin, kerosene, or similar hydrocarbons, may prove unreliable if allowed to stand overnight.

Oil of Thyme.—French chemists say that potassium hydroxide should be used in the assay for phenols as sodium hydroxide will eliminate carvacrol.

Opium.—It is impossible to adopt a method for this drug that will suit all analysts. Certain it is that the conditions have much to do with the results. My only suggestions are to work as nearly as possible at the same temperature, about 25° C., allow the freshly precipitated morphine to stand the same length of time, and use lime water that is U.S.P. strength. Comparative results will then be obtained.

Pancreatin,—The assay is not ideal, as there is no sharp line between the dextrin reaction and the starch reaction. The five-minute digestion period must be accurately measured if comparative results are expected. Thirty seconds difference in time of digestion will show results widely divergent. It is wise to transfer the thick starch paste from the flask in which it was boiled to a clean one, straining through cheese cloth if lumps are present. Often lumps will adhere to the sides and not be converted, and later will give an elegant starch reaction.

Pepsin.—It is difficult to press egg albumin through a No. 40 sieve, a quick method is to squeeze it through strong cheese cloth while still warm, immediately weigh, add the dilute acid and shake vigorously, which will completely disintegrate the albumin. Comparative results are only obtained by closely following every detail in the digestion.

Phenol.—Care must be exercised in obtaining the sample for analysis. A good way is to cut the crystals from a drum that has just been opened and immediately transfer to a perfectly dry bottle, melt and obtain congealing point. The assay of phenol is both rapid and very accurate.

Resin of Scammony.—Perhaps this resin is not completely soluble in oil of turpentine as required, as a sample made directly from Scammony root by U.S.P. method, fails to completely dissolve.

Sugar of Milk.—The test for absence of cane sugar is fallacious.

Thymol Iodide.—An official method for assay is desirable as divergent results are obtained by different methods.

It is often a matter of judgment in deciding whether a certain sample is U.S.P. quality, because in limit tests depending on shades of color or degree of turbidity the requirements are quite flexible.

The various shades of color could easily be compared with a standard chart such as accompanies certain text books on organic chemistry and a definite limit given.

Similarily the degree of turbidity could be indicated by some such scheme as Dr. McFarland's Nephelometer (*J. A. M. A.*, October 5, 1907).

The subject of detecting inferior and adulterated volatile oils is a problem difficult of solution, but the detection might be aided by the introduction of an odor limit test. By this I mean a certain oil should still have a characteristic odor, unaltered when diluted to a certain volume.

The dilution could easily be accomplished by adding 1 c.c. of the oil to 99 c.c. of alcohol, then 1 c.c. of this to 99 c.c. of dilute alcohol, then 1 c.c. of this to 99 c.c. of water.

These dilutions to be varied to suit the oil.

The odor of the best grade of some oils is extremely tenacious, while that of their substitutes and those of inferior quality is much less persistent.

The introduction of official methods for obtaining boiling, congealing, and melting points, and the determination of alcoholic strengths, would give much more uniformity to these determinations.

Another step toward uniformity would be made if the alcoholic strength of tinctures and fluidextracts of the same drugs would be made the same, unless there are good reasons for variation.

More liquid should be recommended in several alkaloidal assays for extraction and washing purposes.

I consider that the Pharmacopœia should be the guide to all important materials used in the treatment of disease. If we consider the Pharmacopœia from a scientific view point, we must look forward and anticipate what the therapeutics of the future will be.

Unquestionably therapeutics of to-day is far from uniform, and different schools have sprung up like mushrooms and claimed merit for their particular methods. That each class has many able followers cannot be denied. Certain it is that medicine and pharmacy are breaking all bands of mythology, and that the ultimate therapeutics will be rational therapeutics gleaned from what is best from each system.

Pharmacy as the science and the art of preparing products for the treatment of the sick is broader than ever before. The widely diverging therapeutics demand special service.

If we believe in psychological therapeutics, we have our field in writing arguments to convince those who think they are sick that they are not.

If hydropathy is to be practiced, we must be prepared to furnish the proper kinds of water.

If osteopathy prevails, we must provide all appliances needed for that practice.

If vaccine therapy is the important remedial agent, we have our field in the preparation. Just so with all the other special branches of therapeutics. Few pharmacists realize their scope, but hang tenaciously to the mythology of unimportant drugs.

If I may indulge in further speculation, I would say that the therapy of the future will be mainly preventive or prophylactic practice, and adherence to only the remedial agents that have proved particularly efficacious. For example: Small pox has practically been eradicated by scientific use of vaccine. Serum therapy has greatly decreased the mortality of diphtheria and bids fair to hold its place in the treatment of that disease. Tuberculosis can effectually be fought with a combination of fresh air, isolation and tuberculin. Just so with other maladies, the ultimate treatment will tend toward uniformity after this period of adjustment. Of course, death is necessary to life, so human suffering can never be banished, yet the more common diseases to which we are subject may at last be overcome and the body run evenly for "three score years and ten," when it will fall to pieces as did "The one horse shay."

Why is this speculation important to pharmacists? Because we are concerned in the preparation of the products that are to be used and we must be able in some way to discriminate. To my mind, rational therapeutics will be the final victor and it is the one we should follow. We are a long way from the final goal, but have seen some important advances, of which standardization is a vital one.

Alkaloidal assay has added a remarkable stimulus to uniformity, but all our active drugs are not capable of such valuation.

The test of the pudding is in the eating, not in the appearance, size, color, number of raisins, per cent. of proteid, fat or starch.

Just so with the digitalis, ergot, strophanthus, convallaria, squill, Indian cannabis, thyroid and suprarenal glands, you cannot judge them by appearance, but it is possible to standardize them comparatively by physiological means. Uniformity is the important slogan. Therefore I would suggest that physiological standards be introduced in the Pharmacopeia. True, the tests could not be done accurately by the busy retail pharmacist, nor can standardization of antitoxin, or, in fact, one of the common alkaloidal assays.

The whole scheme could be accomplished under the same method as is now in force in standardizing antitoxin. The Government to send out standards for comparison to each manufacturer, as often as deemed necessary, and uniformity would result without the humiliation manifested by one of our leading Philadelphia physicians, who was called hurriedly in consultation to see a case of alarming toxic digitalis symptoms. The physician who had given the drug said, "Let me throw that stuff out the window." "Give it to me," said the consulting physician, "for I can never get any that will work."

With these suggestions, some of which I trust you may think of favorably, I must conclude this inadequate survey of a subject which is of vital importance to us all. It only remains for me to thank you for your courteous attention.

THE PHARMACOPŒIA AND THE MICROSCOPIC EXAMINATION OF VEGETABLE DRUGS.[1]

By Henry Kraemer.

I have been asked by the committee having this meeting in charge to discuss (*a*) the subject of the microscopic examination of vegetable drugs, (*b*) the introduction of histological descriptions into the U. S. Pharmacopœia, and (*c*) to consider any of the difficulties which stand in the way of introducing such descriptions into the Pharmacopœia. In presenting this subject I have deemed it advisable to treat it under three heads. These are:

(1) What has been done by some of the other pharmacopœias.

(2) The Eighth Revision of the U.S.P.

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[1] Read before the Philadelphia Branch of the American Pharmaceutical Association, January 7, 1908.

(3) What the next Committee of Revision will probably do, and why.

I. FOREIGN PHARMACOPŒIAS.

The fourth edition of the German Pharmacopœia appeared in 1900. In the preface it is stated (page xv) that for practical reasons the description of crude drugs has been considerably changed, the thought being that as the majority of the drugs used to-day by the apothecary are in a comminuted or powdered condition, the description of the more important drugs should be enlarged and histological characters introduced. From a half to two-thirds of a page is usually given to the definition and description. There is no separation into paragraphs of the definition, and the macroscopic and microscopic descriptions. Apparently, it was thought that the histological characters should be taken into account not only in the examination of powdered drugs, but also in the examination of comminuted drugs where it would be necessary to make sections, as well as of crude drugs where a microscopic examination in many instances would help very considerably.

As showing the idea of the revisers of the German Pharmacopœia we may select the description of ipecac, omitting the method of alkaloidal assay.

Radix Ipecacuanhae—Brechwurzel.

Die getrocknete, verdickte Wurzel von Uragoga Ipecacuanha. Die Wurzel ist höchstens 5 mm dick und durch Wülste der außen dunkelgraubraunen Rinde geringelt, welche sie mehr oder weniger weit umfassen. Die innen weißliche Rinde ist von einer braunen Korkschicht bedeckt und besteht, außer den Siebröhren, nur aus Parenchymzellen, welche meist zusammengesetzte Stärkekörner und Bündel von nadelförmigen Oxalatkrystallen enthalten.

Das harte, hellgelbe Holz besteht allein aus den in der Längsrichtung der Wurzel gestreckten, dickwandigen, verholzten Ersatzfasern, mit schräg gestellten, spaltenförmigen Tüpfeln und aus Tracheen, deren Glieder den Ersatzfasern ähnlich, jedoch behöft getüpfelt und meist durch runde, seitlich und den Enden genähert liegende Löcher verbunden sind.

Der Durchmeffer der größten Einzelkörner der Stärke ſoll 0,012 mm nicht überſchreiten.

About the time that the eighth revision of the U. S. Pharmacopœia appeared the Netherlands Pharmacopœia was issued. In this work, as in the German Pharmacopœia, about an equal amount of space is given to vegetable drugs and chemicals. The descriptions in the Netherlands Pharmacopœia are, however, much more complete and extended, a page or more frequently being given to the description of vegetable drugs, one-half of which pertains to the microscopic characters of the powders.

For the sake of comparison, as well as to get an idea of the character of the work, the description of ipecac may be selected as an example:

RADIX IPECACUANHAE.

Radices adventiciae tumefactae quas praebet Psychotria Ipecacuanha, STOKES, Bot. Mat. Med. I. 365 (Uragoga Ipecacuanha, BAILL. Hist. Pl. VII. 281).

Decimetra ad 1,5 longa, sed plerumque fracta in frusta centimetra non plus quam 5 ad 7 longa, millimetra ad 5,5 crassa, dura, fragilia, cylindrica vel subconica, semper plus minusve enormiter flexa, raro paulum ramosa, tumoribus densis, orbicularibus, fere millimetrum 1 latis, qui plerumque radicem non plane circumdant, at loca non tumefacta in singulis tumoribus in diversas partes versa sunt, ita ut tota radix satis constanter cylindrica sit; iis tumoribus multis locis rimae interiectae sunt undique usque ad lignum pergentes. Superficies tenuiter transverse rugosa, non nitide, obscure griseofusca, nonnunquam magis rubrofusca. Corticis fractura transversa clare griseofusca, levis, non nitida, cornea, nonnunquam farinulenta; fractura ligni alba. Lignum millimetra ad 2 crassum, transverse persectum quodammodo angulosum; hic illic cortex facile a ligno avellitur.

Ad usum cortex ligno liberetur.

Microscopia pulveris. Amylum, plurimum grana soluta, sed etiam in cellulis parenchymaticis leptotichis, coloris expertibus; granorum multa simplicia, diametro non plus quam 12 μ, fere globosa, nucleo et stratis parum conspicuis; at plura composita, pleraque diadelpha vel triadelpha vel tetradelpha sed interdum ad dodecadelpha, parti-

bus saepe valde disparibus. Cellulae suberosae formam orbis exhibent, sunt quinquangulae vel sexangulae, leptotichae, membranis obscure rubrofuscis. Raphides fere 45 μ longae, tenues, interdum in fasciculos intra cellulas parenchymaticas collectae. Xylematis elementa fibrosa, pachyticha, partim scrobiculis rimalibus, partim scrobiculis duplicibus praedita, in pulvere fere nulla adsint.

Odor corticis, imprimis cum contunditur, mucidus; sapor ingrate amarus. Lignum odoris et saporis expers est.

Pulvis Radicis Ipecacuanhae combustus cineris partes centesimas 1,8 ad 6 relinquat.

If the practice of pharmacy in the Netherlands has reached that stage of advancement indicated by this book, and I have good reason to believe that it has from a short sojourn in that country, with what pride must the pharmacist practice his profession! Not only is the book of the highest standard, but it is in the Latin language, which shows the standard of education which must be attained by Dutch pharmacists.[1]

2. THE UNITED SPATES PHARMACOPOEIA.

Shortly after the 1900 convention, Dr. Rice, chairman of the U.S.P. Revision Committee, called me to New York as chairman of the Sub-committee on Botany and Pharmacognosy, which he had appointed, to go over this subject, he having been very much impressed with the work of the German Commission, and in order to facilitate the work in our own revision gave me this copy of the German Pharmacopoeia, which I hold in my hand.

In little more than a year after the Convention, the chairman of the sub-committee on Botany and Pharmacognosy presented in a preliminary report completely revised descriptions of the vegetable drugs for the consideration of the general committee. To indicate the nature of the work that was done we select here as previously the part relating to ipecac.

IPECACUANHA. Ipecac.

The dry root of Uragoga Ipecacuanha Baillon (Fam. Rubiaceae), known in commerce as Rio Ipecac.

[1] A paper treating of the subject of vegetable drugs as set forth in the various foreign pharmacopœias is now in contemplation.

Cylindrical, somewhat tortuous; 5 to 15 cm. long, 1 to 5 mm. in diameter. Externally dark brown, irregularly annulate, sometimes transversely fissured; occasional rootlets or rootlet scars. Internally, bark light brown, 0·5 to 1 mm. thick, easily separated from the dark yellow, non-porous wood; fracture of bark brittle, of the wood tough; odor slight; taste bitter, acrid.

Stems usually more slender, 5 to 10 cm. long, 1 to 1·5 mm. in diameter; nearly smooth or longitudinally wrinkled, bark 0·1 mm. thick, with bast fibers either single or in groups; pith distinct, 0·5 mm. in diameter.

Carthagena Ipecac. Uniformly thicker roots, 4 to 7 mm. in diameter, annulations less pronounced.

Powder. Dark yellow; tracheids with simple, oblique or bordered pores, sometimes containing starch; calcium oxalate in raphides 20 to 40 μ long; starch grains elliptical, 4 to 14 μ in diameter; single or 2- to 4-compound. In Carthagena ipecac the starch grains are uniformly larger, 4 to 15 μ in diameter.

The crude drug descriptions embraced from four to nine lines, and the descriptions of the powders were two to three lines long. In some cases, as where the entire tops of the herb drugs are used, the descriptions were longer. The report having been submitted to an officer of the Convention, he prepared an extended criticism in which he objected to the introduction of scientific terms in the descriptions of crude drugs and to the introduction of descriptions of powdered drugs.

Two main reasons advanced in favor of his position were as follows:

(*a*) Very few of the active pharmacists in our country are college graduates; and even if all the graduates of all the schools of pharmacy in this country were still alive, and all were still actively engaged in the business, they would be but a small proportion of the whole number engaged in the business of pharmacy.

(*b*) The Convention had before it a proposition to introduce descriptions of powdered drugs (proposed by Professor Schneider) and voted it down; another effort at a subsequent session to get at the same result was to refer to the Revision Committee, many voting for this motion to avoid a re-opening of the debate on the subject, and confident that the Committee would carry out the expressed wish and will of the Convention.

It is now proposed by the sub-committee to introduce the descriptions of the microscopical appearances of powdered drugs. It is not necessary to argue this subject at great length here; it was fully realized by the Convention that the introduction of this subject into the Pharmacopœia might result in endless persecutions and prosecutions of retail pharmacists, and the Convention is on record as disapproving af the scheme.

A third argument against the introduction of descriptions of powdered drugs was presented by a member of the general committee who stated:

It is certain that much more space will have to be given to assay processes, and the chemical descriptions will likewise have to be extended in the new book. The increased number of synthetics which will be added, will still further enlarge the book, and there are other additions which will undoubtedly be made, and it is therefore necessary at this time, to take the question of space into serious consideration.

We may then summarize the chief objections which were raised against the introduction of powdered drugs and any extension of the descriptions of crude drugs:

(*a*) General lack of education among pharmacists in the United States.

(*b*) A fear that pharmacists would be persecuted unduly if the characters of powdered drugs were given.

(*c*) Lack of space on account of the introduction of additional assay processes, synthetics and other matters.

Finally, the sub-committee was instructed by the General Committee to prepare a report on the vegetable drugs of the Pharmacopœia according to the following:

(1) The botanical and pharmacognostical descriptions of the drugs entering the U.S.P., 1900, shall be framed in a manner similar to those found in the last

Pharmacopœia, with such corrections and additions as the advance in science demands, but still retaining the style as to terminology and other technical characters adopted in the U.S.P., 1890.

(2) Descriptions of powdered drugs are excluded from the U.S.P., 1900, subject to the following provision: when a drug in the powdered state is known, or reasonably supposed to be subject to a specific adulteration or admixture, there may be such a reference to its powder as shall suffice, in a simple and easy manner, to provide for the detection of such adulterants or admixture, and in other cases, where similar objects are required, brief references to the characters of the powders may be made.

The following summer (1902) the sub-committee prepared a second preliminary report in accordance with the above instructions, which was accepted, and is incorporated in the present Pharmacopœia, with the exception of certain changes which were made while the work was going through the press.

While the treatment represents certain advances, it is, however, inadequate for purposes of identification of not only powdered drugs but crude drugs as well, and it becomes necessary to consult other works for additional information on the identity characters of the official drugs, this feature of the book comparing unfavorably with that portion devoted to the descriptions of chemicals, which are quite replete with identity tests that are sufficient for all practical purposes.

It is not my object to discuss this matter other than for the purpose of showing how a resolution of the Convention may affect the work of the Committee of Revision, and how the work of a special or sub-committee may be hindered by the votes of twenty or more men who are not familiar with the progress that has been made, and with the trend of events in a particular field outside of their own.

This is probably one of the weakest places in pharmacopœial revision, where men who are specialists in one line are permitted to vote on other subjects in which they have not special knowledge, and I, on my part, have hesitated during the course of revision to vote on questions which I did not feel competent to consider.

As we have no assurance that the same arguments will not be put forth again in connection with the revision of the Pharmacopœia, we may briefly consider them at this time.

It seems to me to be a sad commentary on the status of pharmaceutical education in this country, that the Committee of Revision

should be prevented from considering the scientific problems arising during the course of revision on their merits, or in such a manner as the importance of the subject warrants, or the practice of the times demands, by reason of the oft-expressed contention that pharmacists are not educated in such a manner as to be able to make use of the knowledge given, or to appreciate its importance. If, however, it be admitted that this contention is true, then the question narrows itself down to this, that pharmacopœial revision is directly influenced, or hindered from making progress, by the inadequacy of the pharmacist's education.

Whatever may have been true of the past certainly cannot long continue to be true of the future, for the reason that the responsibility must be directly assumed by the schools and colleges of pharmacy and by the boards of pharmacy. We can therefore but trust that this argument relating to the pharmacist's education will never again be raised in connection with pharmacopœial revision.

The second argument when reduced to final analysis means that we are more concerned in avoiding prosecutions and litigation than in safe-guarding the quality of the drugs which the pharmacist handles. This, however, is a question which is now in the hands of the Government, and it would seem that the sooner the Pharmacopœia recognizes powdered drugs and modernizes its attitude toward the whole subject of vegetable drugs, the more weight and authority it will have as a legal standard. There are some who still contend that drugs in the powdered or comminuted condition are not official and therefore are not required to be subject to the official standards. Technically there can be no question that both crude and powdered drugs should conform to the same standard. This is true of the foods and spices for which the government has established standards. Furthermore, as I have already pointed out, there are a number of products official in the U. S. Pharmacopœia which are used for spices or for flavoring purposes for which no definite standards are given, while the U. S. Government has adopted exact standards relating to the quality of these products. This emphasizes the desirability that the revisers of the Pharmacopœia take advantage of scientific investigation pertaining to every official product and fix exact standards for them. In other words standards are fixed legally according to the advance in our scientific knowledge of the subject.

Not much need be said in regard to the third objection, as no principle is involved, other than to suggest that in the next revision the space in the Pharmacopœia be provisionally apportioned in advance, so that one department need not be handicapped or denied a proper amount of space on the ground that other departments require it.

III. VEGETABLE DRUGS IN THE NEXT PHARMACOPŒIA.

It is rather difficult to say at this time just what will be done by the next Revision Committee with regard to the subject of vegetable drugs, but it may safely be assumed that it will not be content to lag much behind the other pharmacopœias in this respect. Not only is this true, but if closer relations are established between physicians and pharmacists, will not the physician expect that when he uses such drugs as aconite, digitalis, ergot and others that the pharmacist shall be familiar with the latest researches on these drugs, just as he, in turn, is expected to be familiar with the latest advances in medicine? In order that the pharmacist may live up to this requirement and be assured that the drugs which he buys are genuine and of good and uniform quality, it is necessary then that the framers of the Pharmacopœia take cognizance of the advances in pharmacognosy, as has already been done by other pharmacopœias.

With the increased use of the microscope in the examination of various technical products, and with the appearance of so many works on the microscopical study of drugs, foods and spices, and with courses of instruction in all of the reputable colleges of pharmacy, in which the microscope comes into daily use, its value in the examination of both crude and powdered drugs can not be questioned. In this connection, I may refer to some of my earlier papers on this subject,[1] and before considering briefly the specific application of the microscope in the study of vegetable drugs, I desire to say something on

THE RELATIVE VALUE OF CRUDE AND COMMINUTED DRUGS.

It would probably be supposed that as I have devoted considerable attention to the study and development of methods for the

[1] AMERICAN JOURNAL OF PHARMACY, 69 (1897), p. 400; and 71 (1899), p. 541.

examination of powdered drugs I might be led to overlook the relative value of crude and powdered drugs. We all know the relative perishability of crude drugs depending upon the nature of the constituents, some deteriorating so rapidly as to make it necessary to use them in a fresh condition, as pulsatilla, bryony and conium. It is true that there are a few vegetable drugs which are improved by keeping them for a certain length of time, but generally speaking they deteriorate more rapidly in the powdered condition than in the crude condition. Another objection to the use of powdered drugs is the fact that they lend themselves more readily to adulteration and to the use of poor grades of drugs, which ofttimes would be rejected if offered for sale in the crude condition.

Dr. Squibb's papers[1] on the study of rhubarb are not without interest at this time. From his observations he concluded that "no ordinary judgment is at all to be depended upon in the selection of powdered drugs," and he even went so far as to say that "the importation of any drug in powder is *prima facie* evidence that there is something to be concealed by the condition of being in powder, and this evidence should be taken as overbalancing all other evidence in the case of medicinal substances, until it can be annulled by proof to the contrary." At this time we do not insist that every powdered drug upon the market should be looked upon with suspicion, but that it is much more difficult to identify and pronounce upon the quality of a drug in the powdered condition than in the crude condition. In view of these various considerations it would probably be better if pharmacists made their preparations from crude drugs. But inasmuch as comminuted and powdered drugs are mostly purchased by retail druggists it becomes necessary for the Pharmacopœia to consider methods for their examination if the révisers desire the Pharmacopœia to be of use to pharmacists in this respect. That the work is technical does not argue against its consideration, but should, it would seem, be all the more reason for giving it attention. Either the Pharmacopœia should admit descriptions of powdered drugs, or extend the descriptions of the histological characters of crude drugs, the elements being identical in each case, only in the crude drugs they have a relation to one

[1] Proceedings of the American Pharmaceutical Association, **16** (1868), p. 452: **17** (1869), p. 398; and **19** (1871), p. 497.

another in the arrangement or grouping into tissues. As already pointed out the latter method is followed in the German pharmacopœia.

THE USE OF THE MICROSCOPE IN THE EXAMINATION OF COMMINUTED AND POWDERED DRUGS.

The microscope furnishes the surest means of determining the identity of a powdered vegetable drug at our command, and is also useful in determining the quality of powders, as in strophanthus, hydrastis, ginger, black pepper, amylum, etc. The microscope also furnishes the most reliable means of detecting and determining adulterants in powdered drugs. It is furthermore useful in detecting the presence of worm-eaten drugs or powders of certain classes of drugs which have been exhausted in whole or in part.

When the active principles of starch-containing drugs have been removed this is indicated by an alteration in the starch grains, as in belladonna, calumba, ipecac, rhubarb, licorice, etc. Exhausted oleo-resinous drugs are readily detected by the use of chloral as a mounting medium, which has the effect of bringing out the oil and resin cells in the genuine drug. There are also a number of microchemical tests which apply to individual drugs that are coming into use. The presence of added lime in cochineal and other drugs may be detected by the use of 25 per cent. sulphuric acid, as a mounting medium which causes a separation of crystals of calcium sulphate.

I have had a great many occasions to use the microscope not only in the detection of adulterants but also in determining drugs which were mislabeled. On one occasion a jobber sent out comminuted belladonna root for inula, and discovered later that the bin in which the drug was kept was wrongly labeled. On another occasion when I ordered genuine "almond meal" and a mixture marketed as almond meal, I found the labels were interchanged, apparently not wholly accidentally, but on account of the finer appearance of the spurious article.

The Value of the Microscope in the Examination of Crude Drugs.

In addition to the aid furnished in identifying crude drugs by a microscopic examination as in digitalis, solanaceous leaves and

arnica flowers, there are very many cases in which the microscope will be found an aid in judging of the quality. A good deal may be learned about the quality of a drug by taking into consideration the microscopic appearance of other cell constituents than the active ones, as of starch, calcium oxalate, inulin, chloroplasts, and aleurone grains. The time of gathering the drug, the method of drying it and the length of time it has been kept may all be judged in many instances by the use of the microscope.

The spurious character of the crude drugs that have been sold in times past is well known. Some of the admixtures or substitutes can be detected with the naked eye, but in many instances a microscopic examination furnishes the surest means of determining them, as in the detection of ruellia in spigelia, spurious cascara barks, etc. I do not desire to multiply examples, but may conclude by saying that one who is accustomed to the examination of drugs by means of the microscope finds it an advantage to use it continually.

CONCLUSIONS.

When invited to discuss the subject of this paper I felt bound to accept the invitation, and to do all I could to assist in future revisions of the work, and to make clear the necessity of the consideration of the progress in the scientific study of vegetable drugs and its application in their examination.

I have pointed out what has been done by the other pharmacopœias and reviewed the difficulties which beset revision work in this department in our own Pharmacopœia.

I have shown that crude drugs are on the whole better in quality and less liable to adulteration than powdered drugs, but as comminuted and powdered drugs are so largely used, the pharmacist must be able to determine them and judge of their quality.

This being the case the Pharmacopœia should either only give definitions of vegetable drugs, leaving it to be inferred that the pharmacist will acquaint himself with the standard scientific works pertaining to them, and that these constitute the standard the Pharmacopœia prescribes, or it should make the descriptions so complete as to apply to the various commercial forms of vegetable drugs, as I have already stated.

POISON IVY FRUIT.

By A. B. Stevens.

In an article on Poison Sumac (American Journal of Pharmacy, **79**, 522), Mr. Warren and the writer referred to Pfaff's statement that he found the poison in the fruit of the poison ivy and poison sumac, and declared our belief that he must have employed fruit collected in the green state, as we had repeatedly examined the ripe fruit of both species and each time were unable to find poison. Since writing the above we have examined two samples of mature, but unripe fruit of poison ivy, and both were poisonous.

A physician once asked if poison ivy, growing in the city, was poisonous. In this connection it is interesting to note that one of the above specimens grew in Weehawken, N. J., near the dueling grounds of Hamilton and Burr, the other in the Old Dutch Cemetery in Tarrytown-on-the-Hudson.

By some oversight a part of the original copy, containing acknowledgements, was omitted and we take this opportunity to express our thanks to Frederick Stearns and Co. for their generosity in maintaining a fellowship in the School of Pharmacy, University of Michigan, which made part of this work possible, and also to Adolph Ziefle for continued assistance, especially in the collection of the latex. In the illustration, p. 506, Mr. Ziefle appears on the right and Mr. Warren on the left.

SHARE-HOLDING IN NOSTRUM COMPANIES BY PHYSICIANS TO STOP.

"Section 4 of Article I of the By-Laws of the Philadelphia County Medical Society provides: 'Any physician who shall procure a patent for a remedy or for an instrument of surgery, or who sells or deals in patent medicines or nostrums, or who shall give a certificate in favor of a patented or proprietary remedy or patent instrument, or who shall enter into an agreement with an apothecary to receive pecuniary compensation or patronage for sending his prescriptions to that apothecary, shall be disqualified from becoming or remaining a member.'

"The holding of shares of stock in a company making or dealing in patented or secret medicines is, therefore, incompatible with membership in the Philadelphia County Medical Society. This

notice shall be printed in three successive issues of the *Weekly Roster* of the medical organizations of Philadelphia."

The foregoing action, adopted at the annual meeting on January 15th, means expulsion for offenders from the County Society, the State Society and the American Medical Association, after expiration of the three notices mentioned.

THE PHILADELPHIA BRANCH OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The stated meeting of the Philadelphia Branch of the American Pharmaceutical Association, for January, was devoted to a discussion of the valuation of drugs and assay processes. The meeting was an unusually interesting one and demonstrated, more than any of the previous meetings, the imperative need for post graduate work on the part of retail pharmacists, if they wish to keep abreast of the needs and requirements of the science of pharmacy to-day.

The first paper was one contributed by Professor W. A. Puckner, of Chicago, entitled: "Recent Progress in the Chemistry of Alkaloid Estimation." This paper included quite a comprehensive review of the progress that has been made during the past twenty years in the quantitative estimation of alkaloids in crude drugs.

A paper by Mr. W. A. Pearson on: "The Pharmacopœia from the View Point of a Scientific Worker," included a number of suggestions for the elaboration or modification of the tests for official articles.

Mr. Pearson also pointed out the need for adopting physiological standards and tests for such drugs as aconite, colchicum, digitalis, ergot, thyroid gland and suprarenal gland.

A joint paper by Dr. E. D. Reed and Mr. Charles E. Vankerkleed on: "The Standardization of the Preparations of Digitalis by Physiological and Chemical Means," brought out a number of interesting facts relating to the possibilities of adopting standards for this really important drug. The work done by Dr. Reed and Mr. Vankerkleed shows that there is a remarkable uniformity between the results obtained by physiological tests and the quantitative determination of the contained digitoxin by chemical means. The results so far obtained it was thought would warrant the continuation of the belief that digitoxin represents fairly well the active constituents of digitalis.

Prof. Henry Kraemer read a paper on: "The Pharmacopœia and the Microscopic Examination of Vegetable Drugs." In the course of this paper he reviewed the descriptions of crude and powdered drugs that have been included in the more recent European pharmacopœias and discussed at some length the reasons why equally satisfactory descriptions had not been included in the recent, eighth decennial, revision of our own pharmacopœia. Even at the present time the value of the compound microscope in determining the identity of crude drugs and in detecting adulterations, contaminations, deterioration and changes caused by exhausting the drug, is thoroughly well established and the very near future will undoubtedly demonstrate that the microscope is absolutely indispensable in the examination and valuation of all drugs of vegetable origin.

Prof. Chas. H. LaWall, in discussing the papers that had been presented, pointed out that the subject of alkaloidal assay was one of very great importance and suggested that variations in results are not infrequently obtained through careless sampling.

Prof. I. V. S. Stanislaus suggested the advisability of working out a reliable method for determining the camphor content of camphor liniment and spirit of camphor.

The papers were liberally discussed by a number of the members and visitors present.

The meeting of the local branch, for February, will be devoted to the consideration of: "The Retail Druggists' Responsibilities in Connection with the Great Black Plague."

M. I. WILBERT,
Secretary.

PHILADELPHIA COLLEGE OF PHARMACY.

The quarterly meeting of the members of the College was held December 30, 1907, at 4.30 P. M. in the Library. The president, Howard B. French, presided. Twelve members were present. The minutes of the semi-annual meeting, held September 30th, were read and approved. The minutes of the Board of Trustees for the meetings held September 12th, October 1st and 5th, and November 6th were read by the Registrar and approved.

A large portrait of the late James T. Shinn, treasurer of the college, was presented by our fellow member, F. Gutekunst, the well known

photographer of Philadelphia. The portrait is an enlargement of the one published in the November JOURNAL in connection with the biographical sketch of Mr. Shinn by Dr. John F. Hancock. The portrait is printed on Willis and Clements best platinum paper, which is said to be very durable.

The portrait was an admirable likeness of Mr. Shinn and the members were greatly pleased in receiving such a speaking likeness of the late treasurer. It was unanimously voted that the thanks of the College be tendered the generous donor.

The president announced that the death of Mr. Shinn occurred on October 4th, after an illness of a few hours.

The president reappointed the following named gentlemen to the Committee on Legislation: M. N. Kline, chairman; Joseph P. Remington, M. I. Wilbert, William McIntyre, W. H. Poley.

Mr. George M. Beringer, on behalf of Mrs. Mary Procter Green, of Florida, a daughter of the late Prof. William Procter, Jr., presented a number of letters from the correspondence of her father, and in view of their great historic value, he suggested that they be carefully preserved, and also published in the AMERICAN JOURNAL OF PHARMACY, and that suitable acknowledgment be made to Mrs. Green, which was approved.

The letters are as follows:—

To William Procter, Jr.

ESTEEMED FRIEND: On behalf of the Board of Trustees of the Philadelphia College of Pharmacy it has become our pleasing duty to inform you that at a special meeting of that body, held at their hall last evening, you were unanimously elected Professor of Pharmacy in the School of Pharmacy of that College. With the best wishes for your health, and for the successful prosecution of the arduous and untried duties devolving upon the station you have been chosen to fill, we subscribe ourselves, your friends.

THOMAS P. JAMES,
Chairman of Board of Trustees.

EDWARD PARRISH,
Secretary.

PHILADELPHIA, June 2d, 1846.

(This letter bears evidence of having been written by Edward Parrish, with the exception of the signature of Thomas P. James.)

AMERICAN PHILOSOPHICAL SOCIETY,
INDEPENDENCE SQUARE,
PHILADELPHIA, 16th April, 1847.

SIR: I have the honor of informing you that you have been this day elected

a member of the American Philosophical Society, held at Philadelphia for promoting useful knowledge.

I am, sir,

Your obedient servant,

JOHN F. FRAZER, *Secretary.*

WM. PROCTER, Jr.,
Present.

RESPECTED FRIEND: Thy official note of the 16th inst., conveying the information of my election to membership in the American Philosophical Society was duly received. Be pleased to inform the Society that I am sensible of the honor conferred on me by their act of consociation, originating as it did in their body, and that I accept it.

With much respect,

I am thy friend,

WILLIAM PROCTER, JR.

To JOHN F. FRAZIER,
Secy. Am. Phil. Society.

PHILADELPHIA, April 17, 1847.

DEAR SIR.—I have the pleasure to inform you, that, last evening, you were elected a member of the Amer. Phil. Society. You will be officially notified of your election, by one of our secretaries, in the course of a few days. You are indebted to this honor, to the talents and industry you have shown in your various chemical and pharmaceutical researches, and no one thinks it more justly deserved than

Your sincere friend,

FRANKLIN BACHE.

PROF. WILLIAM PROCTER, JR.

April 3d, 1860.

MY DEAR MR. PROCTER: I send you herewith, most cheerfully, my check for $100, which I consider but a small compensation for the services rendered by you to the Committee of the Col. of Physicians in revising the Pharmacopœia.

Very truly yours,

GEORGE B. WOOD.

The secretary called attention to the accumulation of returned certificates of membership from those who had resigned or forfeited membership. The safe was being encumbered with them and some disposition should be made of them. Several members suggested destroying them. The President suggested preserving them on account of the historic value of the signatures of the Faculty and officers attached to them, and instanced one case where all the signatures were those of deceased persons. He further suggested preserving them in a large book and said that room could be found for some of them in some of the cases in the Library.

No further business appearing, adjournment was had at 5 P. M.

ABSTRACTS FROM THE MINUTES OF THE BOARD OF TRUSTEES.

September 12, 1907.

Committee on Property reported that the plans for the new laboratory were completed. The cost for building and fixtures would be about $22,000.

That the new microscopical laboratory was practically finished.

The question of raising funds to pay for the New Pure Food and Drug Laboratory was discussed, and among the plans suggested was that of securing the cooperation of the Alumni.

Committee on Library reported a number of accessions to the library.

Committee on Museum and Herbarium reported the purchase and delivery of the Bartram reprints.

Committee on Scholarships reported additional requirements governing the award.

Committee on Examinations reported the names of G. C. Davy, E. J. Fry, C. R. Keiser, and J. L. Wade, who had satisfactorily passed all examinations in Special Chemistry, and were entitled to certificates of Proficiency in Chemistry.

The secretary reported that a communication had been received from the secretary of the Board of Public Education stating that a scholarship had been awarded to a graduate of the Central Manual Training School.

October 1, 1907.

A communication received from the secretary of the college announcing the re-election of Richard M. Shoemaker, Edward M. Boring, and Charles Leedom, as members of the Board of Trustees for the ensuing three years.

Committee on Property reported the addition to the microscopical laboratory completed, and that the facilities for instruction were greatly increased. Also that bids for the New Pure Food and Drug Laboratory were received from several bidders.

Committee on Library reported a number of valuable accessions to the library.

Committee on Alumni requested an appropriation for the use of the Alumni Association—granted.

Committee on Scholarships reported that there were seventeen

applicants, and recommended the award to seven of the applicants, which was agreed to.

Committee on Examinations reported that the examinations for advanced standing were held September 27th—and were well attended.

New business.—The contract for the new building and fixtures was awarded to H. A. Havens.

The Committee on Membership reported favorably on the application of William E. Lee for membership in the college, who was duly elected.

October 5, 1907.

A special meeting of the Board was called to take action on the death of James T. Shinn, Treasurer of the College. Remarks—which were all tributes of respect—were made by Messrs. French, Baer, Mattison, Sadtler, Meyer, Rumsey, Cliffe and Wiegand.

A committee of three, Messrs. Sadtler, French and Baer, was appointed to draft suitable resolutions. It was also voted that the college be closed on the day of the funeral and that the entire Board should attend the funeral, which was to take place from the Haverford Meeting House.

In this connection was stated the interesting fact that since the founding of the college the office of treasurer had always been filled by a member of the Society of Friends. Richard M. Shoemaker was elected Acting Treasurer.

November 6, 1907.

The Special Committee appointed to draft resolutions on the death of the late Treasurer James T. Shinn, made their report, as follows:

RESOLUTIONS ADOPTED BY THE BOARD OF TRUSTEES OF THE PHILADELPHIA COLLEGE OF PHARMACY.

November 6, 1907.

WHEREAS, We have been recently called upon to record the sudden and very unexpected removal from our midst, by death, of our fellow-member, James T. Shinn, and,

WHEREAS, His services to the Philadelphia College of Pharmacy had been so conspicuous and had extended through so long a term of years, and,

WHEREAS, His personal relations to each and all of us had been so close, and he had endeared himself so strongly as a friend to all of his associates in the Board, therefore, be it,

Resolved, That we testify in a minute to be placed upon the permanent records of this Board to our feeling of the great loss sustained by the Philadelphia College of Pharmacy, its members, officers, students, and all connected in any way with its activity, in the death of James T. Shinn, the late Treasurer and Trustee of the college. Be it also further,

Resolved, That American pharmacy has lost a most conspicuous and creditable exemplar, an ex-President of the American Pharmaceutical Association, and a member of the same for nearly half a century, but, above all, a type of the honest, intelligent practicing pharmacist that brought credit to the profession. Be it further,

Resolved, That in the death of our friend, the community in which he lived has lost a useful citizen, and a public spirited friend and benefactor of many charities, and helpful civic organizations, and public movements. Be it further,

Resolved, That this minute be placed upon the records of the Board of Trustees of the college, and a copy thereof be transmitted to the family of our late friend.

[Signed] SAMUEL P. SADTLER,
HOWARD B. FRENCH,
JACOB M. BAER,
Committee.

The resolutions were unanimously adopted, ordered entered on the minutes, and a copy directed to be sent to the family.

Committee on Property reported the burning out of the dynamos on account of extreme pressure, and that, until repairs were completed, arrangements had been made with the Philadelphia Electric Company to supply current.

The Aimwell School building had been torn down, the cellar for the new building practically dug, and good progress was being made.

Committee on Library reported a number of accessions to the library.

Committee on Museum and Herbarium reported that the Bartram reprints were framed and were being hung in the museum.

Special Finance Committee reported further in securing funds for the new laboratory building.

Committee on Instruction reported some details of the rules governing students who had taken instruction in other institutions.

Mr. W. A. Rumsey was appointed chairman of the Committee on Commencement, and Joseph W. England to succeed Mr. James T. Shinn, deceased.

C. A. WEIDEMANN, M.D.,
Recording Secretary.

THE AMERICAN
JOURNAL OF PHARMACY

MARCH, 1908

ESTIMATION OF ALCOHOL IN CONCENTRATED NITROUS ETHER.

By W. A. Pearson.

In searching for an accurate method for determining alcohol in concentrated nitrous ether, I tried the method described by Dupré (Allen, Vol. I, page 102 and *J.A.C.S.*, Vol. XX, page 495) and found it to be very accurate for dilute alcoholic solutions containing from 0·1 gramme to 0·3 gramme in 20 c.c. The accuracy was tried on dilute solutions of alcohol of known strength, the results of analyses differing from the actual amount of alcohol present by only one or two units in the second decimal place, if proper conditions are observed.

The next step was to separate the alcohol from the nitrous ether. Various methods were tried, with varying success, but the evaporation of the concentrated nitrous ether in a flask containing water, and passing the vapor through water seemed advantageous. At first a small Erlenmeyer flask about one-fourth full of ice-water was weighed accurately, 20 to 35 grammes of concentrated nitrous ether poured in, and again accurately weighed. Anticipating your objections to direct weighing of so volatile a liquid under these conditions, will say that only a very slight error will be made if flask and concentrated nitrous ether are very cold and having the subsequent apparatus near the scales, ready to be connected with the flask. The proper weights are placed on the scales slightly below the correct weight of flask, ice-water and concentrated nitrous ether, and as the weight changes, at the proper moment remove the flask from scales and connect at once with the apparatus.

If this method be carefully followed not more than 1 milligramme

will be lost, and the error is not large because only from 10 to 20 per cent. of this is alcohol.

Various forms of apparatus were used, at first merely connecting with upright condensers and allowing the nitrous ether to evaporate

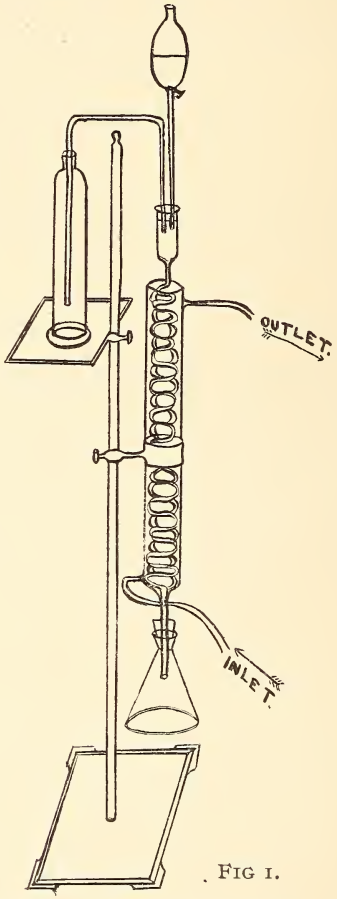


FIG 1.

at room temperature; later a modification of this method was adopted, which works quite satisfactorily. The flask is connected with an upright spiral condenser and in the top is poured ice-water. If the lower opening is quite small, a spiral column of ice-water will be held in the condenser by the pressure developed by the volatilizing concentrated nitrous ether, and will necessitate each bubble of gas passing through this spiral column of cold water. (Fig. 1.)

Another form by which I obtained good results consisted of a bulb thistle tube connected at the top by a large glass spiral and at the bottom by the flask containing the nitrous ether. Water was placed in the spiral in such a way that it remained at the bottom of each turn; water was also placed in the bulbs of the thistle tube. (Fig. 2.)

The later apparatus used was merely a series of five tall wash-bottles, three-quarters filled with water, with the outlet of each bottle reaching nearly to the bottom of the next bottle. This form has simplicity as its chief advantage, and also temperature conditions can be carefully controlled.

In any of the above apparatus at least three days should be allowed for the evaporation of the concentrated nitrous ether.

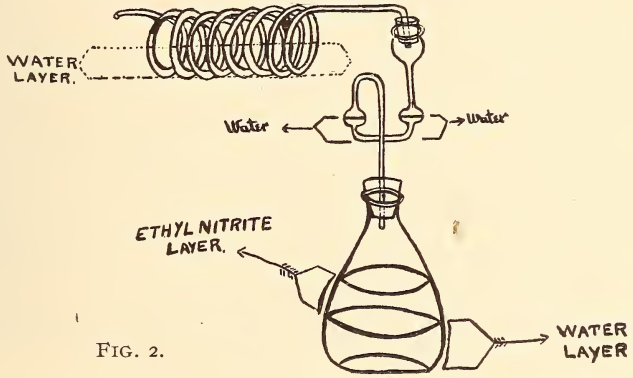


FIG. 2.

When volatilization is complete, the water in the apparatus is combined and put in a measuring flask of such size that, when diluted, 20 c.c. of it will contain from 0·1 gramme to 0·3 gramme of alcohol. The apparatus is carefully washed with ice-water, and washings added to measuring flask, making the proper volume.

After mixing well the combined washings and dilute solution of alcohol from the apparatus, 20 c.c. are accurately measured into a clean magnesium citrate bottle which can easily be obtained with a tight stopper. This solution contains the alcohol and some nitrous ether, depending on the form of apparatus used and the rate of volatilization. The proper amount of oxidizing agent must now be added to destroy the nitrous ether and 10 c.c. more of the chromic acid mixture added to change the alcohol pres-

ent into acetic acid. Potassium permanganate, either solid or in solution, may be added to destroy the nitrous ether and has the advantage of roughly showing the amount of nitrous ether present. Potassium iodide with sulphuric acid cannot be used to destroy the nitrous ether, owing to later volatilization of the iodine.

It is well to titrate a portion with tenth normal potassium permanganate, to form an idea of the amount of nitrous ether present. I prefer to do this and then use sufficient chromic acid mixture to both destroy the nitrous ether and convert the alcohol, as potassium permanganate leaves a muddy residue. One or two trials may be necessary to determine the exact quantity to be used. After the addition of the chromic acid, the bottle is firmly closed and heated for two hours in a steam-bath at 100° C. At the end of this time the solution should not be green, but should have a small excess of chromic acid. The bottle must now be cooled to room temperature, opened, and a small piece of metallic zinc added to destroy the excess of chromic acid; when solution is green, it is poured into a distilling flask, the bottle washed into same flask and carefully distilled, using a well-cooled condenser. When liquid in distilling flask is nearly to dryness, add more water and again distil almost to dryness. If last few drops of distillate are acid to litmus paper, again refill and distil. Test distillate with a drop of barium chloride solution to be positive no sulphuric acid has been carried over, and titrate with standard alkali and compute alcohol present in original sample.

ANALYTICAL RESULTS.

Using flask connected with thistle tube and air-cooled glass spiral, the following results were obtained:

No.		Per cent.
1.	Using KI and H_2SO_4 to destroy nitrous ether present, alcohol indicated	6·11
2.	" $KMnO_4$ " " " " " " "	11·73
3.	" chromic acid " " " " " " "	14·53
4.	" " " " " " " " " "	15·30
5.	" " " " " " " " " "	15·02

Using series of five wash-bottles with different amounts of dilute alcohol and chromic acid and on different days, the following results were obtained:

No.	Date	Alc. Sol.	Chromic acid mixture	Standard Alkali required	Per cent. of alcohol in original
1.	December 24 . .	20 c.c.	20 c.c.	7·4 c.c. normal	16·5
2.	" 24 . .	20 c.c.	20 c.c.	Bottle broken in steam-bath	
3.	" 24 . .	20 c.c.	15 c.c.	7·5 c.c. normal	16·7
4.	" 24 . .	15 c.c.	20 c.c.	5·5 c.c. "	16·4
5.	" 24 . .	10 c.c.	12 c.c.	3·7 c.c. "	16·5
6.	" 24 . .	10 c.c.	13 c.c.	3·7 c.c. "	16·5
7.	" 26 . .	20 c.c.	23 c.c.	7·2 c.c. "	16·0
8.	" 26 . .	20 c.c.	23 c.c.	7·35 c.c. "	16·3
9.	" 26 . .	15 c.c.	18 c.c.	55·1 c.c. " tenth	16·4
10.	" 26 . .	15 c.c.	18 c.c.	54·4 c.c. " "	16·2
	Average				16·44

A 4·8376 gramme sample of the original nitrous ether was weighed in a cold 100 c.c. flask, diluted at once to 100 c c. with alcohol, and tested in nitrometer for absolute ethyl nitrite.

No.		
1.	5 c.c. of this solution liberated	65 c.c. of nitric oxide
2.	5 c.c. " " " "	65·2 c.c. " " "
	Average	65·1 c.c.

65·1 c.c. of nitric oxide represents 82 63 per cent. of absolute ethyl nitrite in sample. The indicated composition of this sample is, therefore: alcohol, 16·44 per cent., ethyl nitrite, 82·63 per cent.

SUMMARY.

Alcohol can be estimated in concentrated nitrous ether by the method of Dupré, using certain modifications, as outlined. The experimental error is large, unless exceptional care is taken at every step, because the final error is magnified by multiplication in computation. Aldehydes, if they be present, will be estimated along with alcohol, and some of the methods for estimating aldehydes must be used for this correction. In the samples above examined no aldehyde was detected by addition of ammonia or solution of sodium bisulphite. Reduction tests for aldehydes, of course, are useless in the presence of ethyl nitrite.

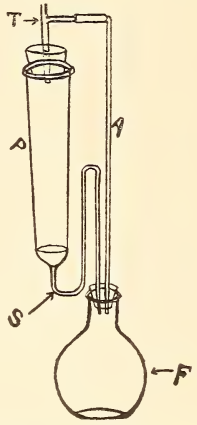
Any ethyl nitrite left dissolved in the water along with the alcohol is also changed into acetic acid. This error is so slight that it may, in most cases, be ignored. A correction may be subtracted for this error by estimating the amount of ethyl nitrite in the water by means of a nitrometer.

From Research Laboratory of
Smith, Kline & French Company.

MODIFICATION OF THE SOXHLET EXTRACTOR.

By Horatio C. Wood, Jr.,
Associate Professor of Pharmacology, University of Pennsylvania.

The apparatus here shown for continuous extraction by volatile solvents has proven itself efficient and offers certain advantages over the Soxhlet extractor, notably in its simplicity and inexpensiveness. It consists of a narrow percolator (P) the lower end of which is connected by means of a tightly fitting cork with a siphon-shaped glass tube, and the upper end closed with a perforated cork into which is fitted a glass "T" tube. The rectangular limb of this tube is connected by a very short piece of rubber with a glass tube



Modified Soxhlet Extractor.

bent at right angles which passes down to the flask containing the solvent. When the contents in the flask (F) are boiled, the vapors pass up through the tube (A) into the tube (T); the upper end of (T) is connected with a reflux cooler into which the vapors pass and, being condensed, run down into the percolator (P) and thence back through (S) into the flask.

Besides the advantages over the Soxhlet apparatus of being less expensive and much less fragile, the facts that by simply removing the corks in each end of the percolator, the apparatus can be easily and quickly cleaned, and that by simply substituting different sizes of percolators it can be adapted for either large or small quantities of drugs with comparatively little trouble, have persuaded me to describe it.

DOES DIGITOXIN REPRESENT THE THERAPEUTIC VIRTUES OF DIGITALIS?

By Horatio C. Wood, Jr.

Associate Professor of Pharmacology, University of Pennsylvania.

Within the last year or two there has been a revival of the idea that was prevalent a generation ago that digitoxin might be regarded as the active principle of digitalis. In 1871 Nativelle was awarded the Orfila prize for the discovery of the active principle of digitalis. Although he named his substance digitaline—under which title it is still recognized by the French Codex—it is generally regarded as identical with the substance described by Schmiedeberg as digitoxin. This discovery attracted much attention, and naturally the crystalline principle enjoyed for a time considerable popularity. It failed, however, to sustain its place as a practical remedy, and its use outside of France was almost entirely abandoned. Recently, however, largely on account of vigorous advertising by certain drug manufacturers, digitoxin has again come to the fore as representing the therapeutic properties of digitalis in a compact and pure form. There are certain observations which would seem to throw some doubt on the justice of this claim.

In the first place, attention may be called to the small amount of digitoxin found in digitalis leaves in comparison to the relative toxicity of the crude drug and of the glucoside. While it is true that digitoxin is the most actively poisonous of the principles which have so far been discovered in digitalis, it seems well established that the dose required to influence the circulation is disproportionately large when compared to the amount contained in the leaves. Digitalis is a drug showing such great variations in potency that it is difficult to draw accurate conclusions concerning the comparative physiological activity of the digitalis leaves without a simultaneous chemical and physiological study of the same individual specimen of the drug. The proper method to arrive at the conclusion concerning the quantitative action of an active principle would be to take a specimen of the crude drug, determine by chemical assay the proportion of principle present, determine by physiological experiment the dose of the crude drug required to kill, also the dose of the principle required to kill, and if the principle accurately

represented the drug, then the fatal dose of the principle should correspond to the amount chemically found in the single dose of the crude drug. Unfortunately, as far as I know, there has been no such study made of digitalis, and we have to rely upon more or less indirect evidence. For instance, in the research carried out some years ago (*Amer. Journ. Medical Sciences*, August, 1900) by Dr. Arnold and myself we found that the average dose of digitalis immediately fatal was, for a dog, 0·15 gramme per kilo of body weight, and that the fatal dose of Merck's digitoxin was about 3 milligrammes per kilo. The average content of digitalis leaves in digitoxin would seem to be, from various reports, between 0·15 and 0·3 of 1 per cent.; if we allow 0·2 per cent. as an average, in the fatal dose of digitalis for a dog there would be contained but 0·3 milligramme, or about one-tenth of the quantity of digitoxin required to kill. These figures, for the reasons just mentioned, would not in themselves be convincing, but they find confirmation in clinical experience which makes them very suggestive. From the reports of a considerable number of authors it would seem that from clinical experience 0·5 milligramme may be regarded as the average therapeutic dose of digitoxin[1] corresponding to the effects of 0·06 gramme of digitalis leaves. This quantity of digitalis leaves, however, would contain but 0·12 milligramme, so that while the discrepancy is not quite so great as in our experiments, there is still a difference of more than 400 per cent. to be accounted for.

It would seem evident, therefore, that digitoxin does not represent in activity more than one-fourth of the power of digitalis, and any assay process of digitalis based upon the quantity of digitoxin it contains, discards three-fourths of the active substance of the plant. As rational would it be, apparently, to assay opium for the codeine in it, neglecting the morphine, as to assay digitalis for its digitoxin alone.

If digitoxin possesses the precise physiological and therapeutic properties of digitalis leaf, the mere quantitative difference becomes a matter of minor importance, since it only necessitates the giving of a comparatively large amount. But this does not, from our present knowledge, seem to be the case. One of the most interesting re-

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[1] See Wenzel (*Therap. Monatsch.*, 1895, ix), Von Starck (*Ibid.*), Masius (*Bull. Acad. Roy. Belg.*, 1893, vii), Curioni (*Clin. Med. Ital.*, 1901), etc.

searches bearing on this point is that of Fraenkel (*Archiv. fiir Exper. Path. und Pharm.*, Vol. li, p. 84). This observer found that after the administration of minimum lethal doses of digitoxin no slowing of the pulse occurred for from twelve to twenty-four hours, but when the effect of the drug began, it passed through the therapeutic stage into poisoning and even death. He found that it was well-nigh impossible to produce from a single dose of digitoxin any therapeutic slowing of the pulse which was not followed later by toxic manifestations; in other words, the border-line between the therapeutic dose and the poisonous dose was so extremely narrow that no one could walk therein. By the administration, however, of comparatively small doses for several days, he could produce easily a marked slowing of the pulse. But here again the peculiar persistency and tendency to show a cumulative effect of digitoxin above the other principles became manifest. For instance, whereas, he could continue administering one-half of the lethal dose of digitalin daily for many weeks without toxic symptoms, one-third of the fatal dose of digitoxin repeated daily for three days caused violent poisoning.

Again, as before, these results have been confirmed by clinical experience. Hatcher (*Jour. Amer. Med. Assoc.*, Vol. xlvii, p. 2059) says, in speaking of digitoxin: "Among these disadvantages are: its insolubility in water and consequent irritant action, slowness to act, and tendency to cumulative effect; its proneness to decomposition, whereby toxiresin is formed; the narrow margin between the effective dose and that which causes cumulative effects on continued use; and its marked vaso-constrictor effects, which may or may not be objectionable, dependent on the case in hand. . . . This insolubility also seems to be responsible for the delay of forty-eight hours or more in inducing the cardiac effects."

For the above reasons it would seem extremely doubtful that digitoxin represents digitalis either quantitatively or qualitatively; for while in a general way the effects of digitoxin upon the circulation are similar to those of digitalis, there are certain differences which may seem slight, but yet which are of great practical importance. Kakowski (*Archiv. Internat. die Pharmac. und die Therap.*), in a series of studies upon the isolated heart of both the frog and the mammal, reached the conclusion that none of the principles thus far found in digitalis had the same effect upon the heart muscle as did the tincture or infusion of digitalis. The principles he studied included digitoxin, digitalein and digitalinum.

In closing, I quote, as having some bearing on the question of the practical utility of digitoxin, from Dixon (*Manual of Pharmacology*, 1906, p. 169): "The samples of digitoxin at present on the market vary in activity even more than the galenical preparations."

THE STANDARDIZATION OF PREPARATIONS OF DIGITALIS BY PHYSIOLOGICAL AND CHEMICAL MEANS.

I. BY PHYSIOLOGICAL MEANS.

By Dr. E. D. Reed.

The question of the physiological standardization of drugs is one that has been attended by a great deal of interest both by pharmaceutical chemists and physicians. No one can deny the desirability and the value of knowing the exact physiological activity of any preparation to be used as a medicine. However, the methods commonly employed for physiological testing are by no means accepted by everyone as correct, or as showing the real activity of a drug.

Without doubt, wherever a chemical assay is possible, it forms the most reliable means of anticipating the physiological or therapeutic activity of any given preparation. This, however, does not rule out the desirability of a control test by physiological methods; but whether or not this should be carried out in all instances is a question hard to decide.

Perhaps no drug has received a greater amount of attention in an effort to formulate a reliable method for standardization than digitalis and other members of the so-called digitalis series.

It is not necessary to consider the other members, such as strophanthus, hellebore, squill, etc., as digitalis is the most important member of this series. The isolation of the active principles of digitalis is rather difficult, and it has been maintained by a number of very competent observers that a chemical assay of digitalis and its preparations is of little value in estimating the physiological activity of the drug. Digitalis and the other members of this family are noted for their stimulating action upon the heart. A great many other properties, namely diuretic, and action on the central nervous system, have been claimed for digitalis, and several attempts have been made to show that various therapeutic properties depended upon one or the other of the several glucosides

occurring in the drug. More recent experience, however, has shown that the active principles of digitalis act primarily on the heart and blood-vessels, and all other effects are secondary; but in many cases the secondary action of the drug is undesirable.

Of the active principles of digitalis, digitoxin is by far the most important and possesses the heart-stimulating property to a much greater degree than any of the other principles.

The cardiac action of digitalis is its most important effect and one which has been studied very widely, particularly on the heart of the frog. The action of digitalis on the frog's heart is very characteristic. After administration it can be observed that the rhythm of the heart is slowed and that on contraction it occupies a smaller volume and does not dilate as fully as under normal conditions. The ventricle is observed to be whiter during contraction, and on dilation does not become so red. A tracing forms a plateau when the heart is in systole.

A frog killed by digitalis dies with its heart in systole. This happens very rarely, if at all, with the mammalian heart, and was thought for a long time to be a distinguishing feature between the action of digitalis on cold-blooded and warm-blooded animals. However, recent research shows that the changes which take place in a frog's heart under digitalis are very closely related to those taking place in the mammalian heart. We can divide the action of digitalis on the mammalian heart into three stages: First, the therapeutic stage, in which the rhythm of the heart is slowed and there is an increased and prolonged systole. The ventricles more nearly empty themselves of blood, and by their prolonged contraction maintain a higher blood-pressure in the vessels than normally. In the second stage, the rhythm of the heart and pulse is very slow and becomes irregular. During diastole the ventricles dilate more fully, while the systole is not so regular and many times weaker, so that more blood remains in the heart than before the drug was administered. This serves to distinguish the first and second stages; namely, in the first stage *more* blood is pumped out or expelled by the ventricle than normal; in the second stage, *less* blood is thrown out than normal.

The important clinical observation which distinguishes the one stage from the other is the irregularity of the pulse. When this occurs, the action of the drug is reaching the second stage and should be immediately withdrawn.

The third stage is the stage in which the toxic action of the drug is the most marked. In this stage the rhythm of the heart is markedly increased, sometimes the pulse is very much faster than normal, but the most characteristic feature of this stage is the extreme irregularity of the contraction of the ventricle. If we examine this by means of a tracing, we get a curve which is characterized by the extreme irregularity of the up-stroke, which represents the contraction of the ventricle. During this stage the effect of digitalis on the central nervous system is quite marked. Vomiting and convulsions are prominent symptoms. Death rapidly follows and is immediately preceded by an extreme irregularity and rapidity of the beat, the so-called "delirium cordis." On autopsy, the heart in mammals is found to be dilated and full of blood.

The first or therapeutic stage is the important one to consider in the administration of digitalis as a medicine. It has little, if any, relation to the second or third stage, and in fact any of the symptoms of the second and third stage are danger signals to be heeded, and call for the immediate withdrawal of the drug.

The question of physiological standardization of digitalis has resolved itself into the specific action of the drug on the heart of the frog. Frogs were treated with digitalis in varying quantities, and that amount of digitalis which would kill a frog of definite weight, and which on autopsy showed its heart to be in systole was considered to be an index of the physiological activity of the preparation.

While no objections can be offered against this method as showing one of the actions of digitalis on the heart, we do not think that it is an absolute or even a safe method for the standardization of this drug. It is, after all, only a toxic effect, and the fact that the frog dies with its heart in systole is not any more characteristic than the mammalian heart in diastole. In either case the animal dies, and the cause of its death is the action of digitalis on the heart, and this method of the physiological standardization of digitalis is nothing more than a determination of the lethal dose.

Recognizing the great irregularity of the frog in its response to digitalis, in which the season of the year plays a very important rôle, the difference with which different species of frogs respond to digitalis, and the necessity of carrying out tests on frogs of equal weight, it was deemed advisable to standardize digitalis by using a

mammal, particularly the guinea-pig, which is quite sensitive to digitalis and which does not appear to offer so wide a variation as is observed in testing this drug on frogs of different kinds and at different seasons of the year.

It was thought desirable also to determine what, if any, relation there was between the lethal dose of a digitalis preparation and the amount of digitoxin present, which principle is more easily determined by chemical means than the other principles accompanying it. The results of these experiments will be detailed in the second portion of the paper.

Experiments with various preparations of digitalis and with the active principle digitoxin point very clearly to the fact that digitoxin represents, if not all, by far the most important properties of digitalis.

In determining the lethal dose of any digitalis preparation, guinea-pigs are selected of 240 grammes weight. The preparation to be tested, if a tincture or fluidextract, is freed from the greater part of alcohol by evaporation at a low temperature and diluted with water to the desired quantity. Progressively increasing amounts are injected subcutaneously into the guinea-pig. A poisonous dose is followed within twenty minutes to a half hour by symptoms of excitement in the animal. The animal runs around its cage, trembles, and a very decided nausea is present. This is rapidly followed by convulsions, which rapidly increase in intensity and in the intervals between them. The animal usually dies during one of these convulsions. It has been observed after experiments on many animals that a dose of digitalis or its preparation which does not kill the animal within two hours is never fatal. This has been accepted arbitrarily as a standard, and that dose of digitalis which kills the guinea-pig of 240 grammes weight between an hour and a half and two hours after administration, we fix as our lethal dose. Upon determining the lethal dose of a given preparation by means of a series of guinea-pigs, we take the lethal dose so determined and administer that amount to five or six other pigs as a control. Without exception, we have found that the dose determined in a series invariably kills the same size pig under the same conditions.

How closely this lethal dose is related to the digitoxin present in a given preparation will also be shown in the second portion of the paper. Our work so far seems to justify us in using the toxic dose

determined for a warm-blooded animal as a control over the chemical assay rather than the commonly accepted method of standardizing digitalis by means of its action on the frog's heart.

The idea is rapidly gaining ground among clinicians that digitoxin is the real active principle of digitalis, from which all the effects of digitalis preparations can be obtained. Its use in a pure condition probably is a long way off, as no satisfactory preparations have yet been made available, and we must still depend for the most part on a reliable tincture or fluidextract for digitalis therapy; but as there are several other principles in digitalis other than digitoxin, which are not inert, but evidently reinforce digitoxin in its action, and as these principles are not easily determined by chemical assay, it seems advisable that digitalis should be standardized, as to digitoxin content, which assures us of its therapeutic effect and, furthermore, the toxic action of the combined principles should be determined by means of physiological test.

2. BY CHEMICAL MEANS.

By Charles E. Vanderkleed.

Both the title of the fourth paper on our programme this evening and the time at our disposal limit the scope of this contribution to a discussion of the *standardization* of digitalis preparations, and, therefore, to review the chemical work on this interesting drug, of such men as Homolle, Nativelle, Schmiedeberg and Keller, the monumental researches of Kiliani, or the more recent discussion of the latter with Cloetta in regard to his (Cloetta's) so-called amorphous digitoxin is uncalled for. Moreover, it is not yet possible to settle beyond all doubt the accuracy of the various chemical views about the digitalis glucosides that have been supported by the various investigators, although it is generally conceded that Kiliani's work affords us the most exhaustive and reliable data concerning this very interesting and, in part, very valuable substance. It may not be out of place, therefore, to endeavor to sum up briefly such facts as all are agreed upon in order to have before us a clear view of the digitalis standardization problem.

All authorities agree that digitalis leaves vary greatly in physiological activity, that those of the first year's growth are practically inactive, and that those only of the second year's growth, collected preferably at the commencement of flowering, should be employed.

Moreover, it has been shown not only that moist leaves quickly become worthless, and that only the dried, or almost completely dried, leaves can be kept for any appreciable length of time without deterioration, but that great care must be exercised in the process of drying, in order that the very process which is intended to aid in preserving the activity of the leaves be not instrumental in destroying it. (In Caeser and Loretz's report in the *Apotheker Zeitung*, 1907, p. 794, Dr. C. Focke is quoted as stating that to dry leaves until 1·5 per cent. moisture remains is a guarantee against deterioration. It is probable that this only means that when all but 1·5 per cent. of moisture has been removed, enough has been eliminated to guard against deterioration due to the hydrolyzing effect of the moisture, whereas, on the other hand, the drying has not been prolonged so far as to injure the delicate active principles.

It is perfectly apparent, therefore, that the appearance of the drug *per se* can be no criterion of its activity. The National Standard Dispensatory (page 530) states that there is no satisfactory method of distinguishing leaves of the first from those of the second year's growth. Moreover, the process of drying would serve further to render more difficult a macro- or microscopic distinction between active and inactive leaves, and the same sample of leaves, although originally good, but improperly dried, would be difficult to distinguish from the same lot when dried under proper restrictions as to heat and light. It has been my experience in examining samples of digitalis leaves for several years, that physical appearance is not a reliable criterion of quality, although the identity of the leaf can be established with comparative ease.

No one will deny, therefore, that some sort of standardization of digitalis leaves is not only highly desirable, but is indispensable to the putting of uniformly reliable preparations into the hands of physicians. Tested leaves only should be used for the preparation of infusion of digitalis to be used extemporaneously, and all preparations of digitalis intended to be kept for some time, such as the tincture and fluidextract, should themselves be subjected to some method of testing whereby not only proof of their activity, but its degree as well may be established. It is well recognized that the fact that tinctures and fluidextracts have been prepared from assayed drugs is not in itself a guarantee of uniformity.

The physiological action of digitalis is primarily that of a cardiac

tonic or stimulant, followed by a pronounced diuretic effect, as was brought out in the first portion of the paper. Assuming Kiliani's work to be the most nearly correct, we have present in digitalis leaves three principal glucosides—digitoxin, digitalin, and digitonin. Digitoxin is a crystalline glucoside, soluble in alcohol and chloroform and in a mixture of alcohol, glycerin and water, slightly soluble in ether and insoluble in water and petroleum benzine; digitalin is an amorphous glucoside, soluble in alcohol and in a mixture of alcohol and chloroform, but only sparingly soluble in ether, chloroform and water; while digitonin is a crystallizable glucoside, soluble in alcohol and in a mixture of alcohol and chloroform, but sparingly soluble in chloroform alone, and differing from the other glucosides in being somewhat more soluble in water. Moreover, this glucoside renders digitalin and possibly also digitoxin more soluble in water—this effect being retroactive on the digitonin, increasing its water solubility. This effect is probably further increased by other constituents of the leaves such as saponins. It is in this way that the activity of an infusion of good digitalis leaves is accounted for. In this connection I wish merely to mention some experiments in which we attempted to prepare a permanent aqueous solution of the digitalis glucosides directly from the drug, depending upon the permanence of this mutually reactive, increased water-solubility effect. They were unsuccessful, however, since, although fully active at first, they gradually deteriorated, until, after two or three months, scarcely a trace of heart-stimulating principles remained in solution. It is apparent, therefore, that only hydro-alcoholic preparations, or those in which part of the alcohol has been replaced by glycerin, will be practically permanent.

Of these three glucosides digitonin is present in greatest amount, but is devoid of all heart-stimulating action. Digitoxin is present in next to largest amount, while true digitalin comes last. Digitoxin is the substance which is by far the strongest heart-stimulating principle in the drug, although the true amorphous digitalin also possesses the heart-stimulating action to a marked degree.

Much of the confusion of prevalent ideas about the relative activity of the digitalis glucosides is due to the unfortunate jumble of names applied to them. Thus, commercial German digitalin, of variable activity, is composed principally of digitonin, while crystallized French digitalin is probably identical with digitoxin.

The difficulty of standardizing digitalis preparations, therefore, lies in the fact that no single constituent represents the entire physiologic effect of the drug. But this is not the only case of that kind—we have many drugs with which this condition exists, such, for example, as strychnine and brucine in nux vomica ; and morphine, codeine, narcotine, etc., in opium. This fact has not deterred us from officially adopting an assay process for nux vomica, based upon the strychnine content ; for opium, based upon the morphine percentage ; and for cinchona, based upon the amounts of the alkaloids relatively more soluble in ether, namely: quinine, cinchonidine and quinidine. Why, then, should we not consider equally valuable an assay process for digitalis based upon the percentage of its most active heart-stimulating glucoside, digitoxin ? May it not be that such a standardization of digitalis will prove to be quite as accurate and efficient as the standardization of cinchona bark, based upon the percentage of ether-soluble alkaloids which it contains ?

The object of this joint paper is to throw light upon that question. We shall endeavor, by means of a table with parallel columns, to show that a fairly constant ratio exists between the chemical assay, *based upon the single constituent digitoxin*, and the result of the physiological test on standard guinea-pigs, which, of course, is that due to the combined effect of all of the active principles. It is not necessary that the constituent which is determined should possess the entire activity of the drug, nor is it claimed to be so in this case. It is only necessary that the amount of the readily determined principle bear a fairly constant ratio to the combined action of all of the drug constituents, in order to make such an assay process valuable. In this connection, however, Dr. Robert A. Hatcher states in the *Journal of the American Medical Association* for December 22, 1906, in referring to the digitalis glucosides, that " digitoxin more nearly represents the leaf," and that " despite the numerous disadvantages of digitoxin, it bids fair to displace digitalis in therapeutics." While I do not believe that Dr. Hatcher has given sufficient consideration to the great disadvantage of the insolubility of digitoxin in neutral media, thereby rendering its hypodermic use impossible, I fully agree with him in believing that digitoxin is by far the most important constituent of digitalis, and that it sufficiently nearly represents the drug to enable us to standardize the drug by means of it.

The physiological method of testing was described in the first portion of the paper. The chemical method for determination of digitoxin employed is essentially that of Keller, as outlined in Lyon's little book on the "Assay of Drugs," and is based upon the relative solubility of the digitalis glucosides in chloroform and water, depending for the final purification of the digitoxin from other principles on its complete insolubility in light petroleum benzine. The method, as used in our laboratory, is as follows:

Twenty grammes of the powdered leaves are exhausted by percolation with 70 per cent. alcohol, and the percolate is evaporated at low temperature on the water-bath until all alcohol has been dissipated (or if a tincture or fluidextract is to be tested, 200 c.c. of the former or 20 c.c. of the latter are taken and evaporated). The residue is diluted with or dissolved in sufficient water to make 150 c.c. Fifteen cubic centimeters of solution of lead subacetate (25 per cent.) is then added, and the mixture diluted to 200 c.c. The precipitate is filtered out and allowed to drain thoroughly, after which sufficient water is passed through the precipitate on the filter to insure saving all retained mother liquor. The united filtrates are again diluted to 200 c.c. and the excess of lead is precipitated by means of dried and powdered sodium sulphate or sodium phosphate.

After standing for twenty-four hours the precipitate is filtered out, allowed to drain well, and is then rinsed with water, in order to save all of the solution. (The taking of aliquot parts, thereby avoiding the necessity for completed filtrations and the washing of precipitates, cannot be recommended in digitalis assays on account of the vast bulk of the lead subacetate, sodium sulphate, or sodium phosphate precipitates.) The solution is transferred to a separatory funnel, 2 c.c. of 10 per cent. ammonia water added, and the mixture shaken out with five portions of chloroform of 30 c.c. each. The united chloroform solutions are evaporated to dryness on the water-bath in a tared flask and the residue of crude digitoxin redissolved in 3 c.c. of fresh chloroform. Ten cubic centimeters of ether and 70 c.c. of light petroleum benzine (the so-called 86°, which must leave no trace of residue on evaporation) are added and the flask allowed to stand in a cool place, covered by an inverted beaker for twenty-four hours. (In hot summer weather the flask is placed in a refrigerator.)

The digitoxin in micro-crystalline form will be found adhering to

the sides and bottom of the flask, from which most of the supernatant liquid can be decanted. The last few drops are evaporated and the residue dried to constant weight at 60° C. The weight of digitoxin so obtained, multiplied by five, will express the percentage present in the drug.

The following table shows the comparative results of a series of chemical and physiologic tests on the same preparations:

No.	Preparations	Chem. assay: grammes digitoxin in 100 c.c.	Physiologic assay: amount to kill 240 gramme pig in two hours
1.	U. S. P. tincture	0·0377	0·6 c.c.
2.	" "	0·023	1 to 1·25 c.c.
3.	" "	0·0277	0·75 c.c.
4.	" "	0·0254	1 c.c.
5.	Fat-free "	0·027	1 to 1·25 c.c.
6.	Fluidextract	0·264	0·1 c.c.
7.	" "	0·2405	0·09 to 0·1 c.c.
8.	" "	0·234	0·08 c.c.
9.	Powd. extract	(1·061 per cent.)	0·019 to 0·025 grammes.

It will be seen from the table that quite a uniform relationship exists between the percentage of digitoxin found and the amount of the preparation required to kill a standard-weight guinea-pig in a definite time. Taking any one of the preparations in the table as a starting-point, as the amount of digitoxin in column two increases, the amount of the preparation required to kill in the third column decreases, the amounts being inversely proportional. These results would lose much of their meaning and value if the preparations assayed had all been prepared from one lot of drug. Such, however, was not the case, as the experiment extended over a considerable period of time and covered several different shipments of digitalis leaves.

The fat-free tincture referred to in the above table is one prepared from drug which has first been exhausted with petroleum benzine to remove fats, volatile oil, etc., thereby making the preparation miscible with aqueous solutions without causing precipitation. This treatment has apparently little or no effect on either the chemical or physiological assay.

A summary of my records on the assay of digitalis leaves, going back about four years, shows the following facts:

Highest percentage of digitoxin	0·455 per cent.
Lowest " "	0·171 "
Average " "	0·313 "

In two experiments on the rate of deterioration of preparations of digitalis, one fluidextract lost in 17½ months 22·6 per cent. of its digitoxin, and another fluidextract in 25 months lost 15·9 per cent. These were preparations which came back to the laboratory after having been out in the trade, and we have no knowledge of the conditions as to light, heat, etc., under which they were kept during the time specified. These results would indicate, however, that under ordinary trade conditions fluidextract of digitalis deteriorates at the rate of about 11 per cent. per year.

RESEARCH LABORATORY OF THE
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NOTES ON COMPOUND RESORCINOL OINTMENT, N.F.

BY E. FULLERTON COOK, P.D.

This ointment has been the source of considerable discussion and some annoyance on the part of pharmacists throughout the country, owing to the difficulty which is experienced in preparing it when the N.F. directions are strictly followed. Resorcinol is described in the Pharmacopœia as "colorless needle-shaped crystals," etc., and the paragraph further states, "it acquires a pinkish tint on exposure to light and air."

Until very recently resorcinol, as found in the pharmacy, was a needle-shaped crystal corresponding to this description; consequently, in preparing this ointment, for which there has been considerable demand, it is necessary to finely powder the crystals in order to incorporate them in the wool-fat, as directed in the N.F. The experience has usually been that it is very difficult to obtain a smooth ointment at this point, owing to the difficulty of powdering the resorcinol. In fact, the water has a tendency to separate from the wool-fat, producing a spongy mass. This condition was experienced with an old sample of hydrous wool-fat, a sample newly purchased, and with one prepared by incorporating 30 per cent. of water with anhydrous wool-fat. The difficulty in incorporating resorcinol with the wool-fat may be overcome in one of two ways: either by obtaining resorcinol in an impalpable powder, which has recently been offered the trade, or by dissolving the crystal resorcinol in the

30 per cent. of water, which would normally be present in the hydrous wool-fat, and incorporating this solution with the right amount of warmed anhydrous wool-fat.

The next difficulty which confronts the manipulator is the addition of the melted paraffine and petrolatum to the mixture of resorcinol, zinc oxide, bismuth subnitrate, and hydrous wool-fat.

My experience at this point in the preparation of the ointment I find to be similar to many others. When this melted mixture of paraffine and petrolatum is added to the remainder of the ointment, whether it be in a mortar or on an ointment-slab, the paraffine will separate in small white particles, owing to its having a much higher melting-point than the petrolatum, and, consequently, cooling more quickly, and when this condition is experienced the usual remedy which the pharmacist adopts is that of rubbing small portions at a time until they are uniform. This involves much labor and the result, at best, is unsatisfactory. Having spoken with a number of pharmacists, I understand that this experience is common, and the strict following of the directions given in the N.F. for its preparation will, I believe, always be unsatisfactory.

After a number of experiments the following modification of the N.F. directions for preparing this ointment, without changing the ingredients, is offered: Dissolve the resorcinol (6 parts) in 10½ parts of water, with the aid of a little heat. Warm 24½ parts of anhydrous wool-fat contained in a porcelain dish on a water-bath, using just a sufficient amount of heat to soften the wool-fat, and add the solution of resorcinol, stirring continuously; then add the 6 parts of bismuth subnitrate and 6 parts of zinc oxide, continuing trituration until perfectly smooth. Having melted the paraffine and petrolatum together, add the mixture to the warmed wool-fat, to which the other ingredients have been added, stirring continuously. Finally, incorporate the 12 parts of oil of cade, and continue the stirring until the ointment is firm.

An ointment made in this way is perfectly smooth, and although the detail here given may seem unnecessary to those who have not tried this ointment, one experiment with each, which may require two hours of hard work to accomplish by the N.F. method, and fifteen minutes by the proposed method, resulting in a superior product, should convince the most skeptical of the need for a change in the N.F. directions.

One other point should be spoken of in connection with this ointment. It is directed in the N.F. that this ointment should be protected from light. The change of color which occurs is quite striking and is attributed usually to the resorcinol, which, as a phenol, becomes pinkish, as is recognized in the Pharmacopœia, when exposed to light and air. This change of color is undoubtedly due to the presence of this phenol, since the mixture of all the ingredients excepting the resorcinol will not show such a change, but, on the other hand, if the ointment be prepared to the point of adding the oil of cade, and this mixture allowed to stand, the creamy white color is not noticeably modified by exposure to either light or air for at least ten days. The conclusion which must be drawn is that the resorcinol and the oil of cade together are responsible for the color changes. To a sample of the ointment, completed, excepting the addition of the oil of cade, creosote was added. There is no change in color.

Acetic acid was added to another sample, likewise without affecting the color. It is evident that some other principle is present in the oil of cade to cause this rapid oxidation.

These color changes are quite striking. The ointment, when first prepared, is of a light, reddish-brown color. Within one-half hour it has changed to a gray-brown on the surface and inside of one hour it develops a distinct, pinkish tint. If this be exposed to light and air for twenty-four hours, it has assumed, on the surface, a purplish color, much darker than at first. This change seems to be due more to contact with air than to light, for the same change seems to occur in an ointment kept in a closed ointment jar, although the change is only upon the surface ; the ointment one-eighth of an inch below the surface showing no purplish color, but the same gray-brown which it had assumed soon after preparation. It has been suggested that the ointment be prepared, excepting the addition of the oil of cade, and that the oil of cade be added when the ointment is dispensed. This, if followed, will insure a uniform product when the ointment leaves the pharmacy.

A GLANCE AT ANCIENT AND MODERN HINDU MEDICINE.

By Anna S. Kugler, M.D.

The claims made by the Hindus in regard to the antiquity of their medical science exceed those made by any other people. The Ayur Veda, or Science of Life, is considered to be a portion of the fourth or Atharva Veda. Brahma communicated the Ayur Veda to Dakshprajapati, who, in turn, communicated it to the Ashvini Kumars, the twin sons of the Sun.

The Ayur Veda consisted of one hundred adhyayas or sections, of one thousand slokas or stanzas each. It is divided into eight parts, as follows:

(1) Skalya (surgery). This includes the methods of removing foreign bodies, of using surgical instruments, of applying bandages, and of treating various surgical diseases.

(2) Shalakya. Treatment of diseases of parts above the clavicles or collar-bones, such as diseases of the eyes, nose, mouth, etc.

(3) Kaya Chikitsa. General diseases affecting the whole body, such as fever, diabetes, etc.

(4) Bhoot Vidya. Demoniacal diseases.

(5) Kanmara Bhritya. Management of children and diseases of mothers and nurses.

(6) Agada. Antidotes for poisons.

(7) Rasayana treats of medicines preserving vigor, restoring youth, improving memory, and curing and preventing diseases in general.

(8) Vajikarana. This treats of how the increase of the human race could best be promoted.

It is said that the oldest existing treatise on Indian medicine is that ascribed to a son of the Vedic Saint Atreya, and hence called the Atreya Samhita. This is a very large work, consisting of several divisions. Atreya is said to have met some of his pupils on the northern face of the Himalayas.

Harita, one of the pupils, asked questions on the origin and treatment of disease. Atreya explained that the Ayur Veda or Medical Science could not be fully explained within the limits of human life, and that his pupils must be content with his own composition, which is completed within 1,500 stanzas. These treat of almost all

varieties of diseases and prescribe remedies for the same. Diseases are classified as curable, incurable, curable by charms, and scarcely possible to be cured. The medicinal qualities of different kinds of water are explained; also of the different kinds of milk, and of the flesh of animals. One chapter treats of the moral causes of diseases. In another chapter diseases are treated of in detail. Intermittent fever is of four varieties, according as to whether it recurs in one day, three days, four days, or longer. Dysentery, diarrhœa, indigestion, consumption, etc., are discussed.

The two most highly revered and most frequently quoted of ancient medical writers among the Hindus are Charaka and Susruta. It is extremely difficult to arrive at a correct estimate of the date of these authors. According to some, Charaka lived 320 B. C. Professor Wilson, who is authority on many things in India, states that, as he is mentioned in the Puranas, he must have lived before the tenth century. Be that as it may, he was the greatest physician of his day, and his Charaka Samhita is still held to be a standard work on medicine. It was his desire to teach men to so manage their bodies as to avoid all unnecessary pain on earth and to ensure happiness after death. Charaka stated that he received the contents of his work indirectly from Atreya. Like that of Atreya, it is divided and subdivided, and covers a wide range in its consideration of the origin, nature and treatment of disease. One division treats of drugs which cause vomiting and purging, and six hundred remedies of this character are mentioned and classified according to the place they come from. Another division describes how medicines should be introduced into the body by means of syringes and tubes, and in what cases emetics, purgatives and enemas should not be used.

The work of Susruta is held in as high esteem by native vaichyas or physicians as an authority on surgery as is that of Charaka on medicine. The cause assigned for the meagerness of the surgical instruments and appliances of the ancients is that their acquaintance with the properties and virtues of drugs was so great that most of the diseases and injuries now dealt with by the surgeon were then cured by medication. An abscess was made to subside by plasters or brought to maturity by poultices. Cases of urinary calculi were treated by antilithics and diuretics. And yet in their works no less than 125 surgical instruments are described.

Hindus were experts in forming new ears and noses, owing to the punishment so common then in India of cutting off the nose and ears. Dr. Hirschfeld, of Berlin, is quoted as saying: "The whole plastic surgery of Europe took new flight when these cunning devices of Indian workmen became known to us. The transplanting of sensible skin-flaps is also an entirely Indian method." The Hindus are also credited with discovering the art of cataract couching.

In Cæsarean section and other abdominal operations, and in amputations, they are said to have been experts. Inoculation for smallpox is said to have been known to them at a very early date.

According to Dr. Wise, the Hindus were acquainted with practical anatomy, and Sir Bhagavat-Singh Jee says that they taught and practiced the dissection of the human body, but the consensus of opinion seems to be that anatomy was the weakest side of Indian medicine. The following method of studying the structure of the human body is given:

Let the physician have the corpse, together with its receptacle, fastened in a brook to' macerate. At the end of seven days the corpse should be rubbed with pieces of bark and all the external and internal parts can then be seen.

The human body is said to consist of 6 members, the 4 extremities, the trunk and the head; and has 7 membranes, 7 segments, 70 vessels, 500 muscles, 900 sinews, 300 bones, 212 joints, 24 nerves, 9 organs of sense, etc. The vessels contain not only blood, but carry also bile, mucus and air.

Very explicit directions are given in regard to the surgeon and the way in which he is to acquire manual dexterity. He was to practice scission or cutting on flowers, incision on skins or bladders filled with paste, lancing on the hollow stalks of plants, sutures on skins, ligatures and bandages on well-made models of human limbs. Susruta directs that the surgeon, before commencing his art, should equip himself with all the requisites, such as the instruments, salts, bandages, honey, oil, water, etc. He should have practical experience in his art and should have seen many operations performed by others. He should be intelligent, steady and skilful, and should have a light hand. He should have steady and strong attendants to assist him. A certain incense should be kept burning in the operation-room. The surgeon should not leave his patient without

offering a prayer to the Almighty for his recovery. Should the wound cause intense pain, a cloth soaked in melted ghee and licorice may be applied. The operations were performed on auspicious days, and the patient was made to sit or stand with his face to the east.

In cases of patients dreading the knife, and of children, sharp pieces of bamboo or glass were substituted. Leeches, caustics, and hot charcoal were used in the treatment of certain affections. The surgical instruments were to be made of the best steel and kept in handsome portable wooden boxes. It is thought that the disappearance of surgery from Hindu medicine is chiefly due to the aversion of the Brahmins to touching a dead body, and to coming into contact with pus, blood, etc. Surgery thus passed from the priestly class into the hands of the lower classes, and for lack of encouragement declined altogether, until bleeding was left to the barbers, bone-setting to the herdsman, and the application of blisters to every man.

The obstetric art is considered a branch of surgery and is treated at great length. External circumstances were supposed to act very powerfully on the physical and moral qualities of the offspring. On this account the woman, from the time of conception, should be kept happy, should remain pure, and should wear ornaments and white clothes. She should not touch a dirty, diseased or imperfectly formed individual. Great attention should be paid to the diet: during the first three months the food should be very cool and thin, as rice and milk. When abortion is threatened, cold water and cold bathing should be used. On a favorable day in the ninth month the pregnant woman is to be removed to a temporary hut built for the purpose, the door to the east or south. Four experienced women should be selected to assist at delivery. Sour gruel in large quantities was to be given to assist in the expulsion of the fœtus. In case of delay the smoke of the skin of the black serpent was to be applied to the vagina.

When the infant was born, a little fine salt and ghee were mixed and put in the mouth, a mixture of linseed, margosa leaves, and ghee was rubbed upon its head, and a piece of oiled cloth put over it. The cord was tied eight fingers from the navel and then divided, and one end was tied around the neck to prevent evil. A little cold water was then thrown over its face, and the father offered up the

prescribed prayers. Much was written in regard to dystocia, and directions were given in regard to Cæsarean section.

The ancient Hindus paidgreat attention to hygiene and prescribed rules for the regulation of the life of the individual, both in sickness and in health. Health was thought to be promoted by the exhibition of an emetic once a fortnight, a purgative once a month, and blood-letting once a year.

Having thus briefly glanced at surgery, as practiced by Susruta and others, we return to the subject of medicine by giving a description of a good physician. He must be a person of strict veracity, of the greatest sobriety, of good moral character, and be versed in all the commentaries of the Ayur Veda. He must be a man of sense and benevolence, his heart must be charitable, his temper calm, and his constant study how to do good. He should daily improve his mind by an attentive perusal of scientific books. He should have his hair dressed and his nails pared; should have clean clothes and carry a stick. To treat a patient conscientiously was supposed to bring punyam or merit to the physician. For the sake of his livelihood he will be justified in expecting a fee from well-to-do people. The Hindus are enjoined not to approach a king, a preceptor or a physician empty-handed.

The Hindus were then, as they are now, very particular about the selection of auspicious days for the preparation of their medicines and the beginning of treatment. For instance, Mondays, Tuesdays and Saturdays were inauspicious days for certain drugs. Tuesdays, Thursdays and Sundays were the best days for the administration of purgatives and emetics.

In regard to prognosis, diseases were classified as curable (sadhya), incurable (asadhya), and controllable by remedies only (yapya). The physician is warned to refrain from treating a disease that is quite incurable.

They claimed that of all diseases the etiology was as follows: Adverse correlation, absence of correlation, and excessive correlation of time, mind and the organs of the senses. Time here means not only that which is divided into days, weeks, etc., but infancy, youth, manhood and old age. All morbid phenomena were attributed to the disordered condition of the three principal humors of the body, called doshas, viz.: wind, bile and phlegm. These three humors were supposed to fill the whole body, but the principal seat

of the wind is between the feet and the umbilicus, of the bile between the umbilicus and the heart, and of the phlegm, between the heart and the vertex. Wind predominates in old age, bile in middle life and phlegm in childhood.

The whole system of Hindu medicine centers around these three forces. These words do not have the same meaning attached to them in ordinary language, but are technical terms used to imply certain states of the body. Treatment is regarded as depending upon the physician, nurse, patient and drugs.

Omens played an important part in the mind of the Hindu physician. A few good omens were : an umbrella, cow with calf, woman with baby, two Brahmins, horse, elephant, dancing-girl, and full water-pot.

Among unlucky omens were grass, snake, raw cotton, oil, enemy, butter-milk, one-eyed person, crow, corpse, and empty water-pot.

The messenger sent to call the physician should be of the same sex and caste as the patient, of good breeding, clever, clean, well dressed, driving a horse or bullock, and holding fruits and white flowers in his hands. A widow or a beggar is not a suitable messenger. Importance was attached by the physician to the dreams of the patient. When other remedies failed, the horoscope was consulted. The duration of a disease was believed to be influenced by the day on which it manifested itself.

Among the causes of disease Karma or Fate took an important place. Thus, the murderer of a Brahmin suffered from anæmia, a cow killer from leprosy, etc. Diseases caused in this way may be cured by propitiatory rites, or if these fail, the progress of the disease will be checked in the life to come.

Demons also were recognized as agents in the causation of certain affections. Such diseases, as well as many others, were cured by amulets and charms.

In diagnosing disease, physical signs, such as palpation, percussion and auscultation, etc., were recognized and referred to in the work of Charaka. The materia medica of the Hindus was most elaborate, and in it were described the properties of drugs belonging to the animal, vegetable and mineral kingdoms. Charaka gives 50 groups of 10 herbs each, which he thought enough for the purpose of an ordinary physician.

Susruta arranged 760 herbs in 37 sets. Other writers classified

remedies as antispasmodic, cathartic, expectorant, diuretic, hypnotic, hydragogue, anæsthetic, etc.

In addition to Charaka and Susruta, there were many authors of note in ancient and medieval India. An oft-quoted Sanscrit stanza states that "Madhava is unrivaled in diagnosis, Vagbhatu in principles and practice of medicine, Susruta in surgery and Charaka in medicine."

During the palmy days of Buddhism in India, under the reign of Asoka, in the third century, priests associated themselves in companies for the education of children, the relief of the sick, and the propagation of the Buddhist religion. Hospitals were erected and a regular system of medical administration established throughout the kingdom. With the decline of Buddhism these institutions disappeared. We close this part of our subject with a quotation from Prof. Wilson: "The ancient Hindus attained as thorough a proficiency in medicine and surgery as any people whose acquisitions are recorded."

Several things combined to bring about a decline of Hindu medicine and surgery. Of these a very important one was the contempt with which the Mohammedan conquerors of Hindustan regarded the scientific knowledge of the Hindus. The diffusion of the European system of medicine also acted as a discouragement to the study of the Sanscrit works. As time went on the ancient works became more inaccessible, and imperfect copies were substituted. Thus confidence diminished and superstition and quackery increased.

Let us now turn to the condition of Hindu medicine as it exists in India to-day.

Of the native physicians of to-day, an experienced Hindu apothecary writes, that "most of the native doctors are those who, having failed in other spheres of life, adopt the healing profession as an easy means of getting a living." He also writes: "In villages where no English medical aid is available and where the patients are poor, they cannot but have recourse to native doctors. If the disease or complaint is an ordinary one, these poor people get well. If severe and complicated, they are sure to die by maltreatment. My belief is that those unfortunate beings who fall into the hands of native quacks are up to 50 or 60 per cent. killed by over-drugging or poisoning by aconite, arsenic or mercury." The description given by this gentleman is similar to my own experience.

In the bazaars of every large town in India will be found one or

more shops in which are kept for sale an assortment of English medicines, and native medicines are found in all the bazaars.

The ordinary native doctor, whose preparation consists in the purchase of a few bazaar drugs and the assumption of a knowledge he does not possess, often succeeds in making a very good living. Mercury is much used as a remedial agent, and it is not uncommon to see ankylosis of the jaw, necrosis of the maxillary bones, and gangrene of the cheek as the result of its use.

The actual cautery is much used, and a common way of applying it is by means of wicks dipped in boiling oil. Every newborn child is burned a number of times over the abdomen. Paralysis, convulsions, abdominal and pelvic disorders are treated with the actual cautery, and we often have patients brought to us covered with burns.

The superstitions of the people are taken advantage of by the native doctors. This is especially true in the case of the devil doctors. Many forms of nervous and mental diseases are believed to be the result of devil possession, and I have known of well-marked cases of hysteria, mania, etc., being treated as such. A few months before I left Guntur, I spent several hours with three devil doctors, two old men and their nephew. They had inherited the profession from their father, and would pass it down to their sons. They gave me a very elaborate account of their method of exorcising devils, the principal feature of which was the repetition of mantrums or prayers, which are composed of various combinations of sixty-four letters. After the devil has been exorcised the doctor ties a charm around the neck of the patient. Thurston, in his "Ethnographic Notes," devotes a large space to omens, evil eye, charms, etc.

Mantrams or consecrated formulas are considered so powerful that even the gods can be brought under control. They are efficacious in curing diseases, in protecting children against devils, and women against miscarriage. Many of the disorders of children are attributed to the evil eye. The following is one of the many remedies: Some chillies salt, human hair, nail-cuttings, and finely powdered earth from the pit of the doorpost are mixed together, whirled three times in front of the baby, and then thrown on the fire.

Votive offerings also occupy a large place in the thoughts of the people, and the temples are daily thronged with those who have come to fulfil vows made during illness or because illness has

been averted. The offering may be a beautiful little daughter who will be married to one of the temple gods and brought up to a life of shame. One lady in South India has devoted her life to the rescue of these little temple girls. The cholera and small-pox goddesses are held in great esteem by the masses. During the cholera epidemic, in 1906, a great sacrifice was made in Guntur to the goddess, and at such a time buffaloes, goats, and chickens are offered.

In addition to these irregular methods of treatment, there is what may be called the regular school of Hindu medicine, to which a small class of native doctors belong. I have frequently met some of these men in the homes of the people, and not infrequently they are in attendance upon the patient at the same time as myself. These men are not averse to being interrogated as to their training, methods of treatment, etc. They have acquired their knowledge from their fathers and grandfathers, and from books handed down in the family. These books have been written in modern times, but are based upon those of the ancients, Charaka, Susruta and others, but are greatly inferior to them. The practice of the regular Hindu physicians of to-day is based upon a false knowledge of anatomy and physiology, and upon erroneous theories as to the cause and nature of disease. They have never dissected, have never seen the inside of the human body, have no knowledge of the clinical thermometer, the stethoscope, the microscope, etc., have attended no medical schools, read no medical journals, and belong to no medical society. For them the human body is composed of 306 bones, 210 joints, 900 ligaments, 700 vessels, etc.

In the diagnosis of disease great stress is laid upon the pulse, which in the male must be felt in the right wrist, in the female in the left. Many explanations are given for this, one being that the blood-vessels are differently distributed in the two sexes. The character of the pulse is largely depended upon for determining the predominance of one or other of the three humors of the body. If the pulse feels like the creeping of a serpent or a leech, wind is predominant, if it be jumping like a frog, or similar to the flight of a crow, bile predominates. When it strikes the finger slowly and resembles the strutting of a peacock it shows that the phlegm is in excess. As the health of the individual depends upon the proper relation of these three humors, disease is the result of a want of correlation, and the treatment of disease consists in the restoration

of this disordered relation. The use of drugs is based upon this theory, and all remedies are considered with reference to their effects upon these three humors.

According to them, every substance, whether animal, vegetable, or mineral, possesses five properties, namely rasa, guna, veerya, vibaka, and prabhava, which may be interpreted as taste, virtue, power, consequence of action and inherent nature. Some of the remedies derived from the animal kingdom are the bone of a goat, the tooth of an elephant, milk, human milk in eye diseases (this is very common), goats' milk in phthisis, etc. Kasturi or musk and the venom of snakes are much in use. Urine is used both internally and externally. Among the minerals used are metals, salts, precious stones and clay. The process of purification of the metals is very long and tedious.

The application of remedies to the eye as counterirritants, and to the crown of the head, are among the favorite methods in use.

Caste to-day rules the medical as well as every other profession in India, and the practice of the native doctor is well expressed in the words of one who said to me: "We treat all castes, but in cases where we find it objectionable to feel the pulse, we get full particulars regarding urine, etc., and then give necessary treatment."

Surgery has entirely fallen into the hands of Mohammedans and barbers. A number of arms and legs have been amputated in our hospitals as the result of the bamboo splints applied by the barbers. Midwifery is entirely in the hands of the barber women, or, as they are called in Southern India, the mantrasani. These women always wash their hands after the delivery of their patient, and we have had hundreds of their victims come to us, sometimes too late for craniotomy to save the mother, sometimes suffering from acquired atresia of the vagina, or it may be with vesico-vaginal fistula and other injuries of the birth-canal.

Some of the more intelligent of the Orthodox Hindu doctors are recognizing the limitations that hinder their development, and are endeavoring to bring about a revival of the Ayur Vedic system of medicine. The late Maharajah of Mysore established a college wherein a complete training, according to the Ayur Vedic system, is available. This system is also taught in Calcutta, Benares, Bombay, Madras and other cities.

The oldest and largest of the two schools of this kind in Madras

is known as the Madras Ayur Vedic College, and is under the auspices of the Sri Kanyaka Paramesvari Charities. The course of study extends over three years. The works of Charaka, Susruta, Bahata and other Ayur Vedic writers are taught. Anatomy, physiology, materia medica, midwifery and hygiene are also taught by graduates of the English Medical College of Madras. The students who pass the required examinations receive diplomas stating that they are qualified physicians of the Ayur Vedic system. At present they have only a dispensary in connection with this school, but they hope soon to have a hospital. From 200 to 300 patients are treated daily at this dispensary. When in October, 1906, I visited this institution, the superintendent, Pandit D. Gopala Charlu, was most courteous in his attention and showed me everything of interest. In the waiting- and treatment-rooms there was nothing to distinguish them from the ordinary Government dispensary. The prescriptions are written in Sanscrit and compounded in the drug-room by the students. The drugs are obtained largely from Mysore and Malabar, but a few herbs are cultivated in the garden adjoining the building. Pills, powders, tinctures, honeys, waters, ointments and oils are upon the shelves of the drug-room. Arsenic, strychnine, nux vomica, lead, zinc, mercury, iron and gold are used in different forms. The superintendent belongs to an old family of Hindu physicians and is on very friendly terms with European members of the medical profession. He has made a special study of plague, and has a special remedy for it. He writes: "In the good old days, more than a thousand years ago, when several of the nations now held up as models of civilization were naked savages, fighting for existence with many of their more formidable enemies, the great medical men of India were grappling with this formidable disease." It is the ambition of the Pandit to have an Ayur Vedic dispensary in every district of the Madras Presidency.

In conclusion, we may ask: What is the condition of medicine in India to-day?

It seems to me that the condition of medicine is not unlike that of religion. There is the quackery that has arisen because of the decline of ancient Hindu medicine; a system based on hypocrisy and deception, succeeding in proportion to the superstition and ignorance of the people, having its counterpart in modern Hinduism, with its temples and priests. There are the comparatively few hered-

itary medical practitioners who are, I believe, in many instances honestly trying to practice the healing art by closely adhering to the medical teaching that has come down through the ages. corresponding in part to the so-called Orthodox Hindu who goes back to the Vedas for his religious teaching. There are those who, in the recently established Ayur Vedic schools, are trying to combine the ancient and the modern systems, corresponding to the Brahmo-Somaj and other reform societies.

And, lastly, there is the medical science that, by means of the English Government and the medical missionary, has come from the West, bringing with it much that is good, not a little of which has been received from the East, to which it is brought, something in the way that Christianity, though originating in the East, is now brought back from the West.

What will be the outcome of it all? As concerns religion, it is not my purpose to attempt an answer here. I know of no one who has attempted to answer, as regards medicine.

It seems not too much to hope that, as the years go by, more attention may be paid to Ayur Vedic medicine by all students of medicine, and that that which is good in it may be incorporated into a system which, being neither that of the East nor of the West, may be a universal system of medicine whose chief object shall be the amelioration of human suffering and the prevention of disease.

PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF THE MORE IMPORTANT ADVANCES IN PHARMACY AND MATERIA MEDICA.

By M. I. Wilbert,
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Food and drug legislation is again attracting the attention of all branches of the drug trade. This is due to the fact that in a number of States the Legislature is considering the enactment of laws more or less in harmony with the Federal Act of June 30, 1906.

The Federal law has been in operation long enough to demonstrate that it is a factor for the bringing about of better conditions, despite the fact that it comes far, very far, from correcting all of the abuses that it was expected to remedy.

The surmise that Congress would be tempted to modify or amend the Federal law at an early date appears to have been well founded, as at least several bills amending the Pure Food and Drugs Act are now pending in committee, though it is hoped they will be allowed to remain securely pigeonholed until the law has been sufficiently tested to demonstrate its shortcomings and needs.

One of the proposed amendments, introduced by Senator Gallinger, of New Hampshire, proposes to make the Homeopathic Pharmacopœia of the United States a drug standard of equal standing with the Pharmacopœia of the United States. Apart from the fact that legislation of this kind would appear to be introducing conflicting standards, it has been pointed out that the Homeopathic Pharmacopœia of the United States is but one of several homeopathic pharmacopœias that are now in use in this country, and that it is not generally recognized by homeopathic practitioners.

A bill that has been introduced in the House by Representative Mann, of Illinois, is designed to correct the abuse that has grown out of the form of guarantee that is now allowed on the label. Practically the same object is sought by a bill that has been introduced in the Senate by Senator Heyburn.

While it is true that the present style of guarantee has been abused to some extent, attention is being called to the fact that manufacturers and others have but recently accommodated themselves to the provisions of the Food and Drugs Act, and it would be a hardship to compel them to destroy their stock of labels, now on hand, and revise the form of guarantee to conform with the modification proposed by either of the proposed measures.

The U.S.P. and N.F. propaganda is attracting considerable attention in various parts of the country. Retail pharmacists appear to have been uniformly successful in calling the attention of physicians to the articles official in the Pharmacopœia and the National Formulary.

It has been pointed out repeatedly that if this propaganda is to meet with the continued success that it rightfully deserves, retail pharmacists must take cognizance of their own shortcomings, from a scientific point of view, and endeavor to meet the increased demands that will be made on them. They will also be required to recognize their sins of omission and commission in connection with the nostrum traffic, and correct at least many, if not all, of the abuses

that are now so manifest. This latter need appears to have been dwelt upon at some length at a joint meeting of retail druggists and physicians recently held in Chicago.

Another need that has manifested itself is the improvement of many of the preparations enumerated in the National Formulary, also a few, at least, of the preparations of the U.S.P. This need has been recognized by the several branches of the American Pharmaceutical Association, and a concerted attempt is now being made to institute investigations looking to the possible improvement of U.S.P. and N.F. formulas.

The Chicago branch has been particularly active in this line of work and a number of valuable suggestions have been brought forward by members of this branch.

Discouraging the Prescribing of Secret Remedies.—That the present move to discourage the use of secret remedies by physicians is attracting the attention of thinking men in all parts of the world is evidenced by the action of the British Columbia Medical Association. At the annual meeting, held in Victoria, B. C., this Association adopted resolutions deprecating the use and sale of patent medicines and the prescribing of proprietary remedies by physicians.

The British Columbia Medical Council was requested to communicate with all physicians in the province, drawing their attention to the undesirability of prescribing secret proprietary remedies. (*Phar. Jour.*, December 7, 1907, page 769.)

In England the British Pharmaceutical Codex is being made the basis of a concerted propaganda on the part of the pharmaceutical societies. This book, but recently published by the Pharmaceutical Society of Great Britain, presents many interesting possibilities that are well worth careful consideration on the part of American pharmacists.

Proprietary and Trade Names.—Among the many features of the British Pharmaceutical Codex, the treatment that has been accorded the admittedly complicated problem of proprietary and trade names is perhaps the most interesting. In this connection an attempt has been made to introduce short and euphonious names for the more lengthy chemical names for substances not protected by patents. Among the titles thus introduced to take the place of trade names we find :

Acetannin for tannigen.
Acetomorphine hydrochloride for heroin hydrochloride.
Acid salaceticum for aspirin.
Adrenine for adrenalin.
Benzylmorphine hydrochloride for peronin.
Betacaine hydrochloride for β-eucain.
Chloramide for chloralamid.
Chlorbutol for chloretone.
Ethylmorphine hydrochloride for dionin.
Formamine for urotropine, and many others.
Formamol for citramin, helmitol and others.
Malourea for veronal.
Quinalgen for analgen.

These are but a few of the many new titles that have been introduced and serve to indicate the effort that has been made to introduce short, easily remembered names for articles sold under proprietary names. While it is true that many of these titles are open to criticism, it does appear as though the move is one to be commended as being a step in the right direction.

Sunday Rest.—In Prussia the apothecaries appear to have succeeded in their efforts to secure a whole, or at least a partial, day of rest on Sunday. A recent circular order sent out by the Prussian Government not alone permits, but actually provides for the introduction of increased facilities for Sunday rest on the part of pharmacists and their employees. In places where there are several pharmacies, Sunday closing is to be achieved by mutual agreement among the several proprietors, while in places with but one pharmacy, the police authorities are permitted to arrange for restricted hours. (*Chem. and Drug.*, January 4, 1908, p. 8.)

Origin of Titles.—According to Le Clere's famous "History of Medicine," the term Apotheke was first used to describe the storehouses of the herbalists. These traders were called Rhizotomoi and Botanologi by the Greeks, and Herbarii in Latin.

The title Pharmaceutes and Pharmacopes originally meant dealers in medicaments and became terms of reproach because of their dealing in poisons, love-philters and the various quackeries of the day.

In Rome the business was still more divided. Besides the herbalists, there were shops for medicaments, others for perfumes, others

for colors; curiously enough it was the Pigmentarii who seem to have been the most respected, and who ultimately absorbed the trade of the others. (*Chem. and Drug.*, December 28, 1907, page 968.)

Pill Excipient for Oxidizable Substances.—Pills of readily decomposed chemicals, such as silver nitrate, potassium permanganate, gold chloride and mercuric iodide, are readily massed by the aid of two parts of kaolin and one part of dried sodium sulphate with sufficient water to moisten.

The mass must be carefully and rapidly mixed and rolled out without delay, as it remains plastic only for a short time. The pills are said to dissolve much more readily than pills made with kaolin alone. (*Pharm. Zeit'g*, December 21, 1907, page 1059.)

The Lumière Process of Color Photography.—For many years experimenters have sought for a simple and readily followed method for fixing color by photographic means. A number of more or less complicated processes have been worked out, but it has remained for the Messrs. August and Louis Lumière to simplify the process so that it is now possible to produce photographs containing all of the shades and colors of the original, true to nature.

The Lumière process is, in fact, a practical application of the well-known three-color processes, and consists essentially of a screen containing the color elements, orange, green and violet, in the form of finely divided particles, spread evenly over the surface of a specially sensitized plate. These colored particles, with the addition of an equalizing screen, are utilized to act as a color screen in the taking of the picture, and serve to reproduce the color of the original object when the resulting picture is projected on a screen or viewed by transmitted light.

So far it has been possible to produce the pictures only in the form of glass positives, one at a time. Even this offers a wide field of usefulness, as the resulting pictures can be utilized as transparencies, or as lantern slides, and promise to be of great educational value.

β-Barbaloin.—Leger has succeeded in transforming barbaloin into an isomeric substance which he terms β-barbaloin. This isomeric aloin also occurs naturally in various species of aloes.

β-Barbaloin is uncrystallizable, but yields a crystalline chloro-derivative. Leger has identified β-barbaloin in Cape aloes and in

Uganda aloes, but only the merest traces of it exist naturally in Barbadoes aloes or other aloes rich in crystallizable aloins. (*Chem. and Drug.*, January 11, 1908, page 48, from *Jour. de Pharm. et de Chem.*)

Estimation of Eucalyptol in Oil of Eucalyptus.—Schimmel & Co., in their semi-annual report, for October 1907, give the following easily applied method for estimating the amount of eucalyptol in oil of eucalyptus:

"Ten cubic centimeters of the oil containing eucalyptol are mixed in a cassia flask of 100 c.c. capacity with so much of a 50 per cent. resorcinol solution that the flask is filled for about four-fifths of its capacity. The mixture is then thoroughly shaken for five minutes, and the oil portions which have not entered into reaction are brought into the neck of the flask by adding resorcinol solution, and their volume determined. By subtracting this volume from ten, the eucalyptol content of the oil is obtained; this is then expressed in percent. by volume by multiplying by ten."

Oils very rich in eucalyptol are suitably diluted beforehand with an equal volume of turpentine oil, as otherwise the eucalyptol resorcinol might crystallize out and cause the whole liquid to solidify.

Determination of Eucalyptol.—C. T. Bennett has experimented with the resorcinol method for the determination of eucalyptol in oil of eucalyptus, and finds that it gives results that are quite misleading. Bennett finds that the use of resorcinol solution gives results that are from 25 to 50 per cent. too high. The process of estimation given in the United States Pharmacopœia, on the other hand, Bennett finds, gives results that are invariably too low. (*Chem. and Drug.*, January 11, 1908, page 55).

Eucerine.—Unna claims that wool-fat does not owe its power of absorbing water to its cholesterin ethers, as stated by Dietrich, but to its free cholesterin and oxycholesterins; the oxycholesterins and their derivatives are free from odor and are unalterable, while the odor and gradual hardening of wool-fat is due to the cholesterin group of bodies. Unna has separated the oxycholesterin group of bodies and terms a mixture of 5 per cent. of them with 95 per cent. of paraffin, anhydrous eucerine, mixed with its own weight of water. This is eucerine, which is claimed to be an ideal ointment base for the exhibition of numerous substances that are to be absorbed. (*Chem. and Drug.*, January 11, 1908, page 48.)

Cacaosin is the name given to a substitute for oil of theobroma that is now being marketed in Germany. The substance has a melting-point of 28·5 and a congealing-point of 26·6, and is said to be admirably adapted as a vehicle and base for suppositories. It is probably a mixture of cocoanut oil with fats of a higher melting-point. (*Pharm. Zent'h.*, 1908, page 86.)

Constituents of Kola Seeds.—Perrot and Goris, in a critical review of the constituents of kola seeds, conclude that only three well-defined bodies have been isolated from this drug; caffeine, theobromine and kolatin. The last-named substance has been obtained from fresh seeds in small, white crystals that are slightly soluble in water, readily soluble in alcohol, acetone and acetic ether. (*Pharm. Jour.*, January 11, 1908, page 31, from *Bull. des Sci. Pharm.*)

Chinosol.—The Council on Pharmacy and Chemistry of the American Medical Association, in a recent report (*Jour. A.M.A.*, January 25, 1908, page 293) calls renewed attention to the fact that this article has been studied in Germany and found to be quite as poisonous for rabbits as lysol, and when given subcutaneously it is 100 per cent. more poisonous, but when absorbed from the peritoneum it is 50 per cent. less poisonous. While it is admitted to possess considerable antiseptic action, it was found to be decidedly deficient as a disinfectant.

The chemical composition of chinosol also varies from the claims that are made for it by the manufacturers and the American agents, who assert it to be potassium oxychinoline sulphonate. Chemical examination appears to indicate that it is really a simple mixture of potassium sulphate and oxychinolin sulphate.

Alexipon.—This is acetylsalicylic acid ethyl ester and has been recommended as an antirheumatic (*Phar. Zeit'g*, January, 1, 1908, page 9).

Borovertin is the trade name for a combination formed by the reaction of 1 molecule of hexamethylenamine on 3 molecules of boric acid, resulting in the liberation of 3 molecules of water, the conversion of the boric acid into metaboric acid and the combination of the latter with the hexamethylenamine.

The trade article occurs as a white, slightly acid powder, having a salty taste. It is soluble in 11 parts of water and in 48 parts of 96 per cent. alcohol. The composition is readily decomposed by heating. (*Pharm. Zent'h.*, 1907, page 941.)

Ferrated Milk.—Dr. Schmitgen (*Ber. klin. Wochenschr.*, 1907, page 1902), asserts that milk containing an unusually high percentage of true organic iron may be obtained from cows that are fed on specially prepared dry fodder containing readily absorbable iron compounds. This milk does not differ materially from ordinary milk but is said to contain from three to eleven times the amount of iron that is usually found in milk, and is said to be advantageous in the treatment of various forms of anemia. (*Pharm. Zent'h.*, 1907, page 1014.)

Ferroplasma is said to be an organic iron compound, extracted from cultivated plants of *Rumex crispus* (*Pharm. Zent'h.*, 1907, page 1014). In Merck's report for 1906 it is asserted that the roots of *Rumex crispus* have the faculty of absorbing considerable quantities of iron when grown on soil containing iron compounds.

Guaiodol.—This is an iodine derivative of guaiacol. Each guaiacol molecule is said to contain one atom of iodine and one free hydroxyl group, so that the preparation represents approximately 50 per cent. of iodine. It is said to be useful in all diseases of a tubercular nature. (*Pharm. Zent'h.*, 1907, page 1060.)

Hetraline, dioxybenzol hexamethylenetetramine, is being introduced into England as an intestinal antiseptic, particularly for the urinary tract. It is said to represent 60 per cent. of hexamethylenetetramine in true chemical combination with resorcinol.

Hetraline crystallizes in perfectly stable, snow-white needles that are soluble in 4 parts of hot water, or in 14 parts of cold water. It may be given in doses of 0·5 gm. (7 = ½ gr). (*Pharm. Jour.*, January 11, 1908, page 44.)

Hydropyrin.—Acetylsalicylate of sodium is being introduced in Austria as a substitute for acetylsalicylic acid. It is said to have the advantage of being freely soluble in water. (*Pharm. Zeit'g*, 1907, page 1051.)

Jute and jute seeds, according to Kobert (*Münch. med. Wochenschr.*, 1907, page 1143), contain a glucoside, corchorin, that is ten times as bitter as quinine. The lethal dose per kilo of animal, hypodermically, is 0·2 mg. for rabbits, 0·8 mg. for dogs and 2·9 mg. for horses. The toad is said to be singularly immune to the action of this poison, being 100 times less susceptible to its action than the frog.

In the latter animal the drug slows the heart-beat and causes a systolic paralysis of the ventricle.

Corchorin belongs to the digitalis group of medicaments and is closely related to andromedotoxin.

Metadinitrobenzol as a Reagent for Sugar.—The reagent consists of 1 gm. of metadinitrobenzol dissolved in 100 c.c. of alcohol and 35 c.c. of a 33 per cent. soda solution; 10 c.c. of this solution, when mixed with a 1 per cent. solution of maltose, dextrose, lactose, galactose or arabinose gives a violet color in one minute, and with levulose in two minutes. Saccharose and glycogen produce no color. Aldehydes and ketones produce a red color and albumen, albumose, amido-acids, urea and keratin give a yellow coloration. (*Pharm. Zent'h.*, 1907, page 994).

Methylencitrylsalicylic acid is said to be produced by interaction between salicylic acid or salicylates and the dihalogens of methylencitric acid. The resulting substance is tasteless and nonirritating, and in this respect is said to be superior to acetylsalicylic acid. It is decomposed in the alkaline secretions of the intestines, liberating, in addition to salicylic acid, a small proportion of formaldehyde. It is said to be particularly useful in cases of rheumatism. (*Pharm. Zent'h.*, 1907, page 956.)

Morphine-brom methylate is produced by treating morphine with dimethyl sulphate, dissolving the resulting addition product in water and converting the same with a saturated solution of potassium bromide, which also acts as a precipitant for the resulting morphin-brom-methylate. The latter is then purified by recrystallizing from a solution in warm water. Morphin-brom-methylate occurs as white, needle-shaped crystals that decompose and melt at from 265° to 266° C.

It is readily soluble in hot water, and at 15° C. is soluble in the proportion of 1 in 20 of water. It is but slightly or not at all soluble in alcohol, ether or chloroform. Its uses are the same as morphine. (*Pharm. Zent'h.*, 1907, page 960.)

Paralysol is the name given to a cresol soap preparation that is being marketed in the form of tablets.

F. Zernik has recently examined these tablets and found them to consist, in round numbers, essentially of 75 per cent. of equal parts of m- and p-cresol in the form of a double salt of potassium, 15 per cent. of a soda soap, and 10 per cent. of talc and bolus. (*Apothek. Zeit'g*, 1907, page 1126.)

Pyrenol, a substance that was claimed to be benzoyl-thymol-

sodium-benzoyl-oxybenzoate, was examined by F. Zernik, at the Pharmaceutical Institute of the University of Berlin, and found to consist essentially of a mixture of 49·48 parts of sodium benzoate and 49·02 parts of sodium salicylate with 0·2 per cent. of thymol. (*Apothek. Zeit'g*, 1907, page 1091.)

Resorbol is said to be a combination of iodine with some of the higher fatty acids in the form of organic salts that are readily absorbed. It occurs as a brown liquid containing 10 per cent. of iodine in combination, but no free iodine. Resorbol has a specific gravity of 1·072 and mixes readily with water or alcohol in all proportions. It does not stain the hands or the clothing and is readily removed by washing. Resorbol has been used with reputed good results in cases of sciatica, neuritis and inflammation. (*Pharm. Zent'h.*, 1907, page 858.)

Solandrine.—Dr. J. M. Petrie has communicated to the Linnean Society of New South Wales an account of an alkaloid from *Solandra lævis* to which he gives the name solandrine. This alkaloid belongs to the atropin group and resembles hyoscine, but differs from it and its aurochloride in not reddening litmus phenolphthalein and in yielding atropic acid instead of tropic acid when hydrolyzed. The exact constitution of the alkaloid has not been worked out, but the results so far obtained appear to indicate the existence of a tropeine alkaloid in the plant. (*Chem. and Drug.*, January 4, 1908, page 14.)

Spirosol is the monoglycolester of salicylic acid and occurs as an oily, nearly odorless and tasteless fluid that is readily soluble in alcohol, ether, chloroform and benzol, and in about 110 parts of water. It boils at from 169° to 170° C.

Spirosol has been recommended to be used as a local application in cases of rheumatism, and is also said to be useful in cases of objectionable perspiration. It is claimed to be quite free from irritating effects and to be readily absorbed. (*Pharm. Zent'h.*, 1907, page 868.)

Synthetic Suprarenine.—This is said to be prepared by condensing catechol with chloracetic acid to form chloracetyl catechol, which is then treated with methylamine and the resulting methylamine acetyl catechol is reduced to dihydroxyphenylmethylaminomethylcarbinol, or synthetic suprarenine, which, in the form of the hydrochloride, is said to be indistinguishable, in physiological action, from the natural alkaloid of the suprarenal gland. (*Chem. and Drug.*, January 11, 1908, page 48.)

BOOK REVIEWS.

KURZES LEHRBUCH DER ORGANISCHEN CHEMIE. Von William A. Noyes, Professor of Chemistry in the University of Illinois. Translated by Walter Ostwald, and with a Preface by Wilhelm Ostwald. Leipzig: Akademische Verlagsgesellschaft m. b. H., 1907.

It can hardly be denied that our institutions of learning have not accorded to pure organic chemistry the prominent place this subject occupies in the German Universities, nor that the American contributions to its literature, both in text-books and original memoirs, will bear no comparison with the output of the German chemists. It might seem, therefore, like carrying coals to Newcastle to translate into German an American text on organic chemistry; and yet this has been done repeatedly and successfully. The present translation was made at the suggestion and under the direction of Professor Ostwald, who recognizes "the independent and original manner in which the author has conceived and solved his problem," as well as the fact that the modern developments of physical chemistry are adequately brought out by the author. As the book was first published five years ago, it seems unnecessary here to call special attention to its lucid style and logical arrangement, nor to the truly scientific spirit that pervades it. The German version leaves nothing to be desired; it reads like an original, and embodies a number of changes that enhance its usefulness to German students, as well as many additions and corrections supplied by the author. The type, printing and paper are decidedly superior to those used in the making of the American book; the cuts, however, are not up to the standard set by the best German and French text-books.

If the novel arrangement of the subject matter appeals to other German teachers as it did to Professor Ostwald, this translation may become even more popular than the original.

H. F. KELLER.

CENTRAL HIGH SCHOOL, PHILADELPHIA.

PHARMACEUTICAL AND CHEMICAL PROBLEMS AND EXERCISES WITH EXPLANATORY TEXT, including pharmaceutical and chemical arithmetic, weights and measures, specific density and specific volume and chemical notation and nomenclature, chemical equations, problems in oxidation and reduction and stoechiometry, together with

the elementary theoretical chemistry necessary to their understanding. Intended as an aid to students, teachers and examiners. By Oscar Oldberg. Fourth edition, revised and enlarged. Chicago: Chicago Medical Book Company. Price, $3.00.

With the appearance of several books on pharmaceutical arithmetic, it is becoming apparent that a comparatively small proportion of the students of pharmacy have been grounded in the fundamental principles of arithmetic, or have devoted themselves to the mastery of these principles to the extent of being able to apply them with certainty in solving the every-day problems of the laboratory and prescription counter. This is not the place to discuss the question as to why this deficiency in the pharmaceutical student's education exists, nor to consider the ways for remedying this defect. Certain it is that books of the character of this one, by Professor Oldberg, are always welcome to both students of pharmacy and pharmacists, and when the subject is elaborated and presented so systematically, as in the present instance, it rises to the dignity of a distinct branch and presents a legitimate claim to a place in our curriculum.

The book contains two excellent chapters, of about 45 pages each, devoted to the review of elementary arithmetic (including fractions, reciprocals of numbers and their uses, proportion, percentage and alligation), and elementary theoretical chemistry.

The chapters on weights and measures, and solutions and mixtures, supplemented as they are by miscellaneous examples in proportion and percentage, are of particular value to the retail pharmacist. Teachers and the examiners on boards of pharmacy will find not only in the problems, but also in the text, a large amount of material that will be helpful in framing practical questions.

The problems and exercises relating to chemistry are equally well presented, and the chapters on the periodic system, chemical notation, oxidation and reduction, stoechiometry, are specially commended for the manner in which they are written. Part VI treats of specific density and specific volume, and will be found of great practical value, containing, as it does, a large number of miscellaneous problems on the relation of weight and volume, and rules for reducing Baumé degrees to specific gravity and vice versa.

Professor Oldberg's book is the best one we have seen relating to pharmaceutical and chemical problems, and should be in every laboratory and on the dispensing counter of every pharmacist, for use at a moment's notice.

A Manual of Materia Medica, especially designed for students of pharmacy. By Prof. Edsel A. Ruddiman. Philadelphia and New York: Lea Brothers & Co., 1907. Cloth, $2.25.

The purpose of this book is set forth in the following statement taken from the preface: "In the multiplicity of books treating of the various phases of materia medica, there seems to be a place for one especially condensed and written for the student of pharmacy. The author has attempted to present, in as few words as possible, the work usually given to such students." While one may present the essential principles of a subject in a condensed form, or present an elementary treatise on a given subject, this is not the time to provide short cuts and quick turns for pharmacy students. On the other hand, the aim should be to inculcate the principles in each branch as thoroughly as possible, and at the same time to broaden the student's grasp of the subject.

Professor Ruddiman's Manual bears evidence that he was especially guided in his selection of material by the U. S. Pharmacopœia, Hare's Therapeutics, and Culbreth's Materia Medica. One wonders why, in a book of this kind, which is presumably written for students supposed to have a good preliminary training, weights and measures given in grains and inches are prominently brought forward, while the metric equivalents are given in parentheses, contrary both to the spirit and language of the Pharmacopœia, when apparently the latter was the source of the data given in all cases. The condensed treatment of the subject of constituents is unfortunate, so far as pharmacy students are concerned. This is the feature that should have been extended rather than that on the action and uses of drugs.

The reviewer believes that thoroughness and efficiency should be made the watchwords in the training of pharmaceutical students, and he uses this occasion to put pharmaceutical teachers and authors on their guard, lest they unduly condense and shorten the matter presented to their students.

Prescription Practice and General Dispensing. An elementary treatise for students of pharmacy. By Prof. J. H. Beal, 1908.

In the preface Professor Beal states that "the principal object of the following pages is to afford an outline of a systematic course of study for the novice in extemporaneous compounding, and is not

intended as a general treatise or handbook for the experienced practitioner." A question may be raised as to what the author means by "the novice in extemporaneous compounding." If he means one who has not had a prescribed course of training and study, then there is a possibility of the book's doing more harm than good, for such an one should not be permitted to engage in that most responsible of all the work which the pharmacist has to do, namely, extemporaneous compounding. If, however, he means the recent graduate of pharmacy, then the book does not fill a real want, for the graduate of pharmacy will supposedly be able to use the "general treatise" or "handbook," to which reference has been made. The book contains some good things, but why the author should have chosen this method of presenting them at this time is not clear, particularly when there are so many excellent books which the beginner, as well as the pharmacist, should have.

PHILADELPHIA MEDICAL SCHOOLS AND THE UNITED STATES PHARMACOPŒIA.

At an informal conference, called by Prof. Joseph P. Remington, of the teachers named below, in the medical schools of Philadelphia, the following resolution was passed:

"Resolved, that it is of the utmost importance for accuracy in prescribing, and in the treatment of disease, that students of Medicine be instructed fully as to those portions of the United States Pharmacopœia which are of value to the practitioner, and that members of the Medical profession be urged to prescribe the preparations of that publication, and further, that this resolution be forwarded to the Medical and Pharmaceutical Journals, and to the teachers of Medicine and Therapeutics in the United States."

James Tyson, John H. Musser, John Marshall, Horatio C. Wood, Jr., H. A. Hare, J. W. Holland, Alfred Stengel, David L. Edsall, Seneca Egbert, M. C. Thrush, James Wilson, E. Q. Thornton, John V. Shoemaker, I. Newton Snively, J. M. Anders, S. Solis Cohen.

February 3d, 1908.

PHARMACEUTICAL MEETINGS.

JANUARY

The stated Pharmaceutical Meeting of the Philadelphia College of Pharmacy was held Tuesday, January 21, at 3 o'clock, with Warren H. Poley, a member of the Board of Trustees, in the chair. A number of practical points were brought out in the discussion of the various topics on the programme which would consume too much space to record, but which emphasize the advisability of attendance by those who desire to profit from the discussions.

Mr. Joseph W. England read a paper on the "Comparative Composition of Milks," which was published in the February number of this JOURNAL, p. 55.

Dr. Horatio C. Wood, Jr. exhibited a modified Soxhlet apparatus (see page 106).

Dr. Wood also read a paper having the title, "Does Digitoxin Represent the Therapeutic Virtues of Digitalis?" (see page 107).

Mr. England said that he had reached the same conclusion as Dr. Wood, namely, that digitoxin is not wholly representative of digitalis, which was based on its chemical behavior. He referred to the insolubility of digitoxin, and thought that in view of this property it is probably not present in the infusion of digitalis.

Dr. C. B. Lowe enumerated the more important constituents of digitalis, giving their solubilities and therapeutic properties. He said that the infusion of the drug contains certain principles which render it valuable as a diuretic, and condemned the practice of preparing the infusion from the fluidextract.

With regard to the solubility of digitoxin, Mr. Chas. E. Vanderkleed stated when extracts of digitalis are made, the digitoxin is extracted along with other constituents, and that during the course of assay, according to the Keller method, it exists in solution, being present in the lead subacetate solution, from which, however, it separates out in the course of two or three months, and will not again dissolve.

Mr. M. I. Wilbert referred to German digitalin, which is a mixture containing some digitoxin, and said that the digitoxin is rendered soluble by the other substances present, and expressed the opinion that by reason of the presence of the associated principles there is probably some digitoxin in the infusion of digitalis.

In answer to a question by Mr. Vanderkleed, as to whether it would be practicable to standardize digitalis preparations on the basis of the digitoxin content, Dr. Wood gave a negative reply, and said that some years ago he had come to the conclusion that digitalin probably represents the drug better.

Dr. E. D. Reed said that Dr. Wood's experiments and his own did not wholly agree. He said that the cumulative action of digitoxin is very pronounced, and stated that when a toxic or one-third toxic dose of digitoxin is given to a dog, and followed in twelve hours by a similar dose, it will cause the death of the dog, the result being attributed to the cumulative action. Dr. Reed said that probably the association of the digitoxin with other principles in preparations was an advantage, but claimed that the therapeutic effects on blood-pressure and diuresis were due to digitoxin. While making the further claim that where so much confusion exists we are warranted in considering digitoxin as the most important constituent of digitalis, Dr. Reed said that we are not warranted in saying that digitoxin is as valuable as the preparations, namely, the fluidextract and tincture, due to its physical condition in these preparations, and perhaps to a slight action of the other constituents.

J. T. Harbold, apothecary at the Pennsylvania Hospital, said that the physicians at the hospital manifest more satisfaction with the tincture of digitalis than with digitoxin.

Mr. Poley stated that according to his observation the infusion is being prescribed more than the tincture.

Prof. E. Fullerton Cook gave some "Notes on Compound Resorcinol Ointment, N.F.," and demonstrated an improved method for its preparation (see page 120).

In discussing the paper, Mr. F. M. Apple said that owing to the small quantity of the salts, his practice was to mix the bases and to add the correct proportion of the salts at the time of dispensing the ointment.

Mr. Aquila Hoch stated that he had found that when white petrolatum was used in the preparation of the ointment, the color changed in a less degree, due probably to the lesser proportion of sulphur compounds which would react with the zinc salts.

Edgar R. Buzzell, a student of the college, read a paper on "Glycerite of Bismuth, N.F.," and F. S. Bonnell, also a student, read a paper on "Antiseptic Solution, U.S.P., and Alkaline Anti-

septic Solution," in which he called attention to the variation in the finished products, due to the difference in character of the essential oils used.

This group of papers was further discussed by the chairman, W. L. Cliffe, Ambrose Hunsberger, C. E. Vanderkleed, M. I. Wilbert, and Harry Martin.

In this connection Mr. Wilbert demonstrated a method for incorporating resinous solutions with aqueous solutions, which was originated by Valentine Smith, a German. It consists in adding the alcoholic solution slowly to the aqueous solution contained in a bottle, and then revolving the bottle very slowly, holding it in a horizontal position.

William McIntyre, chairman of the Committee on Special Schools of the Board of Education of Philadelphia, read an interesting paper entitled: "The Public School Gardens of Philadelphia."

Prof. Henry Kraemer called attention to a series of back volumes of the AMERICAN JOURNAL OF PHARMACY, a copy of the 1830 edition of the U. S. Pharmacopœia, and a copy of "Wegweiser," which had been presented by Mr. Jacob Eppstein, a local apothecary, whereupon a vote of thanks was tendered Mr. Eppstein.

FEBRUARY

The meeting for February was held on Tuesday evening, February 18th, with Dr. Adolph W. Miller, corresponding Secretary of the College, in the chair.

The meeting was devoted to an illustrated lecture on "A Glance at Ancient and Modern Hindu Medicine" by Anna S. Kugler, M.D. (see page 123). Dr. Kugler is a graduate of the Woman's Medical College of Pennsylvania, and has just completed twenty-five years of medical practice at Guntur, India, where, under the auspices of the General Synod of the Lutheran Church, she has helped to establish a large hospital for women.

Dr. Kugler's paper, as here published, is an abstract of two papers prepared in 1905 and 1906 for the Oriental Society of the American Evangelical Lutheran Mission, Guntur, India.

FLORENCE YAPLE,
Secretary pro tem.

THE AMERICAN

JOURNAL OF PHARMACY

APRIL, 1908

PHOSPHORIC ACID.[1]

By Prof. Virgil Coblentz and Otto B. May, Ph.D.

A criticism has been made that the percentage strength of phosphoric acid, determined by the present alkalimetric titration, does not give results in accordance with those obtained from the specific gravity and its table (page 661, U.S.P.). Experiments having confirmed this criticism, it was decided to investigate our official method, in addition to others, which might be available for pharmacopœial purposes. It was also noted that, with different dilutions, the percentage strength indicated by the specific gravity did not always coincide with the gravimetric determinations. These will be investigated later. For the following experiments, a sample of phosphoric acid fulfilling the U S.P. tests for purity was assayed gravimetrically. This contained 84·84 per cent. of absolute phosphoric acid. From this acid, 10 and 5 per cent. dilutions were prepared and the results calculated to that of the original acid employed. The 10 or 5 c.c. employed for each titration was carefully measured from a burette and titrated with normal potassium hydroxide, V. S., using phenolphthalein as indicator.

[1] This, with such other similar publications as may appear in the columns of the Journal of Pharmacy, represent research work carried out by Dr. Otto May, under the direction of V. Coblentz, chairman of the Sub-committee on Inorganic Chemicals of the Committee of Revision of the U.S. Pharmacopœia.

		Normal Potassium Hydroxide, V. S. (N/1 KOH, V. S.)	Absolute Phosphoric Acid (H_3PO_4) Per Cent.
1.	10 c.c. acid without diluting with water	16·3 c.c.	corresponding to 81·72
2.	10 " " " " " "	16·9 "	" 82·21
3.	10 " " + 10 c.c. sat. sol. NaCl	18·1 "	" 88·05
4.	10 " " + 10 " " " "	18·1 "	" 88·05
5.	10 " " + 10 " " " "	18·2 "	" 88·53
6.	10 " " + 10 " " " " + 90 c.c. H_2O.	18·3 "	" 89·04
7.	10 " " + 10 " " " " " " " .	18·35 "	" 89·25
8.	10 " " + 10 " " " " " " " .	18·35 "	" 89·25
9.	10 " " + excess, dry NaCl	20·6 "	" 100·20
10.	10 " " + " " " + 100 c.c. H_2O .	20·2 "	" 98·33
11.	10 " " + 10 c.c. sat. sol. NH_4Cl	19·2 "	" 93·40
12.	10 " " + 10 " " " "	19·3 "	" 93 88
13.	10 " " + 20 " " " "	20 2 "	" 98 26
14.	10 " " + 20 " " " "	20·2 "	" 98·26
15.	10 " " + 20 " " " " + 80 c.c. H_2O .	22·6 "	" 109·9

When the acid is titrated without dilution, the end-reaction is not sharp, phenolphthalein giving a rose tint when two thirds of the acid has been neutralized, thus :

$$H_3PO_4 + 2KOH = K_2HPO_4 + 2H_2O.$$

This irregularity in the alkalimetric estimation of phosphoric acid is brought about through the variable valency of the H atoms of the acid, influenced by its dissociation. Although H_3PO_4 possesses three replaceable hydrogen atoms, yet it is only a feeble acid, that is, there are but few H ions present in its dilutions. As shown by its relative conductivity, only H and H_2PO_4 ions are present in any quantity. In the alkalimetric titrations the kations HPO_4 and PO_4 have the tendency to go over into the stabler H_2PO_4 ion, according to the equations :

$$Na_3 — PO_4 + H — OH = Na_2 — HPO_4 + Na — OH.$$
$$Na_2 — HPO_4 + H — OH = Na — H_2PO_4 + Na — OH.$$

Since NaOH dissociates completely, free OH kations are present in its solution. The color change of the indicator is dependent on the degree of concentration of the dissociated —OH ions, which in turn is governed by the extent of dilution and the presence of an ionizable salt. This explains the irregularities among the results of experiments 3 to 15, inclusive.

The differences between the lower gravimetric results (84 84 per cent.) and those of experiments 3, 4, 5, etc. (88 to 89 25) might be explained, according to the preceding ionic theory, by the conversion of eleven-twelfths of the acid into Na_2HPO_4 and one-twelfth

into Na_3PO_4. Again, as in experiment 9, a mixture of 32 per cent. of K_3PO_4 and 78 per cent. of K_2HPO_4 will have required 20·6 c.c. of N/1 KOH, V.S. for the neutralization of the acid used. The results of these titrations, while corresponding quite satisfactorily when carried out under the same conditions, are invariably high and fluctuating, through variations in dilution and ionizable salts. A few titrations, with methyl orange as indicator, are added:

		N/1 KOH, V.S.	H_3PO_4. Per Cent.
10 c.c. H_3PO_4 (10 per cent.)	+ 10 c.c. sat. sol. NaCl	8.9 c.c. KOH	corresponding to 86·59
10 " "	10 " " " "	9·05 " "	" 88·05
10 " "	10 " " " "	9·05 " "	" 88 05
10 " "	10 " " " "	9·05 " "	" 88·05

Among other methods possibly available for pharmacopœial purposes, the following iodometric one, proposed by A. Christensen (*Jahresberichte d. Phar.*, 96, 338) has been found to be very satisfactory. The method is simple and gives uniform results, agreeing accurately with gravimetric determinations. This method is based on the reaction taking place between phosphoric acid, potassium iodide and bromate in solution, whereby a molecular equivalent quantity of iodine is liberated for each molecule of phosphoric acid present. Thus:

$$6H_3PO_4 + 6KI + KBrO_3 = 6KH_2PO_4 + 3I_2 + KBr + 3H_2O$$

$$6 \times 97{\cdot}29 \text{ p. } H_3PO_4 = 6 \times 125{\cdot}9 \text{ p. } I = 6 \times 246{\cdot}46 \text{ p. } Na_2S_2O_3, \text{ or}$$

$$97{\cdot}29 \text{ p. } H_3PO_4 = 125{\cdot}9 \text{ p. } I = 246{\cdot}46 \text{ p. } Na_2S_2O_3, \text{ or}$$

$$1 \text{ cc. N/10 } Na_2S_2O_3, \text{ V.S. } (0{\cdot}024646 \text{ gm.}) = 0{\cdot}009729 \text{ gm. } H_3PO_4.$$

A 5 per cent. solution of the original sample of phosphoric acid was employed in these estimations and the results calculated to the strong acid, for comparison. Like all iodometric methods of this class, the operation is carried out in a securely stoppered bottle. In an accurately fitted glass-stoppered bottle of about 150 c.c. capacity, 5 c.c. of the sample of phosphoric acid (measured from a burette) was introduced, followed by approximately 2 grammes of potassium iodide, 5 c.c. of a saturated solution of potassium bromate and 30 c.c. of water. After securing the stopper, the bottle and contents were nearly immersed in a bath of water at the temperature of 65° C. for ten minutes; after cooling thoroughly, removing (rinsing the neck and stopper), the liberated iodine was estimated as usual with sodium thiosulphate, V. S.

H_3PO_4	Sodium Thiosulphate, V. S.	H_3PO_4 abs. in Original Sample.
5 c.c.	21·9	85·24 per cent.
5 "	21·8	85·84 " "
5 "	21·7	84·44 " "
5 "	21·8	84·84 " "
5 "	21·9	84·24 " "
5 "	21·8	84·84 " "

Exposure to temperatures above 65° C. entail a loss in iodine through failure of (even specially constructed) pressure vials to seal securely. Digestion for longer periods, at lower temperatures, cause a further liberation of iodine due to secondary reaction. Experiments were then made to determine the feasibility of a cold method whereby the objectionable features of the above might be avoided. It was found that the reaction (according to theory), is complete after a period of 2·5 to 3 hours, when the securely stoppered flask and contents are exposed to a room temperature of 20° C. These conditions must be strictly followed, otherwise low or high results will be obtained.

H_3PO_4		Sodium Thiosulphate, V. S.	H_3PO_4 abs. in Original Sample.
5 c.c.,	3 hours	28·7 c.c.	84·44 per cent.
5 "	3 "	21·8 "	84·84 " "
5 "	3 "	21·8 "	84·84 " "
5 "	2½ "	21·8 "	84·84 " "
5 "	2½ "	21·85 "	85·00 " "

The gravimetric estimation of abs. H_3PO_4 in the original sample being 84·84 per cent., further comparisons are unnecessary to demonstrate the value of this method for the accurate titrimetric estimation of phosphoric acid.

OIL OF BITTER ALMONDS.

By Frank O. Taylor.

It is well known that the oil of bitter almonds of commerce is largely substituted by artificial benzaldehyde, and even that which is natural is not often derived from the almond, but from the kernel of the apricot; but the extent of this substitution of benzaldehyde for the genuine oil is frequently not realized, and many times oil of bitter almonds may be purchased by retail dealers which is, in truth, nothing more than the much cheaper product, benzaldehyde. The

presence of hydrocyanic acid in the oil is always certain if it be genuine and has not been treated to remove this constituent, but the presence of the acid is by no means a guaranty of its genuineness, for we will find oils consisting of benzaldehyde to which has been added the requisite amount of hydrocyanic acid to meet the requirements of the trade or of the Pharmacopœia. The U.S.P. tests are as comprehensive and exacting as we can well expect, and there is good reason to believe that an oil which will meet these tests is an excellent one; but it would appear, after an examination of results which are here submitted, that some of these requirements are erroneous, particularly the assay for benzaldehyde. Subjoined in tabular arrangement are the results of the application of the United States Pharmacopœia tests, with the exception of the benzaldehyde assay (which will be treated of separately), to twenty-two samples of oil derived from various sources:

No.	Specific Gravity at 15°	Solubility in 70 per cent. Alcohol.	Chlorinated Compounds Copper Test.	Chlorinated Compounds $AgNO_3$ Test.	Hydrocyanic Acid Qualitative.	Hydrocyanic Acid Quantitative Per cent.
1.	1·064	1·0	absent	absent	present	2·23
2.	1·063	1·0	present	present	absent	—
3.	1·054	1·0	absent	absent	"	—
4.	1·054	1·0	present	present	"	—
5.	1·055	1·0	"	"	"	—
6.	1·053	1·0	"	"	"	—
7.	1·058	1·0	"	"	"	—
8.	1·051	1·0	absent	absent	"	—
9.	1·075	0·9	"	"	present	6·44
10.	1·051	1·0	"	"	absent	—
11.	1·054	1·0	present	present	"	—
12.	1·072	0·9	"	"	"	—
13.	1·058	0 95	"	"	present	1 24
14.	1·060	1·0	"	"	absent	—
15.	1·062	0·95	"	"	present	0·69
16.	1.063	0·95	"	"	"	3·31
17.	1·053	1·0	"	"	absent	—
18.	1·058	1·0	"	"	"	—
19.	1.068	0·95	"	"	present	3·29
20.	1·058	0·95	"	"	"	3·28
21.	1 057	1·0	"	"	"	0·9
22.	1·060	1·0	"	"	absent	—

Specific Gravity.—The specific gravity recorded by the U.S P. of 1·045 to 1·060 at 25° is about equivalent to 1·052 to 1·067 at 15° C. These (1·045 to 1·060) are the limits for 15° C. as given by Gilde-

meister and Hoffmann, but more recently Schimmel & Co. (*Schimmel's Report*, April, 1906, 72) state that it should be 1·45 to 1·70 at 15°; equivalent to 1·38 to 1·63 at 25° C. Oil which is lower in specific gravity than this lower limit is suspicious and may probably contain added alcohol, which is sometimes used as a preservative, particularly in view of the fact that the chemists of Schimmel & Co. have shown (*Schimmel's Report*, April, 1895, 11) that a small quantity of alcohol materially decreases the oxidation to benzoic acid. Specific gravity higher than these limits indicates the presence of excessive quantities of hydrocyanic acid, not however as such, but in the form of benzo-nitrile produced by the interaction of benzaldehyde and hydrocyanic acid. For example, sample number 9, with a specific gravity of 1·075, will be seen by the table to have a very large quantity of hydrocyanic acid present (6·44 per cent.); the high gravity of numbers 12, 19 and 20 is probably due to the presence of considerable benzoic acid.

Alcohol Solubility.—Of the solubility requirements of the U.S.P., the one having most importance is that in 70 per cent. alcohol. This was applied by carefully measuring out exactly 5 c.c. of the oil in a graduated cylinder and adding the 70 per cent. alcohol from a burette with constant shaking until a perfectly clear solution resulted. By this means a very accurate determination of the solubility of the oil may be effected. None of the samples failed to meet this test, while some of them, it will be noted, required slightly less of the alcohol to produce a clear solution. The test is of value and, to get the most out of it, should be applied in some such manner as the above. Schimmel & Co. (*Schimmel's Report*, April, 1906, 72) consider that a pure oil requires one to two parts of 70 per cent. alcohol for solution.

Chlorinated Compounds.—The presence or absence of chlorinated compounds has been shown to be a very excellent criterion of the genuineness of the oil from the fact that natural oil does not contain any compounds which, by the application of either of these tests, show the presence of chlorine, and that benzaldehyde synthetically produced from toluene invariably contains some traces of chlorinated compounds. These chlorinated compounds may be either those produced by the introduction of chlorine direct into the benzene nucleus or compounds having the chlorine in the side-chain. This statement is made in the present tense, though it should in reality

be modified, because it is becoming possible to obtain benzaldehyde produced by chemical synthesis which shows no presence of these intermediate chlorine-bearing compounds. All the substitutions of genuine oil of bitter almonds by benzaldehyde occurring in the oils here recorded have been easily detected by the presence of such chlorinated bodies. It is interesting to note in this connection that there was at one time a controversy between the chemists of Merck & Co., and those of Schimmel & Co., the former claiming to have found traces of chlorine even in genuine oil of bitter almonds. This fact was subsequently proven to be erroneous by Schimmel & Co., and they at that time proved the efficacy of their qualitative test, giving also processes for the quantitative estimation (comparatively at least) of chlorine present both in the substituted compounds and the organic chlorides (*Schimmel's Report*, April, 1891, 3).

Copper Test.—This is the well-known test for the detection of halogens in organic compounds, and its exceeding delicacy makes it very valuable, though it is probably no more delicate than the silver nitrate test; but at least it is not undesirable to have two such excellent tests to check each other, particularly when we consider possible sources of error in silver nitrate tests, to which we will have occasion to refer later. By this test only five of the twenty-two samples were shown to be absolutely free from any trace of chlorine. These are numbers 1, 3, 8, 9 and 10, and hence may be considered genuine oils, the remainder being in whole or in part artificial benzaldehyde.

Silver Nitrate Test.—This test, which is the only one given in the U.S P., 1890, is very reliable, it being both extremely delicate when properly handled and capable of giving some approximate idea of the quantity of organic chlorine-containing bodies present. The only difference between this and the preceding test is that while inorganic and non-volatile chlorides will give no indications by this test, their presence will be demonstrated by the copper test. The U.S.P. test is so worded as to exclude any possibility of error due to the production of silver cyanide instead of silver chloride, and the consequent misinterpretation of the test, but it fails completely to take cognizance of another and very much more important source of error, and one which I do not remember having seen any notice of in this immediate connection, viz.: *the possibility of the filter paper used containing chlorides.*

Mallinckrodt and Stull (*Jour. Am. Chem. Soc.*, 1904, 1029) called attention to some difficulty they had in testing potassium iodide for iodate by reason of the presence of nitrites in the filter paper which they had used, and went on to show that all the samples of filter paper which had been kept in their laboratory showed more or less marked traces of nitrites. Procter (*Jour. Soc. Chem. Ind.*, 1904, 9), in an article regarding water analysis, also calls attention to the ready absorption of ammoniacal and acid vapors from the air of the laboratory and the necessity of washing filter papers prior to their use, which were desired to be free from any traces of these bodies. We have found the same thing to be true in the application of this silver nitrate test.

The Pharmacopœia directs that after burning the oil in the presence of water to absorb the volatile chlorine compound the resulting solution shall be filtered free from carbon and the filtrate tested by the addition of silver nitrate. By the application of this test *exactly as directed there was not a single one of the twenty-two samples that did not show a more or less distinct test for chlorides in the aqueous solution.* The water used was found to be absolutely free from the minutest taste of chlorine, and in looking further for a possible source of error, it was found that not a filter paper in the laboratory but would give at least a slight test for chlorine when extracted with water. The tests on these filter papers included every variety in stock, from the heaviest sheet filter to the various grades of Schleicher & Schüll's quantitative filters. An aqueous extraction of the filters also showed the presence of ammonia by Nessler's reagent, so that this source of error is due to the absorption from the atmosphere of the laboratory of the vapors of ammonia and hydrochloric acid, the resulting ammonium chloride being readily extracted, in part at least, by the passage of even a small quantity of water through the filter. Two methods may be adopted to obviate this source of error: *First*, the filter papers used may be washed carefully with water free from chlorine immediately before use; or, *second*, the test for chlorides may be made without filtering off the carbon produced in process of the test. The second method is preferable, as it renders unnecessary the additional time and trouble to wash the filter, and the finely divided carbon floating on the surface of the liquid does not in any way interfere with the delicacy of the test. Thus the clos-

ing section of the description of this test in the U.S.P. should be so modified in wording as to obviate the fallacy of its present reading.

Hydrocyanic Test, Qualitative.—This well-known test requires no comment, and we may pass it by, merely calling attention to the fact that six of the samples, which were in whole or part evidently artificial benzaldehyde, yet contained hydrocyanic acid, showing that an attempt had been made to duplicate more nearly the genuine oil.

Hydrocyanic Acid Estimation.—The determination of hydrocyanic acid present in oil of bitter almonds may be accomplished with a fair degree of accuracy with the method given in the U.S.P., and although the U.S.P. specifies that magnesium hydroxide free from chlorides shall be used, yet an hydroxide containing chlorides will be equally useful if a blank test be run alongside of the assay. The quantities found range from 0·69 per cent. in number 15 to the very high figure of 6·44 in number 9, which sample is also the one having the highest specific gravity. Numbers 13 and 31 are below the U.S.P. standard, while the remaining four are within the limits of 2 to 4 per cent. Three of these four, however, it will be seen by reference to the chlorinated compound test, were not natural oils.

Benzaldehyde Estimation.—Few practical problems in connection with the whole field of volatile oil analysis have recently attracted more attention than the methods for the estimation of aldehydic or ketonic constituents. The method of estimating such constituents by use of acid or neutral sulphite of sodium received its early and widest application to the estimation of citral in lemon oil, but has since been extended to various other oils, and among the more recent applications of the method is that to oil of bitter almonds. In connection with work upon a large number of oils of this character, Burgess (*Analyst*, 1904, 78) applied the method to benzaldehyde and oil of bitter almonds, and carried out the estimation by measurement of the uncombined oil. More recently, S. S. Sadtler has applied the observations of Tiemann (*Berichte*, 31, 3334), who demonstrated the liberation of alkali by the action of sodium sulphite on an aldehyde, to the determination of various aldehydes and among them benzaldehyde in oil of bitter almonds. In a paper read before the Chemical Section of the Franklin Institute (*Jour. Franklin Institute*, December 1903) he described a method for the quantitative estimation of aldehydes and ketones based upon this reaction and the determination of the alkali formed. Another article of similar

character appeared in the *Journal of the Society of Chemical Industry*, 1904, 303, wherein he mentions an attempt to apply this reaction to the determination of benzaldehyde in oil of bitter almonds, and states that they gave "results varying about one-third of the theoretical." Sadtler's latest contribution on this subject (*Jour. Amer. Chem Soc.*, 1905, 1321) deals with the benzaldehyde determination slightly more *in extenso*. He gives results obtained in the estimation of benzaldehyde in a good quality of the commercial article, which ranged on the same sample from 96·8 per cent. to 99 per cent. No other analytical results are recorded, but we are led to conclude that the method works well, although the operation must be carried out entirely in the cold, the avoidance of heat being absolutely necessary. It is from this work that the U.S.P. method of assay is probably derived.

Judging by the results below, it seems that the introduction of this method of assay into the Pharmacopœia has been a little premature, for I have been unable to obtain results that are reliable, and it further appears that the same conclusions regarding this matter have been reached by the chemists of Schimmel & Co. They say (*Schimmel's Report*, 1905, 30) "we were compelled to reject the use of Sadtler's method for the estimation of citral in lemon oil because an exact titration could not be carried out," and again (*Schimmel's Report*, April–May, 1906, 70, 74 and 122) they reiterate this opinion. This is exactly the difficulty which I have encountered as being the most serious one.

The application of this assay to sample number 1, which was a sample of the genuine oil from Fritzsche Brothers, and which answered all the other U.S.P. tests, gave the following results:

69·19 per cent.	. 68·06 per cent.
70·5 " "	. 69·46 " "
68·93 " "	. 69·34 " "

The average of these results is 69·25 per cent., and the extreme variation among these is 2·54 per cent., which, when we consider the method of assay, is sufficiently close agreement for all practical purposes. In view of the requirement of the U.S.P. that oil of bitter almonds should contain 85 per cent. of benzaldehyde, these results may be looked upon with suspicion as showing *not* a poor quality of oil, but the shortcomings of the process. The quantity of benzoic acid present, as shown by two assays, was 0·95 and 0·98

per cent., which shows that the small amount of benzaldehyde is not caused by an excessive oxidation to benzoic acid. To further try the process, a sample of high-grade commercial benzaldehyde was obtained and assayed. This sample had a specific gravity of 1·053 at 15° C. and in fractional distillation gave the following results:

Pressure, 739 m.m.

	Per Cent.		Per cent.
177° to 178°	4	179° to 179·5°	10
178° " 178·5°,	26	179·5°, " 180°	5
178·5° " 179°,	45	Not distilled.	10

The distillation was from an ordinary distilling flask and over a free flame without any special protection of the upper part of the distilling flask. Three assays of this benzaldehyde gave as results 79·8 per cent, 80·12 per cent., and 80.07 per cent., which determinations are very close indeed. The amount of benzoic acid present in this benzaldehyde was very small, amounting to nothing more than a distinct trace. Here, again, we have results which are 5 per cent. below the U.S.P. standard, showing that the assay process used is certainly at fault in some particular.

The results above given, both on the oil and the benzaldehyde, as obtained by the writer, were duplicated within the limits of their variations by another analyst, so that the trouble is evidently not due to a misreading of the end-point.

Still, a third sample, which was marked "Oil of Bitter Almonds, Artificial," assayed 78·4 per cent.

As we have stated, the chief difficulty with the process is the uncertainty attendant upon the determination of the end-point, and while Sadtler recommends rosolic acid as giving better results, I rather prefer phenolphthalein. Unless extreme care be taken, particularly if one is unacquainted with this process, the end-point will be considered reached before such is actually the case, for the final pink tint of the phenolphthalein is exceedingly faint. For this reason it is absolutely essential that the titration should be carried out in full daylight, a cloudy day even being detrimental to the best results. It is evident that results which are fairly concordant may be obtained, but it seems equally evident that concordance of results is not indicative of accuracy. It is of interest to note here the statements in the first article of Sadtler's dealing in any way with the assay of benzaldehyde by this process, wherein he says that it gave

results varying about one-third of the theoretical, as compared to the implied, though not definitely worded statement in the last article upon the same subject, that the process is accurate. So far as I have been able to find, he has given no explanation of this wide variation from the theoretical and why at the present time the method is to be regarded as satisfactory. Certain it is that these results accord far better with the earlier statement.

Opportunity has been wanting to enter into this process in detail with a view of rendering it more accurate, and so perforce the results here submitted are destructive without being in addition constructive.

From the Laboratories of Parke, Davis & Co.

NOTES ON PROTEID IRON SOLUTIONS.[1]

By William H. Harrison.

LIQUOR FERRI PEPTONATI.

The present National Formulary formula yields a product which is a thick red-brown liquid, with a very disagreeable gluey odor. It is clear in neither reflected nor transmitted light, and of such a colloidal nature as to render filtration impossible even under greatly increased pressure. The taste is at first pleasant, followed by a strongly alkaline and ferruginous after-taste, which persists.

Heated to above 60°, the iron is precipitated as ferric hydroxide, partly free and partly in combination with peptone. Carbon dioxide causes the complete precipitation of the iron in combination with peptone and albumoses. The iron content is ·735 per cent.

In the preparation of the above compound the formula directs that dry peptone be employed. There is nothing to be gained in the use of dry peptone. On the contrary, this is the greatest objection to the present formula.

A. Catillon (*Pharm. Journ.* (3), XI (1881), 759) points out the fact that even in the most carefully prepared dry peptone a strong unpleasant odor persists, while freshly prepared solutions of peptone from egg albumen are almost free from odor. Most of the com-

[1] Read before the Chicago Branch of the American Pharmaceutical Association.

mercial peptone on the market is made from fish, serum and egg albumen of varying quality, either by peptic or pancreatic digestion, while not a small quantity is made by the digestion of meat in the presence of hydrochloric or tartaric acid with superheated steam. The products are as varied as the number of raw materials entering into their preparation.

Peptones from meat are always more or less contaminated with meat bases, gelatin, etc. That from fish albumen always has a fishy odor. The products from either source are prone to rapid putrefaction and yield iron combinations of most offensive odors.

Allen has pointed out that commercial peptones are often adulterated with gum, dextrin, sugars, flour, etc. He cites (Allen, Vol. IV, pp. 290–292) that of five samples analyzed, only one contained over 6 per cent. of real peptone and three contained less than 1 per cent.

According to A. Denaeyer, the so-called peptones, which are produced by the action of superheated steam on meat, contain no true peptone. The preparation of peptone in this manner is the subject of a patent by Etieme and Delhaye (Eng., 1890, No. 10,961).

The three samples of peptone used in the preparation of the samples of liquor ferri peptonati, upon which this criticism is based, may be described thus:

I. "Peptone from egg albumen" contains 30 per cent. insoluble matter, chiefly starch. It is a white powder with a slightly starch odor and forms a faintly yellowish solution with water.

II. "Peptone, meat," a dark brown hygroscopic mass, with a strong odor of meat bases and glue. Almost completely soluble, giving a yellowish-brown solution.

III. "Peptone, pure." A light yellow powder, soluble in water. Odor strong, glue-like.

The three above samples were all that were obtainable on the Chicago market, and fairly represent, I think, the peptones available for the present National Formulary preparation.

A wholesome solution of peptone may be readily obtained by the digestion of fresh egg albumen by pepsin in the presence of hydrochloric acid. The best results (*i. e.*, 70 per cent. albumoses and peptone) are obtained by digesting the egg albumen at 40° C. for six hours, in the presence of ·5 per cent. hydrochloric acid.

A good peptonized iron is readily soluble in a warm dilute solu-

tion of sodium citrate, the resultant solution being perfectly clear, with a rich claret color, odorless and free from ferruginous taste. Further, this solution is not rendered turbid by carbon dioxide or by boiling. These points prove, I think, a dilute solution of sodium citrate a better solvent for peptonized iron than sodium hydroxide, where peptonized iron is to be employed in solution.

Solution of ferric chloride may be advantageously employed in place of the more expensive oxychloride solution in the preparation of peptonized iron. It yields a product which is not only more completely but more quickly soluble in either sodium hydroxide, sodium citrate or hydrochloric acid.

I have been unable to prepare a satisfactory solution of peptonized iron by the use of the oxychloride solution. The solution so made is clear only by strong transmitted light. In view of the above facts, which are supported by exhaustive tests covering some four months, I have constructed the following formula, which yields not only a more beautiful and more palatable product, but one of perfect stability:

Egg albumen, fresh	125 gm.
Hydrochloric acid	15 c.c.
Pepsin	1 gm.
Sol. ferric chloride, U.S.P. 8th	60 "
Ammonium hydroxide	48 c.c.
Sodium citrate	20 gm.
Alcohol	100 c.c.
Aromatic elixir	100 "
Tincture vanilla	100 "
Angelica wine	100 "
Sodium hydroxide	
Water	q. s.

Dissolve the egg albumen in 2,000 c.c. of water, add the hydrochloric acid and the pepsin and digest at 40° C. for six to twelve hours, or until the solution gives no precipitate of albumen on boiling. Filter. Dilute the ammonium hydroxide with an equal volume of water and add the resultant solution to the solution of ferric chloride in small portions, shaking well and waiting after each addition until the precipitate which is formed is redissolved. When all has been added, dilute to 2,000 c.c. Mix the two solutions thoroughly and add sufficient dilute sodium hydroxide solution (25 c.c. official solution to 100 of water) to render the mixture faintly alka-

line to sensitive litmus paper. Transfer to a tall cylinder and allow to stand until the precipitated peptonized iron has subsided (over night); then decant off the supernatant liquid and wash repeatedly by decantation with water until the washings give but a faint opalescence with silver nitrate solution. If the precipitate does not settle readily or settles incompletely, as often happens, after the slight excess of alkali has been washed out, again render the mixture faintly alkaline. A slight excess of the alkali (about 2 c.c. of ·5 per cent. NaOH per liter) effects the rapid and complete settling of the precipitate.

Transfer to a fine muslin strainer and drain. Transfer the magma to a porcelain dish.

Dissolve the sodium citrate in 50 c.c. of boiling water and pour the solution over the magma in the dish. Heat until all is dissolved. Cool and add the alcohol, aromatic elixir, tincture of vanilla, angelica wine and enough water to make 1,000 c.c. Filter if necessary.

The finished preparation is a perfectly clear claret-colored solution, with no odor except that imparted by the flavoring ingredients. Taste sweetish, faintly aromatic, with not a trace of astringency. Samples made four months ago have kept perfectly.

I have selected ·6 per cent. iron as the iron content in place of ·735, as it seems to be the more universally accepted strength of solutions containing proteid iron combinations.

Numerous attempts to modify the above formula have resulted in rendering the product less satisfactory. A good quality of dry egg albumen (15 grammes) may be used without altering the nature of the product to any extent. Solution of oxychloride of iron (164 c.c.) used in place of the solution of ferric chloride and ammonium hydroxide lessens the number of times the precipitated peptonized iron must be washed, but the finished product in this case is quite turbid.

I have cut down the amount of aromatic elixir from 400 c.c. to 100 c.c., because of numerous complaints that the preparation of the National Formulary is too sweet, and to make it more consistent with the liquor ferri peptonati cum mangano. The addition of the tincture of vanilla and angelica wine has rendered the aroma and taste of the finished product all that is to be desired.

LIQUOR FERRI PEPTONATI CUM MANGANO.

When made according to the present formula, with the materials obtainable on the market, the National Formulary preparation may be described thus:

A dark brown sluggish liquid, with a most offensive odor, not unlike a mixture of ammonia and putrefied beef extract. Taste alkaline, saline and nauseating. It deposits after a time a dirty white sediment, which soon covers the bottom of the vessel.

The finished product contains about ·15 per cent. iron, ·145 per cent. or less manganese, and ·234 per cent. ammonium hydroxide, the latter serving the sole purpose of developing more offensive odors.

I have prepared four samples, in each case using different samples of peptonized iron, the finished products being almost identical.

The trouble with this preparation lies principally with the peptonized iron and ammonium hydroxide, although there is room for improvement elsewhere.

Of six samples of peptonized iron examined, the products of the principal manufacturers of pharmaceutical chemicals, all showed that putrefaction was in progress. Of seven examined for iron content, only one showed over 5 per cent. Fe_2O_3 (3·5 per cent. Fe), and this one sample has not yet been on the market under the name of peptonized iron or iron peptonate.

At the time this work was started, but two samples of iron peptonate and none of soluble manganese citrate were obtainable on the Chicago market.

After some time I succeeded in collecting some direct from the manufacturers, seven samples of peptonized iron and two of soluble manganese citrate.

These two samples of soluble manganese citrate, although bearing the same title, are entirely different substances.

(1) A light red-brown powder with a strong odor of acetamide and ammonia. It is a manganese-ammonium citrate containing about 18 per cent. manganese. Incompletely soluble in water, but solution is rendered clear by standing for some time with a slight excess of ammonia.

(2) Pearl-colored scales (evidently made after the formula of F. B. Power, Proceedings A.Ph.A., 1902, 937). Contains 13·5 per

cent. manganese. It is a manganese sodium citrate, freely water-soluble.

There are at least two additional soluble manganese citrates, but no sample of these was found on the market. (I have myself prepared the four scale salts and will make these the subject of a future paper.)

Which of the scale salts of the market is to be used? One gives the finished product a manganese content of about ·145 per cent., the other about ·108 per cent. The latter yields a product of about the same manganese content as the solution approved by the Committee on Pharmacy and Chemistry of the A.M.A.; but in Proceedings A.Ph.A., **51**, 400, we are told that the former was intended. But why use these scale salts of variable composition at all? The normal manganese citrate is a definite chemical compound containing 23 per cent. Mn. It is freely soluble in ammonium hydroxide or sodium citrate solution. It costs about one-half as much (per gramme manganese) as the double salts.

In view of the above facts, it seems that a satisfactory preparation according to the present N. F. formula is impossible, although with a good sample of peptonized iron it could yield a passable one. A sample of peptonized iron which promises to keep well (containing about 15 per cent. Fe) has been prepared by the writer, but the formula is withheld until it can be proven to keep satisfactorily.

A liquor ferri peptonati cum mangano may be prepared, however, by slightly modifying the formula of liquor ferri peptonati. All that is necessary is to increase the amount of sodium citrate to 25 grammes, and dissolve in the solution of this salt in water 4·4 grammes normal manganese citrate before adding it to the peptonized iron.

The finished product leaves little further to be desired and is identical with liquor ferri peptonati, except that it contains in addition ·1 per cent. manganese.

Attempts to supply the manganese by means of manganese chloride resulted in the product having an objectionable salty taste.

The iron and manganese cannot be precipitated together as peptonized compounds, because in the presence of ammonium chloride the peptonized iron requires too large an excess of alkali for complete precipitation, while in the absence of the ammonium salt (*i. e.*, from iron oxychloride solution) the peptonized iron precipitates in

such a way as to form turbid solutions with sodium citrate solution or alkali.

It will be seen that the same "base" forms the body of both preparations. This has a decided advantage in that further combinations are possible.

If the formula for L. F. P. be completed to the point where the peptonized iron is dissolved in the solution of sodium citrate and alcohol added, it will have a volume less than 400 c.c. It may be diluted to this volume and filtered. It will now keep indefinitely, and may be designated "liquor ferri peptonati base."

To prepare liquor ferri peptonati, N. F.:

Base	400 c.c.
Aromatic elixir	100 "
Tincture vanilla	8 "
Angelica wine	100 "
Water, q. s. to make	1000 "

Liquor ferri peptonati cum mangano:

Base	400 c.c.
Manganese citrate, normal	4·4 grammes.
Sodium citrate	5 "
Aromatic elixir	100 c.c.
Tincture vanilla	8 "
Angelica wine	100 "

Dissolve the sodium citrate in 10 c.c. of water and add to this the manganese citrate. When all is dissolved, add the solution to the base and then add the other ingredients.

Liquor ferri peptonati cum mangano et arseno.

Base	400 c.c.
Manganese citrate	4·4 grammes.
Sodium citrate	5 "
Arsenous oxide	·325 "
Potassium bicarbonate	·7 "
Aromatic elixir	100 c.c.
Tincture vanilla	8 "
Angelica wine	100 "

Dissolve and add the manganese citrate as in liquor ferri peptonati cum mangano. Dissolve the potassium bicarbonate in 10 c.c. water and heat with the arsenous oxide until all is dissolved. Add to the mixture already prepared. Then add the flavoring ingredients and sufficient water to make 1,000 c.c. The finished solution contains:

Fe ·6 per cent., Mn ·1 per cent., and As_2O_3 ·0013 gramme (1-50 gr.) per 4 c.c.

Liquor ferri peptonati cum mangano, arseno et strychnina.

Base . . . . . 400 c.c.

Solution of 4·4 grammes manganese citrate as above, solution of 0·325 As_2O_3 as above, then add a solution of ·162 gramme strychnine sulphate in 5 c.c. of water. Next add the flavoring ingredients and water sufficient to make 1,000 c.c.

This solution contains: Fe ·6 per cent. Mn ·1 per cent., and each 4 c.c. ·0013 gramme (1-50 gr.) As_2O_3, and ·00065 gramme (1-100 gr.), strychnine sulphate.

All these formulas have been prepared and thoroughly tried and found to meet the demands for these preparations.

It may be well to add that the above solution of peptonized iron has a wonderful power in the masking of the taste of alkaloids.

LIQUOR FERRI ALBUMINATI.

The National Formulary product is a brownish-yellow liquid, clear in neither transmitted nor reflected light. Taste aromatic, sweet, then slightly astringent. The solution cannot be filtered, and a more or less gelatinous precipitate soon appears. The National Formulary states that each 4 c.c. contains about ·026 gramme Fe, (corresponding to ·65 per cent. Fe), yet the 130 c.c. of oxychloride solution can only furnish an iron content of ·47775 per cent. The solution cannot be considered acceptable.

The formula calls for dried egg albumen, good qualities of which are not easily obtainable, at least on the drug market, although dealers in bakers' supplies have some excellent samples. The commercial article is largely adulterated. Of four samples examined, but one was fit for use in the N. F. formula.

With good dried egg albumen hard to procure, it seems preferable to use fresh egg albumen so readily obtainable. It represents about 12 per cent. dried albumen.

Solution of ferric chloride yields a completely soluble albuminated iron, and should be used in place of the solution of oxychloride of iron which yields an incompletely soluble albuminate.

A reconstructed formula based on these points yields a product which has a beautiful claret-red color, and is an acceptable preparation.

Egg albumen	400 grammes.
Solution of ferric chloride, U.S.P. 8th	15 "
Ammonium hydroxide	12 c.c.
Alcohol	120 "
Aromatic elixir	400 "
Solution of sodium hydroxide	
Water, of each sufficient quantity.	

Dilute the ammonium hydroxide with an equal volume of water and add the resultant solution to the solution of ferric chloride in small portions at a time, shaking vigorously and waiting after each addition until the precipitate formed is redissolved. When all has been added, dilute with 1,000 c.c. of water and heat to 50° C.

Shake the egg albumen with a few pieces of broken glass and 1,000 c.c. of water, strain, filter and heat to 50° C. Filter into the diluted iron solution, under constant stirring. When all has been added, add cautiously a dilute solution of sodium hydroxide (2 vol. 5 per cent. to 8 vol. water) until the mixture is perfectly neutral to sensitive litmus paper (about 200 c.c. of the dilute alkali being required; *an excess must be avoided lest the precipitate be redissolved*), whereupon the precipitate readily settles, leaving a clear, colorless supernatant liquid. Now add 2,000 c.c. of distilled water at 50° C., transfer to a tall jar and allow the precipitate to settle. Wash by decantation with water at 50° C. until the washings give no test for chlorides. (This may be told by boiling about 2 c.c. of the supernatant liquid, filtering and testing for Cl on the filtrate by means of HNO_3 and $AgNO_3$.) If during the washing the precipitate does not settle readily, it shows the presence of a little acid in the water (even the carbon dioxide usually present in distilled water causes the precipitate to settle slowly); this should be neutralized with dilute alkali, about 1 c.c. of 1 per cent. NaOH per liter being sufficient.

The precipitate is then drained and the excess of water pressed out. Transfer the magma to a porcelain dish and dissolve in a mixture of 12 c.c. solution of sodium hydroxide and 25 c.c. of water. When solution is complete, add the alcohol, aromatic elixir and enough water to make 1,000 c.c. Filter. The finished product is perfectly clear in transmitted light and very faintly turbid by reflected light. Its iron content is about ·6 per cent.

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THE QUANTITATIVE ESTIMATION OF BENZOIC ACID IN CATSUP.

By Charles H. LaWall and Henry A. Bradshaw.

The quantitative estimation of benzoic acid in catsup has hitherto been attended with some difficulty on account of the fact that there is usually a great tendency to emulsification, which can be counteracted only by extreme dilution of the catsup; also, the benzoic acid, being obtained by the shaking-out process, requires to be purified by sublimation. The following process has proved to be almost free from these defects, and work upon known samples has given repeatedly concordant results, agreeing within one or two-hundredths of 1 per cent. It is as follows:

Catsup, 20 grammes; sodium chloride, 2 grammes; hydrochloric acid, 5 c.c.; saturated solution of sodium chloride, 25 c.c. Shake the mixture thoroughly for about five minutes, transfer to a moistened filter and collect the filtrate in a receiving vessel graduated to 100 c.c. Wash the residue upon the filter with a saturated solution of sodium chloride until 100 c.c. of filtrate have been obtained. Transfer the filtrate to a separatory funnel and shake out with three portions of chloroform, using 25 c.c., 15 c.c. and 10 c.c., respectively. Evaporate the chloroform at room temperature. If the residue is perfectly white and crystalline, as is usually the case, dry to constant weight over sulphuric acid in a desiccator. If the residue is slightly yellowish and oily, which rarely occurs, dissolve it in about 10 or 15 c.c. of weak ammonia water, filter into a separatory funnel, washing the filter and funnel with water. Acidulate with dilute sulphuric acid, and again shake out with chloroform. The white, crystalline residue of benzoic acid, as obtained by drying in a desiccator, may be weighed, preparatory to checking up by titration.

After obtaining the weight, from 3 to 5 c.c. of alcohol are added to dissolve the residue in the capsule from which the chloroformic solution has been evaporated, a few drops of phenolphthalein solution are added, and the solution is titrated with twentieth normal potassium hydroxide solution, and the results calculated to benzoic acid. The titration should agree with the gravimetric estimation very closely, the difference rarely being more than 1 or 2 milligrammes. The solution resulting from the titration, which is very

slightly alkaline, is then divided into two portions, to one of which is added a solution of manganous sulphate, for the purpose of ascertaining the presence or absence of cinnamic acid, Prof. W. L. Scoville having recently called attention to the fact that benzoic acid does not produce a precipitate with manganous sulphate, while cinnamic acid does. To the other portion is added solution of ferric chloride for the purpose of confirming the presence of benzoic acid. The amount of benzoic acid, as determined by the foregoing process, may be calculated as sodium benzoate, as it is in this form when added to the catsup, and in terms of which it is stated on the label.

This process is applicable, of course, only where benzoic acid is the sole preservative used, as salicylic acid and saccharin are both extracted by this method, and unless their absence was assured, would be estimated as benzoic acid.

The principle upon which the above process is based is that outlined by Prof. F. X. Moerk in the "Proceedings of the Pennsylvania Pharmaceutical Association" for 1905, page 181, in an article on the detection and estimation of benzoic acid and salicylic acid in milk, in which he advocates the use of sodium chloride and hydrochloric acid in assisting in the extraction of these preservatives in the pure state and preventing emulsification during the process.

SUGGESTIONS FROM THE BRITISH PHARMACEUTICAL CODEX.

By M. I. Wilbert,

Apothecary at the German Hospital, Philadelphia, Pa.

No English-speaking pharmacist who is at all interested in the science of his calling can afford to ignore the British Pharmaceutical Codex, or even attempt to conduct an up-to-date pharmacy without a copy of this really valuable compendium.

Even a cursory inspection of this book must suggest that it promises to be an active factor in encouraging rational prescribing on the part of medical practitioners, and it will surely prove to be a powerful incentive to the development of an active interest in the science of pharmacy on the part of the votaries of that calling.

While the monographs and the descriptions of drugs and chemi-

cals are of unusual interest and contain much that is novel and valuable, the formulæ for galenical preparations that are contained in this book are even more interesting to American pharmacists, as many of them will be found to be particularly useful, or at least suggestive, in connection with the present-day propaganda for the use of official or open formula remedies in place of the semi-secret proprietaries and out-and-out nostrums that appear to be so popular at the present time.

In this connection it will perhaps not be necessary to reiterate the oft-made statement that the dispensing pharmacist, if he desires to give generally satisfactory service, must enlarge on his possibilities and resources so as to be in position to compete with the manufacturer in the preparation of all of the available dosage forms of medicine. To do this it will be necessary to be ever on the look-out for suggestions that will lead to the development of new forms for the administration of active medicaments, to improve on the well-known present-day forms and to be able to demonstrate that in all particulars the product of the dispensing pharmacist is at least the equal and, in some respects is decidedly superior to the best that the manufacturer may have to offer.

Few, if any, books on pharmacy that have come to my attention offer a greater number of suggestions along these very lines than the British Pharmaceutical Codex, and for this reason alone, if for no other, the book would be a valuable addition to the dispensing room of any well-organized pharmacy.

One of the more interesting features, and one that is comparatively novel on this side of the water, as the Englishman would say, is the use of chocolate as a vehicle. We have, it is true, made use of chocolate, or the color of this substance, in the form of variable mixtures of oxide of iron, starch and sugar, to some extent as a coating for pills, but as yet the paste itself has not been widely exploited as a vehicle in the production of extemporaneous preparations at the prescription counter.

Theobroma Paste.—In the British Pharmaceutical Codex this substance is directed to be used in the preparation of a class of preparations designated as Tabellæ. The directions for the making of this particular class of preparations are simple and readily followed, and it will be quite practicable to dispense these extemporaneously.

Theobroma paste is recommended as a vehicle for such sub-

stances as menthol, pepsin, santonin, the insoluble salts of bismuth and a number of the alkaloids.

Phenolphthalein Lozenges.—Trochisci phenolphthaleini, B.P C., are also directed to be made with chocolate paste and represent approximately 2 grains each of phenolphthalein.

Lozenge Base.—The article on lozenges is a comprehensive one and should be worth many times the price of the book to any up-to-date pharmacist. Cut lozenges constitute a class of preparations that is much neglected and deserves to be brought to the attention of physicians. The Codex contains modified formulas for the official British bases, the more useful of which are:

LOZENGES WITH FRUIT BASIS.

Refined sugar	88
Gum acacia, in powder	4
Mucilage of acacia	7
Black currant paste	11
Distilled water, a sufficient quantity.	
Mix and divide into 100 lozenges.	

LOZENGES WITH TOLU BASIS.

Refined sugar	96
Tincture of tolu	2 c.c.
Gum acacia, in powder	4
Mucilage of acacia	7
Distilled water, a sufficient quantity.	
Mix and divide into 100 lozenges.	

Compressed Tablets.—The directions for making compressed tablets are particularly well adapted to the production of these articles on a small scale. The vehicles used for granulating the several substances are those suggested by White and Robinson in a paper read at the meeting of the British Pharmaceutical Conference some five years ago.

While these substances are undoubtedly useful for many of the possible combinations of drugs, and have the added advantage that the granulations are readily dried by exposure at ordinary temperatures, they should not be relied on too implicitly, particularly for tablets that are to retain a purely white color.

For extracts and mixtures containing extracts, the more preferable is:

ETHEREAL SOLUTION OF THEOBROMA.

Oil of theobroma	16·5
Ether, sufficient to produce 100.	

THEOBROMA EMULSION.

Oil of theobroma	25·00
Hard soap	3·00
Tragacanth, in powder	0·50
Benzoic acid	0·25
Distilled water, to produce	100.

Dissolve the soap in 25 of the water by the aid of heat, add the hot solution to the oil of theobroma, previously melted, and mix by agitation, then shake in the tragacanth, add the benzoic acid and make up to 100 with distilled water.

Where the presence of soap is considered undesirable, 15 of gum acacia may be substituted for the soap.

Pastilles.—These are directed to be made with a basis of glycogelatin, with which, when melted on a water-bath, the active medicinal agent is incorporated, either in solution or suspension. The melted mixture is then directed to be poured into moulds or into a suitable tray, allowed to solidify, and then cut into the required number of pastilles.

Glycogelatin.—The formula for glycogelatin, B.P.C., the basis for pastilles, is as follows :

Gelatin	12·00
Glycerin	40·00
Distilled water	20·00
Orange-flower water	20·00
Sugar	5·00
Citric acid	2·00
Oil of lemon	0·10
Solution of caramel, a sufficient quantity.	

Concentrated Waters.—Aquæ concentrata, B.P.C. The directions of the British Pharmacopœia for medicated waters involve the distillation of the product from the crude drugs. Concentrated waters have evidently been included in the Codex to provide for a ready method of extemporaneous preparation. They are described as being solutions of volatile oils in alcohol, or mixtures of alcohol and water, and are designed for the extemporaneous production of medicated waters. Ten formulas are included, and these are so designed that one part of the product is the equivalent of about 40 parts of the official medicated water. The resulting medicated waters are directed to be clarified by the intervention of calcium phosphate. Apart from being a matter of interest, this particular

class of preparations has little or nothing to commend it. The addition of alcohol to a volatile oil in the making of medicated waters is of doubtful utility, and the use of calcium phosphate as an absorbent powder is open to the objection that this substance, in addition to being subject to contaminations, is itself slightly soluble in water.

A more valuable addition, and one that pharmacists and others in this country would, no doubt, desire to have an authoritative standard for, is:

NORMAL SALINE SOLUTION, SOLUTION SALINA, B.P.C.

Sodium chloride	0.95
Water, sufficient to produce	100.

Boil the water, cool and dissolve the salt.

There are a number of miscellaneous preparations that are of interest at the present time, in connection with our efforts to popularize open-formula preparations. An alkaline antiseptic preparation somewhat similar in character to the alkaline antiseptic of the National Formulary is:

COMPOUND GLYCERIN OF THYMOL, GLYCERINUM THYMOL COMPOSITUM, B.P.C.

Sodium bicarbonate	1.00
" biborate	2.00
" benzoate	0.75
" salicylate	0.50
Menthol	0.03
Thymol	0.05
Oil of pine	0.05
Eucalyptol	0.13
Oil of wintergreen	0.03
Glycerin	10.00
Alcohol	2.50
Solution of carmine	0.50
Distilled water, sufficient to produce	100.

Dissolve the sodium salts in the water, add the glycerin and solution of carmine; then add the menthol, thymol and oils previously dissolved in the alcohol.

This preparation will be found to be generally more acceptable than the corresponding preparation of the National Formulary. This suggests the suspicion that somewhere in the transcribing of the formula for the liquor antisepticus alkalinus, N.F., the quantities for the sodium benzoate and the sodium biborate have become trans-

posed. A reversal of these quantities produces a surprising change in the character of the preparation and eliminates the objectionable sweet taste to which many object.

SYRUP OF FIGS, SYRUPUS FICORUM, B.P.C.

Figs, cut small	40·00
Refined sugar	50·00
Distilled water, sufficient to make	100·00.

The figs are digested with boiling water and the resulting strained liquor evaporated to produce the required volume of syrup on the addition of the sugar. The resulting syrup is rather viscid and promises to be an excellent vehicle for acrid or bitter substances.

An excellent illustration of its varied uses is:

COMPOUND SYRUP OF FIGS, SYRUPUS FICORUM COMPOSITUM, B.P.C.

Compound tincture of rhubarb	5·00
Fluidextract of senna	10·00
Spirit of cinnamon	1·25
" " nutmeg (10%)	1·25
Fluidextract of cascara sagrada, aromatic	5·00
Syrup of figs, sufficient to make	100·00.

The ingredients here have been altered to comply with the U.S.P., as the fluidextract official in the British Pharmacopœia is directed to be made from senna pods.

A type of the viscid expectorants is:

LINCTUS OF ACETOMORPHINE, LINCTUS ACETOMORPHINÆ, B.P.C.

Acetomorphine hydrochloride	0·10
Tincture of hyoscyamus	7·50
Spirit of chloroform	7·50
Syrup of tolu	15·00
" " wild cherry	15·00
Glycerin, sufficient to produce	100·00.

A tooth powder that promises to find favor is:

MAGNESIUM PEROXIDE WITH CHALK, MAGNESII PEROXIDUM CUM CRETA, B.P.C.

Magnesium peroxide	10·00
Hard soap, in powder	2·50
Menthol	0·10
Oil of rose	0·25
" " wintergreen	0·50
Precipitated chalk, heavy, sufficient to make	100·00.

Triturate the menthol and oils with a portion of the precipitated

chalk, add the soap and the magnesium peroxide and sufficient precipitated chalk to take up the required weight.

Three external remedies that will probably prove useful are:

COMPOUND METHYL SALICYLATE OINTMENT, UNGUENTUM METHYLIS SALICYLATIS COMPOSITUM, B.P.C.

Methyl salicylate	12·50
Menthol	2·50
Oil of eucalyptus	2·50
Essential oil of camphor	2·50
Hydrous wool-fat	25·00

Paraffin ointment, sufficient to produce 100·00.

Mix.

COMPOUND LINIMENT OF BIRCH, LINIMENTUM BETULÆ COMPOSITUM, B.P.C.

Menthol	5·00
Oil of eucalyptus	10·00

Methyl salicylate, sufficient to produce 100·00.

Dissolve the menthol in the liquids.

LUBRICANT PASTE, PASTA LUBRICANS, B.P.C.

Carbolic acid	3·00
Glycerin	10 00
Tragacanth	2·50

Distilled water, sufficient to produce 100·00.

Dissolve the carbolic acid in 80 of the water, then mix the glycerin with the tragacanth, add the aqueous solution gradually, with constant stirring, and make up the required volume by the addition o distilled water.

A preparation of castor oil that will serve as the basis at least for similar peparations is:

AROMATIC CASTOR OIL, OLEUM RICINI AROMATICUS, B.P.C.

Amyl acetate	0·10
Saccharin	0·30
Alcohol	5.00

Castor oil, sufficient to produce 100·00.

Dissolve the amyl acetate and the saccharin in the alcohol, then add the castor oil.

The quantity of saccharin in this preparation can readily be reduced and the flavoring can, of course, be changed to suit. Given with milk or from a wetted spoon, the preparation is quite acceptable.

HELEN ABBOTT MICHAEL: AN APPRECIATION.

By Edward Kremers.

Helen Cecilia De Silver Abbott, youngest child of James Abbott and Caroline Montelius, was born in Philadelphia, December 23, 1857. After a careful home education under governesses and private teachers, who, without exception, were delighted with her affectionate and studious disposition and her extraordinary quickness of mind, she was inclined to make a specialty of music, a genius for which she early manifested.

She went abroad in 1878, spending the winter in Paris. In May, 1879, she returned to America, but the season 1880–81 again finds her in Paris engaged in the study of chamber music. Returning once more to Philadelphia, she took up the study of musical composition.

A copy of Helmholtz's work on optics, purchased in one of the second-hand book stalls on the quays along the Seine, caused her to seek instruction in physics. From optics her "interest ran to zoölogy and to the dissecting of animals." Next she enters "the Woman's Medical College as the open sesame to the undiscovered lands." She "passed the first year's examinations in chemistry, anatomy and physiology with a record of one hundred in each branch." During the second year of her medical studies "she met with a serious accident that interfered with her work, yet she passed the examinations with the same record as in the previous year."

During the previous year she had published a short paper entitled, "Some Observations on the Nutritive Value of Condiments," published in *The Polyclinic*, in which she records the ash content and the percentage of P_2O_5 in twenty different condiments. As a result of her work in Professor Trimble's laboratory in 1884, she read her first scientific paper on "Preliminary Analysis of the Bark of Fouquieria Splendens," before the A. A. A. S., which met in Philadelphia in the month of September of that year. It is essentially a report of a so-called proximate analysis with selective solvents.

Sickness prevented her from continuing her studies until February, 1885, when she began the "Chemical Study of Yucca Angustifolia" in Professor Trimble's laboratory, the paper on this subject being read at the Ann Arbor meeting of the A. A. A. S. in August of that year. It is a much more extensive report, but along similar lines to the one of the previous year.

Having dropped her medical studies, she spent some time in 1885 and 1886 in the study of mathematics and the modern languages, looking toward admission to the junior class of the University of Pennsylvania, with the ultimate hope of attaining a Ph.D. degree.

However, her enthusiasm for plant chemistry did not abate; but with the exception of two papers, her contributions were rather of the character of essays or lectures than of reports of research. These two exceptions are the one "On Hæmatoxylin in the Bark of Saraca Indica," and "On the Occurrence of Solid Hydrocarbons in Plants," both of which are the result of work under the guidance of Professor Trimble in the Philadelphia College of Pharmacy.

Of her lectures she herself records the following in her diary: "That season I gave two lectures before the Franklin Institute, and I lectured at the Academy of Natural Sciences, and at the Philadelphia College of Pharmacy to large audiences. In the Spring of '87, I gave, at Washington, one of the Saturday lectures under the auspices of the Philosophical and Anthropological and Biological Societies, in the United States National Museum. The subject chosen was the chemistry of the higher and lower plants, and owing to the courtesy of Dr. Wiley, the government greenhouses were placed at my disposal, and a living exhibition of plants, from the highest to the lowest, illustrated my lecture. Most of the Washington science coterie were present, and after the lecture we met at an informal reception."

The subjects of her lectures are: (1) "Certain Chemical Constituents of Plants Considered in Relation to their Morphology;" (2) "Plant Analysis as an Applied Science;" (3) "Plant Chemistry, as Illustrated in the Production of Sugar from Sorghum;" (4) "The Chemical Basis of Plant Forms;" (5) "Comparative Chemistry of Higher and Lower Plants."

The summer of 1887 finds her again on the ocean, in search this time of a laboratory in which to pursue her phytochemical studies. "The magic of her name," says her biographer, "was an open sesame to all doors. Her researches made her known to the learned world of England and the Continent."

The notes taken down, as she went from place to place, and later copied into a book, are possibly the most interesting part of the volume,[1] since she was not content to see the laboratories and their

[1] Studies in Plant and Organic Chemistry, and Literary Papers.

equipment, but called at the professors' homes as well. Since it is but seldom that we are favored with a description of the laboratories and studies of the great men in chemistry as seen through a feminine eye, the following two paragraphs, descriptive of Hofmann's laboratory and study, may be quoted as an illustration of the kind of notes which Miss Abbott took down:

"The laboratory looked like a place, a home, which had not the personal supervision of a head. I see where my weak points are, and what is necessary for me to do to fortify myself by study. The beginners are made to work on some inorganic compound first for qualitative study; then they are hurried to organic chemistry. It is the worship of the benzole ring. The assistant told me that it was all he cared for. Tiemann, the one who has synthetically made vanillin, was absent.

"Hofmann's study in his house is quite a large room, containing family portraits. Over his desk is a marble female bust. The furniture is black and gold, sofas and chairs covered with green. The carpet looks like chinchilla, a velvet one. The chemical lecture-room of the university (Hofmann's) is where the Chemical Society usually meets. I was present on the opening night, October 10th."

After her visit to the scientific centers of England, Norway, Sweden, Denmark, Germany, Switzerland and France, she returns via England to the United States and begins studying under the direction of Professor Arthur Michael, of Tufts College. She was married to him in June, 1888, and in the summer of the same year Professor and Mrs. Michael started on a trip around the world, which lasted about a year and a half.

On their return to America, Professor Michael accepted the position of Director of the Chemical Laboratory of the newly established Clark University at Worcester. He resigned shortly afterwards, and the following year (1891) he and Mrs. Michael took up their residence at Bonchurch, Isle of Wight, England, where they equipped a private laboratory and continued their research work. After a residence of four years, they returned to Boston, Professor Michael resuming his connection with Tufts College.

During this period there appeared, in 1892, "Ueber eine neue Bildungsweise von aromatischen Nitrilen" and "Zur Kenntniss der Mandelsäure und ihres Nitrils," joint reports with John Jeanprêtre in the *Berichte;* "Zur Kenntniss der Addition von Brom und Chlor

zu fester Crotonsäure," which appeared in Volume 46, page 273, of the *J. f. pr. Ch.*, and 1894, "Zur Constitution des Phloretins," again in the *Berichte* of the German Chemical Society, of which she was a member. The change in subjects from those of the years 1886–87 speaks for itself.

Having returned to America, as mentioned above, she delivered her last public address on a scientific subject in her home city before the Franklin Institute, March 8, 1895, namely: "A Review of Recent Synthetic Work in the Class of Carbohydrates."

In 1896 she went abroad again. Although she had "resumed her chemical researches at the Tufts College Laboratory, . . . her interests were becoming enlisted in wider fields." Instead of writing about chemical professors, their laboratories and their studies, she now writes about the Austrian peasant and kindred topics.

Yet in the Fall of 1900 she enters the Medical School of Tufts College and wins her doctor's degree in June, 1903.

Associated with another woman physician, she spent most of her spare time caring for poor patients, who flocked to her private house, transformed into a free hospital. Stricken by the grippe, and after a trying illness, she passed away in Boston on the 29 h of November, 1904.

As a fitting close to this rather objective review, the words spoken at her funeral by a friend of her family may herewith be quoted: "We cannot help recalling the universality of her personality and its many-formed expression, of her wide sympathies and appreciations. We must realize that as, after all, humanity is the essence of religion, she was deeply religious. We must mention the many polished facets of her jewel-like mind, and how she won distinction in music, languages, expression, both prose and poetic, in scientific research, and finally, even in the few months of her active practice, in medicine. We are certain that medicine, being both subjective and objective, and bringing her into ever closer touch with humanity and its needs, spiritual and physical, was her final and most fitting expression."

BOOK REVIEWS.

THE BRITISH PHARMACEUTICAL CODEX.—An Imperial Dispensatory for the Use of Medical Practitioners and Pharmacists. By Authority of the Council of the Pharmaceutical Society of Great Britain. Published by the Pharmaceutical Society at 72 Great Russell Street, London, W. C., 1907. Price, 12*s.* 6*d.* net (abroad, 13*s.* 6*d.*), delivered.

This ponderous tome of more than 1400 pages comes as an opportune and highly interesting contribution to the almost worldwide efforts that are being made to rehabilitate the profession of pharmacy in a field from which its votaries have been all but driven out by the manufacturers of nostrums and proprietary remedies.

In England itself this book appears to have been received with marked evidences of approval on the one hand, and vigorous, and, one might almost add, venomous, criticism on the other. The marked differences of opinion that have characterized the reception of this book may be taken as evidence that it has aroused a healthy interest in things pharmaceutical at home, and for this reason, if for no other, it is well worth the attention and study of pharmacists in all parts of the world.

In a preliminary review of this kind it will, of course, be practically impossible to call attention to all of the various features of the Codex that merit recognition, and we must content ourselves with a more general inquiry into the object, the contents and the uses of the volume before us.

From what has already been said, it will appear that the British Pharmaceutical Codex is in reality more than a mere recipe book, and that it actually essays to be, as its subtitle indicates, "An Imperial Dispensatory for the Use of Medical Practitioners and Pharmacists." That this claim of the publishers is well founded is evidenced by the fact that the book contains upwards of 2,500 monographs and formulæ in addition to a number of tables that add materially to its usefulness as a pharmaceutical handbook and guide.

The practical value of the volume is further augmented by an exhaustive index, contained in 104 double-column pages, that represents upwards of 12,000 references.

In the preface the existence of the Codex is explained as being the result of an apparent need for a reliable work of reference, on the available or recognized materia medica, published by the

authority of some statutory body, and the book is the direct outcome of a resolution adopted by the Council of the Pharmaceutical Society on November 4, 1903.

The production of the Codex was entrusted to a committee consisting of Messrs. Michael Carteighe, C. B. Allen, S. R. Atkins, J. F. Harrington, G. T. W. Newsholme, R. A. Robinson, and J. Rymer Young. This committee subsequently deputed the labor of compiling the information to a sub-committee consisting of Dr. W. E. Dixon, Prof. H. G. Greenish, and Messrs. Edmund White, W. F. Gulliver, F. W. Gambel, and John Humphrey, the latter acting as secretary.

That this committee has devoted much arduous labor to the solution of the problems that presented themselves will be admitted by all who are sufficiently interested in pharmacy to become more fully acquainted with the book itself. To the credit of the Pharmaceutical Society it should be said that much of the work was done in the research laboratory of that Society, though much of it was voluntarily undertaken by individual members of the Society and others interested in the development of the book.

The direct object of the Codex is to give English pharmacists and physicians information regarding all medicines and medicinal preparations that are at all popular throughout the wide extent of the British Empire. In addition to embodying the whole of the British Pharmacopœia the book also includes much information concerning articles that are official in France, Germany and the United States, and it also contains many formulas for preparations having a more or less local repute.

The monographs and formulæ are arranged alphabetically and the style of the descriptive material is similar to that followed in modern pharmacopœias.

The descriptions of crude drugs, for instance, include references to name, species, source, collection, production and preparation of the drug followed by a clear, though somewhat popular, description that not infrequently includes anatomical and chemical information. The microscopic structure of important drugs is usually described at some length, and in many cases attention is specifically directed to the kinds of cells and cell contents that are not found in the drug, and are, therefore, indicative of adulteration or sophistication.

The monographs of chemical substances are also quite compre-

hensive, and, for the physician particularly, quite practical, as they contain numerous and varied suggestions for prescribing and dispensing the several articles.

One rather interesting feature, and one that has resulted in considerable controversy and criticism, is the attempt that has been made to give brief but descriptive titles to substances of definite composition which are exploited under a variety of trade names. In addition to giving the true chemical name, as a synonym, reference is usually made to the trade-protected titles in foot-notes to the respective monographs. Thus, under Formamina or Formamine we have, as synonyms, Hexamethylenamina and Hexamethylenetetramine, and, in a foot-note, the statement: "Formamine is also known under the following trade names: Aminoform, Ammonio-formaldehyde, Ammonaldehyde, Cystamine, Cystogen, Formin, Metramine, Urisol, Uritone, Urotropine and Vesalvine.

While this is one of the more familiar examples of the unnecessary duplication of names for the same article, we must remember that, owing to the more conservative nature of the British patent laws, pharmacists in Great Britain are much more harrassed by the multiplicity of trade names for well-known articles than we, in the United States.

Whether or not the Codex Committee will be successful in establishing and maintaining the position that they have taken in this connection remains to be seen. The innovation certainly offers a means for fighting quackery and allied practices by supplying accurate information respecting drugs and medicines in common use, and, by removing the veil of secrecy, demonstrating that fancy names are all too frequently the means of extorting exorbitant prices for comparatively simple substances.

Formulæ for galenical preparations are unusually numerous and comprise fully two-thirds of the total number of articles included in the book. With few exceptions, the preparations are directed to be made to parts by weight or volume, leaving the choice of the system of weights and measures used to the pharmacist, though the Committee distinctly recommends the use of metric weights and measures as being more in keeping with the object of the book and the scientific needs of the profession.

The number and the nature of the formulæ contained in the book also serve to illustrate the characteristic differences that exist between American and British pharmacy.

The class titles of many of the preparations sound quite strange to an American pharmacist; as they not infrequently indicate the therapeutic uses, or the method of administering the several preparations. We find it rather unusual to see formulæ for baths, enemas, lotions, spray solutions, injections and snuffs in a book that partakes of the nature of a pharmacopœia, and comparatively few American pharmacists would be able to give an adequate description of the general composition, nature, or the uses of a "Linctus." Another characteristically British feature is to be seen in the comparatively large number of formulæ for such preparations as confections, decoctions, and infusions. Still another illustration of British conservatism is to be found in the monograph on capsules, which embodies detailed and really valuable directions for making the well-known elastic capsules and incidentally asserts that: "A capsule of American origin, sometimes used, is cylindrical or cup-shaped, and closed by a lid of the same material, which fits tightly over the end of the capsule; it is not suitable for liquids."

The very varied uses to which these empty capsules are adapted, in the hands of the American pharmacist, evidence the fact that our English cousins are not as yet familiar with the possibilities of this particular form of dose administration.

Apart, however, from a comparatively few distinctive features that serve to reflect some of the more characteristic features of British pharmacy, the British Pharmaceutical Codex contains much valuable information and an innumerable number of practical suggestions that should be of great use to the pharmacist in this country, particularly at this time.

One of the more evidently commendable features, in this connection, is to be found in the pharmacological notes that include just the sort of information that is useful to the pharmacist. This information is doubly useful in that it acts as a deterrent feature to the all-too-widespread habit of counter prescribing, and at the same time enables the pharmacist to make intelligent suggestions to the physician who is in search of a substance that will take the place of one not fully suited to the particular case that he happens to have in mind.

The pharmacology of the book has been contributed by Dr. W. E. Dixon, Professor of Pharmacology, Kings College, London, a widely recognized authority on the subject, whose name alone will

serve as a guarantee of the up-to-date character and the general reliability of the information that is presented under this heading.

An innovation that should contribute materially to the popularization of the Metric System with English-speaking people is the introduction of the term "mil" to represent the one-thousandth part of a liter, in place of the more cumbersome and less practical cubic centimeter.

In this connection it may be pointed out that despite the fact that the word "mil," a contraction for milliliter, has been officially recognized as being permissible, no serious attempt has ever been made to introduce it in this country, and the renewed prominence that is given it in the Codex may serve to popularize it in American medical and pharmaceutical literature.

One might go on at great length, pointing out the interesting features that are to be found in this particular book, but enough has been said to indicate that the Pharmaceutical Society of Great Britain has once more demonstrated its right to continue as an educator not alone of students of pharmacy and of members of the Society, but also of pharmacists and physicians generally.

That a book that portends to be so exhaustive, so original and so far-reaching as this, would of necessity contain many errors of a minor nature that were overlooked in the final reading of proof, is to be expected, and the Committee in charge of the publication are to be congratulated that these mistakes are not more serious and more numerous than the carping critics in England have been able to find. As it is, they are practically all enumerated in a table of errata in the front part of the book.

The British Pharmaceutical Codex will certainly serve to strengthen the position of the Pharmaceutical Society of Great Britain, and will further serve to define the relations that should exist between the pharmacist and the physician on the one hand, and the pharmacist and the public on the other.

The book should be of peculiar interest to the physician, in that it contains more than the usual amount of information directly of interest to medical practitioners, and for the pharmacist it will serve to answer many thousands of questions that arise constantly in the laboratory and at the prescription counter.

M. I. Wilbert.

THE PHILADELPHIA BRANCH OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

FEBRUARY MEETING.

The stated meeting of the Philadelphia Branch of the American Pharmaceutical Association, held on February 4, 1908, was devoted to a discussion of "The Responsibilities of the Retail Druggist in the Spread of the Great Black Plague."

The subject proper was introduced by Dr. Henry Beates, Jr., who discussed "The Relation of Medical Practice Acts to Contagious and Infectious Diseases." He called particular attention to the fact that in populous communities the so-called fundamental privileges or rights of the individual must of necessity be subordinated to the welfare of the community as a whole.

He further called attention to the generally accepted definitions for what is understood by "practice of medicine," and pointed out that the usually accepted right of "self-medication" is not permissible for persons suffering from a contagious or infectious disease, particularly when the health and even the lives of others may be in jeopardy.

Dr. A. A. Uhle, Assistant Instructor in Genito-Urinary Diseases at the University of Pennsylvania, presented a rather exhaustive paper on "Gonorrhea, its Nature, Prevalency, Recognition and Treatment," in the course of which he quoted a number of rather interesting statistics as to the prevalency of this disease, and the time and money loss that it involves. He also called attention to the ease with which this disease may be spread and the difficulties that beset the proper diagnosis and the successful treatment of it, even in the hands of physicians who devote all of their time to its study.

Dr. E. E. Montgomery, in opening the general discussion, confined his remarks to the consideration of "the infection of the innocent and the suffering and misery that is entailed." In his introductory remarks he expressed the opinion that, if gonorrhea could be limited to the vile and the vicious, it might be considered as being a beneficent agent, but, unfortunately this disease is most prone to attack the innocent, and here, being ofttimes unrecognized, because unsuspected, it usually causes great damage before it is brought under control.

Dr. Montgomery briefly outlined a number of ways in which innocent and unsuspecting persons might be inoculated with this really

dread disease, and graphically portrayed the sufferings, more horrible than death, that are in store for a trusting woman who is unfortunate enough to be wedded to a man with a latent or chronic gonorrhea, the result, all too frequently, of the improper treatment accorded him at the hands of the retail druggist.

In concluding his remarks he asked whether, with such an array of conditions that are possible as the sequelæ of an improperly treated case of gonorrhea, any number of men would be willing to stultify themselves by risking the happiness, health and even the lives of innocent persons for the meager profit that might accrue from the illegal prescribing for diseases of this type.

Dr. George E. de Schweinitz, in speaking of "Gonorrheal Ophthalmia and its Relation to Total and Partial Blindness," said that the pharmacist no less than the physician must on occasion assume the rôle of instructor, to prevent the unnecessary spread of disease, and to do this he must himself possess or seek the necessary information.

The doctor then briefly reviewed the various types of purulent infections of the eye and called particular attention to the really serious nature of this condition.

He particularly warned retail druggists to refrain from selling eye lotions for sore eyes in the newborn, as this condition is almost invariably due to a gonorrheal infection of the mother, and, unless properly treated, is sure to result in total blindness.

In conclusion, he begged his hearers to bear the ever-present possibility of gonorrheal infection of the eye and the resulting blindness in mind, and not to contribute, either directly or indirectly, to the increase of this really horrible affliction.

Dr. Thomas Neilson spoke of "The More Remote Complications of Gonorrhea in the Male," and referred particularly to the difficulty of effecting a cure in a patient who had been improperly treated and was suffering from latent or chronic gonorrhea.

He emphasized the fact that a patient thus afflicted was particularly dangerous in that he was a prolific source of infection to others, without himself being aware of the damage he was doing.

Dr. Neilson also referred at some length to the possible complications that may result from autoreinfection, and in conclusion assured those present that gonorrhea is indeed one of the most serious infections to which mankind is liable, and, while it is true that the gonococcus itself is not so deadly, the frequency of mixed

infection, the possible complications, and the lowered vitality are all factors that make for continued suffering, and not infrequently an untimely death.

The subject was further discussed by a number of the members and visitors who were present, and it was unanimously agreed that it would be well to endeavor to have the information presented at this meeting reach even a larger audience. On motion, Mr. A. J. Staudt, Dr. Henry Beates, Jr., and Prof. Henry Kraemer were appointed a committee to secure copies of the several communications, and, if practicable, have them reprinted in pamphlet form for general distribution among retail druggists.

At the business session a communication from Dr. John V. Shoemaker, the president of the American Therapeutic Society, was presented, and it was agreed to hold a joint meeting with that society on the evening of Thursday, May 7th, and also to exhibit a line of U.S.P. and N.F. preparations at the meetings of the American Therapeutic Society.

A motion to endorse Mr. William L. Cliffe as a candidate to succeed himself as member of the State Pharmaceutical Examining Board was accepted by a rising vote.

Prof. Henry Kraemer, Dr. H. C. Wood, Jr., and Mr. R. H. Lackey were appointed a committee to submit nominations for officers for the coming year.

MARCH MEETING.

The meeting of the Philadelphia Branch of the American Pharmaceutical Association, on the evening of Tuesday, March 3, 1908, was devoted to a discussion of the several problems that are involved in the manufacture and sale of flavoring extracts.

An invitation had been extended to members of the American Extract Manufacturers' Association to be present and take part in the discussion, and this association was represented by members from Philadelphia, New York, Brooklyn, Jersey City, Baltimore and other places. There were present also a number of manufacturers of flavoring extracts not members of the American Extract Manufacturers' Association, and also a number of chemists more or less directly affiliated with the extract trade.

The first communication on the programme was a paper by Mr. A. E. Claus on "Formulæ for Flavoring Extracts," being the

views, from a practical standpoint, of the American Extract Manufacturers' Association.

Mr. Claus called attention to the conflicting rulings that have been made by the Department of Internal Revenue and the Bureau of Chemistry, and pointed out that a manufacturer was held liable for tax or fine by the Internal Revenue Department for using an excessive amount of alcohol in his preparations, or for adulteration by the Bureau of Chemistry if the amount of alcohol used did not come up to the established ideas or standards.

Referring more specifically to extract of vanilla, he asserted that the Mexican varieties were not uniformly superior to other beans, and that manufacturers of the better grades of flavoring extracts usually preferred the Bourbon varieties of vanilla as being more uniformly satisfactory.

He further called attention to the fact that manufacturers of flavoring extracts had found it to be impracticable to handle all varieties or lots of vanilla in the same manner or to extract them with the same menstruum. He believed that, other things being equal, the less alcohol a flavoring extract contained, the more satisfactory it would be for the purpose for which it was intended; and for this one reason alone, if for no other, the U.S.P. formula for extract of vanilla was to be condemned.

For extract of lemon he believed that the U.S.P. requirements were entirely too high, both as to alcohol as well as oil content. He asserted that a weaker preparation would prove to be much more satisfactory as a flavor.

In speaking of the use of terpeneless oils, he expressed the belief that the use of terpeneless extracts was sure to grow in favor, though the so-called terpeneless oils of lemon and orange now on the market do not appeal to the well-informed extract manufacturer, who generally prefers to make his own terpeneless oils.

Mr. Claus pointed out that the so-called minor extracts are of little or no importance, as the bulk of the extract business is with vanilla, lemon and orange. In discussing standards, he suggested that the official standards should be minimum standards based on the flavoring units contained in the finished preparation. As a satisfactory formula for vanilla he suggested 10 ounces of vanilla to a gallon of extract, representing from 30 to 40 per cent. of alcohol.

The next speaker, Prof. I. V. S. Stanislaus, presented a communi-

cation entitled, "The U.S.P. as a Standard for Flavoring Extracts." As an introductory to his remarks, he said that in discussing this subject from the point of view of the pharmacist, much of what he had to say would, of necessity, be diametrically opposed to what the previous speaker had said, as he fully believed that the standards of the U.S.P. were not impracticable or unattainable.

Professor Stanislaus believes that the retail pharmacist is fully competent to supply all possible demands for flavoring extracts and that he should be in position to look for and to command the trade in at least the better quality of flavoring extracts.

That the retail druggist is even now supplying the superior article was evidenced by a number of quotations from the reports of analysts and other authorities quoted by Professor Stanislaus in support of his contention.

Prof. Charles H. LaWall presented a communication on "Some Flavoring Extracts I Have Seen," and exhibited a number of specimens that had come under his observation.

He said that while it is true that vanilla, lemon and orange do constitute the more important class of flavoring extracts, the mixtures of fruit ethers, so common years ago, are still used and have quite a ready sale in connection with the cheaper grades of soda syrups.

He also called attention to the fact that the proper labeling of a substance did not always detract from its ready sale, and related how at least one curbstone soda-water vender developed a thriving business by the prominent display of a sign asserting that "Our syrups are guaranteed to be artificial."

Mr. C. S. Brinton called attention to "Food Inspection Decisions, No. 47," and also referred at some length to a number of points bearing on the subject of flavoring extracts, particularly the definitions for vanilla extract, lemon extract and orange extract contained in Circular No. 19.

Dr. T. C. Stearns, in opening the general discussion, expressed the appreciation of the members of the American Extract Manufacturers' Association for this opportunity to discuss what is to them a vitally interesting subject. He asserted that the American Extract Manufacturers' Association is on record as being in favor of standards for flavoring extracts, but he also pointed out that it would be difficult indeed to establish reliable and generally equitable standards for such products as vanilla, for instance.

He emphasized the fact that each particular lot of vanilla must be treated with a specially selected menstruum designed to extract the virtues of that particular variety of bean.

Dr. Stearns also called attention to the fact that extract manufacturers were being unnecessarily harassed by the Bureau of Chemistry on the one hand, and the Internal Revenue Department on the other, and that the decisions of these two departments of the Federal Government did not always coincide.

Mr. Collins, taking up some of the thoughts suggested by Dr. Stearns, expressed the belief that a lower percentage of alcohol in flavoring extracts would generally be preferable, particularly in extract of vanilla. His experiments with this preparation led him to believe that an extract containing not more than 25 per cent. of alcohol would be preferable, in every respect, to a preparation containing a higher percentage of alcohol.

He also called attention to the fact that the term extractive is but a relative one, and that it is quite impossible to determine what is meant by "extractive from 10 grammes of vanilla."

Professor Remington expressed his appreciation of the information that had been offered, and said that he was in favor of having two standards for products of this kind, one for drugs and druggists and another for substances to be used as food products.

Professor Kimberly related some personal experiences that he had had as chemist to the food commissioner of North Dakota.

Referring to the one-time widespread use of wood alcohol, he said that, in 1902, out of ten samples of lemon extract that were examined, no less than five contained methyl alcohol.

Lemon was perhaps the most frequently sophisticated of all of the flavoring extracts, and in North Dakota, in 1902, only two of the specimens that were examined were found to be true to label.

Professor Kimberly believes that the establishing of standards for flavoring extracts is possible, and that the acceptance of comparatively high standards by the manufacturers of such products would be of great advantage in bringing about a desirable reform in this trade.

Dr. Horn asserted that it was his belief that the manufacturers of extracts are ready and willing to supply the demands of the people, and that the government authorities should content themselves with insisting that the people get what they really want. He

believes that the drug store is not the place to make and sell flavoring extracts, particularly as the men who conduct drug stores are very much like other men. So far as standards are concerned, Dr. Horn believes that, for vanilla, people desire the flavor of vanillin, but, not knowing the facts in the case, many people would no doubt object to buying it in any form but that usually known as extract of vanilla.

Dr. McCormick related an experience that led him to believe that a vanillin mixture would be uniformly more satisfactory than a corresponding extract made from vanilla beans. He also expressed the belief that all of the more reputable manufacturers of extracts would gladly welcome the establishment of standards, if equitable standards were practicable.

Mr. Brinton suggested that extract manufacturers should themselves be in position to suggest reliable standards in that they should have at hand considerable reliable data bearing on the several properties of the various varieties of vanilla beans and the extractive that is contained in them. If this data is not available, it would offer an excellent opportunity for research work on the part of some one manufacturer.

Mr. Brooks related his experience as State chemist in New Jersey. He pointed out that agents invariably look for articles that are likely to be wrong, so that the number of spurious or adulterated articles reported should not be taken as a criterion of the average condition of affairs. He has met with vanilla, lemon, ginger and even paregoric made with wood alcohol. He pointed out that flavoring extracts, as sold at the present time in the city of New York, were far from being above reproof.

In a recent examination that he made for *Good Housekeeping*, he found that but seven out of twenty-nine samples of extract of lemon were true to label; sixteen of the twenty-two below standard were absolutely false, and two of them contained wood alcohol; four of the seven pure brands contained 8 per cent. or more of oil of lemon, showing that a standard higher than that of the U.S.P. could be maintained.

Eight of sixteen samples of vanilla extract were found to be pure. Of the remaining eight, two contained coumarin, six contained excessive amounts of vanillin, and two contained wood alcohol.

Mr. Clawson admitted that there was much to be said on both sides, but he also believes that the manufacturers of flavoring extracts have made wonderful strides in improving their goods.

The subject was further discussed by a number of the members and visitors present, and at the conclusion of the discussion a vote of thanks was extended to the members of the American Extract Manufacturers' Association for their interest in taking part in the discussion.

At the business session, which preceded the regular meeting, announcement was made of a joint meeting to be held under the auspices of the Philadelphia County Medical Society, at which communications were to be presented by members of the local branch.

A committee was appointed to arrange for the details of the joint meeting to be held with the American Therapeutic Society, in May. The program, as proposed for this meeting, is quite an elaborate one, and will include a joint scientific meeting and an exhibition of official preparations.

The report of the Committee on Nominations was unanimously adopted, and on motion the following were declared duly elected as officers for the coming year: President, William McIntyre, of Philadelphia; first vice-president, William L. Cliffe; second vice-president, Charles H. LaWall; and secretary-treasurer, M. I. Wilbert.

M. I. Wilbert,
Secretary.

PHARMACEUTICAL MEETING.

The stated pharmaceutical meeting of the Philadelphia College of Pharmacy was held Tuesday, March 17, 1908, at 3 o'clock, Henry C. Blair presiding.

The meeting was principally devoted to a discussion of the formulæ given in the National Formulary and kindred topics. The discussion was opened by Prof. E. Fullerton Cook, Assistant Director of the Operative Pharmacy Laboratory, who exhibited one hundred or more N. F. preparations, comprising the fluidextracts and a majority of the elixirs, stating that he had been assisted in the work by the following students: T. C. Ladakis, Ralph R. Johnston, Lee F. Mauger, Edgar R. Buzzell, D. H. Reighter and Frank S. T.

Bonnell. No adverse criticisms were offered on the formulæ of the fluidextracts, but attention was called to the fact that in purchasing the drugs for the preparation of the fluidextracts, it was found that crude drug dealers for the most part use synonyms as chief titles on their labels, the botanical names being given in parentheses; and as these synonyms frequently apply to more than one drug or plant, and hence are not distinctive, the revision of the labels used by crude drug dealers was suggested. The observations on elixirs were presented in the form of a paper, which will be published in a later issue of this JOURNAL. Professor Cook also called attention to samples of the N. F. milk of magnesia, and stated that in order to avoid coloration of the preparation, it should be made with distilled water, at the same time recommending an increase of the amount of water directed by the formula, as the preparation is not sufficiently liquid.

Among those taking part in the general discussion were: Prof. C. B. Lowe, M. I. Wilbert, Prof. Joseph P. Remington, William L. Cliffe, George M. Beringer, Franklin M. Apple, and the chairman.

The question having arisen as to the existence of curaçao oil of orange, Professor Remington said that as the National Formulary is an expansion of the New York and Brooklyn Formulary, and the latter being largely the work of Dr. Rice, it therefore appeared that the oil was a genuine article at that time.

Mr. Blair criticised the elixir of curaçao on the ground of its being acid in character, claiming that elixirs should be neutral preparations. He also suggested an improvement for the elixir of terpin hydrate, whereby the terpin hydrate is dissolved in a solution consisting of equal parts of alcohol and glycerin.

Mr. Apple said that by reason of the high percentage of glycerin in glycerinated elixir of gentian, it rightly belongs to the class of glycerites, and that owing to the presence of several ingredients, the word "compound" should be added to the title.

Mr. Wilbert commented unfavorably on fluidextracts as a class of pharmaceutical preparations, and said that of those, formulæ for which are given in the National Formulary, only about twelve or fifteen are efficient or should be used. He likewise condemned the N. F. elixirs, saying that the majority of them are now obsolete, and that they were obsolete when the formulæ were first published, but were introduced into the New York and Brooklyn Formulary to satisfy the craze for elixirs at that time. He said that the original formu-

lary included fifty-two elixirs, and that of the eighty-eight formulæ now incorporated in the National Formulary, possibly a dozen have some slight merit.

Professor Remington said that the main object had in mind in making this display of N. F. elixirs was to elicit detailed criticism of the formulæ. He claimed that the formulæ had the advantage of not being secret, and said that the preparations were in his opinion much better as a class than the nostrums which are being or have been prescribed.

Mr. Cliffe said that the elixir of the glycerophosphates furnished an exception to this rule, the preparation on the market being the better.

Mr. Beringer said that by looking over recent legislative acts it will be found that in various States the formulæ of the U. S. Pharmacopœia and National Formulary are made absolute. He cited the New Jersey law as an example, and said that when either an U.S. P. or N. F. preparation is ordered, the pharmacist must not vary the formula in any particular, even when he knows it to be faulty. He, therefore, claimed that the law is radically wrong; and said that formerly when an improvement was found, the pharmacist was free to state it. He said that he desired it to be understood that he was not opposed to the National Formulary, particularly as it was originally planned by the American Pharmaceutical Association. One of the criticisms which he offered related to the formulæ adapted from other authorities. He said that if the physician desires a preparation of the British Pharmacopœia, the German Pharmacopœia or the French Codex, he does not get this if he orders the corresponding N. F. preparation, as the formula has been modified so as to give an entirely different preparation. He also questioned the practice of publishing formulæ to simulate those of proprietary preparations, claiming that the originators of these formulæ have in many instances a rightful claim to them, and of these preparations he mentioned Dieterich's solution of iron. He strongly favored an early revision of the National Formulary.

Mr. Wilbert maintained that the reason the National Formulary is faulty is not that the American Pharmaceutical Association is unwilling to make improvements, or that the Committee are not willing to make improvements, but that the fault lies with American pharmacists. He alluded to the Apotheker Verein, which main-

tains the Pharmaceutical Institute at Berlin, where laboratory facilities are furnished for carrying on work of this kind, and said that some such plan should be adopted in this country. He said it was unreasonable to expect three or four men to work out formulæ for the 40,000 pharmacists of the country.

Professor Remington remarked that the question here was the same as with the Pharmacopœia; that for seventy years things went along very quietly; but when the Food and Drugs Act was passed, a different attitude was assumed, and comments began to be freely made and information volunteered.

At the conclusion of the discussion, Mr. Beringer offered the following resolution, which was adopted:

Resolved, That we request that the Committee on National Formulary, of the American Pharmaceutical Association, proceed *immediately* to revise that work, so as to make it a proper legal standard; and, further, that the members of the Philadelphia College of Pharmacy and the pharmacists attending this meeting, pledge their assistance to the committee toward improving the work and making the formulas satisfactory.

A paper entitled, "Suggestions from the British Pharmaceutical Codex" was read by M. I. Wilbert (see page 172). While reading the paper, he incidentally remarked that if the quantities of sodium borate and sodium benzoate, directed by the formula of the N. F. for alkaline antiseptic solution be reversed, the preparation is much improved.

Prof. Charles H. LaWall read a paper on "The Quantitative Estimation of Benzoic Acid in Catsup" (see page 171).

Prof. Henry Kraemer announced that fifty-four volumes of the American Journal of Pharmacy and forty-seven volumes of the "Proceedings of the American Pharmaceutical Association," had been donated to the college by one of its members, Dr. Joseph Heintzelman, and moved that a vote of thanks be tendered Dr. Heintzelman for his liberal gift, which motion was unanimously adopted.

Florence Yaple,
Secretary pro tem.

ESPERANTO, UNIVERSAL OR FRENCH?[1]

Now that turbines, electric power and flying machines are destroying distance, the nations of the world are concerning themselves as to the best means of drawing mind together as well as matter. A universal language is being universally talked about, but the real question is, What shall we talk? The vast extent of the British Empire, and the enormous population of the United States, have created a feeling that English must be the dominant language of the future; but a Russian, M. J. Novicow, in the *Revue des Deux Mondes*, puts in a plea for French as a universal language, and makes a very good argument for it. Curiously enough, the French seem to be rather indifferent, and lean more towards an artificial language, preferably "Esperanto," the one that contains fewest of the elements of Latin, whilst "Universal," founded by a German, Dr. Molenaar, entirely on French, has met with no success. After disposing, in a lively and convincing manner, of the myth of Teutonic and Anglo-Saxon superiority, M. Novicow shows the absurdity of allowing national *amour-propre* to prevent the adoption of a living language as a universal means of communication. The Germans and English are the only objectors to the use of French as such a language; yet *amour-propre* does not prevent their considering it very advantageous to speak French, and making great efforts to succeed in doing so.

Also, there is individual as well as national feeling to be reckoned with; and M. Novicow sees no reason for adopting the language of a Warsaw doctor, when there are other made-to-order tongues that he considers superior; moreover, Dr. Zamenhof and the Esperantists profess quite as much scorn for Universal as he and others do for Esperanto. So much for *amour-propre*.

The plea of facility is disposed of with equal readiness. A Russian, knowing no language but his own, will find it no easier to call *vada* (water) *sidi*, in artificial tongue, than *water* in English or *acqua* in Italian. The mixed systems are even more difficult than living languages, except to those who already know all that they are derived from. Thus, to find Esperanto easy, one must know French, English, German, Russian, Latin and Greek! To know an auxiliary

[1] In view of the present advocacy of "Esperanto" for international correspondence, it was thought that the above would be of interest to our readers.—EDITOR.

language, a man must first learn six others! This is hardly following the line of least resistance. For *queue*, Esperanto uses the word *vost*. This is as easy for those who know its Russian analogue, *koost*, as it is for a German to understand *trink*, and for a Greek, whose *and* is *kai*, to find *kaj* simple. But what would these words signify to a Frenchman, who would have to learn them just as he would the Arabic words *bent* (woman) and *efta* (key)?

As for the languages that derive from one source, a Frenchman would readily comprehend the sentence in Universal, "Lingi pure artifizial es totale inkomprensibil a prim vist," which in French is, "La langue purement artificielle est complètement incompréhensible à première vue;" but what would it convey to a German accustomed to "Eine ganz künstliche sprache ist vollkommen unverstaendlich zum ersten Blicke," or to a Russian used to, "Vpolnié iskonstvennyi yasyk soverchenno ne poniaten na pervye vxgliad?" "As for me," says M. Novicow, "although I know the six sources from which Esperanto is drawn, I have difficulty sometimes in understanding some of its sentences. Judge what it must be for one who understands only Italian or Swedish." There seems very little reason for learning a new and difficult language, without tradition or literature—for, as M. Novicow says, "Esperanto will never have its Cicero or Bossuet"—when there is ready to hand (or to tongue) a language like French, that has been used all over the continent as a court language, and to-day, as every traveler in Europe knows, will carry one almost anywhere.

He cites Italy as a land where a universal language coexists with many dialects. French might be the universal language, and all the other nations could keep their dialects for home use. Certainly the prospect is more attractive than that of having the burden of another language added to our over-burdened minds, especially when our minds would really receive no reward for the labor of learning, as only our tongues could wag in Esperanto. We should still want to know French for the sake of its literature, and it seems hardly worth while, in these labor-saving days, to try to build the Tower of Babel any higher.—*Putnam's Monthly and the Reader, April, 1908.*

THE AMERICAN
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MAY, 1908

HYOSCYAMUS MUTICUS.

By Edwin Dowzard.

The nature of the alkaloid occurring in *Hyoscyamus muticus* was not known until Dunstan and Brown (*Journ. Chem. Soc. Trans.*, 1899) proved that hyoscyamine was the sole alkaloidal constituent. This work was done on material obtained from India, the drug contained about 0·1 per cent. of alkaloid. In a subsequent note Dunstan and Brown (*Proc. Chem. Soc.*, 1900) reported that Hyoscyamus muticus grown in Egypt is much richer in hyoscyamine than the Indian variety. Gadamer (*Arch. Pharm.*, 1898, 236, 704) also states that the Egyptian variety contains a much larger proportion of alkaloid. Ransom and Henderson (Year Book of Pharm., 1903) have examined the latter variety with the following results :

	Percentage of alkaloid in the dried drug.
1. Stalk, etc.	0·498
2. Leaf, etc.	0·900
3. Seed capsule	0·585

According to Floyer (Year Book Pharm., 1903) : " The plant grows wild all over Egypt, where it is known by the name of 'Sakran,' the drunken. In the rich soil of the Valley of the Nile the plant luxuriates, and one shrub weighs when fresh as much as sixty pounds. There it makes large succulent leaves, but does not give a very large amount of seeds. In light sandy soil the plant has less leaf and more flowers, and in coarse sandy soil the root is very largely devel-

oped, the leaves become less and less and the seed vessels more and more numerous. A plant growing in coarse sandy soil will sometimes ripen 5,000 seed pods. Though each pod may well contain 100 seed grains, the plant does not, in coarse sandy situations, cover any large area of ground. Under similar circumstances any kind of erodium will fill whole valleys. But the muticus always remains sporadic. It will, therefore, not be surprising to find that the plant is difficult to grow. The seeds germinate, but an enormous percentage do not reach a height of three inches. The plant does not bear submersion, and such plants as spring up in ground flooded by the high Nile are strictly annual. But those above reach of water attain an age of from three to five or perhaps six years, giving each year more seeds and fewer leaves. It has yet to be ascertained whether a five years' plant contains more alkaloid than a first year's plant."

Recently a large quantity of henbane appeared on the American market, which contained an extremely high percentage of alkaloid. An examination of different parts of the plant gave the following results:

	Percentage of Alkaloid.
Whole drug	0·75
Root	0·83
Stem	0·48
Leaf	1·34
Seed	1·17

As the Egyptian variety of Hyoscyamus muticus is the only species of henbane known to contain alkaloid in such proportions, it was surmised that the drug consisted of the above species. This proved to be the case, the plant being identified as Hyoscyamus muticus.

In order to ascertain if the active principle consisted of one or more of the mydriatics, a quantity of alkaloid was separated by the following process:

Four thousand grammes of the powdered drug was percolated with 94 per cent. alcohol until nearly exhausted. The percolate was concentrated to a thick syrupy liquid in vacuo and the alkaloid shaken out with 2 per cent. hydrochloric acid. The acid solution was filtered, made alkaline with ammonia and shaken out repeatedly with chloroform. The chloroformic solution was then extracted with 2

per cent. hydrochloric acid. To the latter solution a slight excess of ammonia was added and the alkaloid shaken out with chloroform. After evaporating the solvent in vacuo, about 26 grammes (0·65 per cent.) of slightly colored crystalline alkaloid was obtained.

A portion of the alkaloid was dissolved in acidulated water and the alkaloid fractionally precipitated with auric chloride. Six fractions were obtained, each fraction was then dissolved in hot acidulated water and fractionally crystallized; three fractions were obtained from each fractional precipitate, or eighteen fractions in all. The aurichlorides thus obtained were dried at about 100° C. and their melting points determined, with the following results:

MELTING POINTS OF AURICHLORIDE FRACTIONS.

	No. 1			No. 2			No. 3		
Fractional precipitates	157·5° C.			161° C.			161° C.		
Fractions obtained by crystallization	160.	157.5	158·5	161·	161.5	161·	161.	161·5	160·5

	No. 4			No. 5			No, 6		
Fractional precipitates	161·5° C.			161·5 C.			160·5° C.		
Fractions obtained by crystallization	160.	161·5	160·5	162·	162·	161·	161·5	161·	160·5

Maximum M. P. . . . . 162° C.
Minimum " " . . . . . 157·5° C.

The following are the melting points of the three principal mydriatic aurichlorides:

	Melting Point.
Atropine aurichloride	136° to 138° C.
Hyoscyamine "	159° to 162° C.
Hyoscine "	197° to 199° C.

A portion of the alkaloid was dissolved in 2 per cent. hydrochloric acid and treated with purified animal charcoal. The mixture was then filtered, the filtrate made slightly alkaline with ammonia and shaken out with chloroform. The chloroformic solution was evaporated in vacuo, and the residual alkaloid, which was almost white, dried at about 95° C. The alkaloid thus obtained had the following characteristics:

	Melting Point.	Specific Rotatory Power.
Purified alkaloid from Hyoscyamus muticus	107° C.	—20·4° C.
Pnre hyoscyamine	108° C.	—21° C.
" atropine	111° C.	Inactive.
" hyoscine	liquid at ordinary temperatures.	lævorotatory.

The above figures show that the alkaloid consists of practically pure hyoscyamine.

Ransom and Henderson (Year Book Pharm., 1903) prepared standardized tinctures from Hyoscyamus muticus, Egyptian, for the purpose of therapeutic examination. Mr. W. A. Shann, M.B., reported as follows:

"I have a very strong impression that the tincture of *Hyoscyamus muticus* is markedly superior to the ordinary tincture. In the first case in which I tried it—a case of inflammation of the bladder—the relief was immediate, and my subsequent experience has confirmed me in the opinion that it is a reliable preparation of considerable therapeutic value. I have found, too, that smaller doses were required than of the ordinary B. P. official tincture (not standardized), and I now always prescribe it in preference to the ordinary tincture."

The Egyptian variety of *Hyoscyamus muticus* is evidently equal if not superior in therapeutic value to the official drug, and would yield more elegant preparations than the latter. As the drug can be obtained in large quantities, I think the question of its use in Western medicine should be taken up.

Analytical Department Parke, Davis & Co.,
Detroit, Michigan.

OIL OF BERGAMOT.

By Edwin Dowzard.

The constituents of bergamot oil which have so far been identified are: linalyl acetate, linalol, limonene and bergaptene. H. v. Soden and W. Rojahn (*Pharm. Zeit.*, **46**, 1901, 778) have, in addition to bergaptene, isolated another crystalline compound. This new body has been named "bergaptin." Burgess and Page (*Jour. Chem. Soc.*, **85**, 1904, 1327) have also detected free acetic acid, an octylene, pinene and camphene. Schimmel & Co. criticise the

work of Burgess and Page (Report, April-May, 1905) as follows: "In spite of the statement made by the authors that they had to deal with an unsophisticated bergamot oil (the purity of the oil is by no means proved by the constants mentioned by the authors), we beg to doubt as yet the presence of octylene, pinene and camphene in pure bergamot oil, as in the course of this winter we were more than once able to convince ourselves of the large dimensions which the adulteration of bergamot has acquired."

The constituent which has received most attention is linalyl acetate, which, although modified by other bodies, gives the characteristic odor to bergamot oil. Linalyl acetate is present in the pure oil to the extent of about 32 to 40 per cent.; this refers only to the pressed oil, as that obtained by steam distillation from the pressed residue contains a low percentage of ester, due to decomposition. The following table shows the low ester content of distilled oils (Schimmel, Report, April, 1893):

	Specific Gravity 15° C.	Rotation 100 m.m.	Solubility in 1·5 to 2 Vols. 8 Per Cent Alcohol.	Ester Per Cent.
1. From residue after pressing,	·873	+11° 20′	Soluble	12·4
2. From residue after pressing,	·873	+4°	Soluble	12·0
3. Oil of 40 per cent. ester, rectified,	·871	+20° 40′	Soluble	22·0

The color of bergamot oil is due to the presence of chlorophyll, although copper may be present in some cases. We have examined twenty-three samples of oil and have not been able to find copper.

The following test was used: 10 c. c. of oil are shaken with 3 drops of concentrated hydrochloric acid for 30 seconds, 5 c. c. of water are added and the mixture again shaken. After the mixture has separated, 1 drop of 5 per cent. potassium ferrocyanide solution is added to the aqueous layer. If copper be present, a reddish-brown coloration or precipitate is produced. Three samples of oil which gave no reaction with the above test were allowed to stand over copper foil for two days at the ordinary temperature. After this treatment, they all gave strong reactions, one of the samples yielding a considerable precipitate of copper ferrocyanide.

The following results were obtained in the examination of twenty-three samples of bergamot oil:

	Spec. Grav. 15° C.	Rotation 100 m.m.	Solubility Value.	Per Cent. Residue.	Acid Value.	Per Cent. Linalyl Acetate.	Remarks.
1.	·875	+18° 20′	160	6·6	4·9	19·6	Adulterated, probably turpentine.
2.	·885	+11° 36′	260	5·6	2·1	37·8	Normal.
3.	·881	+22° 40′	225	4·6	2·S	31·8	Normal.
4.	·889	+ 7° 52′	220	5·5	2·1	34·8	Normal.
5.	·886	+ 9° 30′	285	6·1	2·8	37·8	Normal.
6.	·869	+35°	140	4·0	1·4	20·1	Adulterated, probably lemon, citrene or orange.
7.	·886	+16° 32′	270	4·8	2·S	27·4	Adulterated, probably distilled bergamot.
8.	·884	+13° 28′	260	6·4	4·2	35·8	Normal.
9.	·884	+13° 36′	270	5·5	4·2	37·8	Normal.
10.	·882	+11°	280	6·4	2·S	37·8	Normal.
11.	·885	+ 9° 20′	255	4·6	1·4	38·6	Normal.
12.	·882	+20°	220	4·5	2·1	33·7	Normal.
13.	·872	+34°	150	4·0	1·4	23·9	Adulterated, probably lemon, citrene or orange.
14.	·886	+15° 20′	290	6·0	3·0	38·6	Normal.
15.	·883	+21°	250	5·7	2.8	32·9	Normal.
16.	·876	+34°	170	4·5	2·8	23·5	Adulterated, probably lemon, citrene, or orange.
17.	·878	+20° 36′	230	4·2	2·8	31·3	Adulterated, probably distilled bergamot.
18.	·875	+17° 20′	200	3·3	11·2	32·9	Adulterated, alcohol and free acid.
19.	·883	+10° 24′	290	5·7	2·8	35·2	Normal.
20.	·882	+20° 5′	230	4·5	2·8	33·3	Normal.
21.	·881	+10° 30′	280	4·3	2·1	35·1	Normal.
22.	·876	+40°	140	4·5	2·8	20·1	Adulterated, probably lemon, citrene or orange.
23.	·880	+22° 20′	210	4·5	2·8	30·8	Adulterated, probably distilled bergamot.

Specific Gravity.—The specific gravity limits, as given by the various authorities, are as follows:

Schimmel & Co. . . . . ·881 to ·886
Parry . . . . . ·882 to ·886
Gildemeister & Hoffmann . . . . . ·882 to ·886

These limits are confirmed by the results which we have obtained. All the oils in the above table, which may be classed as pure have a specific gravity varying from ·881 to ·886, except in one case (No. 4), where the specific gravity was ·889.

Rotation.—The rotation varies from + 8° to + 24° (Schimmel, Report, April-May, 1905). Gildemeister & Hoffman, also Parry, give + 8° to + 20° as the limits for pure oils. In most cases, owing to the dark color of the oil, this determination must be made in a 50 or 20 m.m. tube. The pure oils which we have examined have rotations varying between + 7° 52′ and + 21°.

Solubility.—Bergamot oil is soluble in one-fourth to one-half volume of 90 per cent. alcohol, and the solution does not become turbid on the addition of more alcohol. An accurate determination of the solubility in alcohol by the above method is out of the question; the solubility can, however, be determined by a method suggested by the writer (*Chem. and Drug.*, **53**, 968). The method is applicable to all volatile oils and has the following advantages: (1) Only one strength of alcohol is necessary; (2) the results represent the actual solubility, and (3) they are directly comparable. 5 c.c. (accurately measured) of oil are mixed with 10 c.c. of alcohol (S. G. ·799 at 15·5° C.), and water is run in from a burette, drop by drop, until the solution becomes turbid. The number of c.c. of water required to produce turbidity is multiplied by 100, the result being termed the "solubility value."

The oils which we have examined had solubility values varying from 220 to 290. Turpentine, lemon oil, orange oil, citrene and fatty oils lower the solubility value.

Residue.—Bergamot oil leaves a residue on evaporation, which consists of bergaptene (Gildemeister & Hoffmann). The non-volatile residue is present to the extent of 4·75 to 6 per cent. (Schimmel, Report, April-May, 1905). Fatty oils increase the residue, while distilled bergamot oil, lemon oil, orange oil, citrene and turpentine decrease the residue. We have found 4·3 per cent. to 6·4 per cent. of residue in pure oils.

The residue may be determined as follows: Take a small porcelain basin about 2½ inches in diameter, introduce a few grammes of sand, and in the sand place a small porcelain crucible. The appliance is dried at 100° C. and weighed. Five grammes of oil are weighed into the crucible and the oil driven off by heating to about 100° C. The residue is weighed as soon as all odor of bergamot oil has disappeared. The above apparatus is used to prevent the oil creeping over the edge of the basin.

Linalyl Acetate.—Linalyl acetate is the most important constituent of bergamot oil, and the value of the oil depends on the amount present. It is determined by saponification. According to Schimmel (Report, April-May, 1905), the linalyl acetate content varies from 34 to 40 per cent. The oil obtained from unripe fruit yields less ester (down to 30 per cent.) than that obtained from ripe fruit. An oil containing 30 per cent. of ester must, however, be looked upon with

suspicion. The results we have obtained show that the minimum amount of linalyl acetate in a pure oil may be fixed at about 32 per cent. The acid value should always be determined and allowed for, as in most cases the amount of free acid will affect the ester determination.

Distilled bergamot oil, lemon oil, orange oil, citrene and turpentine, all lower the ester content.

Adulterations.—The principal adulterants are distilled bergamot oil, lemon oil, orange oil, citrene, turpentine and alcohol. These all cause a decrease in density, and in the case of lemon oil, orange oil and citrene an increase in rotation, while all cause a decrease in ester. Fatty oils are sometimes used as adulterants, and can be detected by the increased amount of residue. Occasionally esters other than linalyl acetate may be used, and sometimes free acid, which will be detected by the increased acid value.

The constants for bergamot oil are as follows:

Specific gravity at 15° C.	·881 to ·886
Rotation, 100 m.m.	+8° to +24°
Solubility value	220 to 290
Residue	4·3 to 6·4 per cent.
Acid value	1·4 to 4·2
Linalyl acetate	32 per cent. and upwards.

From the Laboratories of
Parke, Davis & Co.

BISMUTH SUBGALLATE AND BISMUTH SUBSALICYLATE.

By Otto B. May, Ph.D.

At the time of the Pharmacopœial revision, there was considerable variation in the quality of these two commercial salts, more especially in their bismuth (Bi_2O_3) content and percentage of uncombined organic acids. In the rubric and tests, as much latitude was permitted as possible, consistent with desirable purity. Since our manufacturers have had abundant opportunity and time to replace old stock with new, an examination of our supplies was deemed advisable. In the tables appended, only the more important phar-

macopœial tests are included, all of which demonstrate that our manufacturers are doing their utmost in complying with our rigid requirements.

BISMUTH SUBGALLATE.

It will be noted that not one of the samples strictly fulfils the requirements of test for the "absence of free gallic acid" as given in paragraph 5, page 75 (U.S.P.). In order to ascertain the cause and also to determine the quantity of free gallic acid present, 5 grammes of each of the samples was thoroughly agitated with 30 c.c. of ether, filtered, washed with two further portions of 10 c.c. each, and the filtrates, after distilling off the ether, were dried over sulphuric acid and weighed. The residues, which varied from 0·02 to 0·08 per cent., consisted of fatty matter with but *traces only* of free gallic acid, the former originating evidently from the gallic acid used. Since this residue is present in very small quantities, with but traces of gallic acid, the test would be more reasonable and just, if applied in this manner, than by employing the supersensitive litmus. The following test is suggested in lieu of our present one, being less strenuous and conformed to by all of our manufacturers: "If 1 gramme of the salt be well shaken with 10 c.c. of ether and filtered through a double filter, wetted with ether, the filtrate evaporated to dryness should not leave a weighable residue, nor should an immediate blue-black coloration appear after the addition of 2 drops of ferric chloride T. S."

Weight Volume.—There being some difference in the comparative lightness (bulk) of the various samples, a simple expedient was adopted, whereby the weight volume could be approximately measured. 1·0 gramme of the sample was introduced into a narrow graduated cylinder, and then shaken down by tapping until its volume ceased to decrease; the volume was then noted.

The samples examined were taken from original sealed containers.

Sample.	Bi_2O_3	Nitrates.	U. S. P. Free G. A. Test.	Proposed G. A. Residue Test.	Ether Extract. Per Cent.	Color.	Wt. Vol.
1.	52·6	0	Positive.	None.	0·08	Bright yellow.	1·4
2.	53·6	0	"	"	0·02	Light brown.	1
3.	53·5	0	"	"	0·02	Yellow.	1
4.	55·5	0	"	"	0·02	Bright yellow.	1·5
5.	53·0	0	"	"	0·03	" "	1
6.	53·3	0	"	"	0·025	Yellow.	1·4

BISMUTH SUBSALICYLATE.

The deportment of our samples to the test for limit of free salicylic acid, paragraph 6, page 77, U.S.P., was not anticipated, in view of the results obtained a few years ago. The free acid was estimated in 5 grammes of the sample, as described under subgallate, with results varying from 0·36 to 0·48 per cent. Owing to the feeble basic properties of bismuth salicylate and the readiness with which salicylic acid is liberated during the drying, a more liberal allowance must be made in the future for free (uncombined) acid. Basing such a test upon our present market supply, we would suggest the following:

"If 1 gramme of the salt be agitated with 10 c.c. of ether, and the liquid filtered through a double filter of fine texture, wetted with ether, the filtrate, when evaporated to dryness, should not leave more than 0·004 gramme of residue consisting of salicylic acid."

Among the other tests there is considerable more variation than in the previously mentioned samples.

Sample	Bi_2O_3 Per Cent.	H_2O Per Cent.	U. S. P. Free S. A. Test.	Free S. A. Per Cent.	Color.	Nitrates.	Wt. Vol.
1.	66·6	0·2	Positive.	0·36	Gray white.	0	3.6
2.	62·5	0·2	"	0·40	Yellowish white.	0	1·0
3.	65·0	0·3	"	0·48	White.	0	3·8
4.	66·5	0·2	"	0·36	"	0	4·2
5.	64·3	0·25	"	0·34	Bright white.	0	4·8
6.	64·70	0·3	"	0·30	White.	0	6·0

March 16, 1908.

NOTES ON SOME CHEMICALS.

By Otto B. May, Ph.D.

STARCH TEST SOLUTION, U.S.P.

It is recommended that the third line following 200 c.c., replace present text (p. 538, U.S.P.) by following: "Then boil a few minutes until a thin transparent fluid is obtained."

HYDRARGYRUM CUM CRETA, U.S.P.

In response to the complaint that the tests for *mercurous* and *mercuric* oxides (p. 242, U.S.P.) are too exacting, I examined original samples of our various manufacturers. Of the six samples ex-

amined, four not only complied with the specifications (employing 0·1 gramme), but three of them gave no reaction when as much as 1 gramme of the sample was taken—a very good showing indeed. The remaining two samples gave such marked reactions that the "ous" and "ric" oxides were determined quantitatively.

	Hg_2O	HgO
No. 1	1·26 per cent.	0·22 per cent.
No. 2	None	0·093 per cent.

No sulphites or nitrates were found in either of the above. Further experiments are being conducted with the good samples in order to determine, if possible, the cause of this oxidation. On page 242 I would suggest that the words "If a portion" be replaced by "*If 0·1 gramme.*

FERROUS SULPHATE.

The American Steel and Wire Company, who are the largest producers of ferrous sulphate, desiring to comply with the requirements of the Pure Food and Drug Law, submitted average samples of their products for examination. These samples were taken from large lots representing what is known to the general trade as "Bottom Crystals," consisting of brown-colored, oxidized, irregular-sized crystals, such as are sold for technical uses only. "Prime Green," bright, clean and large crystals. "Sugar Sulphate," a slightly effloresced granular powder, corresponding to Ferri Sulphas Granulatus, U.S.P.

$FeSO_4 \cdot 7\,H_2O$ of 99·5 per cent. (U.S.P.) should contain 20 per cent. of ferrous iron.

		Per Cent.	Per Cent.
"Bottom Crystals"	ferrous Sulphate	96·10	(=19·32 Fe)
	ferric Salt	2·26	(=0·633 Fe.)
"Prime Green"	ferrous Sulphate	98 00	(=19·70 Fe)
	ferric Salt	1·51	(= 0·42 Fe.)
"Sugar Salt"	ferrous Sulphate	101·6	(slightly effloresced)
"Drug Store Sample"	ferrous Sulphate	99 65	(=20 3 Fe.)
	ferric Salt	traces.	

None of the samples responded to the time limit test for foreign metals. If we consider the "Prime Green" sample pharmacopœial (20·1 per cent. Fe), classifying it among those chemicals subject to deterioration, the results demonstrate that our rubric can do injustice to no one purchasing their average "Green," crystalline or granular salts.

Laboratory of New York College of Pharmacy,
April, 1908.

LIQUOR CRESOLIS COMPOSITUS, U.S.P.

By Ferdinand Nitardy.[1]

This preparation has been subject to considerable criticism, and various suggestions toward improvement have been made. The chief cause of criticism is the fact that the U.S.P. formula will not give a clearly water-soluble product. The turbidity is due to unsaponified linseed oil. If the preparation, made according to the U.S.P. process, is allowed to stand long enough, it will become clearly water-soluble, the time required varying from ten days to six months, according to the temperature at which it is kept, and the excess of alkali present. The same result can also be obtained by heating the finished product for three hours on a water bath, but this process is inferior to the one of completely saponifying the linseed oil before adding the cresol, as it involves the loss of some cresol by evaporation, as well as danger of fire, since the cresol vapors are inflammable.

The soap formed in the U.S.P. formula for Liquor cresolis compositus contains but 14 per cent. of water, which is much less than the amount present in ordinary soft soap. The U.S.P. soft soap, containing from 40 to 50 per cent. of water, for this reason can not be substituted for this soap. On account of the small quantity of water present, saponification does not readily take place in the cold. The use of water-bath heat, and the addition of a small quantity of alcohol, to aid rapid saponification, are advisable. Under these conditions saponification is complete in from five to ten minutes.

If the potassium hydroxide, used in making the soap, is of 85 per cent. strength, the resulting soap is exactly neutral or but very slightly alkaline (the saponification number of linseed oil varies from 192 to 195, equivalent to 79·06 to 80·30 grammes of potassium hydroxide required for complete saponification of 350 grammes of linseed oil), but if the potassium hydroxide is of 90 per cent. strength, which may happen, since the potash on the market runs in strength from 85 to 88 and occasionally up to 90 per cent. of KOH, the resulting soap will contain about 0·5 per cent. of free KOH.

A neutral soap is preferable for this preparation, but the small amount of free alkali that would be introduced into the preparation

[1] Read before the Chicago Branch of the American Pharmaceutical Association.

by a soap of this kind does not materially affect its value, especially as it does not remain as free KOH in the finished product, but combines with some of the cresol, forming potassium cresolate. Any amount of free alkali will cause the preparation to become thick, 1 per cent. of KOH in excess producing a syrupy consistence, 3 per cent. a soft jelly, and 5 per cent. a very firm jelly, the germicidal value being slightly reduced.

The substitution of oleic acid, cotton seed, castor and other oils, for the linseed oil called for by the Pharmacopœia, has been suggested, but no advantage is to be gained thereby. Linseed oil soap gives a product somewhat darker than that obtained with a soap made from other oils. But the color is not uniform, as the preparation darkens with age. Cresol varies in color, and old linseed oil gives a darker product than fresh oil; otherwise, old linseed oil will not alter the preparation, as the unsaponifiable matter in it is not increased by aging, oxidation or boiling (Dr. Fendler, *Proc. A. P. A.*, vol. 52, p. 911–912), nor is its saponification number changed by age (Lewkowitsch, "Anal. of Fats and Oils," vol. II, p. 457).

Much has been said in regard to the amount of soap called for in the Pharmacopœial formula. Charles H. LaWall and E. Fullerton Cook, in a paper on Liquor Cresolis Compositus (Am. Journal of Ph., April, 1906), state that there is more soap than necessary in the preparation, this is also claimed by quite a number of pharmacists. This is true from a purely pharmaceutical standpoint.

It is possible to make a perfectly water soluble product containing:

	Per Cent.
Soap (free from water)	16·0
Glycerin (formed in the process)	1·4
Water	32·6
Cresol U. S. P.	50·0

or

Soap (free from water)	22·0
Glycerin (formed in the process)	1·9
Water (necessary for the process)	6·1
Cresol U. S. P.	70·0

For comparison I will state that the U. S.P. product contains:

	Per Cent.
Soap (free from water)	39·5
Glycerin (formed in the process)	3·5
Water	7·0
Cresol	50·0

Perfect solubility, although very desirable, is by no means the most important point in this preparation. Our first aim must be to produce a preparation of maximum efficiency as an antiseptic and germicide with the minimum amount of caustic or irritating properties. As will be seen from the following tests, the reduction of the quantity of soap in the preparation renders it excessively irritating. The tests with substances and preparations mentioned below were carried out in the following manner:

One drop of each was spread over approximately one square inch of skin on the human arm, and the action noticed and recorded at intervals. All of them were tried on several persons, so as to obtain fairly reliable results. Numbers 1 to 6 inclusive produced escharotic action in from one (phenol) to twenty (Liquor cresolis comp. containing 16 per cent. of soap and 50 per cent. of cresol) minutes. Numbers 7 to 16 inclusive only reddened the skin, while the remainder produced no noticeable irritation; these were compared as to their relative irritating properties, by noticing the effect of diluted solutions on mucous membranes. They are given in the order of their action, beginning with the most escharotic.

(1) Phenol.

(2) Liquor cresolis compositus, 8 per cent. soap, 50 per cent. cresol.

(3) Paracresol.

(4) Cresol U. S. P.

(5) Metacresol.

(6) Liquor cresolis compositus, 16 per cent. soap, 50 per cent. cresol.

(7) Orthocresol.

(8) Cresol U. S. P., alcohol, equal volumes.

(9) Liquor cresolis compositus, 24 per cent. soap, 50 per cent. cresol.

(10) Seven per cent. solution of phenol.

(11) Liquor cresolis compositus, 32 per cent. soap, 50 per cent. cresol.

(12) Five per cent. solution of phenol.

(13) Cresol U. S. P. 2 parts, alcohol 1 part, glycerin 1 part.

(14) Liquor cresolis compositus from paracresol.

(15) Potassium cresolate sol. (rep. 50 per cent. cresol).

(16) Liquor cresolis compositus (incompletely saponified).

(17) Liquor cresolis compositus (by modified process).

(18) Liquor cresolis compositus, with excess of 1 per cent. of KOH.

(19) Liquor cresolis compositus, with excess of 3 per cent. of KOH.

(20) Cresol U. S. P. and glycerin, equal parts.

(21) Liquor cresolis compositus from metacresol.

(22) Liquor cresolis compositus, with excess of 5 per cent. of KOH.

(23) Liquor cresolis compositus from orthocresol.

(24) Three per cent. solution of phenol.

It will be noticed that a preparation containing 8 per cent. of soap and 50 per cent. of cresol is more caustic and escharotic than pure cresol; probably due to the fact that the cresol is rendered soluble, and the skin softer and therefore more easily attacked by the cresol.

A preparation containing four-fifths of the required amount of soap produced a decided redness of the skin, later causing it to peel off; while the U.S.P. product made by the modified process produced no irritation. It is important that saponification be complete, as the preparation will otherwise be irritating.

According to Dr. Otto Heiler, soap increases the germicidal power of phenol and cresol by about 25 per cent. if present volume for volume. (*Proc. A.P.A.*, vol. 52, p. 563.)

The above facts tend to show that the proportion of soap present in the U.S.P. product should not be reduced.

This brings us back to the original formula, which, with the following modification in the working directions, is the best that can be produced at present.

COMPOUND SOLUTION OF CRESOL.

Cresol	500 gms.
Linseed oil	350 "
Potassium hydroxide	80 "
Alcohol	35 c.c.
Water, a sufficient quantity to make	1000 gms.

Dissolve the potassium hydroxide in 50 grammes of water in a tared dish, add the linseed oil and mix thorougly. Heat on a water bath or on a steam bath to about 70° C., incorporate the alcohol,

and continue heating until saponification is complete. Then add the cresol, stir well, cover the vessel and allow to stand, stirring occasionally until a clear solution is produced, finally add sufficient water to make the finished product weigh 1,000 grammes.

When it is desired to add volatile oils to the preparation, for the purpose of masking its odor or rendering it more pleasant, I find that up to 2 per cent. of any volatile oil can be added to the finished product without rendering it turbid or impairing its solubility. Of oils whose constituents consist mainly of substances of the phenolic type, like oil of cloves, as much as 5 per cent. may be added.

The preparation can also be mixed to advantage with such preparations as Liq. Antisepticus U.S.P.

School of Pharmacy of
Northwestern University.

ADULTERATION OF VOLATILE OILS.[1]

By Drs. George R. Pancoast and W. A. Pearson.

The American who ordinarily demands honest dealing and despises deception, accepts with amazing meekness the present volatile oils.

It is an open secret that sophistication is practised, due largely to the extreme pressure of competition and the demand for cheaper products. We do not say that only the highest grade should be sold, for that would greatly limit the scope of usefulness, but we do think that each grade should be sold under its proper label. It has been demonstrated that cheaper grades do not endanger the market for the best quality, but that indirectly the sale of the better grade is augmented, the cheaper grade finding new uses where the best grade is limited because of its price.

This is the true condition at Grasse, the very centre of volatile oil production, and is equally true of many of our commodities. Deception steps in when a cheap article is given for an expensive one.

The main use of volatile oils is in imparting agreeable flavors and odors to various products, thus occupying an exalted position in

[1] Read before the Philadelphia Branch of the American Pharmaceutical Association, April 7, 1908.

our æsthetic development. Unfortunately, a certain sample may be pleasing to one and obnoxious to another, and this introduces a serious problem in the valuation, namely the personal equation.

A vast amount of accurate work has been done with volatile oils in determining certain physical and chemical properties and setting limits for natural variation, but often the desirable or most valuable portion which produces the delicate aroma is not considered. The odorous constituents are often so delicate that chemical estimation is impossible. Their source is not definitely known, but it is thought that they are decomposition products from glycosides brought about by the catalytic action of certain enzymes.

The best practical method of valuation is the comparison of odors by experts. The nobility have their perfumers, whose duty it is to blend and select the odors to be used at various functions. So delicate has their sense of smell become, that only a few samples are compared each day. This, then, is the perfumer's art, he has both the natural and artificial products at his disposal, and his duty it is to combine them into a perfect harmony of pleasing odors. At present it is an art—it may become a science.

It remains to be seen whether or not there is a relation between the various odors as there is between musical tones, or of colors. Probably there is, for some will harmonize, some detract, some increase, while others will make a decided discord.

Our scientific knowledge of odors is very meagre when compared to our knowledge of light and sound. Is the sense of smell due to small particles? If so, what is their size, shape and rate of motion? Extreme smallness is not a great barrier at the present time, for particles one thousand times as small as the size we have attributed to molecules have been demonstrated in radium emanations, and these quite accurately studied. Or, is odor due to some vibration in the ether, as is light and sound? Until the day dawns when these things shall be accurately known, comparatively little progress can be made in the exact valuation of odors from volatile oils. Professor Michelson, the great American physicist, has devised an instrument called the interferometer, which will measure the length of light waves so accurately that the error is infinitesimal. Who will devise a way to measure the odors of volatile oils and thus give us an exact scientific method of valuation for these products?

At present, undoubtedly, adulteration is being practised and we

must depend largely on the integrity of the distiller. A few specific cases may well be considered.

OLEUM AMYGDALÆ AMARÆ.

Gildemeister and Hoffmann (page 437) state that only a very small amount of the bitter almond oil of commerce is prepared from bitter almonds, but is prepared mainly from the seeds of the apricot (*Prunus armeniaca*, L.), which is allowable for the U.S.P. product. Parry states ("Chemistry of Essential Oils," page 297) that the true oil may be grossly adulterated with artificial benzaldehyde, and if the purest variety be used, it is impossible to detect it within certain limits except by the odor. Formerly synthetic benzaldehyde always contained chlorinated products which made possible its detection as an adulterant.

Another adulterant is oil of mirbane, which may readily be detected by odor, the specific gravity and by its reduction to aniline with iron filings and acetic acid, which may be distilled and collected. To the distillate a few drops of calcium chloride solution is added and if aniline be present the characteristic violet color is produced. Samples adulterated with nitro-benzene when shaken with an excess of sodium bisulphite solution have the characteristic coarse nitro-benzene odor.

The official assay for benzaldehyde content is exceedingly difficult and a decided improvement was made by Roberts and Carwithen by exactly neutralizing the kerosene before beginning the assay and keeping the flask tightly corked as much as possible.

OLEUM BETULÆ, OLEUM GAULTHERIÆ AND METHYLIS SALICYLAS.

One offender says, "Methyl salicylate is just as official as oil of birch; what harm can there be in mixing them?" It is only reasonable to believe that Nature's laboratory is more efficient than our own, and this has often been demonstrated, but aside from this there is a moral obligation which should not be overlooked, even if the Pure Food and Drugs Law were not in existence.

At present there is only about one-tenth enough wintergreen leaves harvested to make the amount of oil that is actually sold. Where does the rest come from? Often, undoubtedly, the product is oil of birch or mixtures of it and synthetic methyl salicylate.

We are now investigating thoroughly the adulteration of oil of birch and wintergreen with synthetic methyl salicylate, and are very sorry our experimental work is not complete, so that it might be presented at this time, as we expected. In the very near future we hope to present the whole subject and give our distinguishing tests and methods for detection of added synthetic methyl salicylate. We solicit your co-operation on this very important subject and will greatly appreciate any data or authentic samples you may supply.

OLEUM SANTALI.

Sandal-wood is one of the most ancient perfume-bearing substances known to mankind, being, no doubt, brought by the Greeks from India as early as the conquest of Alexander. Not until the fifteenth century is any mention made of the oil distilled from the wood, when Saládinus of Æsculo described his method. It was not until 1882 that the first comprehensive examination was made by Chapoteaut. Many varieties of sandal oil are procurable and each seems to vary widely in certain particulars. Oil distilled from freshly rasped logs may have a specific gravity below 0·975, while that made from old chips, often 0·980.

Drs. Pancoast and Kebler (A. J. P., 1901) state that this oil should be from one to two years old, as the aroma is improved by age.

Undoubtedly there is naturally much difference in the physical and chemical properties of true sandal-wood oil, derived from various sources and distilled under different conditions, and we think that much of the suspicious oil on the market may be genuine. So suspicious have the manufacturers become of this oil that many firms import the wood and distill the oil, but it has been said that the yield from these billets is sometimes increased by steeping the logs in certain adulterants before leaving India.

No doubt this oil has always been subject to adulteration, at first with articles easily recognized, but of late years the adulteration has become more scientific and complex, requiring exhaustive analyses. We have grown suspicious of this oil unless its properties correspond rigidly to the requirements of our Pharmacopœia, and besides it is well to apply other tests, such as fractional distillation, as used by Parry and Bennett (*Chemist and Druggist*, July 6, 1907) when oil mixed with turpineol was found. It is also wise to take the acid number. The per cent. of santalol is of vital importance, but,

unfortunately, the present official method gives too high results in the presence of chloroform. The main difficulty in using this adulterant is in adding an excessive quantity when the indicated per cent. of santalol will be above 100 per cent. In one case 166 per cent. of santalol was indicated by adding 1 part of chloroform to 7 parts of oil, the optical rotation of this admixture was—17° 12′, specific gravity 1·033, and it was soluble in two volumes of 70 per cent. alcohol. Wielen (*Chemiker Zeitung*) has offered an improvement in the manipulation of the assay by substituting a 10 per cent. solution of sodium chloride for the water, by which time is saved and much less oil is lost by emulsification.

It would be unwise for our Pharmacopœia to give a wider range to the constants of this oil, even if some injustice is done by excluding some pure oils. The comparative narrow limits render adulteration more difficult.

OLEUM SASSAFRAS.

The main adulterant of this oil is a certain fraction of camphor oil. The detection is exceedingly difficult, providing the manufacturer does not take too large a fraction and increase the specific gravity above the limit. One chemist has reported the finding of camphor in the oil, no doubt due to a small amount present in the camphor oil used for adulteration.

Many other specific cases might be considered, but in general a comparative odor test with a sample of known purity is a very satisfactory way of valuation. Place equal amounts of the oils on filter papers in the bottom of small jars or beakers, and carefully consider the delicacy of the odors until evaporation is complete. The odor of the natural oil is very persistent. One authority states that $\frac{1}{2000}$ of a milligramme of mint can be detected in one quart of air. As a rule pure oils will retain their same fundamental odor until the end of the experiment, while an adulterated or synthetic oil will pass through a series of variations depending on the nature of the mixture. Another peculiarity of true oils is that they will impart their characteristic odor to a larger volume of liquid than their substitutes. A satisfactory odor dilution test can be made by dissolving 1 c.c. of the oil in 100 c.c. of alcohol, 1 c.c. of this is added to 99 c.c. of dilute alcohol, and 1 c.c. of this dilution added

to various volumes of water, depending on the intensity of the odor and the peculiarities of the oil.

Science is no respecter of persons and has benefited both the honest manufacturer and the rogue. This subject has been treated more comprehensively by Drs. Pancoast and Kebler in the AMERICAN JOURNAL OF PHARMACY, January, 1901, and their anticipations of a firm's displaying the placard "Essential Oils Made to Order While You Wait," has actually been realized according to Professor Remington, who says there is a London firm which builds volatile oils to order and scientifically corrects any of the constants in an inferior product.

In conclusion we wish to thank both the firm we represent and the many individuals who have contributed indirectly to this report, and we solicit your co-operation in sending us samples and data of adulterated oils, that we may do more to rid the market of spurious products.

RESEARCH LABORATORY,
SMITH, KLINE & FRENCH CO.

SOME REMARKS ON THE ADULTERATIONS OF DRUGS AND CHEMICALS AS FOUND IN PRACTICE.[1]

BY L. HENRY BERNEGAU, PH.G., A.C.

In bringing the following instances of "adulterated" drugs and chemicals before the meeting to-night, I do so with the understanding that the word "adulterated" is used in its broader sense to include drugs which may be of low strength or poor quality due to natural causes—and chemicals which may in some way, perhaps by carelessness, be "off" in strength or purity—as well as in its narrower sense of intentional sophistication. Moreover, the examples which are given are all taken from actual laboratory records of the past few weeks, as it does not take a very long time to accumulate a number of observations of possible interest in a laboratory where much work is going on.

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[1] Read before the Philadelphia Branch of the American Pharmaceutical Association, April 7, 1908.

STRAMONIUM LEAVES.

Some time ago we received a sample of a shipment of stramonium leaves in our laboratory to be identified and assayed. The drug was very dry, broken to small fragments, and it was, therefore, difficult to get hold of a good specimen. The drug contained many flowers, which were identified as stramonium flowers. At the same time we found some capsules containing small seeds; these were identified as hyoscyamus seeds. We then made four assays of the drug and found an average of 0·262 per cent. mydriatic alkaloids. This showed that the larger part of the drug was stramonium, as hyoscyamus seldom assays higher than 0·10 per cent. We most certainly rejected the whole shipment, because it was impossible to separate the stramonium from the hyoscyamus and the analytical department would not take the responsibility upon itself to accept the drug as stramonium.

CONIUM LEAVES.

All the samples received by us during the past year or two have been either entirely inert or contained only small traces of coniine. The leaves were evidently not adulterated and showed the characteristics of conium leaves. I myself once supervised the harvesting of conium leaves in Germany many years ago. The laborers put the leaves, as soon as they were picked, into potato or grain sacks, and the men were told not to press the leaves too hard into the sacks. There is considerable heat produced in only a few minutes, if the leaves are pressed too hard, and by this heat the coniine is either evaporated or decomposed. Assays made from leaves taken from different sacks showed plainly that leaves collected on the same field assayed much higher if pressure, and therefore heat, had been avoided. I think the right way of collecting the leaves on the field has much to do with their respective activity or inertness, although climate and weather conditions have much to do with the alkaloidal strength of the drug.

POWDERED LICORICE ROOT.

Six samples submitted at the same time from different sources showed under the microscope the characteristics of glycyrrhiza. All showed distinctly the yellow-wood fibres, the brown cork cells,

bastrings, calcium oxalate crystals, starch grains, etc., except *one* sample, the wood-fibres of which had a peculiar color and there were not many crystals of calcium oxalate visible. We made a fluid extract of each of the samples and found by our results that the suspicion we put on the one sample was well-founded. Instead of about 40 per cent. or more extractive it ran not quite 20 per cent.

Prof. Henry Kraemer outlined some months ago, in one of these meetings, that many more microscopic tests of powdered drugs should be made than is done at the present time. That Professor Kraemer was right in this is proven in this case here. The sample seen with the naked eye looked not suspicious at all and had a fairly good taste; but looks and taste often fool us. The root was evidently partly exhausted, dried again and then pulverized, adding some coloring matter and perhaps a small amount of saccharine. We could not prove this positively, the sample was very small and not enough of it was left to make additional tests. The fact is, that the microscope gave the first clue in finding out that there was something wrong with the powdered root.

ERGOT,

as we all know, is impossible to be adulterated itself. The bulk is sometimes loaded with small stones, grains, etc., but this, I think, is mostly not done on purpose. Old stock is often brightened with oil. All this is not so bad if the drug assays high enough in total alkaloid or so-called "cornutine of Keller" as outlined by that author in 1894. Recent researches of Barger and Dale, of London, on the chemistry of ergot, point to the fact that its activity lies largely in an alkaloid-like body which they call ergotoxin or hydroergótinin, thus substantiating Professor Lyons' belief that an assay based upon the determination of alkaloid unquestionably has value. The worst is that most samples in the market are worm-eaten, some are really alive with vermin. A good ergot should assay at least 0·15 per cent. "cornutine." We had some samples lately for assay which ran only 0·03 per cent., one assayed only 0·016 per cent. Of the last sample 10 pounds at least would therefore be necessary to make 1 pint of a fair fluidextract containing 0·15 per cent. "cornutine." I think it would not pay very well to use such a drug for manufacturing.

SANGUINARINE NITRATE.

Of the commercial variety, sold as sanguinarine nitrate without qualification, we found one sample to assay only 51·4 per cent., one 61·2 per cent., and another 75·3 per cent. pure sanguinarine nitrate. The highest assay ran 89·5 per cent. This commercial salt is not supposed to run 100 per cent., but the great variation in the strength makes it necessary to assay each individual lot, thereby enabling one to use the right proportions of the salt in preparations. Manufacturers of this salt should put the percentage of the pure salt on their labels, or should state on their labels that so and so much pure crystalline sanguinarine nitrate is present in the respective preparations, because the mere labeling "sanguinarine nitrate" is misleading. The retail druggist is hardly in a position to test this product.

RESIN PODOPHYLLUM.

Very few of the samples we tested lately came up to the U. S. P. requirements. Most of them contained about 10 or more per cent. of alcohol insoluble matter. We manufactured some pounds in our own laboratories according to U. S. P. method and had no difficulty in getting a product which was strictly U. S. P.

POWDERED CASTILE SOAP.

A large percentage of samples sold as "pure olive oil soap" were found to contain large amounts of animal fats.

ZINC PERMANGANATE.

During the last few months we were unable to get a zinc permanganate which was entirely soluble in water. As this product is used not only for injection but also for eye washes, it would be evidently dangerous to use a product containing insoluble matter, the latter causing irritation of the membranes to which the solution is applied. The best sample we got hold of contained 8 per cent. insoluble matter; one sample submitted to us by a prominent house contained even 32 per cent. insoluble matter. As we all know, the salt decomposes very rapidly if exposed to light and air, but the once decomposed salt is certainly unfit for medicinal purposes.

GOLD AND SODIUM CHLORIDE.

Of the many samples of gold and sodium chloride received during the last months we found none which assayed the required 30 per cent. metallic gold. Most of the samples ran between 28 and 28·8 per cent., one sample assayed far below this, namely, 24·6 per cent. metallic gold. Many samples were not mixed thoroughly, others had absorbed some moisture. Some samples were treated both by the H_2O_2 method (U. S. P. 8th Rev.) and also by the oxalic acid method (U. S. P. 1890). Both methods gave identical results. One manufacturer claimed that it was necessary, in making a correct assay, to replace the water during heating and precipitating the gold solution on the steam bath. As could be expected this scheme did not work and we were unable to obtain better results by doing so. Another claim made was that in the U. S. P. method some gold remains unreduced and is lost in the filtrate. This is hardly possible, since, if that were true, the filtrate from the precipitated gold would betray the presence of the metallic salt by a faint yellow color. This test is very delicate, as the tinctorial power of gold salts is very high and scarcely weighable quantities would impart a yellow color to the filtrate. Now the manufacturer has either to reduce the price of the *double* salt in proportion to metallic gold found (we are not willing to pay too much for *common* salt), or he has to add a little more gold chloride to his product to bring it up to U. S. P. standard—30 per cent.

Analytical Laborarory of the
H. K. Mulford Company.

THE UNITED STATES PHARMACOPŒIA AS A STANDARD FOR FLAVORING EXTRACTS.

By I. V. S. Stanislaus, B.Sc., Phar.D.

In taking up the matter of this paper, the justness of the cause, and the position the Pharmacopœia should occupy as a standard for Flavoring Extracts become self-apparent and will serve as an excuse for this paper. For, what other standard could be selected but the Pharmacopœia for preparations of drugs? We have not one other official standard in this country. The Pharmacopœia is

the pharmaceutic as well as the Government's standard for the identification, purification, valuation and preparation of drugs and their preparations. And what are the flavoring extracts but the spirits and the tinctures of our Pharmacopœia and, therefore, justly falling under its provisions for purity and strength. True enough, the Pharmacopœia does not embrace every extract contributing to savor of our palates, but it gives standards for all the prominent extracts used, and certainly all those that can safely be used as food products.

Now, what is an "extract" (for that is the popular title applied to flavoring essences). In Circular No. 19 of the U. S. Department of Agriculture—the "Standards of Purity for Food Products"—we read: "A flavoring extract is a solution in ethyl alcohol of proper strength of the sapid and odorous principles derived from an aromatic plant or parts of the plant, with or without its coloring matter, and conforms in name to the plant used in its preparation."

We find as a foot-note in the same circular, "that the flavoring extracts therein described should not be confounded with similar preparations described in the Pharmacopœia for medical purposes." Yet a cursory examination of the matter of flavoring extracts therein described shows that, with a very few and unimportant exceptions, the standards laid down therein are almost identical with those of the Pharmacopœia. The same may be said of the savory drugs used as condiments or spices, where nearly every one of the definitions are those of the Pharmacopœia with a few minor and unimportant exceptions. Now, it is the pharmacist's occupation to prepare and dispense drugs and their preparations, under which heading these products naturally fall. Let us see whether the pharmacists have done their duty.

An examination of the "Report of the Connecticut Agricultural Experiment Station on Food Products for 1907" shows a *very* interesting fact to us pharmacists. On page 145 we read under the heading "Lemon Extracts not Found Adulterated"—"*All but two of the samples not found adulterated were sold in druggists' vials and bore no brand name.*" It is to be regretted that no statistics for Vanilla Extract were given in that report.

Now let us look at what is being said of other purveyors of flavoring extracts and in other States:

Inspection of flavoring extracts in North Dakota for 1902 has

shown that 38·4 per cent. of lemon extracts contained wood alcohol, 30+ per cent. contain ed artificial coloring matter, 30 per cent. contained but analytic traces of lemon oil, 23+ per cent. were below strength, and 23+ per cent. above strength—none complying with the official strength.

Of the vanilla extracts examined during the same year 30 per cent were fair extracts (of which 67 per cent were pure and high strength), 40 per cent. were mixed extracts of vanilla and tonka, and 30 per cent. were artificial vanilla extracts. Of the total, 50 per cent. were colored with caramel and 10 per cent. with coal-tar dyes.

In the report for 1903 the North Dakota Agricultural Station, in Bulletin No. 57, records 57·5 per cent. of the vanilla extracts exposed for sale to be artificial products—synthetic preparations, some colored with caramel, others with guaranteed non-fading coal-tar dyes, and some packages containing one fluid-ounce were labeled "containing two ounces."

Of the lemon extracts examined during the same year but 23·4 per cent. responded to the official requirements, the balance (76·6 per cent.) were either below strength, artificially colored, contained low percentages of alcohol, or defective in all three directions.

Now as to 1904. The North Dakota Commissioners' report for that year shows that 50 per cent. of the lemon extracts were artificially colored, 64 per cent. contained wood alcohol, and the lemon oil content varied from 0 per cent. to 4·5 per cent., while 25 per cent. of the samples contained no oil but traces, the average containing 2·17 per cent.

Of the vanilla extracts examined the same year only 15·4 per cent. were weak extracts, while 84·6 per cent. were synthetic or artificial extracts, and all the 100 per cent. were artificially colored.

The report from the same State for 1905 reveals the following figures: Lemon extracts, 34 per cent. below strength, of which about 12 per cent. contained no lemon oil at all, 15 per cent. contained artificial color, and 1·8 per cent. contained wood alcohol (1 sample in 56). Vanilla extracts—of 42 samples examined 14 were illegal, being either synthetic, artificially colored, or artificial substitutes, showing thus that 33⅓ per cent. were illegal. The other extracts examined that year were orange, which was bad, and peppermint, which was questionable; and of the extracts not embraced

in the Pharmacopœia, raspberry, strawberry and rose extracts, when examined, proved to be artificially dyed with good coal-tar dyes and guaranteed not to fade.

Inspection of extracts in North Dakota in 1906, has shown that only 44 per cent. of lemon extracts responded to the official strength, while 56 per cent. were deficient in strength, artificially colored, and one sample, indeed, contained as little as 0·31 per cent. of oil. Of the vanilla extracts examined, 60 per cent. were either artificially colored, synthetic products or short in measure, and only 40 per cent. answered standard requirements. Of miscellaneous flavors, representing wintergreen, orange, compound banana and raspberry extracts, *not one* responded to either the official or legal standards.

Here is the State of Massachusetts, considerably further east than North Dakota, and examining the reports of the Massachusetts State Board of Health for 1901 we find the following more interesting figures: Of 167 samples of lemon extracts examined, representing about 100 brands (every brand sold in Massachusetts), 139 samples were classed adulterated, or about 83·25 per cent., and only 16·75 per cent. were up to the standard. Of the inferior or adulterated extracts 42 samples contained *no* lemon oil at all, and one was made of oil other than lemon. In alcohol strength they ranged from 4 to 45 per cent., usually colored with either dinitro-cresol, tropæolin, or coal-tar dyes, or turmeric. In the vanilla extracts examined, such appetizing substances as bay rum, burnt sugar, balsam peru, etc., were found. They were either very poor extracts or entirely artificial, and their alcohol content ranged from 5 per cent. to 20 per cent.

This conspectus, covering the examination of flavoring extracts in but two States—North Dakota and Massachusetts—is very interesting to us pharmacists for two very important reasons:

First, because it demonstrates that 66+ per cent. of the flavoring extracts examined in North Dakota were illegally exhibited for sale by grocers, department stores and dealers in table luxuries.

Second, because the examination of the tables exhibited shows uniformly that almost all, if not quite all, the samples were made by wholesale grocery-supply houses and other self-styled and so-called "extract manufacturers"; and in Massachusetts the conditions were equally bad, and in some cases worse.

Let us next take a look in another direction, in a direction where

men daily engaged in the examination of food products intended for human consumption are carefully watching over the public's well-being. Let us examine the resolutions adopted at the Food Commissioners' Conference:

Resolutions adopted at the Conference of Food Commissioners, September 17, 1907, held at St. Paul, Minn., for the States of Illinois, Iowa, Minnesota, Wisconsin, North and South Dakota.

DEFINITION OF AN "EXTRACT."

(5) *Resolved*, That the terms extract, flavor, flavoring, spirits, essence or tincture as applied to solutions used for flavoring food products are held to be synonymous, but the use of any term in lieu of the word "extract" is deprecated as applied to flavoring solutions made from an aromatic plant or part of the plant.

(6) *Resolved*, That any other flavoring extract recognized in U. S. Circular No. 19, and complying with the standard laid down in that circular and free from artificial color, may be sold if the face label on both bottle and carton contain the following information:

First. Net weight or measure.

Second. Brand or trade mark (optional).

Third. Name of extract as recognized in Circular No. 19.

Fourth. Percentage of alcohol by volume.

Fifth. The true name and business address of the manufacturer.

(7) *Resolved*, That the terms "double" and "triple," etc., as applied to flavoring extracts, be held to mean respectively two or three times the minimum strength required by the standards of U. S. Circular No. 19.

(8) *Resolved*, That the term "concentrated" is false and misleading.

(16) *Resolved*, That such terms as "extra quality" and "first quality," as applied to food products, is deemed *misbranding*, *unless* the quality of the products is corresponding.

The convention further adopted the Standards of Purity for Food Products stated in U. S. Circular No. 19, where Resolutions 1 and 2 read as follows:

That extract of vanilla must contain no artificial color, and must contain 40 per cent. of alcohol by volume (this shown upon the label). Extracts other than those of pure vanilla must be labelled as: "Vanillin Flavor," "Coumarin and Vanillin Flavor," or "Artificial Vanillin," etc., stating also the alcohol strength.

The artificial flavors, such as pineapple, strawberry, raspberry, etc., must be produced from "harmless" substances, must be free from artificial color, must contain no statement or design to deceive the purchaser. Artificial extracts will not be permitted where true extracts can be produced. (The form of labelling must be the same as under vanilla.)

One of the biggest "holes in heaven," punched by the "Pure Food and Drug Regulations," is the requirement of the Association of Food Commissioners, that all artificial extracts of such drugs as pineapple, banana, raspberry, strawberry, etc., be labelled as "imitation extracts." These "extracts" have for many years been sold to some of the more or less ignorant bottlers of beverages as "natural extracts," beautifully colored, of course, and usually marked from two to ten "X," thus purporting to be of from two to tenfold the strength of the "druggists' extracts."

Now these artificial fruit essences must, in the future, go *uncolored;* they must be labelled "imitation extracts;" they must show their "true alcohol content;" they must give "the true name and address of their manufacturer," and, worst of all, they cannot be marked "double" or "quadruple X," or "extra quality" (all of which statements commanded an *extra price*) and they *cannot* be offered for sale *where true extracts can be produced.* "Und da liegt der Hund begraben."

For years and years the extract manufacturers offered for sale these products as bona fide, highly concentrated extracts, extracting correspondingly higher prices for each "X" upon the label, and claimed the products to have been prepared from "fresh fruits." How can they now face the bottlers and admit their guilt? How can they (and they must, to meet competition) drop from their high-priced scale to the low prices which cheap products command?

Now, what are the "artificial fruit essences?" The banana essence is a solution of butyric ether and amyl acetate in alcohol. The pineapple essence is made by dissolving butyric ether in alcohol. The strawberry extract is a mixture of nitrous ether, acetic ether, butyric ether and methyl salicylate in alcohol. The raspberry extract is a mixture of the above strawberry extract with the addition of benzoic and œnanthic ether. And these simple mixtures may be repeated for all the flavors in creation. They are all simple, all inexpensive, and all surrounded with a mantle of secrecy—of mystery.

Now, what are the natural flavors, let us ask? These may be divided into (*a*) those prepared directly from the fruits or odorous and sapid principles of aromatic plants or plant-parts; (*b*) those made by dissolving the essential oils of the plants in alcohol.

To the first class belong the extracts of raspberry, strawberry, pineapple, banana, etc. These are all made about as follows (taking strawberry extract as an example): Four and a half pounds of wild strawberries are bruised and covered with three quarts of 90 per cent. alcohol, macerated for about a month and filtered. The yield will be about one gallon of strawberry extract. But this strawberry essence is made from the fruit which is in season but two months of the year, and when the crops are small, the price will, and of necessity must be, higher, and the method of production slow and expensive.

To the second class belong the official spirits and tinctures like cinnamon, wintergreen, anise, peppermint, ginger, vanilla, etc. These are made by simple solution of the oil in alcohol, as, for example, the 10 per cent. spirit of cinnamon, or by maceration and percolation, as the 10 per cent. tincture of vanilla, or the 50 per cent. tinctures of lemon and orange peel made by maceration, or yet the 10 per cent. spirit of peppermint made by solution and maceration.

Now, it is self-apparent that all these preparations come within the province of the pharmacist. It is for us to protect our rights; it is for us to stand by the standard and to require all other corresponding preparations to respond to the tests and requirements laid down in our national standard, which is the United States Pharmacopœia.

And this is not the only phase of the question. There is another. Any of the so-called spices, like cinnamon, cayenne pepper, caraway and allspice are drugs, the doses of which lie between one and fifteen grains. Spirits like those of bitter almond, cinnamon, wintergreen and peppermint are all directed in the Pharmacopœia in doses less than 60 minims. It should be remembered that in the State of Pennsylvania drugs whose doses are less than 60 grains are considered poisons. Now, gentlemen, properly speaking these come within the province of the qualified pharmacist (whose qualification was attested by registration before the State Pharmaceutical Board). It is, therefore, in my opinion, illegal to expose these arti-

cles for sale in other places than pharmacies or drug stores. I hold, further, that the making of such dangerous preparations as the spirit of bitter almond (which may be taken as an example) is not a safe article in the hands of anybody but a qualified pharmacist, and the only safe place for its disposal is a pharmacy, and *not* a general store. This is of great importance to us pharmacists to know, and also to know the opinion as handed down by the Supreme Court of Illinois in the case of the Illinois State Board of Pharmacy against a Chinese laundryman prosecuted for selling opium. In handing down the decision the Court held:

First: That opium is a drug and not an article of ordinary merchandise.

Second: That any place where drugs and medicines are sold is a drug store within the law; and I hold, genlemen, that this decision is of the greatest importance to us. It defines the drug store and the position of the pharmacist. The substances mentioned are as much drugs as opium, and the preparations of oil of bitter almond more dangerous than opium; therefore the drug store is the proper place for their sale, the pharmacists their rightful manufacturers, and the United States Pharmacopœia the proper standard within the law.

SCHOOL GARDENS.

By William McIntyre,
Chairman of Committee on Special Schools, Board of Public Education, Philadelphia.

For many years school gardens have been a feature of public school education in Europe, and, to quote Helen C. Bennett,[1] "An idea of the extent to which this branch of education is carried on in European countries may be obtained from the statement that in Austria there are no less than 8,000 school gardens; in Sweden, 2,016; while in France practical gardening is taught in 2,800 primary and elementary schools." And now a widespread movement for their establishment exists in the United States, school farms having been conducted in some of the larger cities of the East, notably New York, Boston, Philadelphia and Washington for some

[1] *The American Monthly Review of Reviews*, April, 1904.

years past. It is also of interest to note that in Porto Rico the United States Government maintains school gardens in connection with every public school, the teachers being regularly trained for the work in a course of theoretical and practical lessons on agriculture. Here in Philadelphia, during the year past, there were maintained by the Board of Public Education, ten gardens, having a total area of 8½ acres.

A Garden in a School Yard.

Some of the arguments set forth by the Public Education Association of Philadelphia in favor of school gardens are as follows:

The Objects of School Gardens.—To dispose children favorably toward manual labor, by giving a much needed industrial supplement to the confining book training and almost exclusively academic ideals of the schools.

To take children off the streets in the vacation period, and still give only pleasurable occupation out of doors.

To teach the elements of the industry on which life principally depends—agriculture—and thus promote distribution of population in rural districts, instead of continued concentration in cities.

How Gardens are Educational.—To be of educational value, it is not enough to provide gardens with tools and a gardener. The gardener or laborer is needed only as a janitor, and for work that is too heavy for children.

Why Teachers are Needed.—For any *educational* results to be accomplished, the constant direction of trained teachers is necessary, because of their knowledge of children and of methods of teaching. Discipline and nature talks are the work of teachers.

The Work of the Teachers.—To teach children to learn by observation, and to give them practical training by the eye and the hand.

To teach children to apply what they learn from books, as to nature study, mensuration, and other subjects, without the strain of additional indoor work.

To influence character by appeal to their love of nature.

To prepare children for citizenship by teaching, practically, the care of private and public property.

To mold character by demanding independence, each child being dependent upon himself in a garden for the results of his labor.

To impress practically and theoretically the law of sequence, one event proceeding from another as its direct consequence.

To educate the emotions, by teaching care and protection of tender, growing things.

A *gardener*, no matter how excellent, will not be as competent as an experienced teacher to carry out these educational purposes of school gardens.

A school garden usually measures about one acre, and is subdivided into small individual plots, larger or class plots, a centre and border, for flowers. The yield from the small plots belongs to the children who cultivate them, that from the class plot belongs to the garden. The beautiful flowers are taken to the pupils' homes or made into bouquets and sent to the hospitals for the sick.

One supervisor, nine principal and ten assistant teachers, with six gardeners, were employed. The total cost to the city, for the season, in material and salaries, was $11,035.

Accurate records are kept, including the amount of produce per child, the attendance and effects of the work upon the pupils' phys-

ical, mental and moral being. The total attendance here was 90,919 boys and girls, with an average daily attendance of 627, the division by sex being about equal.

The following table is not without interest, showing, as it does, the yield of produce on one plot 6 by 10 feet:

Lettuce heads, 19; radishes (two crops), 42 bunches = 510; turnips, 25; beets, 25; spinach, 3 pecks; wax beans, 3 pecks; tomatoes, 3 pecks; lima beans, ⅓ peck. The question of financial gain is not held out to the children, nothing being allowed to be sold in the garden; but, nevertheless, since all the produce belongs to the little farmer, it may be found wise for the parents at home to purchase the produce by way of encouragement.

The cold rain of spring and the heat of summer did not lessen the enthusiasm necessary to transform waste lands, covered with rubbish, into orderly, beautiful gardens. Here is a strong argument for gardens as a factor in municipal improvement, but stronger still is the argument in favor of gardens as a factor for the development of the boys and girls themselves.

Realizing the neglected condition of many of the back yards at their homes, the children were urged to start little gardens of their own. All plants that are adapted to transplanting, government seeds and others were given them, with the result that 494 home gardens were made.

The general interest maintained by the pupils and their deportment precludes all thought of discipline. While sections of classes are in waiting for lessons, a playground in an adjoining field will often be an acceptable place for passing time, but we find that the average child looks upon work or play according to the manner in which it is presented. School gardens furnish an industrial playground for six months' time, affording practical manual training object lessons in plant life, and a study of elementary agriculture as well as the proper use of tools and their care. They teach what soil is, the reasons for fertilizing it, the influence of moisture, and how to maintain proper soil conditions by plowing, harrowing and the rotation of crops, a little of chemistry and nature's laws. They supply nature-study and drawing materials to nearby schools. Advantageous and disadvantageous worms, insects and birds, all receive a share of attention, and many specimens are mounted and correctly named.

The growing of vegetables and flowers is not the main object sought in school-garden work. Their real value depends upon their power to arouse and confirm in the child good traits of character.

The methods pursued lead to an appreciation of the dignity of labor, which in turn may develop into an intelligent interest in the work of the field.

It has been possible to secure young women teachers who have the qualifications to give instruction in the study of plant life and related biological sciences such as are required in a work of this kind. The course of study is too long to present here, but it is systematic and presented in such a way as to hold the interest of the children.

A visitor to the gardens wrote: "The result both as to the fruits gathered and the adornment of unsightly lots was very creditable. The great value of this work, however, is unseen. The child who plants the seed, watches it germinate and grow under his care, who sees the flower and then the fruit, has little room for impure thoughts and feelings. The wonder and beauty of nature's laws are seen and felt day by day, stamp their impress on the mind and heart of the child and bring him very close to the One who gives life to all.

"There is no life for a child that equals the country life. Its close companionship with nature, its silent, unconscious influences, give a moral and physical strength supplied in no other way.

"The school garden gives the child of the city a glimpse into this life, and who can measure the value to him of this brief companionship with nature? Under the wise direction of his instructor it becomes to him much more than a glimpse."

In conclusion, it may be stated that the gardens have grown a few plants of interest to the pharmacist.

CORRESPONDENCE.

OIL OF BITTER ALMONDS.

Prof. Henry Kraemer, Editor AMERICAN JOURNAL OF PHARMACY:

DEAR SIR.—I would be pleased if you would insert the following correction concerning my recent article on "Oil of Bitter Almonds" in the forthcoming number of the AMERICAN JOURNAL OF PHARMACY.

On page 156, line 11, the word "benzo-nitrile" should be "phenyl oxyaceto-nitrile." Through an error in the manuscript sent you this incorrect word appeared. Very truly yours,

FRANK O. TAYLOR.

DETROIT, MICH., April 16, 1908.

BOOK REVIEWS.

THE PHARMACOPŒIA AND THE PHYSICIAN. By Robert A. Hatcher, Ph.G., M.D., and Martin I. Wilbert, Ph.M. Second revised edition. 485 pages, with excellent index. American Medical Association Press. 1908.

This is distinctly a book with a purpose, and a most worthy purpose—that of familiarizing the medical profession with the official drugs. It is a notorious fact, conceded by all medical teachers, that until quite recently materia medica has been the worst-taught subject in the whole medical curriculum. Most of the men now in practice were obliged to acquire the greater part of their knowledge of this subject after graduation, without teachers—or rather with worse than none! The manufacturers of the various proprietary specialties stood quite ready to supply information, unlimited in amount and attractive in appearance, but distinctly one-sided in quality. This teaching naturally took the form of extolling the more or less imaginary advantages of these proprietary drugs over the official, neglecting entirely the often much more substantial disadvantages. Most physicians accepted these statements as facts, with quite childlike confidence, forgetting that the official drugs had successfully stood the test of time, and that the specialties had scarcely been tried. This confidence so emboldened many of these proprietary houses that conditions became not only intolerable, but absurd, furnishing a well-prepared soil for the seeds of reform. These were sown by the appointment of professional scientists to the chairs of pharmacology and materia medica in a few of the better medical schools. The experiment was so successful that it extended rapidly to more and more of such schools, and the graduates of the present day are not quite so easily imposed upon. At the same time, the enlightenment of the older graduates was undertaken by their

national organization, the American Medical Association, through its Council on Pharmacy and Chemistry. These manifestations of interest on the part of the medical profession aroused the more progressive pharmacists to renewed activity, until even the N.A.R.D. is taking a hand in the propaganda.

This book of Hatcher's and Wilbert's is destined to be a most valuable instrument in this broad movement of reform. Its direct aim is to give physicians a glimpse—for some a revelation—of the rich therapeutic armamentorium of the U.S.P. and N.F. It does not pretend to be either a reference or a text-book, but rather a readable presentation of the practical phases of the subject—the manner in which therapeutical indications can be met by official drugs; the preparations and combinations in which these may be prescribed, and such pharmaceutical properties as are important to the physician. The authors do not look upon the Pharmacopœia and Formulary as idols; they do not hesitate to criticise the shortcomings of these works; neither, on the other hand, do they hesitate to expose the extravagant and often absurd claims of the proprietary preparations. It is quite needless to dwell upon the accuracy and reliability of the contents. No physician could take up the book without getting from it something of direct value; the early appearance of this second edition attests the general appreciation of this fact. The pharmacist also will find it not only interesting, but practically valuable, for an intelligent knowledge of therapeutical properties is indispensable to the scientific understanding of his profession; and if he is interested in the general propaganda, he cannot do better than to discuss the subjects of this book with his medical friends.

TORALD SOLLMANN.

WINDOW DISPLAYS FOR DRUGGISTS. By Harry B. Mason, editor of the *Bulletin of Pharmacy*. Detroit, Mich: E. G. Swift. Price, postpaid, $1.

This book is invaluable to retail druggists who believe in show-window advertising, which is unquestionably a paying proposition, especially in those stores located on large thoroughfares.

It has been said that "a man's face is a mirror to his soul," therefore it can be truthfully said that a drug store show-window denotes the character of the man managing the store. Mr. Mason has presented in his book over one hundred photographic illustrations of

practical window-dressing, consisting of every species of merchandise generally handled by a retail druggist,together with practical suggestions as to how to vary the exhibit to suit any condition. One of the most difficult problems in the commercial career of a retailer is how to properly display his goods to advantage. This problem can be easily solved by consulting Mr. Mason's book, and all retail druggists who have any personal pride in the attractive appearance of their stores should feel under great obligation to him for placing within their reach such an easy solution of their difficulties.

THOMAS H. POTTS.

THE PHILADELPHIA BRANCH OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The meeting of the Philadelphia Branch of the American Pharmaceutical Association, on the evening of Tuesday, April 7, 1908, was devoted to a discussion on "Adulterations and their Detection."

Dr. George R. Pancoast and Mr. W. A. Pearson discussed "The Adulteration of Volatile Oils," and called attention to the difficulty of satisfactorily controlling these products by chemical means. They pointed out that for volatile oils that are used largely, if not entirely, for their odor, odor tests are perhaps the most satisfactory, particularly when combined with systematic dilution.

Mr. L. Henry Bernegau, in a communication entitled "Some Remarks on the Adulterations of Drugs and Chemicals as found in practice," gave an interesting résumé of some laboratory experiences with well-known drugs and chemicals. Of a number of samples of gold and sodium chloride that were examined, not one represented fully the 30 per cent. of metallic gold required by the Pharmacopœia. The greater number of samples varied from 28·8 to 24·6 per cent. of metallic gold.

Samples of commercial resin of podophyllin contained as high as 10 per cent of foreign matter, and even chemical substances, like sanguinarine nitrate, were found to be quite variable in composition.

Dr. Lyman F. Kebler, of the Division of Drugs, Bureau of Chemistry, presented a communication on "The Drug Laboratory of the Bureau of Chemistry as a Factor in the Detection of Adulterations."

Dr. Kebler called attention to some of the varied activities of the drug laboratory, and the attempts that are now being made to compel a reasonably strict adherence to the provisions of the food and drugs act. In connection with the work that is being done under the food and drugs act, the most evident need is the devising of improved methods for detecting the composition of the several compounds that are being marketed.

Another practical difficulty that has been encountered is the difficulty of procuring many of the necessary chemicals of the required standard for purity. To insure reasonably pure chemicals it has been found necessary to revert to the standards of the U.S.P. for 1890, as these are invariably higher than the standards of the U.S.P. 8th Decennial Revision.

One of the many practical problems that the men in charge of the laboratory are now endeavoring to solve is the question of deterioration of drugs and chemicals. For this purpose a number of drugs that are usually thought to be readily decomposed have been studied systematically to determine, if possible, the rate of deterioration under varying conditions.

In connection with the study of vegetable drugs a rather interesting complication has been developed by the discovery that the greater number of reference herbariums are far from being uniformly reliable.

This fact will require a careful review of herbariums used for comparison, and this is now being done by the officials in charge of the herbarium in the Smithsonian Institution.

In conclusion Dr. Kebler exhibited a number of samples of adulterated and sophisticated drugs that had come to his attention and also showed a number of preparations that were being marketed contrary to the requirements of the food and drugs act.

The several communications were discussed by Prof. Joseph P. Remington, Professor Stanislaus, Mr. Hunsberger, Professor Kraemer, Mr. Hilts and a number of others. A vote of thanks was tendered to Dr. Kebler and the other contributors for the presentation of interesting and valuable information.

A preamble and resolution endorsing "H. R. 16,091" was unanimously adopted.

M. I. Wilbert,
Secretary.

APRIL PHARMACEUTICAL MEETING.

The regular Pharmaceutical Meeting of the Philadelphia College of Pharmacy was held Tuesday afternoon, April 21st, with Prof. Joseph P. Remington in the chair.

Prof. C. S. N. Hallberg, of the University of Illinois, addressed the meeting on the subject of improving the practice of pharmacy and medicine in the United States. The address was largely devoted to a consideration of that class of proprietary medicines for which false claims are made, both to physicians and to the public. The methods of advertising these preparations were described, and the statement was made that if the journals published to exploit them were not allowed second-class postal rates, these journals could not exist. Professor Hallberg said that the work of the Council on Pharmacy and Chemistry of the American Medical Association had entirely changed the attitude of the medical profession toward secret remedies. He said that the Council had been at work for about three years, and had found some 300 proprietary compounds and preparations that were true in name and composition, and in this connection said that the Council had not heretofore undertaken to investigate the therapeutic qualities of these preparations, and, therefore, it should be understood that they do not recommend them on the basis of their therapeutic properties.

Professor Hallberg also spoke of the splendid results which are attending the joint meetings of physicians and pharmacists in various parts of the country, one of them being an increase in the use of U.S.P. and N.F. preparations. The trend of the movement is, however, as he sees it, not against manufacturing pharmacists, but against the manufacturers of secret preparations or those for which untruthful claims are made.

The address was discussed by Dr. Albert M. Eaton, president of the Philadelphia County Medical Society; Dr. H. C. Wood, Jr.; Dr. C. B. Lowe, H. K. Mulford, W. L. Cliffe, William McIntyre, M. I. Wilbert, Prof. I.V. S. Stanislaus, and the chairman. Dr. Eaton stated that all of the scientific physicians in Philadelphia are in harmony with the movement to bring physicians and pharmacists together. He said that the matter had been taken up by several of the branches of the society, and that it would be considered by every branch not only next year, but every year until it is satisfactorily

settled. Dr. Eaton said that the Council on Pharmacy and Chemistry of the A.M.A. has done work which every one appreciates, and for which physicians are truly grateful, and that when the work done by the American Medical Association in 1875 is compared with that now being carried on by the Association, the change brought about amounts almost to a revolution. He then mentioned some of the facts which go to show that physicians as a class are improving not only in their attitude toward minor ethical practices, but also in regard to the kind of medical journals which they read. Another interesting fact mentioned by Dr. Eaton was that in his work as a member of the Committee on Advertising in Religious Journals of the Pennsylvania State Medical Society, he had found six journals of this class that were clean.

Dr. Wood said that he was interested in the remark that formerly when questions of mutual interest were discussed, physicians would meet in one place and pharmacists in another, and he claimed that this manner of procedure was largely responsible for conditions as they had existed in the past. He therefore urged that the members of the two callings meet in friendly concourse to consider the evils that have sprung up.

Mr. Mulford said that he had been impressed by the position taken by Professor Hallberg in advocating the use of Latin names for all preparations. He said that his firm had tried the experiment of using the official titles on their labels, and that they had received objections to this manner of labeling from jobbers all over the country, thus being obliged to print another set of labels giving the common names of the preparations. Mr. Mulford advanced the opinion that more information regarding the properties of medicines should be given by physicians to the laity, claiming that if the layman has some knowledge of drugs, he is better able to appreciate the benefits of medical treatment; and that ignorant laymen are the ones who are victims of medical pretenders.

Mr. Wilbert announced that Dr. J. N. McCormack would deliver an address on certain phases of the work of the Ameriean Medical Association at Witherspoon Hall, Philadelphia, on the evening of May 11th, and urged those present to attend the lecture.

At the close of the discussion a vote of thanks was tendered Professor Hallberg for his interesting address.

FLORENCE YAPLE, *Secretary pro tem.*

PHILADELPHIA COLLEGE OF PHARMACY.

MINUTES OF THE ANNUAL MEETING.

The annual meeting of the members of the Philadelphia College of Pharmacy was held on Monday, March 30, 1908, at 4 P.M. in the Library. The President, Howard B. French, presided. Twenty-six members were present.

The minutes of the quarterly meeting, held December 30, 1907, were read and approved.

The minutes of the meetings of the Board of Trustees, held December 2, 1907, January 7th, and February 4, 1908, were read by the Registrar, J. S. Beetem, and approved.

The President read his report for the year ending at this date, from which the following items are abstracted:

Owing to the excessive amount of work required of the electrical plant, it was found necessary to have the dynamo rewound, and to prevent a recurrence of similar trouble a circuit-breaker was placed on the switchboard.

The electrical plant is now in first-class order, but unfortunately it is too small for present requirements,, and a duplicate plant will soon be necessary.

The old Quiz room on the third story of the back building has been remodeled and provided with desks, electric lights, shelving and compartments for the use of the Department of Botany and Pharmacognosy. The cost of these alterations was $1384.37. This gives the Department double the laboratory space heretofore occupied. The new laboratory has been devoted to the uses of the Pure Food and Drug Classes, the students in Bacteriology, and those doing special work, In addition a number of students from the other classes have taken advantage of the increased facilities thus afforded for the purpose of examining specimens under the microscope, and of examining specimens composing the collections that have been placed in the laboratory.

During the past winter several students desired to take up the examination of blood, and the physiological testing of drugs, and instruction was given them on these subjects. There is a growing demand for micro-analysts, and the students are taking advantage of the opportunity offered to qualify themselves for this important work.

A door has been cut through from the Chemical Laboratory to the Chemical lecture room, which enables the Professor of Analytical Chemistry to use more conveniently the latter room in instructing his classes. Other portions of the buildings have had more or less of repairs put upon them, and the entire College is now in fairly good condition.

Early in the year the Board of Trustees authorized the Committee on Property to have plans and specifications drawn for the improvement of the Aimwell School property. The services of Messrs. Seymour Davis and Paul A. Davis, 3d, architects, were secured. Plans and specifications for a two-story and basement building were prepared and bids invited. A number of bids were received and the award was made to the lowest bidder, Mr. Herbert E. Havens.

The building as erected is a model of convenience, is now almost completed, and will be turned over to the College at an early date. It is to be utilized as a Pure Food and Drug Laboratory. The President stated that with this addition, together with the new Microscopical Laboratory, the College is in better condition for perfecting students in the analysis and examination of Foods and Drugs than any other educational institution of which he was aware. It also gives the students of the College added facilities for perfecting themselves in chemistry as applied in many of the arts and manufactures, and to qualify themselves for important positions in manufacturing plants. In this connection he urged the establisement of a Post-Graduate Course.

The work in Operative Pharmacy has been steadily advancing. The special course in Dispensing has proven of much value, and there is no doubt as to the wisdom of separating the instruction in Dispensing from that given to the regular classes.

A new field of work has been inaugurated in the department of Operative Pharmacy, which may be termed "Pharmacopœial Research." Preparations of the U. S. Pharmacopœia and National Formulary have been made by the students specially fitted for this work. Critical notes and suggestions for improvement in the processes have been made, which, it is hoped, will be of assistance to the Revision Committee of the U. S. Pharmacopœia and the National Formulary.

There is a net increase of fifty-four students over the corresponding period of last year. In the various departments of the College, viz.: Pure Food and Drugs course, Chemistry, Bacteriology, Microscopy and Special Studies, 103 students are enrolled, in addition to those taking the regular pharmacy course.

Special notice is taken of the death of the lamented Treasurer, James T. Shinn, whose death occurred suddenly on October 4, 1907. He had devoted much time and ability to the welfare of the College. and his death was a severe blow to the institution. He was a man of staunch character and lovable traits, one who will long be missed and whose life is well worthy of emulation.

Acknowledgment is made to many members and friends of the College for their liberality in contributing towards the erection of the new Annex Laboratory.

The activity of the Alumni Association continues, for which it is strongly commended.

The President expressed his appreciation of the kindly co-operation of all officers of the College, and also the hope that unity of action and earnest effort on the part of all the members will be continued in the future.

The Committee on Nominations presented their report, containing the names of the various nominees for offices, trustees and committees.

The report of the Publication Committee was read by Professor Sadtler, which stated that all bills for the year had been paid and that a balance remained to be carried over to the new account.

The report of the editor of the AMERICAN JOURNAL OF PHARMACY contained a summary of the matter that has been published during the year.

The report of the Committee on Pharmaceutical Meetings. The meetings have been held regularly during the year. The formulæ and make-up of the National Formulary received considerable attention, and the discussions were of practical interest to retail pharmacists. At one of the meetings a resolution was passed requesting an early revision of the National Formulary, and pledging the assistance of the members of the College in carrying on the work.

Curator's Report by Joseph W. England:

The Museum is in good condition, but is in need of extension in several directions. The Martindale and College Herbarium Collections should be rearranged; this will entail considerable work, as the numbers of the plants run into the thousands. It is important that some provision be made for the proper keeping and exhibition of the historical collection of the College. For this purpose new cases are needed, which could be placed in the gallery of the Museum. A series of Museum lectures is recommended to be given during the year, exhibiting not only the collections in the Museum, but also those of special historical and other interest contained in the collections of the teachers. Thus, one lecture could be devoted to the Martindale and College Collection of plants, and one to plant products, one to chemical products, and one to pharmaceutical products, etc. These lectures would be useful in making known the value of the collections, and would also open the door for the presentation of new specimens, and thus keep the collections up-to-date.

The Curator also suggested that the various collections in the College might be utilized for exhibition purposes during Founders' week in October next.

In the discussion that followed the reading of the Curator's report, Professors Remington and Sadtler commended the suggestion of having the Museum lectures. On motion, the report was referred to the Board of Trustees for consideration.

Librarian's Report by Thomas S. Wiegand:

There have been added 180 volumes during the year, and in addition a number of volumes have been donated. The library has

also been enriched by the volumes of the large number of valuable exchanges, which have been bound. There are now in the library about 12,000 bound volumes and over 3,000 pamphlets. The library has been consulted by the students more than usual, and a number of non-members have enjoyed its privileges.

Historical Committee Report, by George M. Beringer. During the past year a few additional contributions to the Historical Souvenirs and data that are being collected by the Museum have been received, notably some letters and correspondence of the late Prof. William Procter, Jr.; a letter in Latin of Baron Justus Liebig (received from Mr. Joseph Jacobs, of Atlanta, Ga.).

The exhibit authorized by the College for the Pennsylvania State Museum has been completed and forwarded to Harrisburg, where it is now on exhibition in the Museum. It consists of a series of volumes of the AMERICAN JOURNAL OF PHARMACY. A "hand made" book containing "Memoirs of Some of Those Identified with the Development of the Philadelphia College of Pharmacy." Articles of Incorporation, Constitution and By-laws of the College and a Condensed History. Announcements of the College. A booklet entitled "The Faculty of the Philadelphia College of Pharmacy." The printed text-books of Professors Remington, Sadtler, Kraemer and Moerk.

A series of photographs of the buildings showing interior and exterior views, and portraits of the presidents of the College and those who have been teachers in the College, and the present faculty. (These portraits were prepared by Mr. Gutekunst, of a uniform style and size, and a duplicate set has been prepared and retained in the College.) In this collection of the portraits of the presidents there is still lacking the portrait of Mr. William Lehman, the second President of the College, who filled that office from 1825–1829. The Committee have been unable to find a portrait of Mr. Lehman, but are continuing their search and hope to be able to supply the deficiency.

The laboratories of the College contributed to the exhibit as follows:

The Pharmaceutical Laboratory, a collection of approved packages for dispensing of prescriptions.

The Chemical Laboratory, six cards of Mounted Type Tests and Color Reactions.

Botanical and Microscopical Laboratory, four cards containing Type Specimens of Commercial Opium and Alkaloidal Constituents, Commercial Cinchonas and Alkaloidal Constituents, Commercial Cinnamons, and a Student's Case of Crude Vegetable Drugs.

A letter from the Curator of the Museum at Harrisburg states that the exhibit has proved attractive and interesting.

The committee recommend a vote of thanks to Mr. Joseph Jacobs for the autograph letter of Baron Liebig, which was, on motion, adopted.

The resignations of Doctor William S. Weakley and George Y. Wood from active membership were read and accepted.

The President made the following appointments: Delegates to the meeting of the Pennsylvania Pharmaceutical Association, to be held at Easton, June 23d, 24th and 25th, Clement B. Lowe, Mahlon N. Kline, William McIntyre, H. L. Stiles and Charles H. La Wall. Committee on By-Laws, George M. Beringer, Joseph W. England and C. A. Weidemann. Delegates to the New Jersey Pharmaceutical Association, George M. Beringer, Joseph P. Remington and C. B. Lowe.

Mr. Wilbert presented a preamble and resolution relating to a bill now pending in Congress, known as "H. R." No. 16,091, which has for its object the improvement of the pharmaceutical service in the Public Health and Marine Hospital service. Considerable discussion followed the presentation; numerous amendments and motions were made, after which a special committee, consisting of Messrs. Remington, Cliffe and Wilbert were appointed to consider the matter, who subsequently proposed the following amendment to the House bill:

"*Resolved*, That we recommend that appointments to the rank of Assistant Pharmacists be limited to graduates of pharmacy from a recognized college or school of pharmacy."

This was adopted, and copies of the preamble and resolution, and amendment directed to be sent to the chairman of the Committee on Expenditures of the Treasury Department, and the Representatives in Congress from Philadelphia.

The election of officers, trustees and committees being now in order, Messrs. Cliffe and England were appointed tellers, who, after a ballot was had, reported the election of: President, Howard B. French; First Vice-President, Mahlon N. Kline; Second Vice-Presi-

dent, R. V. Mattison; Treasurer, Richard M. Shoemaker; Corresponding Secretary, A. W. Miller; Recording Secretary, C. A. Weidemann; Curator, Joseph W. England; Librarian, Thomas S. Wiegand; Editor, Henry Kraemer; Trustees, Joseph P. Remington, Gustavus Pile and C. Carroll Meyer. Theodore Campbell was elected to fill the unexpired term of Richard M. Shoemaker, who was elected treasurer; Publication Committee, Samuel P. Sadtler, Henry Kraemer, Joseph W. England, Martin I. Wilbert, Miss Florence Yaple, Charles H. La Wall; Committee on Pharmaceutical Meetings, Joseph P. Remington, C. B. Lowe, William L. Cliffe, William McIntyre, and the editor.

C. A. Weidemann, M.D.,
Recording Secretary.

ABSTRACTS FROM THE MINUTES OF THE BOARD OF TRUSTEES.

December 2, 1907. Fifteen members were present.

Committee on Property reported progress on the new Pure Food and Drug Laboratory building, which, it was stated, would be under roof by January 1, 1908.

Special Finance Committee reported progress in securing contributions towards the new building.

January 7, 1908. Eleven members were present

Committee on Property reported that weather conditions had delayed work on the new annex building.

Committee on Library reported a number of accessions to the library during the past two months.

Committee on Examinations reported as suitable candidates a number of names for the award of the degree of Master in Pharmacy.

The subject of conferring the honorary degree of Doctor in Pharmacy (P. D.), had been discussed by the committee, but no recommendation was made.

Prof. Henry Kraemer submitted the name of John J. Bridgeman, Jr., as additional assistant in the microscopical laboratory.

Prof. F. X. Moerk submitted the name of Joseph A. Wolfe as additional assistant in the chemical laboratory.

The selection of these assistants was confirmed by the board.

Professor Sadtler stated that he would endeavor to arrange for some special lectures to the students in the Pure Food and Drugs Course by the first of April.

February 4, 1908. Fifteen members were present.

Committee on Property reported that the work on the new building was progressing favorably, though it had been delayed, but it was expected that the building would be completed in about three weeks. The committee further reported that a new electric light plant would be necessary.

Committee on Library reported a number of accessions during the month.

The Special Committee, to whom was referred the selection of names from those submitted at the last meeting by the Committee on Examinations, upon whom the degree of Master in Pharmacy should be conferred, submitted five names, and their selection was approved by the board.

The Committee on Property was authorized to arrange for a formal opening of the new Pure Food and Drug Laboratory.

The Secretary of the College was authorized to sign the names of officers and faculty, deceased, on duplicate diplomas and certificates, and an engrossed foot-note on the diploma or certificate, stating that such names were signed by the Secretary of the College by order of the Board of Trustees.

George B. Evans and Richard H. Lackey were elected active members.

C. A. Weidemann, M.D.,
Recording Secretary.

OBITUARY.

JACOB A. MILLER.

Dr. Jacob A. Miller, one of the best known druggists of Harrisburg, Pa., died at his residence in that city on April 27, 1908, from cancer of the throat, he having been ill since January.

Dr. Miller was born in Lancaster seventy-one years ago. He was graduated from Lafayette College in 1858 and from the Medical Department of the University of Pennsylvania in 1861. That year he became assistant superintendent of the Pennsylvania State Lunatic Hospital located at Harrisburg.

At the outbreak of the Civil War he was assigned from General

McClellan's headquarters as a surgeon to Burdan's New York Sharpshooters and was later transferred to the Second Regiment, Rhode Island Volunteers. The last time he was ill with the exception of the illness that resulted in his death, was when he was taken sick with camp fever and sent home, when he again assumed his duties at the Insane Hospital. For a number of years in the early sixties he was county physician in Lancaster.

Forty years ago he opened his drug store at Second and Chestnut Streets and for thirty years he was secretary of the Pennsylvania State Pharmaceutical Association. He served for a number of years as secretary of the Dauphin County Pharmaceutical Association and was the first secretary of the Lancaster County Medical Association.

Dr. Miller represented the Third Ward in the School Board from 1878 to 1887.

For thirty-one years Dr. Miller was an elder in the Market Square Presbyterian Church and also clerk of the session. He taught in the Sunday-school for thirty years or more and for many years held an unbroken record for attendance.

Dr. Miller is survived by a wife and two sons: John Z. Miller, of Erie, and Charles G. Miller, of Harrisburg.

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CHEMICAL EXAMINATION OF IPOMŒA PURPUREA.

By Frederick B. Power and Harold Rogerson.
A Contribution from the Wellcome Chemical Research Laboratories, London.

Ipomœa purpurea, Roth (syn. *Ipomœa congesta*, R. Br., *Convolvulus purpureus*, Linné, *Pharbitis hispida*, Choisy), Fam. *Convolvulaceæ*, is indigenous to the tropical regions of both hemispheres. It is largely cultivated in temperate climates on account of the beauty of its flowers, being known as the common Morning Glory (compare Gray's "Manual of Botany," sixth edition, p. 369).

The above-mentioned plant was brought to the notice of Messrs. Burroughs, Wellcome & Co., London, a few years ago by Mr. J. Medley Wood, A.L.S., Director of the Natal Botanic Gardens, Durban, South Africa, and to the kindness of Mr. Wood we are indebted for the material employed in this investigation, which was specially collected under his supervision for the purpose.

The interest pertaining to this subject depends upon the fact that the stems and roots of the respective plant, called by the natives of South Africa "i-Jalapa," are used by them as an aperient medicine, and are believed to be as valuable for this purpose as true jalap. It is, however, well known that among the 300–400 species of the genus *Ipomœa*, which are distributed throughout tropical and temperate countries, there are many which possess purgative properties similar to those of jalap, and a number of these plants, or the resins obtained from them, have in fact been employed to some extent medicinally (compare "The National Standard Dispensatory," p. 836; "United States Dispensatory," nineteenth edition, p. 675; "Pharmacographia Indica," Vol. II, pp. 527 *et seq.*).

With consideration, therefore, of the recognized value of true jalap, and also of the conditions which in recent years have so unfavorably influenced the quality of this drug, it would appear to be very desirable that such plants as are capable of affording products of similar or equal activity should be subjected to a complete chemical and physiological examination. The results of such investigations, apart from the scientific interest they may possess, would doubtless often prove useful in directing attention to the particular value of native remedies, even should their employment remain restricted to the country of their production.

A description of *Ipomœa purpurea* (Roth), with its synonymy and geographical distribution, is contained in the "Flora Capensis," Vol. IV, section 2, p. 59. London, 1904. It is stated in this work that the plant not only occurs in the Kalahari and eastern regions of South Africa, such as the Transvaal and Natal, but also in Central and South America and Australia.

A more detailed description of the same plant, under the name of *Ipomœa congesta*, R. Br., is given in the work entitled "Natal Plants," by J. Medley Wood, A.L.S., and Maurice S. Evans, M.L.A., F.Z.S., Vol. I, Part 2, p. 75. Durban, 1899. This description is accompanied by an uncolored plate, representing a flowering plant with dissections of the flower. It is likewise noted by these authors that the plant is not uncommon in the coast districts of Natal, and that it is also a native of Australia.

The material employed in this investigation evidently consisted chiefly of the ærial stems of the above-mentioned plant. It had the following general characters:—Curved, rope-like pieces, a metre or more in length, and varying in diameter from 8 millimetres in the larger pieces to 1 millimetre or less in the branches. Color, light brown; fracture, short, except in the bark, where fine, long, silky fibres project; odor and taste slight.

Experimental.

As a preliminary experiment for ascertaining the general characters of the drug, fifty grammes of the finely-ground material were extracted successively in a Soxhlet apparatus with various solvents, when the following amounts of extract, dried at 100° C., were obtained.

Petroleum (b. p. 40-60° C.)	extracted	0·17 gramme	=	0·34 per cent.
Ether	"	0·30 "	=	0·60 " "
Chloroform	"	0·34 "	=	0·68 " "
Alcohol	"	3·07 grammes	=	6·14 " "
Water	"	5·25 "	=	10·50 " "
	Total	9·13 "		18·26 " "

Determination of Total Resin.

For the determination of the total resin in the drug the following method was employed :—Fifty grammes of the finely-ground material were thoroughly extracted in a Soxhlet apparatus with hot alcohol (94 per cent). To the liquid thus obtained 25 c.c. of water were added, and the alcohol removed by distillation, after which the residue was brought into a dish and heated on a water-bath in order to remove the last traces of alcohol. The separated resin was then washed three or four times with hot distilled water, and finally dried in a water-oven until of constant weight. Two concurrent determinations yielded 2·4 grammes of resin, corresponding to 4·8 per cent. of total resin in the drug. The proportion of this crude resin which was soluble in ether, as determined by its complete extraction with the latter solvent in a Soxhlet apparatus, corresponded to 15·5 per cent. of its weight.

Optical Rotation of the Crude Resin.

It has been indicated by P. Guigues[1] that the specific optical rotatory power of certain convolvulaceous resins is a factor which may be utilized for discriminating between them, and for the detection of substitutes and adulterants. Thus the resin of scammony, obtained from the root, is said to have a rotation varying from — 18° 30′ to —23° 30′, whereas the upper limit for the resin from the natural gum-resin scammony is — 25°. Resins having a rotation between — 23° 30′ and —25° are considered to be derived from *Ipomœa orizabensis*, Ledanois. The addition to the above products of official jalap resin or that of *Ipomœa turpethum*, R.Br., increases the rotation, while an admixture of colophony, sandarac or mastic would lower it, since the latter are dextrorotatory.

[1] *Journ. de Pharm. et de Chim.* [6], 22, 241, and *Chem. Centralblatt*, 1907, Bd. I, p. 309.

In order to determine the value of this factor in connection with the resin under investigation, the method suggested by Guigues was employed. About 2·5 grammes of the crude resin were dissolved in 50 c.c. of alcohol, and the solution boiled with successive small portions of animal charcoal until it became practically colorless. The rotation of this liquid was then observed in a 1 dcm. tube, after which 10 c.c. of the liquid were evaporated to dryness, the residue dried at 105 —110° C., and weighed. The initial rotation in a 1 dcm. tube having been found to be —42′, and as the amount of solid substance in 10 c.c. of the liquid was 0·1374 gramme, the specific rotatory power of the resin is $[\alpha]_D$ — 50·95°.

Preliminary Extraction of the Crude Resin with Different Solvents.

In order to ascertain the general character of the crude resin, an amount of the latter obtained from 100 grammes of the drug (4·8 grammes) was dissolved in alcohol, mixed with purified sawdust, and the thoroughly dried mixture extracted successively in a Soxhlet apparatus with various solvents. The percentages of extract, dried at 110° C., were as follows:

	Per cent.
Petroleum (b. p. 40–60° C.) extracted	8.0
Ether "	7·3
Chloroform "	9·8
Ethyl acetate "	23·8
Alcohol "	49·0
Loss	2·1
	100·0

For the further complete examination of the drug a quantity (43¼ pounds = 19·6 kilograms) of the ground material was completely extracted with hot alcohol. The extract thus obtained, after the removal of the greater portion of the alcohol, was brought into a large flask, some water added, and the mixture distilled in steam until volatile products ceased to pass over. A turbid distillate was thus obtained, from which a few oily drops separated on the surface. After this operation there remained in the distilling vessel a dark-colored, aqueous liquid (*A*), which possessed an agreeable, fruity odor, and a quantity of soft, very dark greenish resin (*B*), which was thoroughly washed with warm water and the washings added to the aqueous liquid.

Examination of the Steam Distillate.

The distillate was extracted with ether, the ethereal liquid being dried with anhydrous sodium sulphate, and the ether removed. A small amount of an essential oil was thus obtained which, when distilled under a pressure of 35 mm., passed over between 90 and 180° C. It had a pale yellow color, a strong characteristic odor, and the following constants: $d\ 20°/20° = 0.9085$; $a_D - 4°\ 52'$ in a 1 dcm. tube. The amount of this essential oil was 3.5 grammes, corresponding to 0.018 per cent. of the weight of the drug.

Examination of the Aqueous Liquid (A).

The aqueous liquid remaining in the steam distillation flask was separated from the previously mentioned soft resin, and, together with the washings from the latter, evaporated to a small volume. It then formed a very dark, syrupy liquid, which, on standing, deposited a quantity of crystals amounting to about 40 grammes. These were separated, and washed with a little alcohol, when on further examination they were found to be entirely inorganic, and to consist of a mixture of potassium chloride and nitrate.

The syrupy liquid was subsequently diluted with water, and treated with a slight excess of solution of basic lead acetate, when an abundant, deep yellow precipitate was produced. This was collected on a filter and washed with water, the washings being added to the filtrate.

Basic Lead Acetate Precipitate.—This was suspended in water, decomposed with hydrogen sulphide, and the lead sulphide removed by filtration. The filtrate had an orange-yellow color and gave a greenish-brown coloration with ferric chloride, indicating the presence of a small amount of tannic matter. When concentrated, it formed a dark brown syrup. As the latter deposited nothing of a crystalline character on standing, it was extracted with ether, and the ethereal liquid shaken with successive portions of a solution of sodium carbonate. The first two extractions with alkali were of a red color, and, when diluted, showed a blue fluorescence, whereas the subsequent extractions were colorless. The alkaline liquids were then acidified and extracted with ether, but only a trace of an amorphous, reddish substance was obtained. The original ethereal liquid which had been shaken with alkali was dried and the ether removed, but it gave practically no residue.

Filtrate from the Basic Lead Acetate Precipitate.—This was treated with hydrogen sulphide for the removal of the lead, the mixture filtered, and the filtrate concentrated under diminished pressure to the consistency of a thick syrup. The latter, on cooling, deposited a further quantity of the above-mentioned mixture of potassium chloride and nitrate. The syrupy liquid, amounting to about 250 grammes, only reduced Fehling's solution very slowly on heating, and no osazone could be obtained directly from it. It was therefore mixed with pnrified sawdust, the mixture thoroughly dried in a vacuum, and extracted successively in a Soxhlet apparatus with ethyl acetate, absolute alcohol, and water. The amounts removed by these solvents were about 20, 190 and 40 grammes, respectively. Both the ethyl acetate and alcohol extracts were uncrystallizable syrups, and only reduced Fehling's solution after heating with a dilute mineral acid. They then afforded crystalline osazones, melting at 213–214° C., thus indicating that by the treatment with acid hydrolysis had ensued with the production of glucose. In both cases during the hydrolysis a peculiar, fragrant odor was developed, and on distilling the liquid the aromatic substance was found to be volatile in steam, but it was only small in amount, and did not afford a reaction for furfural or other aldehydes. The final aqueous extract formed a thick syrup, which, in distinction from the above-mentioned ethyl acetate and alcohol extracts, reduced Fehling's solution directly on heating, although slowly. After hydrolysis, however, the reduction was effected immediately, and it then afforded *d*-phenylglucosazone, melting at 210–211° C. With the exception, therefore, of the previously mentioned inorganic salts, nothing of a crystalline character could be isolated from the original aqueous liquid.

Examination of the Resin (*B*).

For the purpose of completely examining the resinous material the previously mentioned, soft, dark-colored mass was thoroughly mixed with prepared sawdust, the mixture dried, and extracted successively in a Soxhlet apparatus with the following solvents: (I) Petroleum (b. p. 40–60° C.), (II) Ether, (III) Chloroform, (IV) Ethyl acetate, (V) Alcohol.

I. *Petroleum Extract of the Resin.*

This was a soft, thick extract, possessing a deep green color. It was hydrolyzed by heating with an alcoholic solution of an excess

of potassium hydroxide, the alcohol then removed, and the residual thick, green liquid poured into a large volume of water. The strongly alkaline liquid was extracted six times with ether, the combined ethereal solutions washed with water, dried with calcium chloride, and the ether removed, when a dark-colored liquid was obtained which, on cooling, solidified to a crystalline mass. This was dissolved in alcohol, the solution heated with animal charcoal, and filtered, when, on cooling, a quantity of a solid substance separated, which was collected on a filter and spread on a porous plate. After being again subjected to the same process of purification, it was finally distilled under a pressure of 15 m.m , ween it was obtained as a white, silky mass. This was crystallized from ethyl acetate, from which it separated in small, lustrous leaflets, melting sharply at 74–75° C.

0·0794 gave 0·2480 CO_2 and 0·1042 H_2O. C = 85·2; H = 14·6
$C_{35}H_{72}$ requires C = 85·4; H = 14.6 per cent.

The above described substance was thus identified as pentatriacontane.

The alcoholic mother-liquors from the first crystallization of the pentatriacontane were concentrated and allowed to stand, when a further portion of a solid substance separated. This was collected, dried on a porous plate, and subsequently crystallized several times from a mixture of ethyl acetate and alcohol containing a little water. It was then obtained in colorless laminæ, melting at 132–133° C., and afforded the color reactions characteristic of the phytosterols. On analysis it gave the following results:

0·1912 of the air-dried substance when heated to 105° C. lost 0·0090.
H_2O = 4·7
0·0682 of anhydrous substance gave 0·2094 CO_2 and 0·0722 H_2O
C = 83·7; H = 11·8
$C_{27}H_{46}O$, H_2O requires H_2O = 4·5 per cent.
$C_{27}H_{46}O$ requires C = 83·9; H = 11·9 per cent.

This substance was thus identified as a phytosterol. Its optical rotatory power was determined with the following result:—
0·2336 of anhydrous substance, dissolved in 25 c.c. of chloroform, gave α_D — 0·36° in a 2 dcm. tube, whence $[\alpha]_D$ — 32·1°.

From the character of this phytosterol it would appear probable

that it is identical with sitosterol (compare *Chem. Centralblatt*, 1902, Bd. I, p. 743, and 1903, Bd. I, p. 980).

The strongly alkaline, aqueous liquid resulting from the hydrolysis of the petroleum extract, and from which the pentatriacontane and phytosterol had been extracted by means of ether, was concentrated to a small bulk, acidified with sulphuric acid, and distilled with steam. The distillate had an acid reaction, and in the first portions some oily drops were observed. It was therefore extracted with ether, the ethereal solution being washed with a little water, dried with calcium chloride, and the ether removed, when a small amount of a pale-yellow, oily acid was obtained. This was neutralized with ammonia, and, by fractional precipitation with a solution of silver nitrate, several silver salts were prepared, which were washed, dried in a vacuum over sulphuric acid, and analyzed.

(I) 0.2004 of salt gave on ignition 0.0728 Ag. Ag = 36.3
(II) 0.0760 " " " 0.0300 Ag. Ag = 39.5
(III) 0.0112 " " " 0.0046 Ag. Ag = 41.1

$C_9H_{17}O_2$ Ag requires Ag = 40.8 per cent.
$C_{11}H_{21}O_2$ Ag " Ag = 36.9 " "

The results of these analyses indicate the volatile oily product to be a somewhat complex mixture of acids, and no conclusion can be drawn respecting the identity of the latter.

The aqueous distillate, after extraction with ether, still contained a small amount of acid which was converted into a barium salt. This yielded reactions indicating the presence of both formic and butyric acids.

After the removal of the volatile acids by distillation with steam, the contents of the distillation flask, when allowed to cool, consisted of a yellowish liquid, on the surface of which a quantity of a green solid substance had separated. This was removed, dissolved in ether, and the ethereal liquid extracted with a solution of sodium carbonate. There then remained in the ether but a small quantity of substance which, when purified, was obtained in the form of colorless crystals, melting at 74–75° C. This evidently consisted of pentatriacontane, which had escaped extraction by the treatment of the alkaline product of hydrolysis with ether. The sodium carbonate extract was acidified, when a green product was precipitated, which was treated with light petroleum, a small amount of tarry matter

remaining undissolved. The petroleum solution was warmed with a little animal charcoal, filtered, and the solvent removed, when a green colored mass was obtained. This was distilled under 15 mm. pressure, when it passed over for the most part at 230° C. as a pale yellow oil, which solidified on cooling to a nearly white, crystalline mass, and amounted to 4·5 grammes. The solid was dissolved in hot alcohol, from which, on cooling, the greater portion separated, and, after drying, melted at 60–62° C. This portion was converted into a lithium salt, and the acid regenerated from the latter obtained in two fractions. The first of these melted at 66–68° C., and was analyzed with the following result:

0·0730 gave 0·2036 CO_2 and 0·0826 H_2O. C = 76·1; H = 12·6.
$C_{18}H_{36}O_2$ requires C = 76·1; H = 12·7 per cent.

This substance was evidently stearic acid.

The second fraction of acid melted at 60–62° C., and was also analyzed.

0·0600 gave 0·1660 CO_2 and 0·0696 H_2O. C = 75·4; H = 12·9
$C_{16}H_{32}O_2$ requires C = 75·0; H = 12·5 per cent.
$C_{18}H_{36}O_2$ " C = 76·1; H = 12·7 " "

The characters of this second fraction indicated it to consist of a mixture of palmitic and stearic acid.

The alcoholic mother-liquor from the crystallization of the above mentioned acids was tested for the presence of unsaturated acids by treatment with an alcoholic solution of lead acetate, and digesting the precipitated lead salt with ether. The portion of salt dissolved by the ether was decomposed with hydrochloric acid, when a very small amount of an oily acid was obtained. The latter, when dissolved in chloroform, decolorized a solution of bromine in the same solvent, thus indicating the presence of some unsaturated acid.

II. *Ether Extract of the Resin.*

This extract was a hard, dark green, brittle resin.

Fusion with Potassium Hydroxide.—Forty grammes of the resin were fused with 240 grammes of potassium hydroxide in a nickel basin, the temperature of the mixture being kept for some time at 200° C., and finally increased to 260° C., when the mass became thick and pasty. After being allowed to cool, it was dissolved in

water, the liquid acidified with sulphuric acid, and distilled with steam. The first portion of the distillate contained a brown-colored oil of disagreeable odor floating on the surface. The entire distillate was therefore first extracted with ether in order to remove the oily acid, the ethereal liquid being washed, dried, and the solvent removed. The product thus obtained was distilled under a pressure of 50 mm., when it passed over as a dark yellow oil, showing no constant boiling-point, and amounted to 1·5 grammes. A portion of the acid was converted into the ammonium salt, and from this, by fractional precipitation with a solution of silver nitrate, two silver salts were prepared, which were analyzed with the following results:

(I) 0·1574 of salt gave on ignition 0·0616 Ag. Ag = 39·1
(II) 0·0982 " " " " " 0·0410 Ag. Ag = 41·7
$C_9H_{17}O_2$ Ag requires Ag = 40·8 per cent.
$C_{10}H_{19}O_2$ Ag " Ag = 38·7 " "

It is evident from these results that the oily acids represent a mixture of somewhat indefinite composition.

The aqueous distillate, after extraction with ether, still contained some acid, which was converted into a barium salt, of which about 7 grammes were obtained. This salt afforded reactions indicating the presence of formic and butyric acids. After drying at 110° C. it was analyzed:

0 2866 of the dried salt gave 0·2580 $BaSO_4$. Ba = 52·9.
$(CHO_2)_2$ Ba requires Ba = 60·4 per cent.
$(C_4H_7O_2)_2$ Ba " Ba = 44·1 " "

This salt would thus appear to have consisted of barium formate and butyrate in about equal proportions.

After the removal of the volatile acids by steam, as above described, there remained in the distillation flask a quantity of resin and an aqueous liquid, which were separated by filtration. The aqueous liquid was extracted with ether, and from this ethereal liquid, after the removal of the solvent, a small amount of a dark red syrup was obtained. The latter, when dissolved in water, yielded with ferric chloride the characteristic catechol reaction, and, after treatment with animal charcoal, deposited a very small amount of a substance in the form of small, crystalline plates. This substance melted sharply at 103–104° C., was acid to litmus, and gave

no coloration with ferric chloride, but yielded precipitates with solutions of silver nitrate and lead acetate. It appeared to be identical with an acid which was subsequently obtained in larger amount by the fusion of the alcohol extract of the resin with potash, and which proved to be azelaic acid. The mother-liquor from this acid deposited an exceedingly small amount of a crystalline substance which gave the above described coloration with ferric chloride, but it could not be obtained in a pure state.

Treatment with Dilute Alcoholic Sulphuric Acid.—Thirty grammes of the resin were dissolved in alcohol, and such an amount of sulphuric acid added, with a little water, that the total liquid contained about 5 per cent. of its weight of acid. The liquid was then heated in a reflux apparatus on the water-bath for about four hours, after which the alcohol was removed, and the residue subjected to distillation in a current of steam. The distillate, which contained a small amount of oil floating on the surface, was extracted with ether, the ethereal liquid being first washed with a little water, and then shaken with a solution of sodium carbonate in order to remove any acids present. After this treatment the ethereal liquid was dried with calcium chloride and the ether removed, when a small amount of a dark green oil was obtained. This was first distilled under a pressure of 10 mm., and then at the ordinary pressure, but as the range of temperature at which it passed over was very wide, it was evidently a complicated mixture. The amount of neutral oil thus obtained was 1·8 grammes. It was a pale yellow liquid, having a rather agreeable odor.

The alkaline liquid obtained by extraction of the original oily product with sodium carbonate was acidified, and extracted with ether, the ethereal liquid being washed, dried with calcium chloride, and the solvent removed. A small amount of an oily acid was thus obtained, which was converted into an ammonium salt, and from this a silver salt was prepared. The latter was washed, dried in a vacuum over sulphuric acid, and analyzed.

0·1288 of salt gave on ignition 0·0498 Ag. Ag = 38 7

$C_{10}H_{19}O_2$ Ag requires Ag = 38·7 per cent.

The figures obtained by this analysis are seen to be in exact agreement with those required for the silver salt of a decylic acid, although it is probable that the acid was a mixture.

The aqueous distillate which had been extracted with ether still contained a small amount of acid, which was converted into a barium salt, and this yielded reactions indicating the presence of formic and butyric acids.

After the removal of the volatile products of hydrolysis by distillation with steam there remained in the distillation flask a quantity of greenish-black resin and a dark-colored, aqueous liquid, which were separated by filtration. From the resinous substance nothing of a crystalline nature could be obtained. The acid, aqueous liquid was first extracted with ether, which removed only a very small quantity of a syrupy substance, and the sulphuric acid then removed by means of baryta. After filtration the liquid was concentrated, when about 3 grammes of a syrup were obtained which instantly reduced Fehling's solution on heating, and when treated with phenylhydrazine acetate yielded *d*-phenylglucosazone, thus indicating the presence of glucose. This syrupy liquid also contained a small amount of a readily soluble organic acid.

III. *Chloroform Extract of the Resin.*

This extract formed a brown mass, which could readily be powdered. Its solution in chloroform was first repeatedly extracted with a solution of sodium carbonate, but this removed only a very small amount of an amorphous, acidic substance.

Fusion with Potassium Hydroxide.—Twenty grammes of the resin were fused with 120 grammes of potassium hydroxide, the operation being conducted in the same manner as has been described in connection with the ether extract. The cooled mass, when dissolved in water, acidified with sulphuric acid, and distilled with steam, yielded a small amount of oily acid. This was extracted with ether, converted into an ammonium salt, and from the latter three fractions of silver salt were prepared and analyzed:

(I) 0·1364 of salt gave on ignition 0·0516 Ag. Ag = 37·8
(II) 0·0644 " " " 0·0260 Ag. Ag = 40·4
(III) 0·0494 " " " 0·0206 Ag. Ag = 41·7

$C_9H_{17}O_2$ Ag requires Ag = 40·7 per cent.
$C_{11}H_{21}O_2$ Ag " Ag = 36·9 per cent.

The volatile acids remaining in the distillate after extraction with ether were neutralized with baryta, when about 2 grammes of a

barium salt were obtained. This afforded reactions indicating the presence of formic and butyric acids, and, after drying at 110° C., was analyzed with the following result:

0·4848 of the dried salt gave 0·4420 $BaSO_4$. Ba = 53·7
$(CHO_2)_2$ Ba requires Ba = 60·4 per cent.
$(C_4H_7O_2)_2$ Ba " Ba = 44·1 per cent.

This salt would thus appear to have consisted of barium formate and butyrate in approximately equal proportions.

The liquid contained in the distillation flask was separated from a quantity of resin and extracted with ether, which removed a very small quantity of substance in the form of a syrup. This gave with ferric chloride the catehol reaction, but nothing of a crystalline nature could be obtained from it.

Treatment with Dilute Alcoholic Sulphuric Acid.—Twenty grammes of the resin were dissolved in alcohol, and such an amount of sulphuric acid added with a little water, that the total liquid contained about 5 per cent. of its weight of acid. After heating for about four hours in a reflux apparatus, the alcohol was removed and the residue distilled with steam. The distillate, which contained some oily drops, was extracted with ether, the ethereal liquid shaken with a solution of sodium carbonate, and the alkaline liquid separated. After the removal of the ether a very small amount (0·5 gramme) of a pale yellow, neutral oil was obtained, which was very similar in character to that described in connection with the ether extract of the resin. The acid extracted from the ethereal solution of the original oily liquid by means of sodium carbonate was converted into an ammonium salt, from which two fractions of silver salt were prepared and analyzed.

(I) 0·0352 of salt gave on ignition 0·0132 Ag. Ag = 37·5
(II) 0·0324 " " " " " 0·0134 Ag. Ag = 41·4
$C_9H_{17}O_2$ Ag requires Ag = 40·7 per cent.
$C_{11}H_{21}O_2$ Ag " Ag = 36·9 " "

The acids remaining in the aqueous distillate after extraction with ether were converted into a barium salt, of which about 1 gramme was obtained. This gave reactions indicating the presence of formic and butyric acids.

After the removal of the above described volatile products by distillation with steam, there remained in the distillation flask a

quantity of resinous substance and an aqueous liquid. The latter, after the removal of the sulphuric acid, yielded about 1·5 grammes of a syrup in which, by the formation of *d*-phenylglucosazone, the presence of glucose was determined. This syrupy liquid also contained a small amount of a readily soluble organic acid.

From these results it will be seen that the chloroform extract of the resin, by treatment with dilute sulphuric acid, yielded products very similar in character to those obtained from the ether extract.

IV. *Ethyl Acetate Extract of the Resin.*

This extract, as originally obtained, was allowed to stand for some time without removing the solvent, when it deposited a considerable quantity of a brown, viscid resin, together with a small amount of a slightly colored, flocculent substance. The ethyl acetate liquid was decanted from these products, which were then treated with alcohol, when most of the flocculent substance remained undissolved, and was separated by filtration. The alcoholic filtrate, after being boiled with animal charcoal and again filtered, was concentrated to a small bulk, when a little more of the flocculent substance was obtained. The ethyl acetate liquid, which had been decanted from the above-mentioned products, was concentrated, when a further small amount of the flocculent substance separated, and was removed by filtration. This filtrate was finally mixed with the alcoholic solution of the viscid resin and the solvents removed, the residual product thus representing the total resin extracted by ethyl acetate, deprived so far as possible of the small amount of light colored, flocculent solid.

Isolation of a New Dihydric Alcohol, Ipuranol, $C_{23}H_{38}O_2(OH)_2$.

The several portions of flocculent solid described above were mixed, dissolved in alcohol, and the solution boiled with animal charcoal. After filtering, and concentrating the liquid, the substance separated in a perfectly white condition. The amount obtained was only about 0·2 gramme. When heated on platinum-foil it first charred, and then burned with a smoky flame, leaving finally no residue. It was very sparingly soluble in alcohol or ethyl acetate, and quite insoluble in water, even when hot. Its alcoholic solution was neutral to litmus. The substance was not decomposed by dilute acids or alkalis, even on boiling. It was found to be freely soluble in pyri-

dine, and was therefore dissolved in a hot, aqueous solution of this solvent, from which, on cooling, it separated in its original form. After drying, it was finally dissolved in hot alcohol, and the pure white *substance* which separated on cooling then melted at 285–290° C., and was analyzed:

0·0708 gave 0·1884 CO_2 and 0·0676 H_2O. C = 72·6; H = 10·6

$C_{23}H_{40}O_4$ requires C = 72·6; H = 10·5 per cent.

From the remaining portion of the substance an *acetyl derivative* was prepared. The latter, when crystallized from acetic anhydride, was obtained in pearly leaflets, melting sharply at 160° C., but the amount was too small for analysis.

A substance possessing the same empirical formula as that of the above-described compound, namely, $C_{23}H_{40}O_4$, and having the same properties, has recently been isolated in these laboratories from olive bark, and has proved to be a new dihydric alcohol. As the acetyl derivatives of these two preparations have the same melting point, which is not altered when they are mixed, it is evident that the two alcohols are identical. It has thus been possible to establish the correctness of the formula assigned to the above-described substance, and, in view of its being a new alcohol, it is proposed to designate it *ipuranol.*

The resinous portion of the ethyl acetate extract was finally obtained in the form of a yellowish-brown powder. This was subjected to the same treatment as has been described in connection with the ether and chloroform extracts of the resin.

Fusion with Potassium Hydroxide.—Thirty grammes of the resin were fused with 160 grammes of potassium hydroxide, the operation being conducted in the same manner as has been described in connection with the ether extract. The cooled mass, which was very light in color, was dissolved in water, the solution acidified with sulphuric acid, and distilled with steam. The distillate, which contained some dark brown, oily drops, was extracted with ether, the ethereal solution being washed, dried with calcium chloride, and the ether removed. A dark brown, oily liquid was thus obtained, which amounted to 1·5 grammes. This was distilled under a pressure of 40 mm., when it passed over within a wide range of temperature as a light brown oil which darkened in color on standing. A portion

of this oily acid was converted into an ammonium salt, from which two fractions of silver salt were prepared and analyzed:

(I) 0·1302 of salt gave on ignition 0·0490 Ag. Ag = 37·6
(II) 0·1156 " " " " " 0·0484 Ag. Ag = 41·9

$C_8H_{15}O_2$ Ag requires Ag = 43·0 per cent.
$C_{10}H_{19}O_2$ Ag " Ag = 38·7 " "

The acids remaining in the aqueous distillate after extraction with ether were converted into a barium salt, of which about 8 grammes were obtained. This afforded reactions which established the presence of formic and butyric acids. After drying at 110° C., it was analyzed with the following result:

0·5934 of the dried salt gave 0·5242 $BaSO_4$. Ba = 52·0
$(CHO_2)_2$ Ba requires Ba = 60·4 per cent.
$(C_4H_7O_2)_2$ Ba " Ba = 44·1 " "

This salt would thus appear to have consisted of barium formate and butyrate in about equal proportions.

The liquid remaining in the distillation flask after the removal of the volatile acids with steam was separated by filtration from the resin and extracted with ether, but this yielded only a very small amount of an amorphous substance which gave a green coloration with ferric chloride.

Treatment with Dilute Alcoholic Sulphuric Acid.—Thirty grammes of the resin were dissolved in alcohol, and such an amount of sulphuric acid added, with a little water, that the total liquid contained about 5 per cent. of its weight of acid. After heating for about four hours in a reflux apparatus the alcohol was removed, and the residue distilled with steam. The distillate, which contained some oily drops, was extracted with ether, the ethereal liquid shaken with a solution of sodium carbonate, and the alkaline liquid separated. After the removal of the ether a small amount (0·7 gramme) of an aromatic, neutral oil was obtained, which was very similar in character to that produced under the same conditions from the ether and chloroform extracts of the resin. This oil was distilled under a pressure of 40 mm., when it passed over up to a temperature of 170° C. The acid extracted from the original oily liquid by means of sodium carbonate was obtained as a yellow oil which was converted into an ammonium salt, and from the latter three fractions of silver salt were prepared and analyzed.

(I) 0·1300 of salt gave on ignition 0·0514 Ag. Ag = 39·5
(II) 0·0974 " " " 0·0416 Ag. Ag = 42·7
(III) 0·0464 " " " 0·0198 Ag. Ag = 42·7

$C_8H_{15}O_2$ Ag requires Ag = 43·0 per cent.
$C_{10}H_{19}O_2$ Ag " Ag = 38·7 per cent.

The acids remaining in the aqueous distillate after extraction with ether were converted into a barium salt. This was at first syrupy, but soon solidified almost completely, and amounted to about two grammes. It afforded reactions, indicating the presence of formic and butyric acids. The salt was first brought on to a porous tile to deprive it of a little mother-liquor, then recrystallized three times from water, and, after being heated to 110° C. until of constant weight, was analyzed.

0·4028 of the dried salt gave 0·3574 $BaSO_4$. Ba = 52·2

$(CHO_2)_2$ Ba requires Ba = 60·4 per cent.
$(C_4H_7O_2)_2$ Ba " Ba = 44·1 per cent.

This salt thus appears to have consisted of barium formate and butyrate in about equal proportions. From the above results it is also seen that the volatile acids formed by the treatment of the resin with dilute sulphuric acid are very similar in character to those produced by its fusion with potassium hydroxide.

The dark yellow, aqueous liquid remaining in the distillation flask was filtered from the resin and extracted with ether, the ethereal liquid being dried with calcium chloride and the ether removed. A very small quantity of an acid, oily liquid was thus obtained, which gave a brown coloration with ferric chloride. The aqueous liquid which had been extracted with ether, was treated with baryta for the removal of the sulphuric acid, filtered, and the filtrate concentrated, when a small amount of a syrupy liquid was obtained, which immediately reduced Fehling's solution on heating, and yielded *d*-phenylglucosazone, thus indicating the presence of glucose. This syrupy liquid also contained a readily soluble organic acid.

The resin which was separated from the acid liquid after distillation with steam, as above described, was dried, dissolved in alcohol, and mixed with purified sawdust. The thoroughly dried mixture was then extracted successively in a Soxhlet apparatus with light petroleum and ether, but only relatively small amounts of resinous products of an acidic nature were thus obtained.

V. *Alcohol Extract of the Resin.*

This constituted by far the largest proportion of the total resin, and, when dry, could readily be reduced to a very light brown, mobile powder.

In order to insure the freedom of this resin from substances soluble in water, it was dissolved in alcohol and reprecipitated by the addition of water. Its further purification was effected by heating the alcoholic solution with a little pure animal charcoal. After filtering the liquid and removing the solvent a very light colored product was obtained, which, when dry, could be reduced to a perfectly white powder.

The resin, purified as above described, after being dried at 110° C. was found to soften at 140° C., and to melt somewhat indefinitely between 150 and 160° C. When heated on platinum-foil it fuses, chars, and burns with a smoky flame, leaving finally no visible residue. With cold, concentrated sulphuric acid it gives only a light brown color, whereas with nitric acid no coloration is produced.

The optical rotatory power of this purified resin was determined in the same manner as has been described in connection with the crude resin. An alcoholic solution containing 1·3070 gramme of the resin in 25 c.c. had an initial rotation of — 2·7° in a 1 dcm. tube, whence $[a]_D$ — 51·64°.

With the endeavor to ascertain whether this resin is homogeneous in character, 10 grammes of it were dissolved in 100 c.c. of alcohol, and to this solution was added an alcoholic solution of lead acetate. As no precipitate was produced, an alcoholic solution of ammonia was subsequently added in slight excess, when an abundant precipitate was obtained. This precipitate was collected, well washed with alcohol, then suspended in alcohol, and decomposed by hydrogen sulphide. After the removal of the lead sulphide by filtration, the liquid was concentrated to a small bulk, and ether added to precipitate the resin, which was subsequently dissolved in a little alcohol, the solution evaporated, and the residue dried. The weight of the resin which had thus been precipitated by the basic lead acetate was 6 grammes. The alcoholic filtrate from the basic lead acetate precipitate was deprived of lead by means of hydrogen sulphide, and, after filtration, concentrated to the consistency of a syrup. On the subsequent addition of ether a quantity of resin was precipitated,

which, when collected and dried, was found to weigh 3 grammes. This resin, when again dissolved in alcohol and treated with basic lead acetate as before, yielded a further small quantity of a precipitate from which, after treatment with hydrogen sulphide, about 1 gramme of dry resin was obtained. The filtrate from this second precipitation, after removal of the lead, yielded finally 2 grammes of resin, the alcoholic solution of which was no longer precipitated by basic lead acetate.

The result of the above experiment would appear to indicate that the alcohol extract of the resin, notwithstanding the various methods of purification to which it had been subjected, was still not a homogeneous or individual substance.

Destructive Distillation of the Resin under Diminished Pressure.—It was thought of some interest to ascertain the character of the products afforded by the dry distillation of the purified alcohol extract of the resin, especially when this operation was conducted under greatly diminished pressure. For the purpose of this experiment 10 grammes of the dry resin were brought into a small distillation flask, which was connected with a receiver, and the apparatus evacuated to a pressure of 20 mm. On heating gently, the resin first melted, then fumes were evolved, and, on gradually increasing the temperature, a viscid red liquid passed over, until finally, at 280° C./20 mm., the distillation was stopped. The amount of this liquid was 2 grammes, or one-fifth of the weight of resin employed, the remainder having been chiefly converted into a brittle, black mass. The distillate was almost entirely soluble in ether, and on shaking the ethereal liquid with a solution of sodium carbonate the greater portion of the dissolved substance was removed, thus indicating it to be of an acidic nature, while a further small amount was removed by subsequent extraction with a solution of sodium hydroxide, a little finally remaining in the ethereal liquid. The amount of these products was not sufficient for their further examination, and they did not appear to be of sufficient interest to justify the use of larger quantities of the resin in this manner. It may be noted in this connection that Klimenko and Bandalin[1] have recorded an experiment in which they subjected 600 grammes of "jalapin" to dry distillation, and obtained therefrom 285 grammes of a viscid,

[1] *Ber. d. deutsch. chem. Ges.*, 1893, 26, IV, 591.

reddish-brown liquid. By the fractional distillation of this product they established the presence of acetic, tiglic, and palmitic acids. As, however, there is no indication that the resin employed by them had been freed from substances soluble in petroleum, it is probable that the palmitic acid pre-existed, and was not produced by the destructive distillation.

Fusion with Potassium Hydroxide.—Twenty grammes of the resin were fused with 120 grammes of potassium hydroxide in the manner described in connection with the ether extract of the resin. The reaction was particularly vigorous between 220 and 230° C., the temperature of the mass having been finally raised to 250° C. After allowing the mass to cool, it was dissolved in water, the solution acidified with sulphuric acid, and then subjected to distillation with steam. The distillate, which contained some oily drops, was extracted with ether, the ethereal solution being washed with water, dried with calcium chloride, and the ether removed, when about 2 grammes of oily acid were obtained. This was distilled under 30 mm. pressure, and the distillate collected in the following three fractions: (1) below 110°; (2) 110–120°; (3) above 120° C./30 mm. The fractions (1) and (2) were analzyed.

Fraction below 110° C./30 mm.

0.0996 gave 0.2074 CO_2 and 0.0874 H_2O. C = 56.8; H = 9.7

Fraction 110–120° C./30 mm.

0.1290 gave 0.2746 CO_2 and 0.1120 H_2O. C = 58.1; H = 9.6

$C_4H_8O_2$ requires C = 54.5; H = 9.1 per cent.

$C_5H_{10}O_2$ " C = 58.8; H = 9.8 " "

From these results it may be concluded that the above two fractions consisted chiefly of mixtures of butyric and valeric acids.

Fraction above 120° C./30 mm.

From this fraction a silver salt was prepared, which, after being well washed with water and dried in a vacuum, was analyzed.

0.1834 of salt gave on ignition 0.0790 Ag. Ag. = 43.1

0.1874 " " " 0.0806 Ag. Ag. = 43.0

$C_8H_{15}O_2$ Ag requires Ag = 43.0 per cent.

Although the results of these analyses are in agreement with the figures required for silver octoate, it is not probable that the fraction consisted of a pure substance.

The acids remaining in the aqueous distillate after extraction with ether were converted into a barium salt, of which 13·5 grammes were obtained. This salt afforded reactions which established the presence of formic and butyric acids. After drying at 110° C. it was analyzed with the following result:

0 5178 of the dried salt gave 0·4532 $BaSO_4$. Ba = 51·5.
$(CHO_2)_2$ Ba requires Ba = 60·4 per cent.
$(C_4H_7O_2)_2$ Ba " Ba = 44·1 " "

From these results it may be inferred that this salt consisted of barium formate and butyrate in nearly equal proportions.

The liquid remaining in the distillation flask after the removal of the volatile acids by steam was very light in color, and contained practically no resin. It was extracted with ether, the ethereal liquid being washed, dried with calcium chloride, and the ether removed, when a small amount of an oily liquid was obtained, which, on cooling, solidified to a crystalline mass. The substance was acid to litmus, and also soluble in a solution of sodium carbonate. It was recrystallized from water, from which it separated in small, colorless plates, melting at 103–104° C. On analysis it gave the following result:

0·0956 gave 0·2020 CO_2 and 0·0754 H_2O. C = 57·6; H = 8.8
$C_9H_{16}O_4$ requires C = 57 4; H = 8·5 per cent.

A silver salt of the acid was also prepared and analyzed:

0·0268 of salt gave on ignition 0·0144 Ag. Ag = 53·7
$C_9H_{14}O_4$ Ag_2 requires Ag = 53·7 per cent.

It is evident from these results that the above-described substance is a dicarboxylic acid, corresponding in its composition and properties to azelaic acid.

Treatment with Dilute Alcoholic Sulphuric Acid.—Forty grammes of the resin were dissolved in alcohol, and such an amount of sulphuric acid added, with a little water, that the total liquid contained about 5 per cent. of its weight of acid. The liquid was then heated on a water-bath in a reflux apparatus for four hours, after which the alcohol was removed, and the residue subjected to distillation with steam. The distillate was extracted with ether, the ethereal liquid being shaken with a solution of sodium carbonate, then washed with water, dried with calcium chloride, and the ether removed. A very

small quantity (0·5 gramme) of a neutral, oily liquid was thus obtained, which was more viscid than the corresponding products from the previously-described extracts of the resin. The sodium carbonate liquid was acidified and extracted with ether, when a very small amount of an oily acid was obtained, from which a silver salt was prepared and analyzed:

0·1208 of salt gave on ignition 0·0600 Ag. Ag = 49·7
$C_5H_9O_2$ Ag requires Ag = 51·7 per cent.
$C_6H_{11}O_2$ Ag " Ag = 48·4 " "

The acids remaining in the aqueous distillate after extraction with ether were converted into a barium salt, of which 1·8 grammes were obtained. This salt afforded reactions which established the presence of formic and butyric acids. After drying at 110° C. it was analyzed with the following results:

0·5588 of the dried salt gave 0·3898 $BaSO_4$. Ba = 41·0
0·8000 " " " " " 0·5584 $BaSO_4$. Ba = 41·0

As this salt contained a considerably lower percentage of barium than that required for barium butyrate (44·1 per cent. Ba), it must also have contained some acid of higher molecular weight.

After the removal of the above-described volatile products by distillation with steam, and allowing the contents of the distillation flask to cool, it was observed that a small quantity of a white solid had separated, and that the resinous matter, which formed a solid cake floating on the surface of the liquid, was very much smaller in amount than in the case of the corresponding products from the previously-described extracts. The white solid substance was separated, dried on a porous plate, and crystallized from hot water, from which it separated in fine, long, interlaced needles, melting at 100–102° C. This substance was evidently identical with a new acid, $C_{14}H_{28}O_4$, which was subsequently isolated from the above-mentioned cake of resinous matter, and will presently be described.

The acid filtrate from the white solid substance and resinous matter was extracted with ether, the ethereal liquid being shaken with a solution of sodium carbonate, then washed with water, dried, and the ether removed. Only a trace of a neutral oily liquid was thus obtained, which gave no coloration with ferric chloride. The sodium carbonate liquid, which had a dark red color, was acidified and extracted with ether, the ethereal liquid being dried and the

ether removed. A small amount of a dark red oil was thus obtained which, on standing for some time, became solid. This solid substance was dried on a porous plate and crystallized from hot water, when it separated in fine, long needles, melting at 100–101° C. It consisted of a further small amount of the new acid which is described below.

The above-mentioned acid filtrate, which had been extracted with ether, was treated with baryta for the removal of the sulphuric acid, and the filtrate evaporated under diminished pressure to the consistency of a thick syrup, the amount of which was 18 grammes. This syrup readily reduced Fehling's solution on heating, and yielded *d*-phenylglucosazone, melting at 215° C., thus indicating the presence of glucose. It also contained a readily soluble organic acid, which could not be separated from the sugar.

Isolation of a New Dihydroxymonocarboxylic Acid, Ipurolic Acid, $C_{13}H_{25}(OH)_2 \cdot CO_2H$.

The cake of brown resinous matter obtained by the treatment of the alcohol extract of the resin with dilute sulphuric acid, as above described, was dried on a porous plate, then dissolved in alcohol, the solution mixed with purified sawdust, and the mixture, after being thoroughly dried, extracted successively in a Soxhlet apparatus with light petroleum and ether, after which nothing remained on the sawdust. The petroleum removed about 2 grammes of an oily substance which was soluble in a solution of sodium carbonate and the fixed alkalis, and on acidifying these solutions it separated in its original form. On boiling this oily product repeatedly with large volumes of water, filtering the liquids while hot, and allowing them to cool slowly, a small amount of a colorless, crystalline substance was deposited. This melted at 68° C., and was apparently identical with a hydroxylauric acid, which was subsequently obtained in larger quantity, as will presently be described.

The subsequent extraction of the brown resinous matter with ether yielded about 5 grammes of a viscid liquid, which solidified on cooling. This solid substance was dissolved in a dilute solution of sodium hydroxide, when, after standing for some time, a product separated which appeared to be crystalline. The solution was therefore diluted with water, heated with a little animal charcoal, filtered, and concentrated, when, on cooling, the whole solidified to a crys-

talline mass. By recrystallizing this salt four times from water it was obtained perfectly white, and then melted at 185–190° C. From the sodium compound the acid was liberated by means of acetic acid. On heating the acidified liquid the solid acid melted, then dissolved, and, on allowing the solution to cool, it separated in long, thin, interlaced needles which melted at 100–101° C. It can also readily be purified by crystallization from warm chloroform. On heating the acid at 100–105° C. there was no loss of weight, and it is therefore anhydrous. When dissolved in absolute alcohol it was found to be devoid of optical activity. It was analyzed with the following result:

0.0686 gave 0.1618 CO_2 and 0.0674 H_2O. C = 64.3; H = 10.9

$C_{14}H_{28}O_4$ requires C = 64.6; H = 10.8 per cent.

The *sodium salt* gave, on analysis, the following results:

0.2212 of the air-dried salt, on heating at 110° C., lost 0.0106 H_2O.

$H_2O = 4.8$

0.2106 of the anhydrous salt gave, on ignition, 0.0400 Na_2CO_3.

$Na = 8.2$

$C_{14}H_{27}O_4Na$, H_2O requires $H_2O = 6.0$ per cent.

$C_{14}H_{27}O_4Na$ requires $Na = 8.2$ per cent.

The somewhat low percentage of water found in this salt indicates that some efflorescence had occurred.

From the sodium salt a *silver salt* was prepared, which also was crystalline, and melted at 160° C. On analysis it gave the following results:

0.1430 gave 0.2382 CO_2, 0.0940 H_2O, and 0.0428 Ag.

C = 45.4; H = 7.3; Ag = 29.9

0.1304 gave on ignition 0.0390 Ag. Ag = 29.9

$C_{14}H_{27}O_4Ag$ requires C = 45.8; H = 7.4; Ag = 29.4 per cent.

A *copper salt* was likewise prepared from the sodium salt by precipitation with a solution of copper sulphate. This was obtained in the form of a pale blue, amorphous powder, but on analysis was found to be highly basic and of indefinite composition.

The preceding results prove that the above described substance is a monocarboxylic acid, having the empirical formula, $C_{14}H_{28}O_4$. As it is not identical with any acid hitherto described, it is proposed to designate it *ipurolic acid.*

In order to ascertain whether ipurolic acid could be distilled, a small quantity (5 grammes) of it was heated in a distillation flask under a pressure of 15 mm. During the operation water was eliminated, and between 240 and 250° C. the greater portion passed over as a viscid yellow oil, the temperature being finally increased to 280° C. at 15 mm. As the oily product did not solidify, it was dissolved in ether, and the ethereal liquid extracted with a solution of sodium carbonate. On subsequently removing the ether about 0·5 gramme of a non-acidic substance was obtained, whereas the sodium carbonate had extracted about 4 grammes of acidic substance. Both these products were unsaturated, but their analysis and the determination of their iodine values showed them to be complex mixtures which did not permit of further examination.

Methyl Ipurolate, $C_{13}H_{25}(OH)_2 \cdot CO_2CH_3$.

Five grammes of ipurolic acid were dissolved in hot methyl alcohol, and dry hydrogen chloride passed into the solution until it was saturated. The solution was then poured into water, when the *ester* separated as a white precipitate, and was extracted by means of ether. The ethereal liquid was washed, first with a solution of sodium carbonate to remove any unchanged acid, and then with water, after which it was dried with calcium chloride, and the ether removed. A crystalline mass was thus obtained, which was recrystallized from dilute methyl alcohol, when the ester separated in the form of fine needles, melting sharply at 68–69° C. On analysis it gave the following result:

0·1042 gave 0·2500 CO_2 and 0·1038 H_2O. C = 65·4; H = 11·1.
$C_{15}H_{30}O_4$ requires C = 65·7; H = 10·9 per cent.

For the purpose of ascertaining the presence of hydroxyl groups in ipurolic acid, an attempt was made to prepare its acetyl and benzoyl derivatives. The products, however, could only be obtained in the form of thick syrups, which were not suitable for analysis.

Di-phenylurethane of Methyl Ipurolate, $C_{13}H_{25}(O{\cdot}CO{\cdot}NH\,C_6H_5)_2CO_2CH_3$.—Two grammes of methyl ipurolate were heated with an excess of phenyl *iso*cyanate in a sealed tube in a water-bath for about eight hours. After being allowed to cool, the product was shaken with light petroleum, when a solid was precipitated. This was dissolved in a small quantity of ether and cooled to — 10° C., when a

product separated, which was removed and found to be the unchanged ester. The addition of light petroleum to the filtrate caused the separation of a substance which melted at 95–96° C. This was dissolved in ether, and such an amount of light petroleum added that the solid separated slowly. By this means it was obtained in the form of small rosettes, which melted at 96–97° C., and after two recrystallizations the melting point remained unchanged. The compound was then analyzed with the following results:

(I.) 0·1100 gave 0·2572 CO_2 and 0·0798 H_2O. C = 68·2; H = 8·1.
(II.) 0·0352 gave 0·0882 CO_2 and 0·0250 H_2O. C = 68·3; H = 7·9.
0·1562 gave 7·0 c.c. of moist nitrogen at 759 mm. and 19° C. N = 5·6.

$C_{29}H_{40}O_6N_2$ requires C = 68·0; H = 7·8; N = 5·5 per cent.

These results prove conclusively that the above substance was a *di-phenylurethane of methyl ipurolate.* Ipurolic acid, therefore, is a dihydroxymonocarboxylic acid.

Methyl Monomethylipurolate, $C_{13}H_{25}(OH)(OCH_3)CO_2CH_3$.—A quantity (2·5 grammes) of methyl ipurolate was heated in a sealed tube with an excess of methyl iodide and dry silver oxide at 100–110° C. for four hours. The product was then filtered, the filter with its contents being thoroughly washed with ether. After the removal of the ether, a residue was obtained, which, when recrystallized from light petroleum, separated in small needles melting at 64–65° C., and this melting point was not changed by further crystallization. The *substance* was then analyzed.

0·0848 gave 0·2066 CO_2 and 0·0834 H_2O. C = 66·4 H = 10·9.
$C_{16}H_{32}O_4$ requires C = 66·7; H = 11·1 per cent.

It is evident that by the above treatment only one of the hydroxyl groups in methyl ipurolate had become methylated.

Hydrolysis of the Alcohol Extract of the Resin with Barium Hydroxide.

A quantity (200 grammes) of the purified resin was dissolved in alcohol (1000 c.c.), and a freshly prepared, cold, saturated solution of barium hydroxide gradually added until the liquid showed an alkaline reaction. The liquid was then kept at a temperature of about 35° C., small portions of solution of barium hydroxide being

added from time to time in order to maintain alkalinity. This treatment was continued until, on testing a small portion of the liquid with water, no precipitate was produced, a condition which was never attained in less than twelve hours. The liquid was then diluted with a little water, filtered, and the alcohol removed, after which it was deprived of the excess of barium by means of carbon dioxide and filtering. The barium, which still remained in the filtrate in combination with the acids formed from the resin, was exactly precipitated by sulphuric acid, when, after removing the barium sulphate, a clear, lemon-yellow liquid was obtained. This liquid was subjected to distillation with steam in order to remove any volatile acids present. The distillate, which contained no oily drops, was extracted with ether. The ethereal liquid was shaken with a solution of sodium carbonate, washed with water, dried with calcium chloride, and the ether removed, when a very small amount of an oily residue was obtained, which possessed a somewhat disagreeable odor. The sodium carbonate liquid and washings were then acidified and extracted with ether, the ethereal liquid being dried with calcium chloride and the ether removed, when 10 grammes of a colorless acid were obtained, thus representing 5 per cent. of the weight of resin originally employed. This acid was distilled under the ordinary pressure, when it passed over almost completely between 174 and 176° C. as a colorless liquid, having an odor resembling that of valeric acid. On analysis it gave the following results:

0·1274 gave 0·2760 CO_2 and 0·1132 H_2O. C = 59·1; H = 9·9
0·1436 gave 0·3090 CO_2 and 0·1240 H_2O. C = 58·7; H = 9·6
0·1428 gave 0·3082 CO_2 and 0·1256 H_2O. C = 58·9; H = 9·8
$C_5H_{10}O_2$ requires C = 58·8; H = 9·8 per cent.

The silver salt of the acid was also prepared and analyzed. 0·2240 gave, on ignition, 0·1156 Ag. Ag = 51·6.

$C_5H_9O_2Ag$ requires Ag = 51·7 per cent.

The density of the acid was 0·9471 at 16·5° C. It was optically active, and a determination of its specific rotatory power gave the following result:

α_D in a 25 mm. tube at 16·5° C. = + 4°15′, whence $[\alpha]_D$ + 17·95°.

It is evident, therefore, that the above-described liquid consisted of the quite pure, optically active valeric acid, *d*-methylethylacetic acid, $CH(CH_3)(C_2H_5) . CO_2H$, which is recorded[1] as having

$$[a]_D + 17{\cdot}85°$$

The aqueous distillate, after the removal of the methylethylacetic acid by extraction with ether, still contained some acid, which was converted into a barium salt. This afforded the reactions of both formic and butyric acids, although the amount of the former acid was relatively small. After drying at 110° C. it was analyzed.

0·3936 of the dried salt gave 0·2904 $BaSO_4$. Ba = 43·4.

Since barium butyrate requires Ba = 44·1 per cent., it is probable that the above-mentioned barium salt also contained valerate.

After the removal of the volatile acids by distillation with steam, there remained in the distillation flask a clear liquid. This was extracted with ether, but as nothing was removed by this treatment it was concentrated under diminished pressure to the consistency of a syrup. It then still remained clear, possessed an orange-yellow color and a strongly acid reaction, but did not reduce Fehling's solution until after heating with a mineral acid. With the object of effecting a purification of the product, which may be termed the hydrolyzed resin, it was mixed with prepared sawdust, and the thoroughly dried mixture extracted successively in a Soxhlet apparatus with the same solvents as had been employed for the extraction of the original mixture of resins. The results were as follows:

Petroleum (B. P. 40–60° C.) removed nothing.

Ether extracted a light yellow syrup (13 grammes), which did not become solid.

Chloroform extracted a dark yellow syrup (4 grammes), which did not become solid.

Ethyl acetate extracted a dark yellow syrup (9·3 grammes), which, on drying, formed a hygroscopic, amorphous mass.

Alcohol removed the remainder of the material (130 grammes), which solidified to a clear, brittle mass, and could be reduced to a nearly colorless powder.

All the above products were then subjected to treatment with dilute sulphuric acid, in the following manner:—

[1] *Ber. d. deutsch. chem. Ges.*, 1896, **29**, 52.

Ether Extract of the Hydrolyzed Resin.—The entire amount of this extract (13 grammes) was brought into a flask provided with a reflux condenser, together with 130 c.c. of 5 per cent. aqueous sulphuric acid, and the mixture boiled for three hours. The liquid, on cooling, remained quite clear, and had a pale yellow color. It was distilled with steam, and the distillate extracted with ether, but this removed practically nothing. A very small amount of acid was, however, contained in the aqueous distillate, and this, after conversion into a barium salt, afforded reactions indicating the presence of formic and butyric acids.

The aqueous acid liquid remaining in the distillation flask after the removal of the volatile acids with steam, as above described, was extracted with ether, and the ethereal liquid shaken with a solution of sodium carbonate. After the removal of the ether, a very small amount of an oily liquid was obtained. The sodium carbonate liquid, when acidified and extracted with ether, yielded a small amount of an oily acid, but not sufficient for its further examination.

The aqueous acid liquid, which had been extracted with ether, reduced Fehling's solution on heating. It was treated with baryta for the removal of the sulphuric acid, and the filtrate concentrated, when it formed a thick syrup which was found to contain the barium salt of a readily soluble organic acid. The attempts to obtain this acid in a solid state were unsuccessful.

Chloroform Extract of the Hydrolyzed Resin.—The amount of this extract was only 4 grammes. On treatment with dilute sulphuric acid it yielded products very similar to those afforded by the ether extract of the hydrolyzed resin. Thus in distilling the acid liquid with steam, the distillate was found to contain a very small quantity of a neutral oil, together with formic and butyric acids, while the liquid remaining in the distillation flask reduced Fehling's solution on heating, and, after the removal of the sulphuric acid by baryta and concentrating, yielded a very small amount of a syrup containing the barium salt of a readily soluble organic acid.

Ethyl Acetate Extract of the Hydrolyzed Resin.—This extract, like the preceding ones, was relatively small in amount. The entire quantity (9·3 grammes) was heated for about four hours with 100 c.c. of 5 per cent. aqueous sulphuric acid. On cooling, the liquid in the flask was observed to contain a small amount of a white, flocculent substance, together with a small cake of solid matter. It was there-

fore extracted with ether, which removed all the solid material. The ethereal liquid, after being shaken with a solution of sodium carbonate, was dried with calcium chloride, and the ether removed, when a very small, oily residue was obtained, which soon solidified in the form of crystalline needles. This substance was practically insoluble in water, and was therefore recrystallized from ether, after which it melted at 233–235° C., but the amount was much too small for further investigation.

The sodium carbonate liquid was acidified and extracted with ether, when a very small amount of a substance was obtained, which, after recrystallization from 50 per cent. alcohol and finally from hot water, separated in handsome needles melting at 100–101° C. On analysis it gave the following result:

0·0346 gave 0·0820 CO_2 and 0·0338 H_2O. C = 64·6; H = 10·8.

$C_{14}H_{28}O_4$ requires C = 64·6; H = 10·8 per cent.

This substance was evidently identical with ipurolic acid, which has previously been described.

The acid liquid, from which the above-mentioned substances had been extracted by ether, was distilled with steam. The distillate contained a small amount of acid, which, after conversion into a barium salt, was found to consist of a mixture of formic and butyric acids. The liquid remaining in the distillation flask was treated with baryta for the removal of the sulphuric acid, filtered and concentrated. A syrup was thus obtained which reduced Fehling's solution on heating, and, like the corresponding products from the above-described ether and chloroform extracts, contained the barium salt of a readily soluble organic acid.

Alcohol Extract of the Hydrolyzed Resin.

This product represented by far the largest portion of the hydrolyzed resin, and amounted to 130 grammes. As first obtained it was in the form of a syrup, but, after drying, could be reduced to a fine powder, and by treatment with animal charcoal was obtained quite white. The powdered material is not altered on exposure to the air, and dissolves readily in cold water, forming a clear solution. After drying in a vacuum over sulphuric acid, it melted at 105–110° C. With cold concentrated sulphuric acid it gives a deep red color. It is optically active, and its specific rotatory power was determined with the following result:—

An aqueous solution containing 1·7680 grammes of substance in 25 c.c. gave a_D — 4° 47′ in a 1 dcm. tube, whence $[a]_D$ — 67.63°.

Treatment with Dilute Sulphuric Acid.—A quantity (25 grammes) of the above-described material was dissolved in 250 c.c. of 5 per cent. aqueous sulphuric acid, and the solution heated for about four hours in a reflux apparatus. It was then distilled with steam, and the distillate extracted with ether, when a very small quantity of a neutral oil was obtained, which was similar in character to that afforded by the treatment of the alcohol extract of the original resin with dilute sulphuric acid. After extraction with ether, the distillate still contained a small quantity of acid which was converted into a barium salt, and this gave reactions indicating the presence of formic and butyric acids. The liquid remaining in the distillation flask, after the removal of the volatile substances by steam, and being allowed to cool, contained a considerable quantity (5·5 grammes) of a solid crystalline product, part of which was in the form of a brownish cake. It was therefore extracted with ether, the ethereal solution dried, and the solvent removed. The product thus obtained was dissolved in alcohol, the solution mixed with purified sawdust, and, after thoroughly drying the mixture, it was extracted successively in a Soxhlet apparatus with (*a*) light petroleum and (*b*) ether.

(*a*) *Petroleum Extract.*—This liquid deposited a small amount of a crystalline substance in the form of handsome rosettes, which were associated with a little oily matter. After the complete removal of the solvent, the substance was crystallized from 50 per cent. alcohol, and finally from a large volume of hot water. It was thus obtained in handsome, colorless needles, melting at 69–70° C., and on analysis gave the following result :

0·0676 gave 0·1646 CO_2 and 0·0670 H_2O. C = 66·4; H = 11·0.
$C_{12}H_{24}O_3$ requires C = 66·6; H = 11·1 per cent.

The *silver salt* of the acid was also prepared and analyzed.

0·2042 of salt gave on ignition 0·0678 Ag. Ag = 33·2.
$C_{12}H_{23}O_3Ag$ requires Ag = 33·4 per cent.

The above-described substance is thus seen to agree in composition with a *hydroxylauric acid.*

A hydroxylauric acid has previously been obtained by Hoehnel[1]

[1] *Archiv der Pharm.*, 1896, 234, p. 670.

from the so-called purgic acid, a product of the alkaline hydrolysis of "convolvulin" by treatment with dilute sulphuric acid. As Hoehnel, however, did not record the melting point of his acid, and the amount of acid obtained by us having been too small to permit of the preparation of the derivatives described by him, it is impossible to decide whether the two substances are identical.

Guérin[1] has synthesized *a*-hydroxylauric acid, the melting point of which is stated to be 73–74° C. As Guérin had prepared an anilide of this acid (m. p. 83° C.), a little of the corresponding derivative was made from the acid obtained by us for the purpose of comparison, the method employed having been precisely the same as that adopted by Guérin. A product was obtained in the form of small, lustrous plates, which melted at 155–157° C. It is, therefore, evident that the hydroxylauric acid obtained from *Ipomœa purpurea* is not the *alpha* compound.

An attempt was made to obtain an acetyl derivative of the above-described acid, but the product was an oil, which did not solidify.

(*b*) *Ether Extract.*—This constituted the remainder of the solid product obtained from the alcohol extract of the hydrolyzed resin. After purification it was found to consist entirely of ipurolic acid, $C_{14}H_{28}O_4$, which had previously been obtained by the treatment of the alcohol extract of the original resin with dilute sulphuric acid. On analysis it gave the following result:

0·2228 gave 0·5280 CO_2 and 0·2146 H_2O. C = 64·6; H = 10·7.
$C_{14}H_{28}O_4$ requires C = 64·6; H = 10·8 per cent.

The acid liquid, from which the above-mentioned crystalline acids had been separated, was treated with baryta for the removal of the sulphuric acid, and, after filtration, diluted to the measure of 1 litre. This liquid readily reduced Fehling's solution on heating, and yielded an osazone which, after crystallization from pyridine, melted at 212–213° C., and was therefore *d*-phenylglucosazone. A quantitative determination, by means of Fehling's solution, of the amount of sugar, formed by the action of dilute sulphuric acid on the alcohol extract of the hydrolyzed resin, indicated that 25 grammes of the latter had yielded 4·3 grammes of glucose. If the amount of crystalline acid (5·5 grammes), consisting essentially of ipurolic

[1] *Bull. Soc. chim.*, 1903 [3], 29, 1124–1128, and *Journ. Chem. Soc.*, 1904, 86, Part I, p. 138.

acid, which was obtained by the above-described treatment was present in the extract in the form of a glucoside, the latter would have yielded on hydrolysis an amount of glucose corresponding to 3·8 grammes. It is evident, therefore, that practically the entire amount of glucose found resulted from the hydrolysis of the glucosides of ipurolic and hydroxylauric acids. On the other hand, as the 5·5 grammes of crystalline acids obtained would correspond to about 9 grammes of the respective glucosides, and as the weight of alcohol extract of the hydrolyzed resin which was treated with sulphuric acid was 25 grammes, it follows that this extract contained a considerable proportion of a substance which was not a glucoside.

The liquid which had been freed from sulphuric acid by means of baryta, as described above, contained, besides glucose, a considerable quantity of a barium salt, but this did not separate, even when the liquid was concentrated to the consistency of a thick syrup and allowed to stand for a long time. The acid contained in this salt was evidently highly oxygenated, and doubtless represented that constituent of the alcohol extract of the hydrolyzed resin which was not glucosidic in character. Numerous attempts were made to isolate this soluble organic acid, but without success. A determination of the amount of barium in the liquid showed, however, that the soluble non-glucosidic acid yielded by 25 grammes of the alcoholic extract of the hydrolyzed resin corresponded to 4·15 grammes Ba.

SUMMARY AND PHYSIOLOGICAL TESTS.

As the details of the preceding investigation are necessarily somewhat extended, it appears desirable that the more important results should be briefly summarized.

The material employed, consisting chiefly of the aerial stems of *Ipomœa purpurea*, Roth, was kindly supplied to us by Mr. J. Medley Wood, Director of the Natal Botanic Gardens, Durban, South Africa. When extracted with alcohol, and the resulting extract distilled with steam, an amount of essential oil was obtained corresponding to 0·018 per cent. of the weight of the drug. This essential oil was a pale yellow liquid, having a strong, characteristic odor and the following constants: $d\ 20° / 20° = 0{\cdot}9085$; $a_D - 4°52'$ in a 1 dcm. tube. After the removal of the volatile substances

by distillation with steam, there remained in the distillation flask a dark-colored aqueous liquid and a quantity of a soft resin. The aqueous liquid contained a considerable quantity of potassium chloride and nitrate, together with tannic and coloring matters, and yielded glucose on heating with a dilute mineral acid.

The most important product yielded by *Ipomœa purpurea* is the above-mentioned resin, the amount of which corresponded to 4·8 per cent. of the weight of the drug, and of this resin 15·5 per cent. was soluble in ether. The crude resin, which, when dry, can be reduced to a dark brown powder, is, however, an exceedingly complex mixture, as has been shown by the results of its successive extraction with the following solvents: (I) light petroleum, (II) ether, (III) chloroform, (IV) ethyl acetate, and (V) alcohol. The examination of these various extracts has, moreover, rendered it evident that each of them is likewise of complex composition.

The crude resin is optically active. After treatment with animal charcoal to deprive it of coloring matter, it was found to have a specific rotatory power, in alcoholic solution, of $[a]_D$ — 50·95°.

The products obtained from the various extracts of the resin were as follows:

I. *Petroleum Extract.*—This represented 8 per cent. of the total resin. After treatment with an alcoholic solution of potassium hydroxide, it yielded pentatriacontane, $C_{35}H_{72}$ (m. p. 74-75° C.); a phytosterol, $C_{27}H_{46}O$, H_2O (m. p. 132–133° C.; $[a]_D$ — 32·1°); formic, butyric, and higher volatile acids; stearic, and apparently some palmitic acid, with a very small amount of an unsaturated oily acid.

II. *Ether Extract.*—This represented 7·3 per cent. of the total resin. When fused with potassium hydroxide it yielded formic and butyric acids, a mixture of higher volatile acids, and a very small amount of a crystalline acid, melting at 103–104° C., which was apparently azelaic acid, $C_9H_{16}O_4$, together with a trace of substance giving the catechol reaction. The extract, when heated with 5 per cent. alcoholic sulphuric acid, yielded, besides a quantity of resin, a small amount of a neutral oil, having a pleasant odor, together with formic, butyric and higher volatile acids, a readily soluble non-volatile acid, and glucose.

III. *Chloroform Extract.*—This represented 9·8 per cent. of the total resin. When fused with potassium hydroxide, it yielded products analogous to those obtained under the same conditions from

the ether extract, but no crystalline acid could be isolated. When heated with 5 per cent. alcoholic sulphuric acid, it likewise afforded products which were very similar to those obtained from the ether extract of the resin.

IV. *Ethyl Acetate Extract.*—This represented 23·8 per cent. of the total resin. From this extract there was isolated a very small amount of a new crystalline alcohol, *ipuranol*, having the formula $C_{23}H_{38}O_2(OH)_2$, and melting at 285–290° C. Its *acetyl derivative* formed pearly leaflets, melting sharply at 160° C. The extract, when fused with potassium hydroxide, as also when heated with 5 per cent. alcoholic sulphuric acid, yielded products analogous in character to those obtained from the above-described ether and chloroform extracts of the resin by the same treatment.

V. *Alcohol Extract.*—This represented about one-half of the total crude resin. When purified by means of animal charcoal, it was obtained in the form of a perfectly white powder, which, after drying at 110° C., melted somewhat indefinitely between 150 and 160° C. Its specific rotatory power was $[a]_D$ — 51·64°.

When heated with 5 per cent. alcoholic sulphuric acid, this extract like the preceding ones, yielded a small amount of a neutral oil, formic, butyric and higher volatile acids, and a non-volatile acid which was readily soluble in water, together with glucose. In addition to these products, however, it afforded a quantity of a new dihydroxymonocarboxylic acid, $C_{13}H_{25}(OH)_2 \cdot CO_2H$, designated *ipurolic acid*, which crystallizes in fine, colorless, silky needles, melting at 100–101° C. Several derivatives of this acid have been prepared, such as its *sodium salt*, $C_{13}H_{25}(OH)_2 \cdot CO_2Na, H_2O$; *silver salt*, $C_{13}H_{25}(OH)_2 \cdot CO_2Ag$ (m. p. 160° C.); *methyl ester*, $C_{13}H_{25}(OH)_2 \cdot CO_2CH_3$ (m. p. 68–69° C.); the *monomethyl derivative of the methyl ester*, $C_{13}H_{25}(OH)(OCH_3)CO_2CH_3$ (m. p. 64–65° C.); and the *diphenylurethane of the methyl ester*, $C_{13}H_{25}(O\,CO{\cdot}NH{\cdot}C_6H_5)_2 \cdot CO_2CH_3$, melting at 96–97° C.

The above-described alcohol extract of the resin, when treated in alcohol solution with barium hydroxide, yielded, besides formic and butyric acids, a quantity of optically active valeric acid (*d*-methylethylacetic acid), b. p. 174–176° C.; $[a]_D$ + 17·95°, together with a mixture of acids which was readily soluble in water. This mixture of acids was extracted successively with ether, chloroform and ethyl acetate, when small amounts were removed by each of these solvents, the larger proportion being soluble only in alcohol. These

various extracts were finally subjected to treatment with 5 per cent. aqueous sulphuric acid. The portions extracted by ether and chloroform yielded, for the most part, identical products, namely, formic and butyric acids, together with a readily soluble, non-volatile acid, and apparently a little glucose. The portion extracted by ethyl acetate yielded, in addition to the products just mentioned, a very small amount of ipurolic acid. The portion which was soluble only in alcohol was considerable in amount. After further purification with animal charcoal, it was obtained in the form of a nearly white powder. It melted at 105–110° C., and was optically active, having in aqueous solution $[\alpha]_D$ — 67·58°. When treated with 5 per cent. aqueous sulphuric acid, it yielded, besides formic and butyric acids, a *hydroxylauric acid* (m. p. 69–70° C.) and ipurolic acid, together with a readily soluble organic acid and glucose.

The physiological action of the above-described extracts of the original resin was kindly determined for us by Dr. H. H. Dale, Director of the Wellcome Physiological Research Laboratories, and our thanks are due to him for the assistance which he has thus rendered us.

One gramme of each of the extracts was administered at intervals of several days to a dog, with the following results. The petroleum extract produced no definite effect. The ether, ethyl acetate and alcohol extracts had a very marked purgative action two hours after ingestion, which lasted for about twenty-four hours, after which the animal became quite normal. There was no noticeable difference in the action of these three extracts. The chloroform extract, on the other hand, had a rather less pronounced aperient effect, and caused slight vomiting.

The alcohol extract of the resin which had been hydrolyzed by means of baryta, consisting of a product which was readily soluble in water, had no perceptible physiological action when administered to a dog in doses of one gramme. This result is in accordance with the observations previously recorded respecting the action of an analogous, but less completely purified product from jalap resin, which has been designated "convolvulic acid" (compare Husemann, "Die Pflanzenstoffe," second edition, 1882, p. 1141).

It will be seen from this investigation that *Ipomœa purpurea*, Roth, like many other species of the same genus, contains resins which possess purgative properties, and is thus capable of being utilized medicinally.

PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE MORE INTERESTING LITERATURE RELATING TO PHARMACY.

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The Food and Drugs Act continues to be a favorite subject for discussion in pharmaceutical journals. From the evidence now at hand there are not lacking dealers, and even manufacturers, who, having discovered that this law is actually to be enforced, are anxious to have a number of the regulations abrogated or amended.

The evidently inspired attacks that are being made in the columns of medical, pharmaceutical and confectioners' or food journals, on the individuals who have been entrusted with the enforcement of the Federal law, may rightfully be considered as being indicative of the far-reaching influences of this law.

Pure Drug Bill in New York.—The Whitney Bill, introduced at the request of the druggists of New York State, has been passed by both branches of the State Legislature.

This bill places the enforcement of the act entirely in the hands of the State Board of Pharmacy, though it does not in any way abrogate the present power or privileges of the State or local boards of health.

Pure Food and Drug Law in Kentucky.—A pure food and drug law recently enacted in Kentucky is based on the Federal law, but contains a number of clauses that are original or distinctive.

Among other rather interesting features, a drug will also be deemed adulterated "if one article is substituted for a different article, or if a greater or less quantity of any ingredient specified in the prescription is used."

Another clause provides that "no prescription shall be knowingly refilled except for the person for whom it was written."

The sections regarding drugs are to take effect on January 1, 1908. (*Jour. A.M.A.*, March 21, 1908, page 985.)

An Important Precedent.—The first suit that has been brought under the provisions of the Food and Drugs Act has been decided in favor of the Government. This case, popularly known as the Harper case, establishes the precedent that a name like "Cuforhedake Brane Fude" constitutes a violation of the misbranding clause of the Food

and Drugs Act. With Mr. Harper a number of other manufacturers have thought it wise, or at least expedient, to eliminate the word cure from labels on medicinal preparations.

Limitations of the Guarantee.—There is such a widespread misunderstanding as to the use or the limitation of the guarantee label, that the following definite statement contained in the "Circular of Information to the Drug Trade," published by the Indiana State Board of Health, will perhaps serve to awaken pharmacists to a realization of their duty and responsibility in connection with pure drugs.

"The guarantee is a protection against prosecution only in case of goods in original packages; but as soon as the box is opened, stopper drawn or seal detached, the guarantee ceases and all responsibility for the character of the goods passes from the manufacturer or jobber to the retailer. It is, therefore, useless to ask for a guarantee for use on broken packages."

Definition for Proprietary or Patent Medicine.—The Patent Medicine Bill recently introduced into the Canadian House of Commons by the Hon. William Templeman contains the following definition: "Proprietary or Patent Medicine means every artificial remedy or prescription manufactured for the internal use of man, the name, composition, or definition of which is not to be found in the British Pharmacopœia, the Codex Medicamentarius of France, the Pharmacopœia of the United States, or any foreign Pharmacopœia approved by the Minister or any formulary adopted by any properly constituted pharmaceutical association approved by the Minister, or upon which is not printed in conspicuous manner and forming an inseparable part of the label or wrapper the true formula or list of ingredients." (*Chem. and Drug.*, May, 1908, page 663.)

The Propaganda for Publicity and Truth.—What has become known as the U.S.P. and N.F. propaganda has been variously accused as having degenerated into a poorly veiled attempt to substitute indifferently made imitations of nostrums for the nostrums themselves. While this assertion is far from being accepted as true, there can be no gainsaying the fact that many pharmacists, in all parts of the country, are devoting altogether too much attention to the development of a demand for complex fixed formula preparations, and are not advancing themselves as they should in the necessary knowledge of the science of their calling, and rendering themselves of real use and practical value to the community in which they live.

Dr. McCormack and His Work.—A popular meeting held under the auspices of the Philadelphia County Medical Society, on the evening of May 11, 1908, gave pharmacists of Philadelphia an opportunity to familiarize themselves with an important, though as yet scarcely developed, field for association work.

Dr. J. N. McCormack, the Chairman of the Committee on Organization of the American Medical Association, addressed a large and enthusiastic audience on "The Relation of the Physician to the Public." In the course of his address Dr. McCormack pointed out that, despite the shortcomings and the faults of medical men, they were not alone to blame for the present-day lack of development in hygiene and sanitation. He asserted that the public at large, and particularly the more responsible portion of the public, is fully as much to blame as is the medical profession.

The members of the pharmaceutical profession were well represented both in the list of vice-presidents as well as in the audience, and the opinions expressed by Dr. McCormack and the other speakers were generally agreed to by the pharmacists who were present.

The Meeting of the American Medical Association, at Chicago, June 2 to 5, 1908, promises to be one of unusual interest and will undoubtedly prove to be of considerable import to the future progress of pharmacy.

The meetings of the Section on Pharmacology and Therapeutics should prove to be of practical interest and value to pharmacists. The preliminary programme contains a list of communications that are of direct importance to pharmacists, and many if not all of the contributions should be of value to the pharmacist who is earnestly striving to improve himself in his calling.

At least one of the sessions will be devoted to a discussion of the United States Pharmacopœia and the National Formulary. This symposium will be augmented by an exhibition of U.S.P. and N.F. preparations, made by the Chicago Branch of the American Pharmaceutical Association. It is generally believed that the officers and members of the Chicago Branch expect to make this exhibition one of unusual interest to physicians, and they will no doubt succeed.

Medical Education in the United States.—The report of the meeting of the Council on Medical Education of the American Medical

Association (*Jour. A. M. A.*, Vol. L, pages 1544, 1637), contains much of a suggestive nature that teachers and others interested in pharmaceutical education should take cognizance of and profit by.

Few of us are perhaps aware that some of the best, as well as practically all of the worst, medical schools in the world are to be found in the United States. At the present time there are 335 medical colleges in the civilized world; of this number 164, or 48 per cent., are in the United States. So far as known, proprietary schools constitute a development of institutions that are indigenous to the United States, where they constitute a fair proportion of the schools that are classed as deficient both as regards preliminary requirements and length of medical course.

Post-Graduate Instruction in Switzerland.—The first of a series of post-graduate courses for pharmacists, based on the new fourth edition of the Swiss Pharmacopœia was held in the Pharmaceutical Institute of the University of Bern, from the 2d to the 12th of March, 1908.

This initial course was attended by thirty registered pharmacists, a rather high attendance when one remembers that in the whole of Switzerland there are but 520 apothecary shops, conducted by 533 registered apothecaries. (*Schweiz. Woch.-Schr. f. Chem. u. Phar.*, 1908, page 208.)

A French Formulary.—The general Association of French Pharmacists has nominated five of its members to form, with an equal number of members of the Pharmacists' Association of the Loiret Department, the committee for drawing up a formulary of medicaments. (*The Chem. and Drug.*, April 18, 1908, page 584.)

A New Swedish Pharmacopœia.—The recently published eighth edition of the Swedish is practically out of print, and in view of the many changes that would be necessitated by the inclusion of the Protocol of the International Conference for the Unification of the Formulæ of Potent Medicaments, the Revision Commission has decided to prepare and to publish a revised ninth edition of the Swedish Pharmacopœia. (*Phar. Post*, 1908, page 398.)

The Standardization of Tetanus Antitoxin.—Hygienic Laboratory Bulletin, No. 43, March, 1908, contains a detailed description of the work that has been done in connection with the newly adopted American standard for tetanus antitoxin.

This American unit, established under the Act of July 1, 1902, is

defined as follows: "The immunity unit for measuring the strength of tetanus antitoxin shall be ten times the least quantity of antitetanic serum necessary to save the life of a 350-gramme guinea pig for ninety-six hours against the official test dose of a standard toxin furnished by the Hygienic Laboratory of the Public Health and Marine Hospital Service."

Sterilization in Pharmacy.—An ever-increasing number of foreign pharmacopœias are devoting considerable attention to sterilization of medicaments and materials by the pharmacist. As opinions as to methods and processes of sterilization naturally differ, and as the need for this precautionary measure becomes more and more appreciated, the problems connected with the official introduction of satisfactory processes become more apparent.

So far, methods for sterilization have been introduced into the pharmacopœias of Austria, Belgium and Switzerland. In Germany the need for complying with the evident requirement is being actively discussed, and the Swedish Pharmacopœial Commission is also considering the advisability of including the same in the forthcoming edition of their pharmacopœia.

The Alkaloids of the Poppy Plant.—Professor Thoms has demonstrated (*Phar. Zeit'g*, April 8, 1908, page 292) that the amount of opium and of its alkaloids yielded by poppy plants may be increased by suitable soil and proper cultivation. He has also shown that the several opium alkaloids may be obtained directly from the unripe poppy capsule, and these alkaloids also occur, ready developed, in the young poppy plants.

Coloration of Adrenine Solutions.—Gunn and Harrison (*Phar. Jour.*, April 18, 1908, page 513) have investigated the causes of the color in adrenine solutions and have discovered that adrenine dissolved in water with one molecule equivalent of hydrochloric acid, becomes pink quicker than a solution containing a greater proportion of hydrochloric acid. They have also found that the alkali of the glass accelerates the formation of color, as do also exposure to air and light and contamination with iron.

Activity of Colored Solutions of Adrenine.—Prof. W. E. Dixon, of Kings College, London, finds that the loss of activity of adrenine solutions is proportional to the depth of the color. He also found that the artificial adrenine has only about one-half the activity of the natural product. (*Phar. Jour.*, April 18, 1908, page 514.)

Adulterated Belladonna Leaves.—J. Warin, in reporting on a series of comparative assays of extract of belladonna, asserts that he met with samples of belladonna leaves which were evidently derived from Scopola carniolica, and also samples of Italian origin which contained an appreciable admixture of Phytolacca decandra. An extract made from commercial (Austrian) leaves assayed 1·127 per cent. of alkaloids, while one of the samples made from Italian leaves assayed but 0·318 per cent. of mydriatic alkaloid. (*Jour. Phar. et Chim.*, 1908, page 321.)

Frangula and Cascara.—Kroeber has made a comparative examination of the fluidextracts of Rhamnus purshiana and of Rhamnus frangula, and believes that the widespread preference for cascara sagrada is not well founded. He finds that, according to colorimetric tests for oxymethylanthrachinon, as proposed by Tschirch, fluidextract of Rhamnus frangula contains from 4·5 to 5 per cent., and fluidextract of Rhamnus purshiana from 2·0 to 4·14 per cent. of oxymethylanthrachinon. (*Schweiz. Woch.-Schr. f. Chem. u. Phar.*, 1908, page 131.)

The Constituents of Simaruba Bark.—Charles Gilling (*Phar. Jour.*, April 18, 1908, page 510) reports on an exhaustive examination of simaruba bark from British Guiana, doubtless derived from Simaruba amara.

He concludes that the bark of Simaruba amara contains a fixed oil, a crystalline bitter substance, $C_{22}H_{30}O_9$, giving a violet coloration with concentrated sulphuric acid, and a crystalline, non-bitter substance. The presence of a fluorescent principle was also indicated, but this was not isolated.

The Development of Cinchona Alkaloids.—Experiments conducted in the Dutch Government laboratories indicate that the development of bases in Cinchona ledgeriana takes place in the following order: amorphous alkaloid, cinchonine, cinchonidine, quinine and quinidine. The seeds contain both amorphous alkaloid and cinchonine, the latter increasing as the seeds begin to germinate. The leaves of young trees contain cinchonidine, cinchonine and amorphous alkaloid. Quinine first appears in the roots of young plants. (*Phar. Zent'h.*, 1908, page 233.)

Strychnos Aculeata.—The fruits of Strychnos aculeata or of a closely allied species are employed by the natives of the ivory coast as a fish poison. The entire fruit weighs 100 to 150 grammes and

the seed 30 to 40 grammes. The fruit contains no strychnine and only a trace of brucine. This occurs mostly in the kernel, where it amounts to 0·05 per cent. The toxic substance is probably a glucoside, and it is said that 1 part of the fruit macerated in 10,000 parts of water will kill fish. So far as known, it does not affect frogs or mammals. (*Phar. Jour.*, March 28, 1908, page 413, from *Jour. Phar. et Chim.*)

Vanilla Statistics.—The total crop of vanilla for the season 1907–1908 is estimated to be 475 tons, or about 75 tons in excess of the previous season's yield. The source of this supply is: Mexican, 100 tons; Tahiti, 120 tons; Bourbon, 40 tons; Seychelles, 65 tons; Comores and Mayotte, 80 tons; Madagascar and Nossi-Bes, 50 tons; Mauritius, 3 tons; Ceylon and Java, 7 tons; Fiji and Zanzibar, 4 tons; Guadeloupe and Martinique, 6 tons. (*Chem. and Drug.*, March 14, 1908, page 426).

Arhovin.—This is described by the *Journal of the American Medical Association* as "A proprietary in process of evolution." It was originally described by the manufacturer as "thymyl benzoate of diphenylamine;" later this was changed to "a chemical compound of diphenylamine, thymol and benzoic acid." A still later description asserts that "Arhovin consists of diphenylamine and thymol-benzoic acid ethyl ester in molecular proportions." This, the *Journal of the American Medical Association*, points out is an evolution from the atomic to the molecular, and from the specific to the general, so that we may confidently expect to hear that this much-advertised synthetic has, in time, become a mere mixture. (*Jour. A. M. A.*, May 9, 1908, page 1541.)

Arsenogen.—This is said to be a combination containing 16·4 per cent. of iron, 2 per cent. of phosphorus and 14 per cent. of arsenic with paranucleinic acid. It has been recommended as a general tonic. (*Phar. Zeit'g*, 1908, page 280.)

Arthrisin.—This is a name given to acetylsalicylamide, and probably has no distinct advantages over the many other well-known compounds of acetylsalicylic acid. (*Phar. Zent'h.*, 1907, page 283.)

Camphosal.—This is said to be a neutral camphoric acid ester of santal oils. It occurs as a brownish-yellow oil that is readily soluble in ether, alcohol, benzol, chloroform and petroleum ether Unlike santalol and the oil of sandalwood, it is but slightly soluble in 70 per cent. alcohol.

Camphosal may be given in doses of from 5 to 15 minims. (*Chem. and Drug.*, 1908, page 328.)

Dimenthyldimethylene ether is used as an antiseptic and antipyretic. It is obtained by treating menthol with symmetrical di-halogen methyl ether. (*Chem. and Drug.*, 1908, page 328.)

Ethyl Borosalicylate (*Boryl*).—This is obtained by heating together boric acid, 62; salicylic acid, 138; water, about 200; then adding to the solution, alcohol (95 per cent.) 60; sulphuric acid, about 40; and boiling (under a reflux condenser). When esterification is complete, and after washing with water to remove the sulphuric acid, the resulting product should occur in crystalline needles having a higher melting point than that of salicylic acid.

Ethyl borosalicylate has been recommended for use externally and internally as an antiseptic and for the treatment of rheumatism. (*Phar. Jour.*, April 18, 1908, page 518, from *l'Union Pharm.*)

Iodofan.—F. Zernik, in a recent address to the German Pharmaceutical Society, reiterates his former statement that iodofan contains only 4 per cent. of iodine instead of from 42 to 47 per cent. as claimed by the manufacturers. (*Jour. A. M. A.*, April 4, 1908, page 1135.)

Neoform.—This is said to be a basic tri-iodo-phenolate of bismuth, and occurs as a yellow powder, with a distinctive, though not objectionable odor. This preparation is said to be insoluble in the ordinary solvents and does not melt on heating. It begins to decompose at temperatures varying from 170° to 180°.

Neoform is said to be useful as an antiseptic and absorbent powder. (*Zeitschr. d. Allgemein. Oest. Apoth. Ver.*, 1908, page 213.)

Pyrenol.—H. Thoms reiterates the report made by F. Zernik, some time ago, that pyrenol is a mechanical mixture composed of equal parts of sodium salicylate and sodium benzoate, with 1 per cent. of benzoic acid and a trace of thymol, not more than 0·3 per cent.

The product is evidently obtained by fusing a mixture of the constituents. (*Apothek. Zeit'g*, 1908, page 317.)

Salol-Chloral.—It is claimed that a definite compound of salol and chloral results from the heating together on a water bath, at about 100° C., of 214 parts of salol and 147·5 parts of hydrated chloral. The resulting product is an oily liquid, insoluble in water, that crystallizes on cooling. Salol chloral has been recommended as a hyp-

notic and antiseptic. (*Phar. Jour.*, 1908, page 518, from *l'Union Pharm.*)

Vapo-Cresolene.—From an examination made in the chemical laboratory of the American Medical Association, it appears that vapo cresolene is essentially cresol and corresponds in every respect to the requirements for cresol in the United States Pharmacopœia. (*Jour. A. M. A.*, April 4, 1908, page 1135.)

Zinc Boropicrate (*Chrysyl*).—Picric acid, 349; boric acid, 62; water, about 400, are heated together, and zinc oxide, 82, is added to the solution. The resulting yellow powder has been used as a sedative drying agent in the treatment of skin affections and for ophthalmic application. (*Phar. Jour.*, April 18, 1908, page 518, from *l'Union Pharm.*)

PHILADELPHIA COLLEGE OF PHARMACY.

The eighty-seventh annual commencement of the Philadelphia College of Pharmacy was held in the American Academy of Music, corner Broad and Locust Streets, Thursday evening, May 21st. After prayer by the Rev. August Pohlman, M.D., the degrees were conferred by President Howard B. French.

The degree of Master in Pharmacy (Ph.M.) *honoris causa* was conferred upon Samuel William Fairchild, Ph.G., New York City; Horatio Nelson Fraser, Ph.G., New York City; John Francis Hancock, Phar.D., Baltimore; William McIntyre, Ph.G., Philadelphia; and Samuel Arno Darlington Sheppard, Ph.G., Boston. The following are the names of those who received the degree of Doctor in Pharmacy, together with the subjects of their theses:

Name.	*Thesis.*	*State or Country.*
Ackley, Kelso Carter,	Glycerinum,	New Jersey
Allen, Clyde M.,	The Manufacture of Sodium Chloride in New York State,	New York
Anderson, Gus. Goodfred,	Liquid Medicines versus Pills,	Pennsylvania
Ayres, John,	Disinfection,	Pennsylvania
Baer, Howard Jacob,	Magma Magnesiæ,	Pennsylvania
Baldwin, Chas. Hampton,	Ergota	New Jersey
Ballinger, Reeve Leslie,	Liquor Calcis,	New Jersey
Bannan, Samuel Joseph,	Cataplasma Kaolini,	Pennsylvania
Barrett, Edson Jay,	A Practical Container for the Distribution of Liquid Soap,	Pennsylvania

Name.	*Thesis.*	*State or Country.*
Beam, Eugene Cecil,	Preservation of Volatile Oil of Lemon,	West Virginia
Beecham, Edgar F. Carroll,	Digitalis,	Maryland
Bethel, Allen Paul,	Circulatory Displacement,	Oklahoma
Bourne, James Frank,	Microscopic Study of Crude Drugs,	Maryland
Bower, Roy Carson,	Rhamnus Purshiana,	Pennsylvania
Bridgeman, John Joseph,	A Microscopical Examination of Exhausted Ginger,	Pennsylvania
Brigadell, James Chris.,	Turpentine, New Process,	New Jersey
Burt, William Henry,	Opium,	Pennsylvania
Buzzell, Edgar Robert,	Glycerite of Bismuth,	Pennsylvania
Camp, Walter Sam. (P.C.),	Cotton Root Bark,	Texas
Church, Charles Corss,	Ginseng, the Chinese Specific,	Pennsylvania
Ciancarelli, Silvio,	Ipecacuanha,	Italy
Clark, Milton Renn,	Ointment Containers,	Pennsylvania
Coldren, Arthur Bard,	Ergot,	Pennsylvania
Cope, Roy Thomas,	Arseni Trioxidum,	Pennsylvania
Copella, George William,	Liquor Magnesii Citratis,	Pennsylvania
Corp, Clarence Henry,	Oleum Terebinthinæ Rectificatum,	New York
Cutler, Ralph,	Bookkeeping,	Pennsylvania
Dauphinee, For. Whitney,	Iodine,	Pennsylvania
Davies, Chester Stanley,	Elixir Ferri Quininæ et Strychninæ,	Pennsylvania
Dean, J. Atlee,	Iodine,	Pennsylvania
DeLaney, Harry Lee,	Essence of Pepsin N. F.,	Pennsylvania
Delle, Oscar Artus,	Pepsin—Its Importance as a Standard Liquid Preparation,	Pennsylvania
Dillon, LeRoy Victor,	Pharmacy,	Pennsylvania
Donmoyer, Paul Revere,	Linimentum Camphoræ,	Pennsylvania
Dry, William Reddig,	Benzoinum,	Pennsylvania
Duntze, Francis Chas., Jr.,	The Castor Oil Plant and Bean,	Tennessee
Eldon, Clarence Howard,	Sambucus.	Pennsylvania
England, Paul Roberts,	Boron and Its Compounds,	Ohio
Feuerstein, Rose (Miss),	Microscopical and Chemical Study of Digitalis,	Pennsylvania
Fitzpatrick, Richard,	Oil of Wintergreen,	New Jersey
Fleming, John Merle,	Vaccine Virus,	Pennsylvania
Fowler, Jesse A.,	Mel,	New Jersey
Fox, Clarence Roy,	Liquor Magnesii Citratis,	Pennsylvania
Frailey, W. Otterbein, Jr.,	A New Pharmaceutical Appliance,	Pennsylvania
Gabriel, Rose (Miss),	Lime Water,	Russia
Geety, William Wallace,	Powdered Tragacanth,	New York
Glise, Amos Chester,	Alcohol,	Pennsylvania
Goicouria, Pedro Prudencio,	A Number of Species of Datura,	Puerto Rico
Graeff, Claude Conner,	Thyreoidectin,	Pennsylvania
Hamaker, Amos Leopold,	Mucilage of Myrrh,	Pennsylvania
Harr, Charles Nelson,	Ointment Bases,	Pennsylvania
Hillegass, Frank Stanley,	American Hellebore,	New Jersey
Hopkins, John Oliver,	Opium,	Maryland

Name.	*Thesis.*	*State or Country.*
Hopkins, Maxwell,	Apis Mellifica and Its Products,	Pennsylvania
Huebner, Walter Fred.,	Iodoform and Iodoform Ointment,	Pennsylvania
Johnston, Ralph Rupp,	Aromatic Elixir,	Ohio
Kelly, Thomas Joseph,	Copaiba,	Pennsylvania
Knight, Harry Martin,	Commercial Vanilla Bean,	Pennsylvania
Kraemer, William,	Liquor Magnesii Citratis,	Illinois
Ladakis, Triantaphyllo C.,	Pharmacy in Turkey,	Turkey
Lambert, Roy Albert,	Digitalis and Its Action,	Pennsylvania
Landis, Frederick Samuel,	Powder Folders,	Pennsylvania
Laws, Thomas Davis,	Tinctura Strophanthi,	Delaware
Light, Abraham,	Cacao Beans,	New York
Light, Mandell,	Liquor Magnesii,	New York
Link, John William,	Vetiver,	Pennsylvania
Lowe, Clement Wakelin,	Prescription Economics,	Pennsylvania
McAnulty, John Francis,	Crystallization,	Pennsylvania
McElroy, David Gregory,	Glandulæ Thyroideæ,	Pennsylvania
McGovern, John Francis,	Cod Liver Oil,	Pennsylvania
McMichael, Dan. Webster,	Silver,	Texas
Maltman, William Stewart,	Myristica	Delaware
Mauger, Lee Fillmen,	Fluid Extracts of the National Formulary, Third Edition,	Pennsylvania
Miller, Franklin Peter,	Acridity of Arisæma Triphyllum,	Pennsylvania
Morton, Eugene Faunce,	Liquor Magnesii Citratis,	New Jersey
Murray, Joseph Leo,	The Relative Size of the Drops of a Saturated Solution of Potassium Iodide,	Pennsylvania
Nelden, Ralph,	The Thalleioquin Reaction,	Utah
Odenwelder, Asher J., Jr.	Leguminosæ and Their Influence on Agriculture,	Pennsylvania
Ohming, Harry W.,	Acetphenetidinum,	Illinois
Parson, Henry Edwin,	Twentieth Century Pharmacist,	Pennsylvania
Paterno, Feliciano,	Phyllanthus Niruri, L. (Sampalucan),	Manila, P. I.
Pennock, Joseph Levis,	Acacia,	Pennsylvania
Rather, Hugh Henry,	Sapo Liquidus,	Mississippi
Reighter, David Henry,	Elixirs of the National Formulary,	Pennsylvania
Roman, Jose,	Cassia Foetida,	Puerto Rico
Ross, Hendric Arnold,	Oleum Gossypii Seminis,	Arkansas
Santee, Boyd Arthur,	Conium Maculatum,	Pennsylvania
Saul, George Milton,	Greaseless Creams,	Pennsylvania
Schaffer, Frank Warren,	Animal Diastase,	Pennsylvania
Schuehle, Martin Charles,	Juniperus Nana,	Pennsylvania
Shields, Edwin Fay,	Camphora,	Ohio
Shoemaker, Stowe,	Prunus Virginiana,	Pennsylvania
Simpson, John Morton,	Stearic Acid,	Pennsylvania
Smith, Edward Gibbon,	Manufacture of Pig Iron	Pennsylvania
Stevens, Charles Henry,	Some Cultivated Varieties of Capsicum,	Pennsylvania

Name.	*Thesis.*	*State or Country.*
Stetler, Harry Aaron,	The Cultivation and Industry of Gossypium,	Pennsylvania
Stokes, Edward Verry,	Malt Extracts,	Maryland
Stover, Harman Albert,	Syrup of Tolu,	Pennsylvania
Strauch, Robert,	Liquor Magnesii Citratis,	Pennsylvania
Stucker, Lester Eldridge,	Petrolatum Saponatum Liquidum	Iowa
Study, Edwin Lever,	Olive Oil and Adulteration as Found and Shown in Drug Stores,	Pennsylvania
Suter, Louis Adolph,	Spiritus Ammoniæ Aromaticus,	Maryland
Sweeney, Edward James,	Distribution of Mucilage in Sassafras,	Pennsylvania
Teter, Claude Jacob,	Iodine and Its Antiseptic Properties,	Pennsylvania
Titus, Frank DeWight,	Camphor Estimation in Spirit of Camphor,	Pennsylvania
Trainer, Maurice Winfield,	Diphtheria Antitoxin,	Pennsylvania
True, Chester Arthur,	Cinchona and Its Alkaloids,	Maine
Umlauf, Harry Jacob,	Sandalwood,	Pennsylvania
Wagner, John George,	Iodine,	New Jersey
Watson, Herbert Tustin,	The Production of Olive Oil,	Pennsylvania
Weinberg, Samuel,	Cannabis Indica,	New Jersey
Wendel, Paul Herman,	The Microscopical Examination of Powdered Drugs,	New Jersey
Whaland, Berta (Miss) (P. C.),	The Rancidity of Fats,	Pennsylvania
Wheeler, C. E. Richardson,	Agaricus Campestris,	Pennsylvania
Wisman, Robert Maphis,	Sodium Phosphate,	Virginia
Wolfe, Joseph Albert,	Aqua Hydrogenii Dioxidi ,	Maryland
Woodman, Charles David,	Microscopical Study of Sassafras Medulla,	Pennsylvania
Wyss, Walter Aultman,	Ginseng,	Ohio
Young, Edgar Joseph,	Pharmacy a Profession,	Pennsylvania
Young, Jos. Bartholomew,	Microscopical Examination of Several Varieties of Opium,	Pennsylvania
Zeller, Chas. Bruce Boyle,	Salæratus,	Maryland
Zelt, John William,	Asbestos, Preparation and Products,	Pennsylvania

The following are the names of those who received the degree of Pharmaceutical Chemist (P. C.), together with the subjects of their theses:

Name.	*Thesis.*	*State or Country.*
Allen, James Henry,	Lime Tablets,	Georgia
Bell, Howard Homer,	Digitalis,	Pennsylvania
Bonnell, Frank Sumner,	Liquor Antisepticus U.S.P.,	Iowa
Etoch, Michael Antoine,	Labarraque's Solution,	Arkansas
French, Robert Samuel,	Micro-chemical Tests and the Physiological Testing of Drugs,	Oregon
Greeninger, Chas. Wenger,	Elixir Ferri, Quininæ et Strychninæ Phosphatum,	Pennsylvania
Hering, George,	Tincture of Strophanthus,	New Jersey

Name.	*Thesis.*	*Country.*
Jones, Elisha Roy,	Examination of Substances for Poison,	Texas
LaDow, Harry,	Urinary Analysis,	New Jersey
Mathewson, William,	Desiccated Suprarenal Gland,	Pennsylvania
Nahikian, Kissag Marookeh,	The Use of the Microscope as an Adjunct to the Pharmacist,	Armenia
Neal, Clark,	Theobroma Cacao,	Pennsylvania
Rigg, John,	Phenol,	New Jersey
Zahn, Herman Stanley,	Fluid Glycerite of Krameria,	New Jersey

The following were awarded the certificate of Proficiency in Chemistry:

Name.	*State.*
Davy, F. Covell (P.D.)	Pennsylvania
Fry, Elmer Jay	Ohio
Keiser, Charles Raymond	Pennsylvania
Wade, Joseph Louis (P.D.)	Pennsylvania

There were 140 candidates for the degrees *in course*, coming from the various States and countries as follows: Arkansas, 2; Armenia, 1; Delaware, 2; Georgia, 1; Illinois, 2; Iowa, 2; Italy, 1; Maine, 1; Manila, P. I., 1: Maryland, 7; Mississippi, 1; New Jersey, 15; New York, 5; Ohio, 5; Oklahoma, 1; Oregon, 1; Pennsylvania, 81; Puerto Rico, 2; Russia, 1; Tennessee, 1; Texas, 3; Turkey, 1; Utah, 1; Virginia, 1; West Virginia, 1.

The valedictory address was delivered by Hon. Ralph D. Cole, Representative in Congress from Ohio, and was highly appreciated.

AWARD OF PRIZES.

The following students received the grade of distinguished: T. C. Ladakis and Ralph Nelden. The grade of meritorious was attained by Oscar A. Delle, Paul R. England, Frank DeW. Titus, Hugh H. Rather and Joseph A. Wolfe.

The Procter Prize, a gold medal and certificate, for the highest general average of the class with a meritorious thesis, was awarded to Ralph Nelden, the presentation being made by President French.

The William B. Webb Memorial Prize, a gold medal and certificate, offered for the highest general average in the examinations of the committee, operative pharmacy and specimens, was awarded to Ralph Nelden, the presentation being made by Professor Sadtler.

The following graduates received honorable mention in connection therewith: T. C. Ladakis and Hugh H. Rather.

The Pharmacy Prize, a gold medal, offered by Prof. Joseph P. Remington for original pharmaceutical work, was awarded to Lee F. Mauger. The following graduates received honorable mention in connection therewith: William O. Frailey, Jr., and Frederick S. Landis.

The Materia Medica Prize of $25, offered by Prof. Clement B. Lowe for the best examination in materia medica and in the recognition of specimens with a meritorious thesis, was awarded to Ralph Nelden. The following graduates received honorable mention in connection therewith: Edson J. Barrett, John F. McGovern, T. C. Ladakis, Edward J. Sweeney and Frank DeW. Titus.

The Microscopical Research Prize, a Zentmayer microscope, offered by Prof. Henry Kraemer, for the best thesis involving original microscopical work, was awarded to Pedro P. Goicouria. The following graduates received honorable mention in connection therewith: John J. Bridgeman, Jr., Robert S. French, Feliciano Paterno, Charles H. Stevens, Harry J. Umlauf, Charles C. Church, John W. Link, Martin C. Schuehle, Edward J. Sweeney, Charles D. Woodman and Joseph B. Young, Jr.

The Analytical Chemistry Prize, $25, offered by Prof. Frank X. Moerk, for the best work in qualitative and quantitative analysis, was awarded to Ralph Nelden. The following graduates received honorable mention in connection therewith: James H. Allen and Oscar A. Delle.

The Operative Pharmacy Prize, $20 in gold, offered by Prof. Joseph P. Remington, for the best examination in operative pharmacy, was awarded to Thomas Davis Laws, the presentation being made by Wm. L. Cliffe. The following graduates received honorable mention in connection therewith: Edson J. Barrett, Clarence H. Eldon, T. C. Ladakis, Joseph L. Pennock, Frank DeW. Titus, Forrest W. Dauphinee, Paul R. England, Ralph Nelden, Hugh H. Rather and Charles B. B. Zeller.

The Maisch Prize, $20 in gold, offered by Mr. Jacob H. Redsecker, of Lebanon, Pa., for histological knowledge of drugs, was awarded to Ralph Nelden, the presentation being made by Theodore Campbell. The following graduates received honorable mention in connection therewith: James H. Allen, Eugene C. Beam, J. Atlee Dean,

Harry J. Umlauf, Howard J. Baer, John J. Bridgeman, Jr., Pedro P. Goicouria and Joseph A. Wolfe.

The Theoretical Pharmacy Prize, a Troemner Agate Prescription Balance, offered by Mr. Mahlon N. Kline for the best examination in Theory and Practice of Pharmacy, was awarded to T. C. Ladakis, the presentation being made by George M. Beringer. The following graduates received honorable mention in connection therewith: Ralph Nelden and Hugh H. Rather.

The Commercial Training Prize, $20 in gold, offered by Prof. Joseph P. Remington to the graduate who passed the best examination in Commercial Training at the final examination for the degree, was awarded to Edwin L. Study, the presentation being made by Warren H. Poley. The following graduates received honorable mention in connection therewith: Edson J. Barrett, Oscar A. Delle, T. C. Ladakis, Thomas D. Laws, Lee F. Mauger, James F. Bourne, Paul R. England, Ralph R. Johnston, Clement W. Lowe, Ralph Nelden and Hugh Henry Rather.

The Instructors' Prize, $20, offered by the instructors of the College for the highest term average in the branches of Pharmacy, Chemistry and Materia Medica, was awarded to Lee F. Mauger. The following graduates received honorable mention in connection therewith: T. C. Ladakis, Clark Neal, Robert Strauch, William Mathewson, Ralph Nelden, Frank DeW. Titus and Joseph A. Wolfe.

The Pharmacy Review Prize, one year's membership in the American Pharmaceutical Association, offered by Prof. Charles H. LaWall for the best term work in theory and practice of pharmacy, was awarded to Ralph Nelden. The following graduates received honorable mention in connection therewith: Eugene C. Beam, Clarence H. Eldon, T. C. Ladakis, Lee F. Mauger, Harman A. Stover, Frank DeW. Titus, Oscar A. Delle, Robert S. French, William Mathewson, Clark Neal, Robert Strauch and Joseph A. Wolfe.

The Kappa Psi Fraternity Prize, a gold medal, offered by the Eta Chapter of the Kappa Psi Fraternity to the graduate making the highest general average during his or her senior course at the College, was awarded to Ralph Nelden. The following graduates received honorable mention in connection therewith: Oscar A. Delle, T. C. Ladakis, Frank DeW. Titus, Paul R. England, Hugh H. Rather and Joseph A. Wolfe.

COMPLIMENTARY SUPPER AND DINNER.

A very pleasant function following the Commencement exercises was a reception and dinner given at the Union League by the officers and faculty of the College to the guests of the evening, including the Hon. Ralph D. Cole, those receiving honorary degrees and the members of the Board of Trustees of the United States Pharmacopœia Convention. President French acted as toastmaster, and short speeches were made by the recipients of honorary degrees.

On Wednesday evening, May 20th, a complimentary supper was tendered the graduating class by members of the Faculty. Professor Remington, as dean of the Faculty, acted as toastmaster, and in addition to the speeches by the members of the Faculty and instructors, a number of the members of the graduating class made brief responses.

BACCALAUREATE SERMON.

Baccalaureate services were held in the Church of St. Luke and The Epiphany, on Sunday afternoon, May 17th, the sermon being delivered by the rector, the Rev. David M. Steele.

ALUMNI ASSOCIATION.

The forty-fourth annual meeting was held in Alumni Hall, Monday, May 18th, at 2.30 P.M., with the President, Charles H. La Wall, in the chair. Following the annual address of the President, were the reports of officers and standing committees. The annual election of officers was then held and resulted as follows: President, E. Fullerton Cook; first vice-president, Clarence H. Campbell; second vice-president, David J. Reese; recording secretary, Joseph W. England; corresponding secretary, Otto W. Osterlund; treasurer, C. Carroll Meyer; board of directors: Jacob M. Baer, William H. Gano, William E. Lee, Edwin L. Newcomb, Charles S. Cameron and Alfred Heineberg.

The annual reception given by the Association to the members of the graduating class was held on the evening of the same day in the College Museum.

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JULY, 1908

THE MICROSCOPICAL AND CHEMICAL EXAMINATION OF COMMERCIAL GINGER.*

By Henry Kraemer and Harry E. Sindall.

Besides its use in medicine, ginger is extensively used in the United States, both as a condiment and confection, and also in the preparation of ginger ale. While there are about twenty species of the genus *Zingiber*, most of the commercial article is obtained from *Zingiber officinale*, Roscoe. According to Watt,[1] this species is not known in a truly wild state, but is doubtless a native of Tropical Asia. It is now extensively cultivated in both the Eastern and Western Hemispheres, having been introduced into nearly all tropical countries.

It is a perennial herbaceous plant, belonging to the family *Zingiberaceæ*, a monocotyledonous group of plants which are characterized by their aromatic properties. The plant produces two kinds of shoots, one composed of leaves only and one which bears flowers. It is of interest to note in this connection that although the plant is grown in many of the botanic gardens of the world, it is claimed by Bentley and Trimen[2] that it does not flower under these conditions. An excellent illustration of the plant is given by Berg and Schmidt,[3] and this has been reproduced by Engler and Prantl[4] and other authors.

* This is the second of this series of papers, the first having appeared in the January number of this Journal on the "Examination of Black Pepper." It probably should be stated that the chemical analyses given in this series of papers are being carried on by Mr. Sindall, the remaining part of the work being by Professor Kraemer.

When grown for commercial purposes, the plant is propagated from cuttings of the rhizomes. In India great care is bestowed upon this crop, special attention being given both to the physical condition of the soil and its composition. Frequently the *Dolichos* vine is grown along with the ginger plants to keep the ground moist and cool, or the plants are protected by a leafy covering. The cuttings are planted in April or May, or later, according to locality, and it takes about nine months for the plant to reach maturity. In Jamaica the planting season begins in March or April.

When the overground parts of the plants die down, the rhizomes are dug and variously treated to prepare them for market. In Jamaica, according to Kilmer,[5] the rhizomes are first peeled and then washed with clean water, in some cases lime-juice being added to the water, after which they are dried in the sun. In India the rhizomes are usually partly peeled and treated with boiling water, or, according to Simmonds,[6] with boiling lime water. In some cases the peeled rhizomes are subsequently coated with calcium carbonate (chalk) or calcium sulphate (gypsum) to prevent the ravages of insects. Decorticated ginger is often bleached by the use of chlorinated lime or sulphurous acid.

The rhizome is described as being a sympodium, that is, belongs to the dichotomous system of branching, in which the branches on one side are less developed. Its external morphology, as well as histology, has been studied by Meyer,[7] and by Oesterle and Tschirch.[8] The rhizome is flattened, and as a result of its branching habit assumes the peculiar form sometimes spoken of as a "hand," the branches being called "fingers."

DESCRIPTION OF COMMERCIAL GINGERS.

Gingers are known commercially as "scraped" or "decorticated," and "coated," the scraped including those sorts from which the cortex has been removed in whole or in part by peeling, as the Cochin, Jamaica and Japan gingers; whereas the coated gingers include those which retain the periderm or outer natural layers of the rhizomes, as African, Calcutta and Calicut. "Bleached" and "unbleached" sorts are also distinguished, the former including rhizomes which are lighter in color, owing to careful washing and drying or other treatment as already stated. There has long been a demand for "white ginger," which demand has been met by coat-

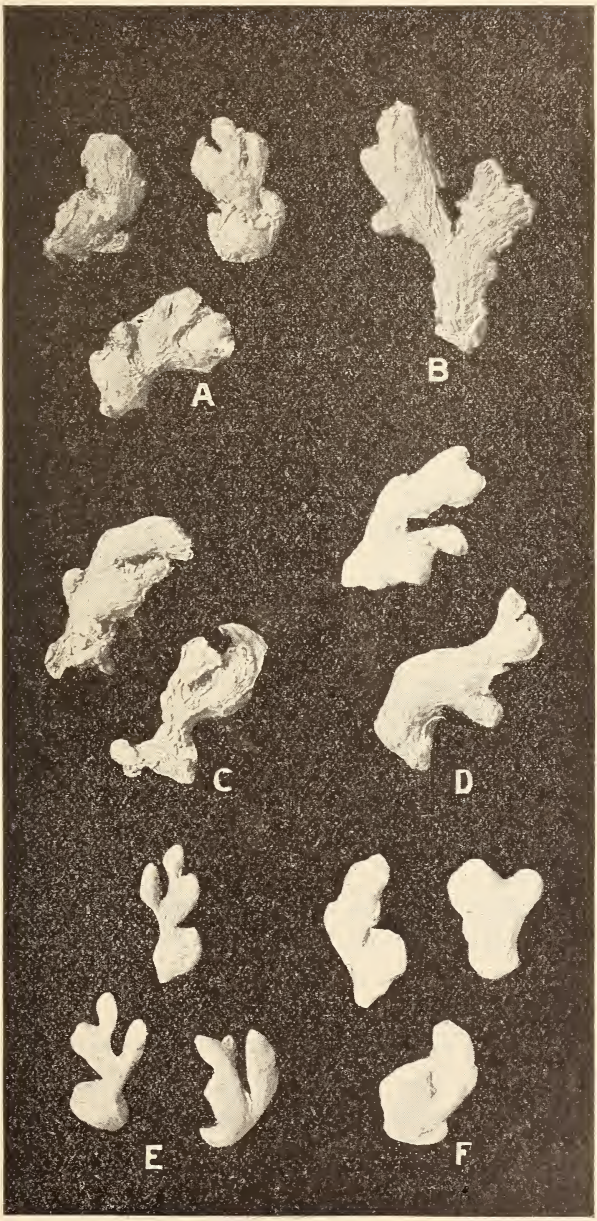

FIG. 1.—Commercial gingers: *A*, African; *B*, Calcutta; *C*, Calicut; *D*, Cochin; *E*, Jamaica; *F*, Japan. (One half natural size).

ing the rhizomes with lime. The United States Government standards do not, however, permit any considerable percentage of lime, but, on the contrary, require the gingers of the market to be carefully garbled, and that only clean pieces be used.

The principal commercial gingers which are coming into this market at present are African, Calcutta, Calicut, Cochin, Jamaica and Japan (*Fig. 1*).

African Ginger.—This sort occurs in short-branched pieces (*Fig. 1*) that vary from 2 to 4 cm. in length, and from 6 to 12 mm. in width. The pieces are partly peeled on the flattened sides, the patches where the cortex is removed being smooth and of a brown color. The unpeeled portion is longitudinally wrinkled, or reticulate, and of a grayish-brown color. The fracture is short or short-fibrous. Internally, the color varies from lemon-yellow to a dark-bluish or slate color, and the sections exhibit yellowish oil dots and light-yellow to garnet resin dots. The odor is strongly aromatic and the taste is intensely acrid.

Calcutta Ginger.—This ginger somewhat resembles the African ginger, but the branches or fingers are larger, and there is a considerable proportion of shriveled pieces. The pieces vary from 2 to 7 cm. long, and from 5 to 20 mm. wide. The color is grayish-brown, the peeled parts being of a grayish-blue or slate color, due to the presence of a mold. The fracture is short and mealy, or horny. Internally, the rhizome is of a light yellow or light brownish-yellow color, and exhibits resin dots which are yellow to yellowish-brown in color. The odor is aromatic, and the taste starchy and strongly pungent.

Calicut Ginger.—The pieces of this sort resemble those of Calcutta ginger, but more of the periderm is removed. They are from 2·5 to 5·5 cm. long and from 10 to 18 mm. wide. The color is more or less uniformly light brown. The fracture is short, or short-fibrous, and mealy. The color internally is light or brownish-yellow, the resin dots under the lens being yellowish. The odor is aromatic and the taste is strongly acrid.

Cochin Ginger.—The pieces are more or less plump and uniform in size, varying from 2 to 4 cm. long, and from 10 to 20 mm. wide. A large proportion of the periderm is removed, and the color varies from a light brown to a grayish-yellow. The fracture is short and mealy. Internally, the pieces are of a light cream color, and under

a lens show numerous black resin dots. The odor is aromatic and the taste is acrid, but less persistent than in some of the other kinds.

Jamaica Ginger.—The main branches of the rhizome appear to

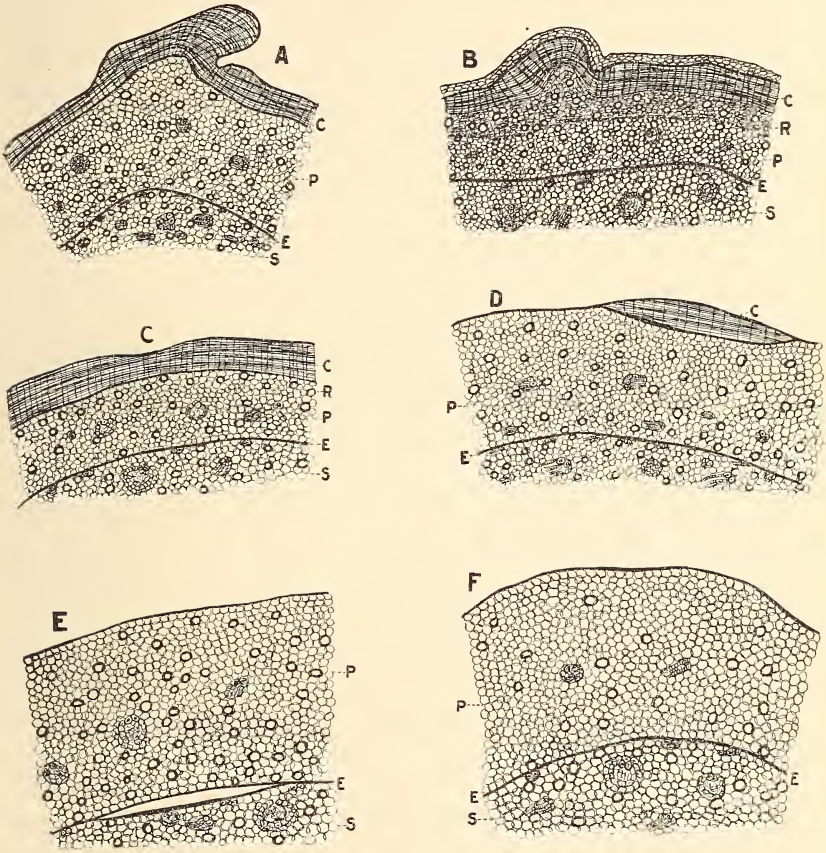

FIG. 2.—Transverse sections showing relative width of cortex in the following commercial gingers: *A*, African; *B*, Calcutta; *C*, Calicut; *D*, Cochin; *E*, Jamaica; *F*, Japan.

C, cork; R, pigment layer; P, parenchyma of cortex, containing secretion cells and fibrovascular bundles; E, endodermis; S, stele with parenchyma, secretion cells and fibrovascular bundles.

be comparatively small, and the pieces vary from 2 to 4 cm. long, and from 2 to 17 mm. wide. All of the periderm is removed and the surface is smooth and grayish-white to dark gray in color. The

fracture is short and smooth. The color internally is light yellowish-brown, showing few reddish-yellow resin dots under a lens. The odor is very aromatic and the taste agreeably pungent.

Japanese Ginger.—The pieces are sparingly branched and vary from 2 to 4 cm. long, and from 10 to 20 mm. in width. The periderm is mostly removed, the surface being smooth and of a whitish color, due to the presence of a coating of calcium carbonate. The fracture is short and very mealy, the color internally varying from cream to light brown. Under the lens the sections exhibit reddish resin dots. The odor is aromatic and the taste is acrid.

MICROSCOPIC STRUCTURE.

The ginger rhizome has the typical monocotyledonous stem structure (*Fig. 2*). It consists chiefly of parenchyma containing starch, among the cells of which are numerous secretion cells with suberized walls that contain oil and resinous substances, and about one-third to one-fourth as many fibrovascular bundles, which are of the closed collateral type. Separating the central cylinder, or stele, from the cortex, is a more or less interrupted endodermis, the radial walls of the cells of which are slightly suberized, but in the dried material it is distinguished with some difficulty. A portion of the cork is found in African, Calcutta, Calicut and Cochin gingers, but is wanting in the Jamaica and Japan varieties.

Parenchyma.—The parenchyma cells are nearly isodiametric, varying from 25 to 120 μ in diameter, and are somewhat elongated. The walls are composed of cellulose and are about 1 μ thick. The parenchyma cells of the stele are uniformly larger than those of the cortex. It has been stated that the parenchyma contains calcium oxalate, but this substance has not been detected in the commercial sorts included in this examination, the cells containing starch as already stated.

Starch Grains.—The careful study of the starch grains of ginger is very important, for not only may the different commercial sorts be distinguished by the characters of the starch grains, but their appearance also possibly throws some light on the manner of curing of the rhizomes. While it is true that the starch grains vary considerably in the same ginger as well as in the different gingers, still they possess some dominant characters which serve to distinguish to a certain extent the different commercial gingers. In a general

way the grains vary from irregular-spherical to ellipsoidal, ovoid, ovoid-pointed and somewhat rectangular as viewed on the side (*Fig. 3*). While occasionally a grain may show distinct lamellæ, this is not the rule. For some reason ginger starch grains do not polarize well. Very few of the grains show a distinct cross, and usually the contrast in the parts of the field is faint, unless they are mounted in oil and heated to 60° C.

The starch grains of Japan ginger are the most easily distinguished. In addition to the typical grains, which vary from 20 to 35 μ in length, there are numerous compound grains varying from 4 to 25 μ in diameter (*Fig. 3, f*). They differ from the ordinary compound grains by being more or less irregular and of varying size, and apparently more easily detached from one another than is usually the case. In Calcutta ginger there appears to be a larger proportion of spherical grains, reminding one of those of wheat, and varying from 15 to 25 μ in diameter. The larger grains are ovoid, pear-shaped, or ovoid and beaked, and not more than 30 to 40 μ in diameter (*Fig. 3, b*). In Jamaica ginger the grains are uniformly larger than in the other gingers, it being not unusual to find them 45 μ long and occasionally 60 μ long (*Fig. 3, e*). The starch grains of African, Calicut and Cochin gingers are quite similar, and vary in diameter from 20 to 45 μ. In Calicut ginger there are, however, a few compound grains and a considerable number of helmet-shaped grains (*Fig. 3, c*). In Cochin ginger the grains show a stronger polarization than those of the other gingers, even when mounted in water (*Fig. 3, d*). In African ginger there is a preponderance of ellipsoidal, ovoid and pear-shaped grains, which on an average are from 25 to 30 μ in length (*Fig. 3, a*).

Secretion Cells.—In ginger there are two kinds of secretion cells, one kind being found with the parenchyma and being nearly spherical, and another associated with the fibrovascular bundles and elongated. Those found in the parenchyma vary in number from 10 to 50 per square millimeter as viewed in transverse section, and are more numerous in the cortex than in the stele, and furthermore occur in greater number near the endodermis (*Fig. 2*). The cells vary in diameter from 45 to 150 μ. The largest of these cells are found in Japan ginger. In fresh ginger and in the confection known as "crystallized ginger," the contents are oily and of a light yellow color, changing to a golden yellow with sulphuric acid. In most of

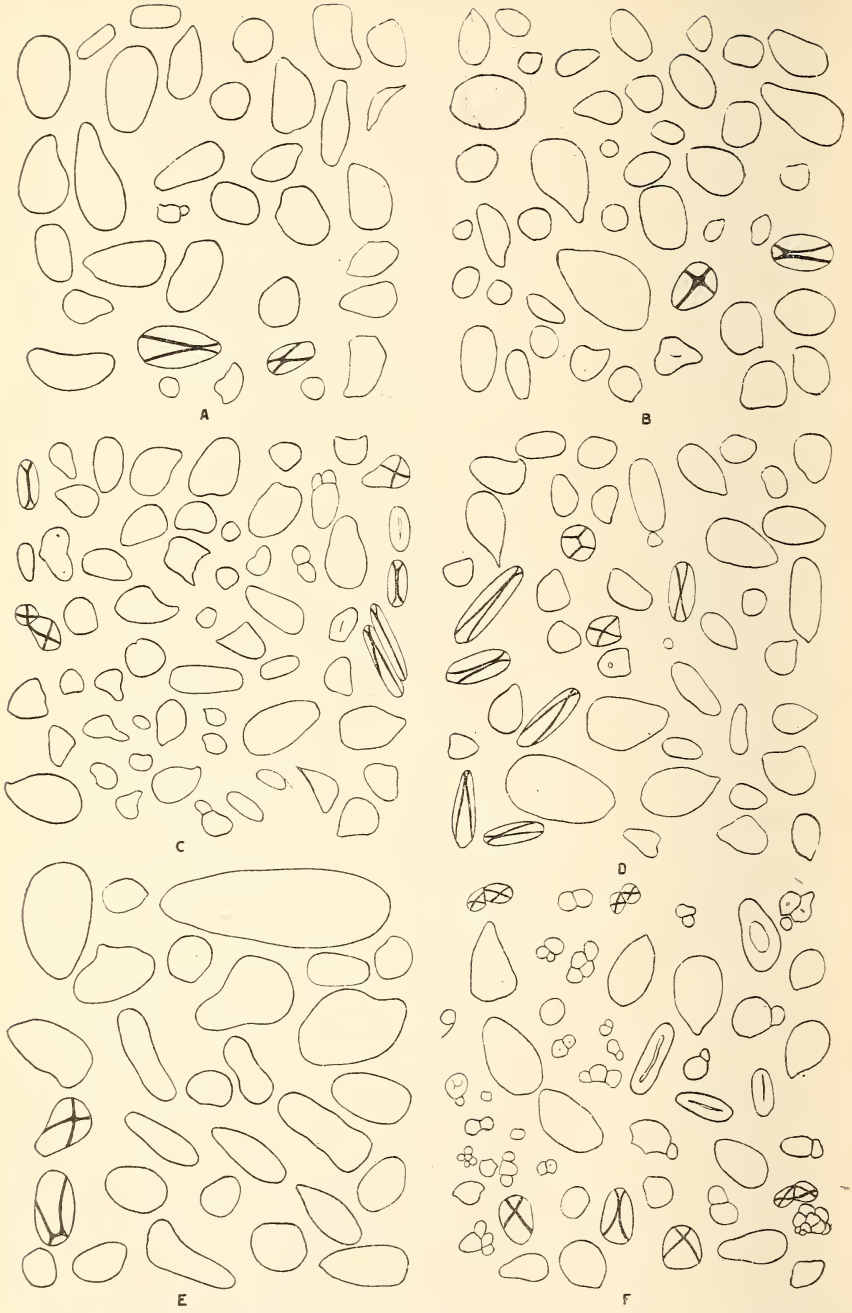

FIG. 3.—Starch grains of the following commercial gingers: *A*, African; *B*, Calcutta; *C*, Calicut; *D*, Cochin; *E*, Jamaica; *F*, Japan.

the dried commercial specimens the contents consist of a yellowish to reddish-brown balsam-like or resinous substance, which becomes of a deep brownish-black color on treatment with sulphuric acid. In Cochin ginger many of these cells contain a black tar-like product.

The elongated secretion cells are from 60 to 150 μ long and from 9 to 15 μ in diameter. They are somewhat irregular in outline and more or less pointed at the ends. In dried material the contents are of a yellow or bright yellowish-brown color.

Fibrovascular Bundles.—The fibrovascular bundles are, as already stated, of the closed collateral type, and the group of cells composing them vary in diameter from 60 to 360 μ, the smaller bundles always being in the region of the endodermis, and the larger occurring in the stele, and averaging from three to five in number per square millimeter. The bundles may consist entirely of two or three tracheæ and accompanying sieve cells, or they may include, in addition, from two or three to forty-five or fifty sclerenchymatous fibers. The latter appear to be more numerous in the Calcutta and Calicut gingers. The tracheæ are mostly reticulate, and vary from 30 to 60 μ in diameter (*Fig. 5*). The walls consist mostly of cellulose and contain little or no lignin, that is, the reaction with phloroglucin is very obscure. The sclerenchymatous fibers vary from 0·3 to 1·3 mm. long, and from 20 to 30 μ in diameter. The walls are about 3 μ thick, slightly yellowish, and have slender oblique simple pores. The walls are said to be slightly lignified, but this does not appear to be true of the samples herein described. They readily swell with sulphuric acid, are first colored deeper yellow with chlor-zinc-iodide, then blue, and are not affected by phloroglucin and hydrochloric acid. The fibers are easily separated either in the crude drug or powder by the use of Schulze's macerating fluid, and some of the more typical ones from the different gingers are shown in Fig. 4.

Endodermis.—The endodermal cells are not especially characteristic, but on treatment with sulphuric acid the radial walls are seen to be suberized. Sometimes the other walls appear to be partly suberized. The cells are from 60 to 90 μ long and about 12 μ in diameter.

Cork.—The cork cells are of the usual type, and in the African ginger the cork layer is about 0·3 mm. thick; in Calcutta ginger, about 0·4 mm. thick. The cells are on an average about 60 μ long, and 25 μ wide.

FIG. 4.—Sclerenchymatous fibers of gingers isolated by means of Schulze's macerating fluid: *A*, African; *B*, Calcutta; *C*, Calicut; *D*, Cochin; *E*, Jamaica; *F*, Japan.

Ground or Powdered Ginger.—The color of powdered ginger varies from pale yellow to light or dark brown. The odor is strongly aromatic and characteristic, and the taste is very pungent. In the making of the tincture of ginger, the U. S. Pharmacopœia directs that the ginger shall be in the form of a moderately fine powder, that is, the particles composing the powder shall be about 0·5 mm. in diameter. An examination of the commercial powdered ginger shows that the particles exclusive of starch grains vary from 0·1 to 0·6 mm. in diameter. Buchwald[9] call attention to the fact that when powdered ginger is dropped upon the surface of water the particles rapidly separate from one another and then sink in the liquid. This behavior of the ginger particles is all the more marked when it is compared with that of ether-extracted ginger, starch or lycopodium. When powdered ginger is treated with pure sulphuric acid, a reddish-brown color is at first produced, which rapidly changes to dark brown and finally to purplish-brown.

In the microscopic examination of the powders (*Fig. 5*) it is necessary to use several reagents. After making a preliminary examination of the material mounted in water, portions of the powders may then be mounted in one of the fixed oils, as olive or almond. While this medium brings out all of the elements of the powder, it is especially useful in the study of the starch grains. For this purpose it is necessary to use a small quantity of material, not more than a milligram to two or three drops of oil. The entire field should be examined carefully and the size and shape of the grains noted. If the preparation be heated at a temperature of 60° C. for 10 to 15 minutes, the polarizing effects of the grains become more pronounced (*Fig. 3*). Inasmuch as there are no lignified cells in ginger, phloroglucin is another important reagent in the examination of the powder, serving to detect any of the usual adulterants which contain lignified cells, as wheat middlings or capsicum. The sclerenchymatous fibers may be isolated by the use of Schulze's macerating fluid. When the cells are separated, the material is mounted in alcoholic methylene blue and glycerin is added (*Fig. 4*). Sulphuric acid is not only useful for determining the presence of ether-exhausted ginger and distinguishing the oil and resin cells, and the presence or absence of cork, but is especially useful in detecting the fungus of moldy ginger, the hyphæ and spores being both brought out with this reagent.

Adulterated Ginger.—The study of ginger is rendered difficult by reason of the fact that in preparing it for the market it is treated in a manner which alters its character to a greater or lesser extent.

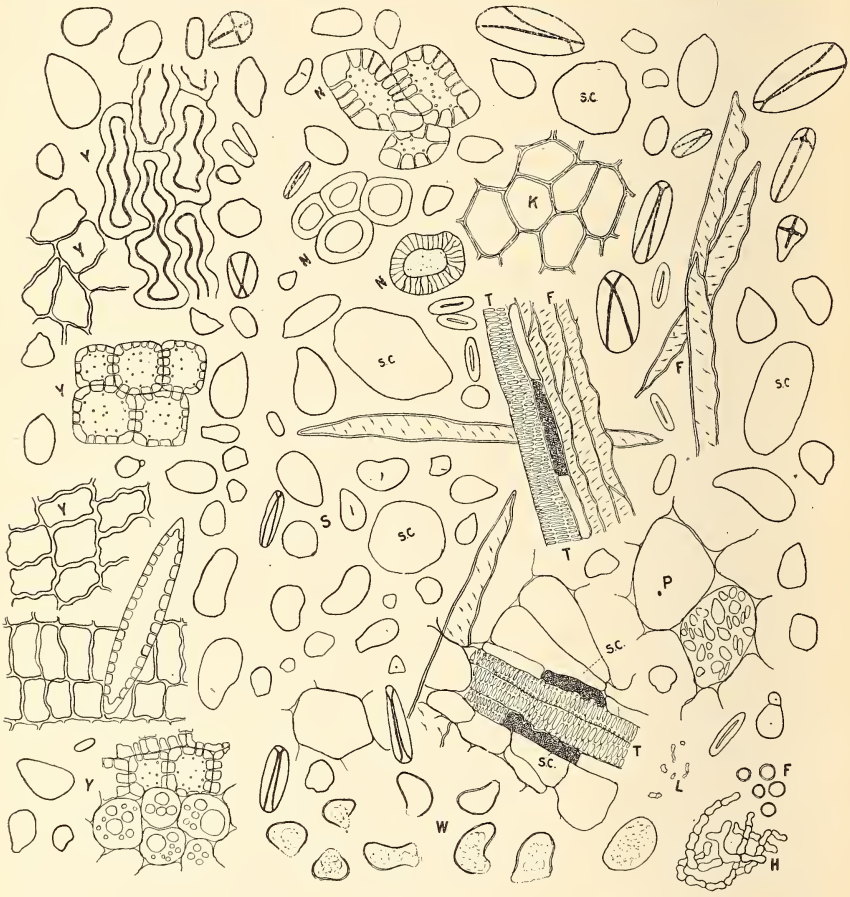

FIG. 5.—Adulterated powdered ginger: F, sclerenchymatous fibers; T, reticulate tracheæ; SC, secretion cells; K, cork; S, starch grains; W, swollen starch grains; W, small swollen altered starch grains; P, parenchyma; H, hyphæ of fungus and spores (F); Y, fragments of tissues of capsicum; N, stone cells of olive endocarp.

The water-soluble extract is partly removed by the washing to which it is subjected, and thus, as pointed out by Clayton,[12] the higher the price and the finer the appearance, the less the proportion of oleo-resinous constituents. In other words, an excessive amount of

washing produces an effect similar to that found in exhausted ginger. Furthermore, it should be stated that on the keeping of ginger the contents of the secretion cells are oxidized and changed in color, as well as rendered insoluble in such solvents as alcohol, ether, acetone, glacial acetic acid, potassium hydrate solution, and chloral hydrate; whereas, in the recently dried material, in the fresh rhizome and in preserved ginger the contents are of a distinct light yellow or yellow color, the oil is in the form of globules, and the contents are easily removed by means of any of the foregoing solvents. It would thus appear that the fresher the ginger the better it is in quality.

While in the past a number of substances have been used in the adulteration of ginger, at the present time apparently exhausted ginger is chiefly used, its deficiency in pungency being made up by the addition of a small amount of capsicum or Cayenne pepper. In the examination of ground ginger for the detection of exhausted ginger or other adulterants, the following points should be borne in mind:

1. Physical appearance. In powdered ginger the material is more or less uniform and granular, whereas in the exhausted powder the fibrous character of the material is especially manifest. The color of exhausted ginger is considerably lighter; the odor is strikingly less aromatic and the taste is less pungent, unless capsicum has been added, in which case the characteristic pungency of this condiment is evident.

2. When ether-extracted ginger is dropped on the surface of water, the particles are not distributed rapidly over the surface, and show a tendency to form a scum on the water, as is the case with wheat flour.

3. On adding sulphuric acid to exhausted ginger, a greenish-brown color at first develops, which becomes darker, the reagent itself not being colored.

4. With phloroglucin the stone cells of capsicum (*Fig. 5, y*) turn to a cherry-red, as also the lignified cells of soap bark. The cells of the sarcocarp of capsicum containing red chromoplasts are readily detected when the material is mounted in chloral or fixed oil.

5. When ginger has been exhausted with water or dilute alcohol, a comparatively larger number of the starch grains have bursted or have a swollen appearance at one end, and in among the grains are

particles of starchy material formed from the altered starch grains. When viewed under the micro-polariscope, while the cross may appear to be less distinct in some of the grains, they do not for the most part seem to have lost their anisotropic character, or to have been changed in constitution.

CHEMICAL EXAMINATION.

A number of excellent papers on the chemical examination of ginger have been published abroad, one of the most important of these being the one by Reich,[10] in which the various commercial sorts as well as exhausted ginger are considered. The most complete series of analyses that have thus far been made in this country is that published by Winton and Mitchell.[11]

The commercial gingers already enumerated were also examined chemically. The methods followed were those recommended by the Association of Official Agricultural Chemists, with the exception of that recommended for the determination of starch, which was estimated according to Allihn's original method for the determination of dextrose.

The following data were obtained in the examination of samples of known purity:

TABLE No. 1.

	Total Ash.	Ash Insoluble in 10 per cent. Hydrochloric Acid.	Cold Water Extract.	Volatile Ether Extract.	Non-Volatile Ether Extract.	Alcoholic Extract.	Crude Fiber.	Starch by Direct Acid Conversion.	Lime as Calcium Oxide.
African	5·74	1·15	12·62	7·17	8·49	7·20	2·62	55·07	0·12
Calcutta	7·47	2·02	14·20	3·06	6·50	6·40	5·46	47·89	0·13
Calicut	5·64	0·55	13·08	4·62	6·42	7·76	1·64	48·77	0·33
Cochin	6·43	0·85	14·30	7·03	6·68	8·04	3·06	52 00	0·58
Jamaica	3·88	0·45	15·54	3·23	7·30	5·80	1·44	58·97	0·17
Japan	6·16	0·69	14·40	7·39	7·01	10 48	1·60	55·97	1·68

The following figures were obtained in the examination of the ash of coarsely ground gingers of known purity. All of the figures given represent the average of two samples, except in the case of Calcutta ginger, in which the figures are the average of those obtained in the examination of four samples.

TABLE No. 2.

	Total Ash.	Insoluble Ash.	Lime as Calcium Oxide.
African	5·29	1 35	0·28
Calcutta	5·83	1 07	0·18
Calicut	5 47	0·57	0·16
Cochin	5·60	0·55	0·69
Jamaica	3·56	0·29	0·09
Japan	5·22	0 38	1·02

The following table shows the averages of the figures obtained in the partial analysis of from four to six samples of gingers of known purity:

TABLE No. 3.

		Total Ash.	Insoluble Ash in 10 per cent. Hydrochloric Acid.	Starch by Direct Acid Conversion.	Alcoholic Extract.
African	Maximum	5·74	1·29	57·09	7 20
"	Minimum	5 60	1 06	48 99	5·68
"	Average	5·64	1·16	53·71	6 36
Calcutta	Maximum	7·75	2·31	60·75	6·40
"	Minimum	7·14	2·02	47·89	5·28
"	Average	7·45	2·15	52·60	5·69
Calicut	Maximum	5·64	0·69	48·77	8·16
"	Minimum	5·51	0·55	48·33	7·00
"	Average	5·56	0·61	48 55	7·64
Cochin	Maximum	6·43	0·92	52·00	8·04
"	Minimum	6·31	0·79	40·39	5·40
"	Average	6 36	0 86	44·40	6·32
Jamaica	Maximum	4·15	0·45	62 97	5·80
"	Minimum	3·72	0·16	43·64	4·32
"	Average	3·90	0·24	56·42	4·95
Japan	Maximum	6·40	0·72	55·97	10·48
"	Minimum	6·02	0·61	39 99	6·96
"	Average	6 14	0·66	50·60	8·37

The following data were obtained in the examination of authentic samples of African and Calcutta gingers:

TABLE No. 4.

	Total Ash.	Insoluble Ash in 10 per cent. Hydrochloric Acid.	Crude Fiber.	Starch by Direct Acid Conversion.
1. African	6.09	0.86	6.88	52.50
2. "	5.09	0.34	—	62.66
3. "	5.16	0.35	—	—
4. "	6.00	0.86	7.44	53.14
5. "	5.93	0.80	—	—
6. Calcutta	6.94	1.68	4.84	54.97
7. "	7.61	2.17	4.80	55.80

The following data were obtained in the examination of twenty-three samples of pure ground ginger:

TABLE No. 5.

	Total Ash.	Insoluble Ash in 10 per cent. Hydrochloric Acid.	Crude Fiber.
Maximum	8.40	2.19	6.80
Minimum	6.08	1.04	6.10
Average	6.78	1.45	6.37

The following figures were obtained in the examination of commercial gingers bought on the market:

TABLE No. 6.

	Total Ash.	Water Soluble Ash.	Insoluble Ash in 10 per cent. Hydrochloric Acid.	Crude Fiber.	Cold Water Extract.	Alcoholic Extract.	Volatile Ether Extract.	Non-Volatile Ether Extract.	Lime as Calcium Oxide.	Starch by Direct Acid Conversion.
1	6.93	2.52	1.62	6.04	11.28	6.84	1.91	7.09	0.41	46.12
2	7.05	2.84	1.54	8.14	12.64	6.16	2.63	7.23	0.50	45.27
3	6.26	2.98	1.23	5.54	12.62	7.84	1.90	8.09	0.30	45.76
4	6.52	2.87	1.18	4.14	11.94	7.60	1.45	6.85	0.44	52.76
5	5.00	2.66	0.50	5.17	11.92	7.52	1.90	8.22	0.44	45.84
6	5.02	2.70	0.41	5.70	13.20	5.24	1.38	8.75	—	45.80
7	2.78	0.95	0.39	5.72	6.62	4.68	1.63	3.87	0.52	46.40

An examination of the figures given in Table 6 shows that all of the samples of commercial powdered ginger conform to the Government standard for starch and lime. All, except No. 2, contain less than 8 per cent. of crude fiber. They all come within the limits for insoluble ash, although the total ash is too high in Nos. 1, 2, 3 and 4. The samples are all lower in volatile ether extract than any of the authentic samples, analyses of which are given in Table 1, and Nos. 1, 4 and 5 show less cold-water extract. No. 7 was obtained as exhausted ginger, and is notably low in water-soluble ash, cold-water extract, alcohol extract, volatile ether extract and non-volatile ether extract.

MICROSCOPICAL EXAMINATION OF SAMPLES OF COMMERCIAL POWDERED GINGER.

The foregoing samples of commercial powdered gingers were also examined microscopically. Nos. 1 and 2 show the presence of Cayenne pepper and of olive endocarp (*Fig. 5*).

No. 4 contained aggregations of starchy material about 0·5 mm. in diameter, in which were distributed reddish oil globules resembling those of capsicum, which, together with the pungency characteristic of capsicum, suggested the addition of tincture of capsicum.

No. 5 contained numerous fragments, about 0·5 mm. in diameter, with polygonal non-lignified cells containing numerous yellowish-brown globular masses from 20 to 30 μ in diameter.

Nos. 3, 4, 5 and 6 all contained a considerable amount of fibrous material, as well as thick-walled isodiametric cells which were strongly lignified. While the presence of this foreign material may have been due to failure in properly garbling the ginger rhizomes, the amount was such as to warrant one in looking upon the samples with suspicion.

No. 7, which was obtained as an exhausted ginger, contained numerous fragments of quillaja or soap bark, as also the typical calcium oxalate crystals of quillaja.

SOME GENERAL CONCLUSIONS.

In considering the data obtained in both the microscopical and chemical examination of the samples of commercial powdered ginger and those of known purity, the conclusion is reached that commer-

cial powdered ginger, as, for example, samples 5, 6 and 7 in Table 6, may conform to the official standards, and yet be adulterated or contain exhausted ginger, or on the other hand be pure and yet vary slightly in the percentage of ash, as given in Tables 1, 4 and 5.

The comparatively high percentage of ash in Calcutta ginger may probably be accounted for by the larger amount of cork and the number of sclerenchymatous fibers in the fibrovascular bundles. That this is true is also shown by the fact that the percentage of crude fiber in Calcutta ginger is higher than in the other gingers examined (Table 1). While the analyses of Calcutta and African ginger, as given in Table 4, do not strictly bear out this assumption, it is seen that in the case of African ginger there is a ratio between the crude fiber and total ash, *i. e.*, the higher the percentage of crude fiber the higher the percentage of ash. The same holds with Cochin ginger, where the fibrovascular bundles are large and numerous, notwithstanding the amount of cork is small. In the case of Japan ginger, the rather high ash is accounted for by the fact that it is a limed ginger.

From the observations herein recorded, it would seem that there should be different standards for ash in the different sorts. In other words, it would probably be better to require the ash in Jamaica ginger to be between 4 and 5 per cent. and that for Calcutta ginger to be between 7 and 8 per cent., than to have a uniform standard of 6 per cent.

In forming an opinion as to the quality of powdered or ground commercial ginger, the following points should be borne in mind:

1. The powder should be uniformly granular and have a pronounced characteristic aromatic odor and a characteristic pungent taste.

2. On treatment with sulphuric acid, the particles of genuine ginger become of a reddish-brown color, which changes rapidly to dark brown and finally to purplish-brown.

3. With phloroglucin and hydrochloric acid, few or none of the fragments should be stained a cherry-red color.

4. Of the official standards, those for the total ash and crude fiber are the most important. The latter is of special importance if the microscopic examination with phloroglucin shows the presence of any lignified tissues.

5. The volatile ether extract should not be less than 3 per cent.

LITERATURE CITED.

[1] George Watt: A Dictionary of Economic Products of India, 6, Part 4, p. 358.

[2] Bentley and Trimen: Medicinal Plants, 4, Monograph 270.

[3] Berg und Schmidt: Officinel Gewächse, Taf. XXXIV, b.

[4] Engler und Prantl: Die natürlichen Pflanzenfamilien, II. Teil, 6. Abteilung p. 26.

[5] F. B. Kilmer: AMERICAN JOURNAL OF PHARMACY, 70 (1898), p. 75.

[6] P. L. Simmonds: Tropical Agriculture, p. 497.

[7] Arthur Meyer: Wissenschaftliche Drogenkunde, Part II, p. 64.

[8] A. Tschirch und O. Oesterle: Anatomischer Atlas, Lief. VI, p. 109, Tafel XXVI.

[9] Joh. Buchwald: *Zeitschr. f. Untersuchung d. Nahr.- u. Genussmittel*, 2 (1899), p. 947.

[10] R. Reich: *Zeitschr. f. Untersuchung d. Nahr.- u. Genussmittel*, 14 (1907), p. 549.

[11] A. L. Winton and W. L. Mitchell: Connecticut Agricultural Experiment Station, Twenty-second Annual Report (1898), p. 144.

[12] E. G. Clayton: *The Analyst*, 24 (1899), p. 122.

NOTES ON "PHYSIOLOGICAL TESTING."[1]

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I was asked to speak on the question of physiological testing, I suppose, because of my former connection with certain of the large drug firms. This connection has given me a rather closer interest in the subject than is usual with pharmacologists in this country, and I had planned to write a series of papers on these methods. The first of this series—the one on the testing of suprarenal glands—has already been published,[2] but it is now a question as to whether I shall be able to complete the series.

The use of animals for testing drugs and chemicals is a method of very old origin and long antedates the use of the term "physio

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[1] Read before the Baltimore Branch of the American Pharmaceutical Association, May 21, 1908.

[2] Crawford, A. C. Use of the Suprarenal Glands in the Physiological Testing of Drug Plants. United States Department of Agriculture, Bureau of Plant Industry, Bulletin 112.

logical testing." This term is, I think, so widely known because of its exploitation by certain of the large drug firms. It has come, in the minds of certain people, to mean a fairly quantitative test of drug preparations on animals. Kobert prefers the use of the term "biological testing," as it has a wider significance, and since the term may be used in reference to the testing qualitatively of chemicals on any form of life, while the term "biological assay" seems more desirable for the quantitative determination by this method.

It has been well recognized that many of the drugs and chemicals cannot be standardized by the ordinary chemical methods, and for this reason they have been tested on animals. There are certain classes of drugs, which, at the present time, can be only thus standardized; for example, the members of the digitalis group, cannabis indica, ergot, antitoxines and the preparations of the ductless glands. As yet we have no other method of testing yohimbin, curare, abrin, ricin, jequirity,[1] saponins, etc. Kobert practically admits that the chemical test is unsuited for the recognition of aconitine, and that such tests fail for small quantities of picrotoxin, etc. Dixon[2] claims that "lobelia can be standardized very accurately by its effect upon blood pressure and its subsequent paralytic action on certain nerve cells." Then again, there are preparations which, while they can be standardized by chemical means, may with advantage be controlled by the physiological test, at least qualitatively; thus, cocaine produces characteristic anæsthesia of the mucous membranes, and atropine produces dilatation of the pupil, and the addition of these tests may render the chemical ones more certain. Others again may be tested by either chemical or biological methods, according to circumstances. Kobert, under certain conditions, prefers the test for arsenic by means of *Penicillium brevicaule* to the Marsh test, although it must be admitted that certain arsenic compounds by this test fail to respond.

ADRENAL GLANDS.

We, Baltimoreans, should be especially familiar with these glands because the first chemical work in this country was done in this

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[1] Scholtz, K. Werthbestimmung d. Jequiritols u. des Jequiritol-Heilserum durch Thierexperimente. *Arch. f. Augenheilkunde*, Vol. 55, p. 209. 1906.

[2] Dixon, W. E. Bio-Chemical Standardization of Drugs. *Pharm. Journ.*, Vol. 75, p. 157. 1905.

city in Professor Abel's laboratory. The best-known preparation of the active principle of these glands which is on the market is that bearing the name of Takamine. Abel has shown, however, that this preparation is not chemically pure. Aldrich, Abel's former associate, has obtained an extremely pure form of this body, and retained Takamine's name; but its production by Aldrich's method is not commercially possible. This adrenalin of Aldrich and Abel's later product, Epinephrin, are probably identical.

There have been numerous attempts to assay these preparations by color reactions produced by iodine and iron chloride; but, while these are fairly serviceable with the pure principle, when used with preparations of the glands themselves, which are colored, they are very misleading. It is admitted by most investigators that the physiological test is the most convenient method of assaying them. Objections have, however, been raised on account of the extreme delicacy of the test.

The method which has been advocated is that by means of the frog's eye or that of Meyer by noting the contraction of strips of muscle while placed in the solution to be tested. In this country we usually assay such preparations by determining the minimum quantity of the solution which will cause a rise in the systemic blood pressure of a narcotized dog with the vagi nerves cut, and comparing this rise with that produced by a definite amount of the pure active principle. The difficulty with all methods is to decide what preparation to use as a standard. The ordinary commercial adrenalin contains a certain amount of extraneous matter (phosphates), so that to standardize preparations accurately a high grade of adrenalin, such as that of Aldrich, or Abel's Epinephrin, should be used.

A method which offers a future is the standardization against a nitrite solution, such as recommended by Cameron. He has shown that a definite amount of nitro-glycerine will neutralize the action on the blood pressure of a definite amount of adrenalin. The physiological test on blood pressure runs within about 5 per cent. error. These methods have been discussed in full in my paper on the suprarenal glands.

The question as to the standardization of the thyroids and pituitaries has not yet been raised, but will no doubt soon be opened. These glands offer peculiar difficulties for the biological assay. As

to the thyroids, the only test yet offered is that of Hunt.[1] The pituitaries cause a rise in blood pressure, and this test may perhaps be used. Unfortunately, after a few injections of pituitary extracts, the circulatory organs acquire a certain immunity to them and fail to respond by a rise in blood pressure.

ERGOT.

There has been an endless amount of discussion as to the active principle of ergot and its assay. The chemical work up to the present time has been one of utmost confusion. Recently, Barger, Carr and Dale,[2] of the Wellcome Research Laboratory, have isolated an amorphous base, ergotoxine, which forms crystalline salts, and a crystalline base, ergotinine, corresponding to Tanret's crystalline ergotinine. This forms amorphous salts. Ergotoxine has been shown to possess the action of ergot on the uterus, the cock's comb, and to cause a rise in blood pressure. Ergotinine is said to be inactive. The total alkaloidal content is about 0·1 per cent.

Simultaneously with the appearance of this work, Kraft[3] independently published almost identical results, but named his alkaloidal bodies differently from the Wellcome Research workers. These investigators, however, finally agreed that they were working with the same compounds. The presence of more than one basic body had been noted several years ago by Tanret and still earlier by Wenzell. The preparations of Kobert and Jacobi are not chemically pure bodies, but are mixtures in varying degrees of the active principle with more or less inert matter. Clavin, the principle isolated by Vahlen,[1] is reported inactive by Cushny,[2] Dale and Kehrer.

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[1] Hunt, R. Probable Demonstration of Thyroid Secretion in the Blood in Exophthalmic Goiter. *Jour. Amer. Med. Assoc.*, Vol. 49, p. 240. 1907.

[2] Barger, G. Ueber Mutterkornalkaloide. *Arch. d. Pharm.*, Vol. 245, p. 235. 1907.

Barger, G., and Dale, H. H. Ergotoxine and Some Other Constituents of Ergot. *Bio-Chem. Jour.*, Vol. 2, p. 240. 1907.

Barger, G., and Carr, F. H. Alkaloids of Ergot. *Jour. of Chem. Soc.*, Vol. 91, p. 337. 1907.

Barger, G., Carr, F. H., and Dale, H. H. An Active Alkaloid from Ergot. *Brit. Med. Jour.*, 1906, Vol. 2, p. 1792.

Dale, H. H. On Some Physiological Actions of Ergot. *Jour. Physiol.*, Vol. 34, p. 163. 1906.

[3] Kraft, F. Ueber das Mutterkorn. *Arch. d. Pharm.*, Vol. 244, p. 336. 1906.

Dale has shown that ergotoxine will cause a marked rise in blood pressure in decerebrized cats. Dixon[3] claims the action of ergot on the blood pressure to run parallel to its action on the uterus. I have found that the alkaline ether shaken from ergot gives a persistent rise in blood pressure in narcotized dogs with cut vagi, and believe the trouble experienced by other experimenters (Sollman and Brown)[4] is probably due to the fact that the inorganic salts and perhaps cholin were not removed in their experiments. It seems at first sight to offer a possible method of standardizing these preparations to use Dale's method and note the amount of ergot solution necessary to cause a reversal in action of a definite amount of adrenalin. Dale, however, believes that there is more than one principle involved in this action. If this is true, then we cannot as yet standardize entirely with reference to ergotoxine.

Up to the present it has seemed to me that all we can do is to rely on the bluing of the cock's comb by either the injection or the feeding of ergot preparations. My own method has been to inject subcutaneously 5 c.c. of the fluidextract into a rooster, and after about an hour's interval the comb and wattles will become markedly blue and cold, provided the preparation is active. This bluing passes off during the course of twenty-four hours. Some of the large firms use the method of feeding ergot preparations to Leghorn roosters which have been starved for twenty-four hours. These animals are then fed 15 to 30 c.c. of the fluidextract, after evaporating off the alcohol. Bluing of the combs and wattles occurs in a few hours. The objection I see to this test is the fact that ergot preparations are often irritating and may not be absorbed, and thus

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[1] Vahlen, C. Clavin, ein neuer Mutterkornbestandtheil. *Arch. f. exper. Path.*, Vol. 55, p. 131. 1906.

[2] Cushny, A. R. On the Movements of the Uterus. *Jour. Physiol.*, Vol. 35, p. 19 1906.

[3] Dixon, W. E. Biochem. Standardization. *Pharm. Jour.*, Vol. 75, p. 157. 1905.

[4] Sollman, T., and Brown, E. D. Intravenous Injection of Ergot. *Jour. Amer. Med. Assoc*, Vol. 45, p. 229. 1905.

A good handling of the question of the action of ergot on the circulation can be found in E. Jolly. Die Einwirkung des Mutterkorns auf die Circulation. Göttingen. 1905.

produce no action. I noted that, after repeated injections of ergot into cocks, these animals showed marked hypertrophy of the comb, and gangrene occurred at the site of injection, an observation agreeing with those of Ferè[1] and Santesson.

The chemical test of the activity of ergot I think unreliable. Dr. Dohme[2] and I made some years ago a statement that the Keller method of assay for cornutine was a fairly accurate method of standardizing ergot. I shall have to modify my part of this statement by saying that unquestionably, so far as I have seen, all the active principle which causes bluing of the cock's comb is shaken out by alkaline ether, in the Keller method, and, in fact, this extract seems to be more active than the original fluidextract of ergot itself; but the mere weighing of this evaporated residue could not give any absolute idea as to the quantitative activity of ergot, because of the extraneous matter present. It seems that besides the active alkaloid also the inactive one is present in the ether extract, and interferes thus with the results.[3]

Barger and Dale[4] believe the cornutine of Keller to be a mixture of ergotinine with 25 per cent. ergotoxine. One of the strong arguments urged by Santesson against the possibility of Keller's cornutine being the active principle of ergot was the fact that in old, presumably inactive ergots, the assay for cornutine often ran relatively high. This now can be explained, as we know the active alkaloid can be readily converted into the inactive one and *vice versa.*

I think the ideal method of testing preparations would be to standardize drugs for the use to which they are to be put in medicine. As ergot is used almost entirely to promote uterine contractions, under these conditions the satisfactory tests would be the standardization by its action on the uterus of some of the lower animals.

This method was used by Diez in 1831. I have collected numer-

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[1] Ferè, C. Note sur une hypertrophie provoquèe de l'ergot de coq. *Comp. rend. hebd. Soc. de Biol.*, 1900, Vol. 52, p. 474.

[2] Dohme, A. R. L., and Crawford, A. C. Active Principle of Ergot. *Proc. Amer. Pharm. Assoc.*, Vol. 74, p. 503. 1902.

[3] Santesson, C. G. Ueber die Wirkung des Cornutin Keller und einiger anderer Secale-extracte. *Skand. Arch. f. Physiol.*, Vol. 13, p. 107. 1902.

[4] Barger, G., and Dale, H. H. Ergotoxine and Some Other Constituents of Ergot. *Bio-Chem. Journ.*, Vol. 2, p. 277. 1907.

ous data on this method, but have recently found that Kehrer[1] has developed it, using the isolated uterus from cats, and claims it to be the best method yet proposed. He uses as his standard 0·01 gramme of ergot in 200 c.c. of Ringer solution as his minimal active dose. According to this test, ergots preserved one year in drug stores become seven or eight times weaker, while after two years, preservation they become fifteen times weaker than originally. Kobert and Gruenfeld[2] showed, by testing on the cock's comb, that ergot lost its activity completely in six months under ordinary conditions. Kehrer, by his test, noted that aqueous extracts of ergot began to lose their activity in a few hours. According to Kobert, no fluid preparation of ergot preserves its activity over twelve months. Perhaps a part of such loss in activity is due to the action of microorganisms.[3] It is, however, known that Bischofberger,[4] as a result of certain clinical experiments on women, claimed that ergot two years old was still active; but the clinical testing of drugs is often apt to be fallacious, as one is unable to control all the conditions, and clinicians are well acquainted with the fact that uterine contractions often appear independent of any drug used.[5]

CANNABIS INDICA.

The chemistry of cannabis is another dark spot, and all that we can say is that at present the active principle seems to be a resinous body, cannabinol, which was obtained by Fraenkel[6] by distillation

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[1] Kehrer, E. Der überlebende Uterus als Testobject für die Wertigkeit der Mutterkornpräparate. *Arch. f. exper. Path.*, Vol. 58, p. 366. 1908. Compare also the negative results of E. M. Kurdinowski, Physiol. u. pharmakol. Versuche an d. isolirter Gebärmutter. *Arch. f. Physiol.*, Physiol. Abtheil. Suppl. Band., p. 372. 1904.

[2] Gruenfeld, A. Beitr. z. Kenntniss d. Mutterkornwirkung. Arbeit. d. pharmakol. Institut. z. Dorpat, Vol. 8, p. 149, etc. 1892. Kobert, R. Present State of the Ergot Question. *Practitioner*, Vol. 35, p. 416. 1885.

[3] Leopard, H. Ueber d. Vorkommen von Mikroorganismen in Ergotinlösung. Dissert. Würzburg, 1887.

[4] Bischof berger, A. Geburts-klin. Untersuch. über. Haltbarkeit d. Mutterkorns. Dissert., p. 45. Bern, 1897.

[5] For literary details on the ergot question consult Krysinski, S. Pathol. u. krit. Beitr. z. Mutterkornfrage. 1888.

[6] Fraenkel, S. Chemie u. Pharmakol. d. Haschisch. *Arch. f. exper. Path.*, Vol. 49, p. 266. 1903.

in extremely high vacuum. Fraenkel found that this pure body would not act on subcutaneous use. We have no chemical method of standardizing cannabis, and the isolation of the body is attended with considerable difficulty, so that the method we use is to feed these preparations to dogs, and note the minimum quantities which will produce incoördination in their movement. Dogs thus fed will become unsteady in their legs and wobble from side to side. All dogs, even of the same weight, do not respond the same to cannabis, so that it may be necessary to feed the drug to a number of dogs and select the one which responds best and use it as the standard for the systematic testing of such preparations. This test has been reported on in full by Dr. Houghton in the January number of the *Therapeutic Gazette*. Ten to fifteen milligrammes per kilo of the extract should produce incoördination in one hour. Chevalier[1] has also recently experimented on this subject, and the report of Famulener and Lyons,[2] which is well worth perusal, furnishes details accessible to us. These latter authors claim that the fluidextract of cannabis underwent little deterioration in a twelve-months' preservation.

Dixon uses in his tests cats weighing about 2½ kilos. He injects subcutaneously these animals with 10 minims of the tincture diluted with the same amount of water. In a short time their gait becomes unsteady, the reflexes are increased in activity and the pupils dilate, if the preparation is active.

Houghton calls attention to the low toxicity of cannabis, and the question arises whether any very exact quantitative assay is necessary. Wood[3] and Houghton have made the important observation that American-grown cannabis has the activity of cannabis grown in India.

DIGITALIS.

The group of digitalis, strophanthus, squill, etc., is the most important one we physicians have to use, and urgently demands

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[1] *Bull. gén. de Therap.*, Vol. 155, p. 18. 1908. (Seen only in reference.)

[2] Famulener, L. W., and Lyons, A. B. Physiological Assay of Cannabis Indica. *Proc. Amer. Pharm. Assoc.*, Vol. 51, p. 240. 1903.

[3] Wood, H. C. On the Medicinal Activity of the Hemp Plant as Grown in North America. *Proc. Amer. Philos. Soc.*, Vol. 11, p. 226, 1871.

An interesting article by Czerkis on Cannabinol can be found in the *Pharmaceutische Post*, 1907, pp. 49, 69, 97.

standardizing. Naunyn[1] made the assertion that he would not care to be a physician without digitalis. Focke,[2] Edmunds, Kobert, Fraenkel, Bennefeld and others have recently called attention to the marked variation in strength of digitalis leaves. In fact, Ott says that the leaves of digitalis grown in Bohemia are too toxic for clinical use. Unfortunately the appearance of the leaves does not give any indication as to their activity.

Dixon[3] says: "For my part I unhesitatingly express the belief that many hundreds of patients die annually from digitalis and allies not possessing the virtues which are required of them." The clinical testing of such preparations on man may not always yield satisfactory ideas as to their real activity, as Loewy[4] has shown that many of these preparations are injured by the normal acidity of the stomach. Focke[5] showed by physiological tests that the leaves lost much of their activity by ordinary keeping. He believes that light has little to do with this deterioration, and that it is a question of carefully drying the leaves and then keeping them in air-tight vessels protected from moisture. Thus Wang, who tested leaves kept in such a manner for two years, found they had the same toxic value for frogs as fresh leaves, while Focke kept such leaves unchanged for three years. Wolff[6] found that it was desirable to dry the leaves in vacuo at a definite temperature, as the ordinary drying in air might be injurious to their activity.

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[1] *Muench. med. Woch.*, 1904, p. 1413.

[2] Focke, C. Ueber d. jahreszeitl. Schwankungen in d. Stärke d. officinell. Folia Digitalis, *Ther. d. Gegenw.* n. s., Vol. 4, p. 44. 1902. Ott. Verhandl. d. Kongresses f. Innere Med., 1901, p. 89. Fraenkel, A. Ueber d. physiol. Dosirung von Digitalispräparaten. *Ther. d. Gegenw.* n. s., Vol. 4, p. 112, 1902. Fraenkel, A. Exper. Untersuch ü. d. Wirksamkeit d. verschied. Digitalispräparaten. *Charité Annalen*, Vol. 6, p. 207. 1881. Edmunds, C. W. Standardization of Cardiac Remedies. *Jour. Amer. Med. Assoc.*, Vol. 48, p. 1744. 1907. Bennefeld, F. Ueber Digitalistincturen. Dissert. Göttingen, 1881. Lutzkaja, S. Ueber d. Wirkungswert d. Folia Digitalis. *Arch. Internat. de Pharmakodynamie*, Vol. 18, p. 77. 1908.

[3] Dixon, W. E. Drug Fallacies. *Brit. Med. Jour.*, Vol. 2, Nov. 1906.

[4] Loewy, J. Ueber d. Bedeutung d. Reaktion d. Digitalisinfuses f. seine Wirksamkeit. *Wien. klin. Woch.*, Vol. 19, p. 1157. 1906.

[5] Focke, C. Physiol. Wertbestimmung d. Digitalisblätter. *Arch. d. Pharm.*, Vol. 241, p. 140. 1903.

[6] Wolff, A. Ueber d. Physiol. Dosirung von Digitalispräparaten. *Ther. d. Gegenw.* n. s., Vol. 4, p. 423. 1902.

Our Pharmacopœia demands that only leaves of the second year's growth be used, and this demand is supported by the experiments of Focke, who found the first year's leaves weaker toward frogs than those of the second year's growth. However, Merck's Report (1907, p. 253) quotes Haynes to the effect that the leaves of the first year are as active as those of the second year, provided they are grown under the same conditions.

Fraenkel has noted that the infusion of digitalis varied in strength from 100 to 275 per cent., while tinctures varied from 200 to 400 per cent. Tinctures of digitalis, when exposed to the light, lost about one-half of their original strength in one year.[1] The infusion loses one-half of its activity in twenty-four hours (Loewy). The addition of a small amount of sodium carbonate is claimed to preserve the infusion for several days.[2]

Our chemical knowledge of these drugs is extremely deficient. There have been a number of bodies isolated from digitalis: digitalin, digitalein, digitophyllin, digitoxin, etc., and as decomposition products of these, digitoxiresin and toxiresin. Haynes[3] and Dixon have reported that many of these principles are inactive, and Haynes says: "These so-called active principles require standardization even more than the galenical preparations." While at one time we thought digitalin was the active principle, now it is thought that digitoxin is the real principle, and attempts are made to standardize the preparation by determination of the digitoxin present.[4]

For this assay the method of Keller, or Keller's method modified by Fromme, is usually used. Barger and Shaw[5] and Ziegenbein[6] have shown by experiments on frogs that the toxicity of the digi-

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[1] Focke, C. Ueber d. prakt. Wert unserer Digitalistincturen. *Deutsch. Aerzt. Ztg.*, Vol. 6, p. 292. 1904.

[2] Focke, C. Wie kann man ein Digitalisinfus bis zu seinem Verbrauch haltbar machen? *Med. Klinik*, Vol. 3, p. 484. 1907.

[3] Haynes, G. S. Pharmacological Action of Digitalis, Strophanthus and Squill on the Heart. *Bio-Chem. Jour.*, Vol. 1, p. 63. 1906.

[4] Reed, E. D., and Vanderkleed, C. E. Standardization of Preparations of Digitalis by Physiological and Chemical Means. *Amer. Jour. Pharm.*, Vol. 80, p. 110. 1908.

[5] Barger, G., and Shaw, W. V. Chemical and Physiological Assay of Digitalis Tinctures. *Yearbook of Pharmacy*, 1904, p. 541.

[6] Ziegenbein, H. Werthbestimmung d. Digitalisblätter. *Arch. d. Pharm.*, 1902, Vol. 240, p. 454.

talis preparations does not correspond to the toxicity of the digitoxin present, and experiments on dogs show a similar disagreement.[1] Vanderkleed, however, claims some degree of parallelism between the digitoxin content and the toxicity of digitalis on guinea pigs. The weight of evidence, however, is that digitalis leaves do not owe their activity to any one yet discovered principle.

These preparations are usually standardized by merely determining their toxicity on frogs. Houghton has reported in the National Standard Dispensatory the method of performing this test. He used the normal lethal dose of 0·0015 gramme per gramme frog for the fluidextract digitalis and 0·00015 gramme for the fluidextract strophanthus, 0·011 gramme for fluidextract squills. Haynes used as his standard that 2½ minims of a tincture of digitalis should kill a frog of 20 grammes weight in three hours, while ¼ minim of tincture of strophanthus should kill a frog weighing 17 grammes. Others, again, recognizing that the characteristic action of this group is the systolic stoppage of the frog heart, have demanded that the preparation be standardized with reference to the quantity which shall cause systolic stoppage of the ventricle within a certain period, some say twenty minutes, some an hour or more.[2] Famulener and Lyons, in the Proceedings of the American Pharmaceutical Association for 1902, have described this method in full. The exact period at which systolic stoppage occurs is at times hard to decide.[3] In none of the work, as far as I have been able to find, is there any accurate description of the frogs used. In fact, the old classification of frogs is very unreliable, and frogs vary so much in their response to drugs

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[1] Wood, H. C., Jr. Does Digitoxin Represent the Therapeutic Virtues of Digitalis? *Amer. Jour. Pharm.*, 1908, p. 107.

[2] Ziegenbein, H. Werthbestimmung der Digitalisblätter. *Arch. d. Pharm.*, 1902, vol. 1, p. 454.

Bührer, C. Ueber d. Grenzen d. Wirksamkeit einiger toxisch. Fluidextracte. *Corresp. d. Schweizer Aerzte*, 1900, Vol. 30, p. 617. Siebert. Werthbestimmung von Digitalis und Strophanthus durch Prüfung an Froschherz. *Berl. klin. Woch.*, Vol. 40, p. 813. 1903. Dixon, W. E. Bio-Chemical Standardization of Drugs. *Pharm. Jour.*, Vol. 75, p. 156. 1905. Focke, C. Die physiol. Werthbestimmung d. Digitalisblätter. *Arch. d. Pharm.*, Vol. 241, p. 128. 1903; Ueber den gleichmässig. Wirkungswert von gut präparirtem und gut aufbewahrtem Digitalisblätterpulver. *Ther. d. Gegenw.*, 1904, p. 250; Zur physiol. Wertheinstellung d. Digitalisblätter. *Ther. d. Gegenw.*, 1904, p. 527.

[3] Wang, E. Werthbestimmung d. Digitalisblätter. Festschrift Olof Hammarsten gewidmet. *Upsala*, 1906, p. 7.

according to species, sex, seasons, whether summer or winter, and also with the temperature at which they are kept, that I think frogs unsatisfactory. Then again, large amounts of inorganic salts present in the extracts would act injuriously on frogs. Many of the observers forget the original investigations of Schmiedeberg, who found that only so-called Rana temporaria showed the characteristic systolic stoppage of the heart from digitalis in a typical manner. Masi noted that digitalin arrested the frog heart in systole, while digitonine caused diastolic arrest of the heart; and further, that if the frogs were immersed in 0·75 per cent. saline solution at 32°[1], digitaline would then cause diastolic stoppage, and Ziegenbein has found that while small doses of digitoxin cause systolic arrest of the heart, often large doses do not.

In one experiment performed in summer, Focke noted that the ventricle at times stopped in diastole and, therefore, urged that the temperature of the room, in which such experiments are carried out, should be within certain limits.[2]

Dr. Reed, of Philadelphia, has made an important advance by using guinea pigs, animals which are more resistant to injury. He apparently uses a dose of 0·6 to 1 c.c. of the tincture per 240 grammes of guinea pig as his standard.

While these methods are all very desirable, the mere determining of the toxicity of the preparation does not to my mind determine its medicinal value. For example, it has been well recognized that the reported active principles readily decompose into digitoxiresin, toxiresin, etc., which are very toxic bodies. If we had a slightly larger amount than normal of decomposition products, we would have an extremely high toxicity, but this would not necessarily mean a high medicinal action.

Sowton[3] has improved the method of testing such preparations by using the mammalian heart. He perfuses rabbit hearts isolated by the Langendorff method with tincture of digitalis 1 to 200,

[1] Masi, G. B. Sull Azione fisiol. della Digitalina. *Riforma Med.*, Vol. 6, pt. 1, p. 741. 1890. Data on our American frogs can be found in Mary Dickerson's Frog Book, while details as to the European species may be seen in G. A. Boulenger's "The Tailless Batrachians of Europe." *Ray Soc.*, 1897.

[2] Focke, C. Weiteres z. physiol. Prüfung d. Digitalisblätter. *Arch. d. Pharm.* Vol. 245, p. 646, 1907.

[3] Sowton, S. C. M. Some Experiences in the Testing of Tincture of Digitalis. *Brit. Med. Journ.*, 1908, Vol. I, p. 310.

Ringer's solution. This method was also tried by Haynes. The strength of these solutions is judged by the length of time necessary to cause stoppage of the right ventricle. Perhaps some of the difficulties with such experiments are due to the fact that the various principles affect different portions of the heart. Focke's method of removing the sternum in unpithed frogs should be discarded on humanitarian grounds.

Theoretically to me the proper way would be to determine the toxicity of these preparations on guinea pigs, and also the action on the isolated mammalian heart, or on the heart in situ, noting the slowing of the heart-beat[1] and the time necessary to cause stoppage, and any rise of blood-pressure, or by making use of the physiological antagonism between digitalis and the nitrites[2] in addition to the toxicity experiments. Naturally in such experiments the depressing potassium salts should be removed from the extract. The standard should be leaves carefully dried in vacuo by Wolff's method and then protected from moisture by preserving in air-tight vessels.

It is needless to add that a thorough botanical identification of the species should be made by an expert. Other species of digitalis besides the official digitalis purpurea are probably also active.

It must be confessed that the methods thus far proposed are not accurate. A long series of experiments should be made with one tincture, and checks made by diluting this to various strengths and comparing the results obtained from these known dilutions on animals.

Dixon[3] has reported that if 5 c.c. of a tincture of digitalis be placed in the stomach of an anæsthetized dog and the stomach be examined two hours later, the stomach will show signs of acute inflammation, and Haynes noted that after similar placing of tincture of digitalis no effect on blood pressure was observed. This failure in action was probably due to non-absorption. Further, Deucher[4]

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[1] Fraenkel, A. Ueber Digitaliswirkung am gesund. Menschen. *Muench. med. Woch.*, Vol. 52, p. 1537. 1905.

[2] Marshall, C. R. On the Antagonistic Action of Digitalis and the Members of the Nitrite Group. *Journ. Physiol.*, Vol. 22, 1897–8.

[3] Dixon, W. E. Manual of Pharmacology, 1906, p. 169.

[4] Deucher, P. Ueber d. Wirkung des Digitalin verum bei Circulations-störungen. *Deutsch. Archiv. f. klin. Med.*, 1896, Vol. 57, p. 34.

NOTE.—In considering Strophanthus, Hatcher's article in the *Journal of the American Medical Association* for 1907, and Santesson's article in the *Skandinavisches Archiv fuer Physiologie* for 1905 may be serviceable.

showed that by gastric digestion digitalin underwent a marked weakening, so that it can be easily seen that the responsibility for a failure of digitalis to act clinically cannot always be laid at the pharmacist's door and this is well worth remembering in these days of lawsuits.

Certain of the purgative drugs likewise cannot be satisfactorily standardized by chemical means, and the physiological test is also rather unsatisfactory, but it is better than the chemical. The emetic drugs can be assayed chemically, but can also be tested physiologically on dogs.

These tests give no indication of the activity of the drug on man, as various animals respond differently, but only as to its comparative strength.

Such, in brief, are the methods in use in the testing of galenical preparations, and as quantitative procedures much is to be desired. It must be remembered that because one firm calls a drug physiologically tested, it does not follow that the drug compares at all with another so-called physiologically tested preparation. In fact, the standards and ideas of testing of one firm may be very different from that of another, and no label "physiolocically tested" means much unless one knows the standard used. One English firm is putting out digitalis leaves and specifies them to be standardized on a basis of 1·4 grammes of the leaf as the minimal toxic dose for 100-gramme frog. Our American firms simply state "physiologically tested."

While many of these preparations may contain full alkaloidal strength, which can be determined by chemical analysis, yet it is perfectly possible that some may be too irritating for certain usage and set up purgation or emesis. As is well known, one of the problems has been to obtain a digitalis preparation which is non-irritating. This irritating action can be determined by the biological test, such as described by Houghton.[1] Again, the simple determination of the amount of alkaloids present in such preparations does not necessarily correspond to the activity of the preparation; because, as physical chemistry has shown, the presence of a large amount of colloids often interferes with the full action of certain chemical compounds. Again, the presence of certain elements increases the

[1] Houghton, E. M. Attempt to Obtain a Uniformly Active, Sterile and Non-irritating Preparation of Digitalis. *Medicine*, Vol. 9, p. 982. 1903.

activity of certain others; thus, small quantities of barium render toxic an otherwise non-toxic dose of KCNS, so that the final test must be that on animals.

The question comes up as to who shall perform such tests. Pharmacists and the practicing physician certainly would not be in a position to carry them out on account of the special training which these tests require, and it seems to me that both of these classes of gentlemen already have their hands full. The difficulty of such testing becomes apparent when we see what different results experimenters are arriving at as to the question of the toxicity of the food preservatives, and even in the case of such a well-known body as ethyl alcohol. Many of the large firms are now employing professional pharmacologists to do such work. In Germany[1] there is now a considerable movement to organize a Government Bureau for the testing of these preparations, and it will not be long before the Federal Government will be compelled to establish such a Bureau.[2] It is urgently desired that representatives of the various pharmaceutical and medical societies meet and decide upon suitable standards.

ELIXIRS OF THE NATIONAL FORMULARY.

By E. Fullerton Cook, P.D.[3]

The statements which are made in this paper of a critical character, or otherwise, are based upon actual experiments with commercial products. Where difficulties have been met with, it may be that in some instances, at least, minute quantities of foreign substances in the ingredients have caused precipitation in the liquid preparation. Further experiments will subsequently be conducted to verify the results here reported and to suggest satisfactory modifications in the several formulas.

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[1] Fraenkel, A. Ueber d. physiol. Dosirung von Digitalispräparaten. *Ther. d. Grgenw.* n. s., Vol. 4, p. 112. 1902. Klemperer, *Ther. d. Gegenw.* n. s., Vol. 6, p. 526. 1904. Wendt, G. Doctor und Apotheker, im dunkeln Spiegel galenischer Präparate. *Med. Woche.*, Vol. 6, p. 100. 1905.

[2] Edmunds, C. W. Standardization of Cardiac Remedies. *Jour. Amer. Med. Assoc.*, Vol. 48, p. 1747. 1907.

[3] Assisted by T. C. Ladakis, Ralph R. Johnston, Edgar R. Buzzell, D. H. Reighter, and S. T. Bonnell.

Primarily, it should be said that in the opinion of the writers there are too many formulas for elixirs contained in this book, which is now a standard Formulary for the United States, there being eighty-eight formulas in all.

For instance there are five formulas for bromides; *i. e.*, simple solutions of the individual bromide in a sufficient amount of aromatic elixir. In the first place the, 23 or 25 per cent. of alcohol present is directly antagonistic to the effect of the sedative; and secondly, why should a simple formula of this character be given when a physician could far better select his own dose of bromide or medicament and the vehicle which he desires to carry it?

This latter criticism may be applied to the following elixirs, although the several formulas, from a pharmaceutical standpoint, are satisfactory:

Elixir of ammonium bromide, calcium bromide, lithium bromide, lithium citrate, lithium salicylate, potassium acetate, potassium bromide, sodium bromide, sodium hypophosphite, and sodium salicylate, while the list might be further extended.

There is no criticism to be made upon the following additional formulas; they are pharmaceutically satisfactory:

Elixir of ammonium valerianate (the title should be "valerate"); ammonium valerianate and quinine; bismuth; buchu; compound buchu; compound cathartic; compound chloroform; cinchona and iron; cinchona, iron, bismuth and strychnine; cinchona, iron and bismuth; cinchona, iron and calcium lactophosphate; cinchona, iron and strychnine; coca and guarana; compound digestive; eucalyptus; iron pyrophosphate; iron hypophosphite; iron phosphate; gentian; gentian and iron chloride; gentian and iron phosphate; glycyrrhiza; guarana; hypophosphites; pepsin; pepsin and bismuth; compound tar; pilocarpus; potassium acetate; hops; pepsin and iron; quinine valerianate (valerate); rhubarb; strychnine valerianate (valerate).

The following criticisms are offered with the hope that they may call attention to difficulties, and, if the elixir is retained in the next edition of the National Formulary, may be made more satisfactory:

ELIXIRS.

Salicylic Acid.—The salicylic acid dissolves very slowly and with great difficulty. It contains 50 per cent. of glycerin and is really a

glycerite. Even a larger amount of glycerin, however, would aid solution.

Anise.—The formula is very unsatisfactory. The odor is not that of anise, but strongly of bitter almond, and considerable oil separates, making an unsightly preparation. While the separation of oil is recognized by the "Note" in the N.F., there can be no reason for the excess.

Caffeine.—It was entirely impossible to dissolve the caffeine in the 125 c.c. of aromatic elixir directed. Experiments show that 625 c.c. is sufficient and a change should be made in the directions.

Calcium Hypophosphite.—The salt dissolves very slowly, a small portion remaining undissolved. It is doubtless the fault of the salt, yet it seems to be impossible to buy an article which is wholly soluble. One worker has suggested the solution of a freshly precipitated salt to avoid the difficulty.

Calcium Lactophosphate.—The directions are faulty. When the calcium lactate was rubbed with the phosphoric acid, water and syrup, it would not dissolve; but when first dissolved in the phosphoric acid and then mixed with the other ingredients, no difficulty was encountered.

Compound Cathartic.—Considerable sediment separates from this elixir after standing a few weeks. This criticism applies to most of the elixirs made from fluidextracts, including: coca, aromatic eriodictyon, euonymus, frangula, grindelia, cascara sagrada, and compound taraxacum.

Cinchona.—In this era of correct titles, this elixir can hardly be called "cinchona," since it is made from cinchona alkaloids and artificially colored. The preparation is very satisfactory from a pharmaceutical standpoint.

Cinchona and Hypophosphites.—The hypophosphites, at least the calcium hypophosphite, dissolved with great difficulty. The color is considerably lighter than the "elixir of cinchona." The acid may be responsible for this color change.

Cinchona, Iron and Pepsin.—This preparation develops a slight white precipitate, as do also the several other elixirs containing pepsin, *i. e.*, cinchona, pepsin and strychnine; plain pepsin; pepsin, bismuth and strychnine; pepsin and bismuth; pepsin and iron.

Coca.—After a few days the elixir became cloudy, talc was added and the preparation again filtered. The elixir has again become cloudy.

Curaçao.—It has been impossible to buy oil of curaçao orange from available sources, from which to make the spirit and subsequently this elixir.

One of the large volatile oil manufacturers has submitted the following letter when asked to explain what was formerly sold as oil of curacao orange:

"Replying to your inquiry of the 6th inst., we fear that you are chasing a rainbow. Curaçao oil of orange undoubtedly is to-day, and in our opinion always has been, a fiction, at least in so far as its position as a commercial article is concerned. The oil that was formerly brought here under this name was probably nothing more than regular bitter orange oil, or possibly a blend of bitter and sweet orange toned up with other aromatics to give it character."

Prof. C. Lewis Diehl, Chairman of the Committee on National Formulary, in reply to this letter, has stated that this formula was included in the original New York and Brooklyn Formulary, out of which grew the N.F., and that probably at that time there was a genuine oil of curacao orange, and if not, the men of that time (1888) were using the best information available.

He states that he has often discussed the subject and advocated many years ago that an oil of bitter orange be introduced for the present oil of curacao in the N.F.

Lactate of Iron.—It was found that by dissolving the potassium acetate first in the water and then the lactate of iron, solution was greatly facilitated.

Pyrophosphate of Iron, Quinine and Strychnine.—The addition of talc before filtering improves the appearance of the elixir.

Iron, Quinine and Strychnine.—This formula is satisfactory, if the tincture of citro-chloride of iron has been made in accordance with the latest issues of the N.F., third edition. The first printing of the third edition called for 410 grammes of sodium citrate. This was shown to be unsatisfactory, and it has been increased in books more recently printed to 425 grammes.

Glycerinated Gentian.—This elixir has been repeatedly criticised for the presence of both acetic ether and solution of saccharin. The formula needs revision.

Aromatic Glycyrrhiza.—This preparation is somewhat turbid; the presence of both a fluidextract and volatile oils may account for this. It is not very satisfactory pharmaceutically.

Glycerophosphates.—Several different makes of the glycerophosphates have proven unsatisfactory. Mr. Dunning has stated that acid glycerophosphate of calcium is the salt required in this formula. A few drops of phosphoric acid will dissolve the precipitate. Solution was obtained in all cases; but upon standing, a voluminous white precipitate developed.

Hypophosphites with Iron.—The elixir has deposited a slight precipitate.

Lithium Salicylate, and other salicylates.—For a colorless preparation of these salts it is essential that a colorless and high-grade chemical be obtained. When bought on the open market, such a lithium salicylate was not received, and consequently the preparation is badly discolored.

Malt and Iron.—The wholesale houses on several occasions have reported that they are unable to supply extract of malt U.S.P. for making this preparation.

Paraldehyde.—This elixir separates into two distinct layers, the top layer occupying about one-fourth of the volume. It has become discolored upon standing two months. It has been suggested that if the alcohol be increased, this separation will not occur. It now contains over 50 per cent. of alcohol, however, and is given in a two fluiddrachm dose, so that its uses, especially if the alcohol is yet further increased, are questionable.

Phosphorus.—This was a U.S.P. 1890 preparation and the formula should be in the Appendix. The only change in the formula is that of directing 560 c.c. of glycerin, the U.S.P. 1890 ordering 550 c.c.

Potassium Acetate and Juniper.—A slight deposit forms upon standing.

Compound Quinine and Phosphates.—Although a solution was first obtained, a voluminous precipitate soon formed. This elixir should be further experimented with, if the preparation is to be retained.

Compound Blackberry.—As blackberries were not in season and the fresh juice was unobtainable, this elixir could not be made.

Elixir Terpin Hydrate.

Elixir Terpin Hydrate with Codeine.

Elixir Terpin Hydrate with Heroine.

In all of these elixirs a heavy crystalline precipitate has formed. It was first supposed to be terpin hydrate; but as its volume soon exceeded the amount of that substance in solution, it was suspected

to be sugar, and a simple investigation of this precipitate proved such to be the case. The crystals were entirely soluble in a small quantity of water, and were sweet to the taste, forming a syrupy-like solution. The elixir contains about 40 per cent. of alcohol, which is necessary for the solution of the terpin hydrate. Doubtless the amount of syrup will have to be reduced.

Of the eighty-eight elixirs of the N.F., the following eleven have not been prepared; all of the others are displayed:

Elixir of hops; phosphorus; phosphorus and nux vomica; compound cascara sagrada; rhubarb and magnesium acetate; compound stillingia; turnera; compound viburnum opulus; viburnum prunifolium; malt and iron; and zinc valerianate (valerate).

IMPROVED ACETONE CANTHARIDAL COLLODION.

By George M. Beringer.

The active principle in cantharides is present partly in a free or uncombined state and partly as a salt in combination with the natural acid as cantharidate. The cantharidate is insoluble in chloroform and ether, and most of the ordinary solvents in which cantharidin is soluble, and which are used in making the pharmaceutical preparations.

Analyses published by N. Dietrich [1] and Boudin [2] show that the combined cantharidin amounts to from 10 to 20 per cent. of the active constituent of the beetle.

In the official process for cantharidal collodion the powdered drug is percolated with chloroform and so only the free cantharidin is extracted and varying proportions of the drug activity is discarded with the marc.

As long ago as 1852, Prof. Wm. Procter, Jr.,[3] pointed out that acetone was an excellent solvent for cantharidin and this has since been confirmed by a number of investigators. Schmidt [4] gives the solubility of cantharidin in acetone as 1 in 38, in chloroform 1 in 66,

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[1] *Pharm. Centralh.*, 42,674, Year Book of Pharmacy, 1902, p. 169.
[2] *Journ. de Pharm. et de Chémie*, 1888—18,391.
[3] Amer. Jour. of Pharmacy, 1889, p. 264.
[4] *Pharmaceutische Chemie*, 9—1874.

and the British Pharmaceutical Codex[1] states its solubility in acetone as 1 in 40, in chloroform 1 in 65, in acetic ether 1 in 150, in ether 1 in 700, and still more sparingly in alcohol. Many of the statements of the authorities concerning the solubility of this principle are, however, discordant and the subject is in need of further critical study.

The writer[2] has elsewhere called attention to the peculiar and valuable solvent properties of acetone and its remarkable miscibility with other solvents as well as with water. Since that time it has been officially recognized and directed in the preparation of some of the oleoresins and its application in numerous manufactures has made it an article of considerable commercial importance, and supplies of pure acetone, suitable for pharmaceutical purposes, are now available at moderate prices.

More recently[3] he proposed its use as a substitute for ether in the preparation of collodions. In the latter communication a formula was given for an acetone cantharidal collodion, and the object of this note is to publish the results of more recent study and submit the following improved formula:

ACETONE CANTHARIDAL COLLODION.

Take of Cantharides in fine powder	60 grammes
Glacial acetic acid	5 c.c.
Pyroxylin	4 grammes
Camphor	1 gramme
Acetone sufficient quantity to make	100 grammes

Mix the glacial acetic acid with 55. c.c. of acetone and moisten the powdered cantharides with this mixture and set it aside in a closely covered container for twenty-four hours. Then pack in a cylindrical percolator and slowly displace with acetone until exhausted. Reduce the percolate by distillation on a water-bath to 95 grammes, and when cold dissolve in this the pyroxylin and camphor. If necessary, make up weight with acetone to 100 grammes.

If the rate of percolation is rapid, from 125 to 150 grammes of percolate will be obtained befor the drug is exhausted, but by carefully regulating the flow the cantharides will be practically exhausted when 95 grammes of percolate is secured.

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[1] *Br. Ph. C.*, 204.

[2] AMER. JOUR. OF PHARMACY, 1892, p. 146.

[3] Proceedings A. Ph. A., 1906, p. 502.

In this formula the glacial acetic acid liberates the combined cantharidin and the resulting preparation represents the full activity of the drug. The finished product is clear, green in color, and exceedingly active. It is a marked improvement over the present official cantharidal collodion and should displace that formula in subsequent revisions.

THE PHARMACOPŒIA OF SWITZERLAND.

By M. I. Wilbert,
Apothecary at the German Hospital, Philadelphia.

"Pharmacopœia Helvetica, Editio Quarta," is the official title of the book, that, in many respects at least, appears to embody the most recent researches and the most modern advances in matters pharmacopœial.

This new fourth edition of the Swiss Pharmacopœia became the official standard for medicinal substances throughout Switzerland, on March 1, 1908, and, largely on account of its comprehensiveness and scientific character, the book itself has attracted an unusual amount of attention in pharmaceutical circles abroad.

Even the most cursory inspection of the Swiss Pharmacopœia will convince the trained pharmacist that it is a book that contains much that is original and evidences great thoroughness in its preparation. Every page of this book is so indicative of painstaking, conscientious work on the part of the members of the revision commission, that it would be difficult indeed to single out any one department or portion of the book as being even suggestive of greater thoroughness than any other.

Throughout the book there are indications that the individual apothecary of Switzerland must be a man of considerable training and attainment, and one who has developed the science as well as the art of his calling to a high degree. The need for testing all available medicaments for their identity, and, so far as possible, for their quality and purity, is everywhere emphasized, and considerable care appears to have been exercised in the selection of tests and processes for applying them, so as to provide methods that can be followed with a minimum of time and material. Care has also been exercised to restrict tests and methods within reasonable limitations, and everywhere the resources and the limitations of the ordinary

apothecary shop have been considered. Thus the revision commission thought it wise to omit all polarization and refractometer tests, as it was thought inexpedient to compel the average pharmacist to equip himself with the necessary, usually expensive, apparatus. The permissible variations of these several factors have, however, been added in a table, as an appendix, for the information and guidance of such dealers, chemists and others who may be equipped with the apparatus necessary to make the various determinations or tests.

The detailed classification of crystals has also been omitted for the reason that pharmacists do not usually have access to a goniometer, and the commercially obtainable crystals are seldom or never perfectly developed.

The history of the Swiss Pharmacopœia is particularly interesting in that it was originated and developed by pharmacists. The first of the distinctly national pharmacopœias of Switzerland was published in 1865 as a private enterprise of the Swiss Society of Apothecaries. This first edition of the Swiss Pharmacopœia appears to have been little more than a formulary, and was followed in 1872 by a second edition, also elaborated and published by the Society of Apothecaries. This book contained, in addition to formulas, descriptions of simples and crude drugs.

The second revision of the Swiss Pharmacopœia was begun by a committee of five members, appointed by the Swiss Society of Apothecaries in 1884, and was subsequently completed by an official Pharmacopœial Commission appointed in 1888.

This Commission consisted of twelve apothecaries, eight physicians, nine chemists and two veterinarians, who completed their work in 1893. The resulting pharmacopœia was printed in the three official languages, German, French and Italian, and became the official standard in all of the several Cantons but one—Glarus.

The present, fourth, edition of the Swiss Pharmacopœia has been revised by the members of the now existing official Swiss Pharmacopœial Commission, comprising two divisions, medical and pharmaceutical, subdivided into nine committees, each presided over by a chairman directly responsible for the accuracy of the work done by his particular committee. This edition of the Swiss Pharmacopœia is particularly interesting in that it is the first to be generally recognized by all of the several Cantons.

The book comprises a total of 672 pages, 34 of which are devoted to the introductory chapters and 517 to the description of the 853 officially recognized articles. Compared with the previous third edition, we find that 151 articles have been added, while no less than 95 have been discontinued, leaving a net gain of 56.

Simple figures, however, give but an inadequate indication of the amount of work that was involved in the revision of this book, particularly in view of the fact that every monograph in the Pharmacopœia was rewritten and elaborated on for this particular edition.

The provisions of the International Conference for the Unification of Formulæ for Potent Medicaments have been included in their entirety, as a portion of the introductory chapter, and, in the body of the book, the names included in the protocol are invariably given as synonyms of the official title, followed by the designation (P. I.) Prescription or Protocol International.

The general adoption that has been accorded to the provisions of the Brussels Conference must be a matter of considerable satisfaction to the men who took part in that conference. Commencing with the Pharmacopœia of the United States, which, it has been estimated, complies with but 27 per cent. of the requirements, practically all of the other pharmacopœias published by countries represented in the Brussels Conference include the greater number, if not all, of the provisions recommended in the Protocol. The pharmacopœias so far published include the Spanish, Belgian, Dutch, Austrian, Danish and Swiss. The introductory chapter of the Swiss Pharmacopœia contains a rather interesting definition for medicines, as follows:

"Medicaments—medicinal substances are substances or mixtures that are used for the prevention or removal of abnormal conditions or processes in the human or animal organism, or for the amelioration of disturbing, disagreeable or dangerous manifestations."

This definition is then further elaborated into forms of medicines and their method of application or use.

A chapter on "General Directions" includes definitions for and descriptions of a number of terms, processes and methods not described in detail in connection with the several monographs in the book itself. Thus we find a general definition for what is meant by warm or hot water and by ordinary or medium temperature. We also find directions for the determination of the specific gravity,

melting point, boiling point, solubility and ash content of substances. Also detailed descriptions of maceration, percolation and sterilization.

Altogether, these general directions include twenty-eight headings and contribute much to the avoidance of unnecessary repetition of details in connection with the several monographs in the body of the book.

The descriptions of chemical substances are terse, direct and readily understood. All of the descriptions are systematically arranged, and include, as headings, the Latin title, followed by the official German, French and Italian titles. The descriptions themselves include an enumeration of the physical properties and a number of qualitative tests. These are followed by tests for purity, the limit of contamination and an enumeration of the minimum per cent. of chemically pure substance that is indicated by the compliance with the several tests.

Whenever necessary, this description is further augmented by directions for keeping and an enumeration of the maximum single and daily dose.

Wherever the composition or the physical properties of a chemical substance depend on the method of preparation, a formula and the directions for making the substance have also been included. Thus the Swiss Pharmacopœia contains formulæ and directions for the several subsalts of bismuth, many of the salts of mercury and also a number of the preparations of iron.

The recognition of patented articles presents difficulties that are not readily met in a satisfactory manner, and this new Swiss Pharmacopœia offers nothing new in this respect. All of the older synthetics, such as salol, phenacetin and sulphonal, are admitted under Latinized titles of the well-known trade names; the newer products, however, products that are still protected by patent or trade rights, have been included under their chemical names, with the trade names, as synonyms, enumerated in the index.

While such names as acidum acetylsalicylicum (Aspirin) and acidum diaëthylbarbituricum (Veronal) may be practical, it is indeed doubtful if any appreciable number of medical men would take kindly to trimethylbenzoxypiperidinum hydrochloricum (Eucaine).

The descriptions of the crude drugs are collected and classified under the parts of plants represented, with the prefix itself restricted

to the singular. Thus we have flos, folium, semen and tuber. Considerable care has been exercised to differentiate the parts of plants more accurately, so that drugs consisting largely or entirely of rhizomes are classed as such and not as roots.

The descriptions of crude drugs are, as a rule, exhaustive, and include not alone a minute description of the botanical characteristics, but frequently also chemical tests and microscopic details.

The title of the more important, or potent drugs is followed by the international titles as synonyms, and then the official German, French and Italian titles, in the order given.

The monographs usually include an enumeration of the source or origin of the drug, the botanical description, a microscopical description and an enumeration of the cells or cell contents that are indicative of adulteration, chemical tests for identity, assay process when adopted, the limit of ash content, and an enumeration of the physical properties, such as taste and smell. With many drugs this description is further augmented by directions for keeping, an enumeration of the maximum daily and single dose, and this in turn is followed by a list of the official preparations that are made from the drug.

Assay processes have been included for such drugs as: Aconite, belladonna leaf, belladonna root, cantharides, cinchona, coca, hyoscyamus, hydrastis, guarana, ipecac, gelsemium, kola, nux vomica, sabadilla, stramonium and veratrum.

For a number of other drugs, such as aloes, frangula, digitalis and strophanthus, qualitative chemical tests have been included. The drugs of animal origin have been augmented by vaccine virus, a general description of serums, and specific descriptions of antidiphtheritic and antitetanic serums. The glandular structures of the animal organism, and the many derivatives that have been introduced do not appear to have been thought of sufficient importance to warrant their being included at this time.

The formula and directions for the several galenical preparations, particularly the liquid preparations, are usually augmented by briefly stated standards for color, taste, density and general appearance. Not infrequently qualitative and at times quantitative chemical tests serve to further complete the description.

The general scarcity of complex galenical preparations is one of the features that must be particularly gratifying to the scientifically

educated pharmacist or physician in that it is indicative of scientific rather than slipshod training on the part of medical practitioners.

The large number of general headings, or directions for making certain classes of preparations, readily makes up for the apparent lack of numbers in some of the different classes.

The Pharmacopœia is further augmented by a series of twenty-three tables which serve as an elaboration of the several monographs.

Among the more interesting of these tables is a list of reagents for medical purposes. This includes formulæ for the tests and stains that are used in the examination of the several secretions and excretions, the examination of blood and the staining of micro-organisms. Then there are a number of tables that are of special interest to the student or the physician. For example, there is a list of articles that are to be kept apart from others, a list of the poisonous or potent articles, a table of maximum single and daily doses, and a table of the per cent. content of active ingredient in the several galenical preparations.

The table or list of atomic weights is, in accordance with the generally adopted practice in Europe, based on oxygen = 16.

An index and list of synonyms, covering fifty-two double column pages, serves as a ready reference to the material contained in the book.

Altogether it may be confidently expected that this new pharmacopœia will surely serve to retain for the Swiss pharmacist the respect of the medical profession in his own country, in that it will necessitate his continuing the practice of his calling along scientific lines, and thus secure for him recognition far outside the limits of his own country. The admiration and the praise that has been so generally expressed throughout Europe, for the scientific character and the practical value of the material presented in the Swiss Pharmacopœia is amply justified and the book itself is certainly well worth careful study and consideration on the part of all who are in any way interested in the elaboration or improvement of our own Pharmacopœia of the United States.

THE PHILADELPHIA BRANCH OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The meeting of the Philadelphia Branch of the American Pharmaceutical Association, held on the evening of May 5, 1908, was devoted to a discussion of "Pharmaceutical Associations and Their Uses."

Mr. M. I. Wilbert read a paper on "The Status of Pharmacy and Pharmacists in Europe," in the course of which he reviewed some of the achievements of the earlier pharmacists abroad and outlined some of the aims and objects of pharmaceutical societies in the several countries of Europe. He asserted that, from a scientific point of view, it was unfortunate, indeed, that pharmaceutical as well as medical training and practice in the United States should be based on the antiquated and undeveloped system in vogue in Great Britain a century or more ago. The precedent thus established has severely handicapped the progress of the science of pharmacy in this country, and it will be many years before we can entirely eliminate the hampering influences of the old-time affiliations that, at times at least, appear to all but overshadow the true vocation of the pharmacist.

In concluding, he expressed the belief that the work that is being done in Europe, and even the work that is being done in connection with the American Medical Association, will be of but indifferent value to American Pharmacy unless pharmacists themselves are able and willing to assist, in a practical way, by perfecting themselves in the science of their calling and by insisting that future generations of pharmacists receive, and are able to profit by, a more complete and better form of pharmaceutical education than has been offered them heretofore.

Mr. Thomas H. Potts, the president of the National Association of Retail Druggists, presented a communication entitled, "The N.A.R.D. as a Factor in the Progress of Pharmacy."

After briefly outlining the conditions as they existed a decade or more ago, before the founding of the N.A.R.D., Mr. Potts recounted some of the benefits that have been secured by organization along business lines.

One of the fundamental principles of the N.A.R.D., he believes, has been to make the business of the retail druggist pay him better, and in this, he asserted, the N.A.R.D. has been eminently successful.

The N.A.R.D. was founded to safeguard and to advance, in every honorable way, the welfare of the retail druggist. Every druggist who is imbued with the spirit of craft kinship, and realizes the harmonizing power of co-operation, should be a member of this organization.

Prof. Joseph P. Remington, in commenting on the paper by Mr. Potts, said that at the present time retail druggists are virtually compelled to give much of their attention to the immediate need for securing bread and butter, and they have little or no time or inclination for following up the professional side of their calling.

He believes that the enactment of pure food and drug laws, and the accompanying acceptance of the Pharmacopœia and of the National Formulary as legal standards, will serve to arouse both the physician as well as the pharmacist to an appreciation of the opportunities now before them, and will serve to elevate the retail druggist to a much higher plane.

Prof. Henry Kraemer read a paper on: "The Reorganization of the American Pharmaceutical Association," in which he expressed himself as being in favor of the form of organization that has been adopted by the American Medical Association, with the local society as the unit in the general scheme of organization.

He believes that pharmacists, collectively or individually, can no longer lose sight of the scientific side of their calling. The methods as well as the work of the retail druggist will, in time, be open to the scrutiny of government officials, and it will not be long before the faults and the shortcomings to be found in pharmacy will be exposed and discussed.

Professor Kraemer believes that some provision should be made for post-graduate work by retail druggists who are interested in the science of their calling. He thinks that this work can best be introduced in connection with the meetings of the existing pharmaceutical associations, and for this purpose he is in favor of eliminating all of the regular business from the general sessions.

The several communications were further discussed by Messrs. Potts, Eppstein, Cliffe, Professor Remington and Professor Stanislaus.

The latter presented a series of resolutions, which were duly seconded, and, after some additional discussion, slightly amended and finally adopted as the expression of the members present, for the guidance of the executive committee for the coming year.

The resolutions, as finally adopted, are as follows:

Resolved, That the members of the Philadelphia Branch of the American Pharmaceutical Association recognize the importance of the work done by the N.A.R.D., and appreciate the need for retail druggists supporting the National Association of Retail Druggists in a practical way.

Resolved, That the members of the Philadelphia Branch of the American Pharmaceutical Association deprecate repeated changes in the by-laws of the American Pharmaceutical Association and favor the reorganization of this Association along broader and simpler lines, so as to provide for the transaction of all routine business by a widely representative elective body of delegates.

Resolved, That the members of the Philadelphia Branch of the American Pharmaceutical Association favor the suggestion that the several schools and colleges in this city be requested to give a series of lectures or demonstrations, in the nature of a post-graduate course of instruction, and that the executive committee of the local branch be requested to arrange, if practicable, for a series of demonstrations for such of the local pharmacists who may wish to attend.

Resolved, That the members of the Philadelphia Branch of the American Pharmaceutical Association reaffirm their endorsement of the work done by the Council on Pharmacy and Chemistry of the American Medical Association, and that individually they pledge their active support in favor of publicity and honesty in connection with medicines and medicinal preparations.

Resolved, That the members of the Philadelphia Branch of the American Pharmaceutical Association, recognizing the many shortcomings and the difficulties that beset a satisfactory revision of the National Formulary, pledge their active support and co-operation to the Committee on Revision of the National Formulary.

Resolved, That the members of the Philadelphia Branch of the American Pharmaceutical Association, during the coming year, take up and discuss "The Declaration on the Prescription" as promulgated by the Chicago Branch of the American Pharmaceutical Association.

M. I. WILBERT,
Secretary.

MAY PHARMACEUTICAL MEETING.

The last of the series of Pharmaceutical Meetings of the Philadelphia College of Pharmacy for 1907–8 was held Tuesday, May 19th, at 3 P.M. Among the visitors present was Mr. S. A. D. Sheppard, of Boston, the well-known treasurer of the American Pharmaceutical Association, who, upon invitation, acted as chairman of the meeting.

T. C. Ladakis, professor of pharmacy in the American College at Beirut, Syria, who has just graduated from the Philadelphia College of Pharmacy with the degree of Doctor in Pharmacy (P.D.), described the practice of pharmacy in Egypt.

Professor Ladakis said that, in considering the conditions of pharmacy in Egypt, it should be remembered that the country has been under English rule only since 1882. He said that the regulation requiring those who practice pharmacy in Egypt to be licensed pharmacists, dates back to 1888.

The Egyptian Government conducts a school of medicine and pharmacy at Cairo, which at the present time is well attended, for the reason that each graduate, whether of medicine or pharmacy, is assured a Government position. At first the instruction given in the school was in Arabic, but now it is in English, the professors being mostly Englishmen. The degree of Bachelor of Arts is required alike of the applicants for admission to the courses on pharmacy and on medicine.

Very few of the pharmacies in Egypt are conducted by natives, most of them being under the management of foreigners, including Englishmen, Greeks, Frenchmen, Italians, Germans, Syrians and others.

Professor Ladakis stated that the practice of pharmacy in Egypt is rendered more difficult by the two factors that the country has no pharmacopœia of its own, and the physicians, being also mostly foreigners, prescribe the preparations of their own pharmacopœias.

Under the pharmacy law adopted in 1904, the pharmacies of Egypt are regularly inspected, and samples of preparations analyzed at the Government chemical laboratory in Cairo, and when a preparation is found deficient, that is, not of the standard required by the pharmacopœia according to which it was prepared, the pharmacist is fined—for the first offense, fined and imprisoned; for the

second offense and for further offenses may have his store closed, or his permission to practice pharmacy revoked.

Graduates of practically all foreign schools or colleges of pharmacy are allowed to practice without examination.

Professor Ladakis said that pharmacists in the near East handle practically nothing but medicines, the only side lines being perfumery, toilet articles and photographic goods. He said that if pharmacists were to attempt to sell cigars, cigarettes, etc., the people would lose the respect which they have for pharmacists, and the present high position of the calling would be greatly lowered.

Proprietary preparations are used to some extent, and those manufactured in Egypt are either preparations for diseases of the eye or general tonics.

The practice of pharmacy in Turkey is about on the same plane as in Egypt, except that the professors in the medical and pharmaceutical schools regard the French pharmacopœia as the official guide.

In Turkey, certain chemicals, for one reason or another, are not allowed either to be manufactured or imported, and of these the following were mentioned: nitric acid, all nitrates (except silver nitrate) and chlorates, cocaine and its salts, sulphonal, potassium cyanide, picric acid, nitroglycerin, gun cotton, bismuth subsalicylate, cotton seed oil, and essence of cognac.

Other interesting points were also brought out in the discussion of the paper.

Mr. M. I. Wilbert gave an interesting résumé of some of the Recent Advances in Pharmacy (see p. 287), and exhibited and commented upon a line of pharmaceutical preparations which had been prepared by members of the local branch of the American Pharmaceutical Association for exhibition at the recent meeting of the American Therapeutic Society, held in Philadelphia.

Mr. Wilbert alluded to the spread of prohibition and local option, and said that pharmacists should take cognizance of the movement, as it is likely to cause a lessening of the amount of alcohol used in medicines and the employment of other means of preserving pharmaceutical preparations.

The speaker then enumerated a series of preparations which should be made by pharmacists, and in this connection spoke of the introduction of sterilization processes by European pharmacists.

He said that this is a subject to which the pharmacists of this country must give more attention in the future, it having been heretofore almost totally neglected.

The distinction between the terms "dispensing" and "compounding" in a legal sense having been announced for discussion, Mr. Wilbert said that while he was not familiar with the State law on this point, the rule seemed to be that wholesalers are allowed, without license, to compound or mix medicines so long as they do not dispense them, and thus it frequently happens that ignorant and uneducated assistants are employed in handling medicines. He said that Governor Pennypacker held that a wholesaler should not be allowed to compound medicines unless he had a pharmacist's license.

Prof. E. Fullerton Cook again called attention to the series of National Formulary fluidextracts and elixirs which were made under his direction by students during the College term, and said that he had received letters from manufacturers protesting against the adverse criticisms made on fluidextracts at the March Pharmaceutical meeting (see April number of this JOURNAL, p. 196), the claim being made that the use of fluidextracts is increasing. Professor Cook said that the increase in the use of fluidextracts is no doubt due to their use in other preparations, as tinctures, elixirs, wines, etc., and he pointed out the desirability of taking up and discussing the subject as to whether their use in this way is permissible.

Mr. Wilbert claimed that the method of dilution as recommended by some manufacturers on their fluidextract labels is not official, and should not be practiced. He wholly condemned the practice of making infusions from fluidextracts, and also said that tinctures should not be made by dilution of fluidextracts, because of the loss of active constituents through precipitation.

Dr. Clayton M. Thrush referred to a statement made by Dr. Janeway, of New York, that he found it very difficult to obtain the official tincture of digitalis. He said that he called the dilution method the "lazy method," and expressed the hope that it would soon cease to exist.

In reply to a question by Mr. C. P. Gabell as to whether, in the case of alkaloidal or standardized preparations, it would be better to make them by dilution of fluidextracts than from drugs of variable quality, Mr. Wilbert said that this subject had been discussed for

many years by Squibb, Rice and others, and that experiments showed that in the diluted fluidextracts, precipitation occurs and carries down the active ingredients.

Mr. Ambrose Hunsberger pointed out that certain manufacturers give the alkaloidal strength of powdered drugs.

A conjoint paper on "A Chemical and Microscopical Examination of Commercial Ginger," by Prof. Henry Kraemer and Mr. Harry E. Sindall, was presented in abstract (see p. 303).

Mr. Sindall stated that Circular 13, issued by the Government, permitted a yield of 8 per cent. of ash in ginger; but in Circular 19 the allowable percentage of ash was reduced to 6, which latter standard excludes Calcutta ginger. He stated that of eleven commercial samples which he examined, only one yielded less than 6 per cent. of ash, and this sample was found to be adulterated.

Professor Kraemer stated that he would not attempt a résumé of his work on ginger in the time at his command, but desired to refer to one or two points only.

Mr. Hunsberger presented to the College an old-fashioned brass hand prescription scale, and a spring lance formerly used by pharmacists as well as by physicians for bleeding their patients and for lancing ulcers.

J. N. Limbert & Co. exhibited a cutting of *Vanilla planifolia* recently received from Mexico, bearing a young green vanilla pod.

Dr. J. Henry Allen, of Savannah, Ga., presented a hand prescription balance used a century ago in the South. The balance is a fine one and has been carefully kept.

Professor Kraemer exhibited a specimen belonging to the College collection, which he said appeared to be very rare indeed, namely, a clustered or multiseriate ovulate cone of probably *Pinus rigida*. He said that he had become interested in the specimen through reading a recent article by Wieland, in the *American Journal of Science* (Vol. 25, page 102). Instead of the usual cluster of up to half a dozen cones, this compound cone consists of about fifty cones, and according to Wieland, there are only four other known specimens, viz., one found in the Silliman collection at Harvard University, and three in the *Jardin des Plantes*, Paris. These compound cones are considered to represent a primitive type, and are of interest more especially to the student of evolution.

FLORENCE YAPLE, *Secretary pro tem.*

THE AMERICAN

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AUGUST, 1908

BEEF, WINE AND IRON.

By John Phillips Street.*

The writer has recently examined a large number of samples of beef, wine and iron, and the results secured indicate certain important objections to the method of preparation recommended in the last National Formulary.

It is rather difficult to understand the reasons for the admission of a preparation of such doubtful efficacy into the Formulary. For all practical purposes, in most cases it is nothing more than a sherry wine of more or less questionable quality, to which has been added small quantities of meat extract and either tincture or citrate of iron. Meat extract is recognized as possessing but slight nutritive value, and the amount used in the preparation of beef, wine and iron would have but little value even as a tonic or stimulant. On the other hand, the iron in these preparations might be of value as a tonic during convalescence or in certain blood disorders, but it could be obtained much more cheaply and could be used much more intelligently in other forms and under a physician's directions. The use of such materials by an invalid on his own responsibility likewise exposes him to the danger of acquiring unconsciously the habit of alcoholism.

Because of the scarcity of analytical data concerning this material, I prepared several mixtures according to the directions of the Formulary, and also with some modifications. It was evident at once that wide variations in composition might arise from the

* Credit for the analytical work is shared by E. M. Bailey and H. R. Stevens.

quality of sherry wine and meat extract used. Furthermore, it is well known that many pharmacists at present substitute citrate of iron and ammonia for the tincture of citro-chloride of iron because of its greater solubility, and it was clear that the iron salt used would influence the quantity of iron present in the preparation.

Five mixtures were prepared, as follows:

No. 1. High-grade meat extract corresponding to Liebig's extract; tincture of citro-chloride of iron; all materials used in the exact proportions directed by the Formulary; alcohol not removed by distillation; solution not filtered.

No. 2. Half of No. 1 was filtered and the original volume restored by the addition of sherry wine.

No. 3. The same as No. 1, except that an equivalent amount of iron in the form of citrate of iron and ammonia was used; alcohol not removed; solution not filtered.

No. 4. Half of No. 3 was filtered and the original volume restored by the addition of sherry wine.

No. 5. Lower-grade meat extract, but with the quantity sufficiently increased to supply the same amount of nitrogen as 33 grammes of Liebig's extract; the exact procedure of the Formulary was followed, using the tincture of iron, and including the removal of the alcohol by distillation, and the double filtration; the sherry used was different from that used in the other four mixtures.

The analysis of the five preparations and a partial analysis of the sherry are shown in the following table:

Preparation.	Specific Gravity at 15.6° C.	Alcohol, by Vol.	Extract.	Ash.	Iron (Fe)	Total Nitrogen	Nitrogen as Ammonia.
		Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.
No. 1. High-grade extract; tincture of iron; not filtered,	1.02165	27.18	14.12	1.113	0.123	0.250	0.007
No. 2. High-grade extract; tincture of iron; filtered . .	1.01562	26.20	12.36	0.723	0.011	0.178	0.007
No. 3. High-grade extract; citrate of iron; not filtered,	1.02660	23.82	14.09	1.138	0.121	0.295	0.066
No. 4. High-grade extract; citrate of iron; filtered . .	1.02564	24.12	13.94	1.162	0.107	0.278	0.064
No. 5. Low-grade extract; tincture of iron; filtered . .	1.02654	19.50	12.95	1.401	0.024	0.216	0.009
Sherry used in Nos. 1 to 4	0.99602	21.50	5.53	—	—	—	—
Sherry used in No. 5	0.99939	22.75	6.75	—	—	—	—

Although the first four preparations were not made according to the Formulary as regards the removal of the alcohol, the composition would not be materially affected save in the case of the alcohol content, which we find to be very high, ranging from 23·82 to 27·18, against 19·50 in No. 5. The influence of the form of iron used is very marked. Where filtration is practiced and the tincture is used, the iron falls from 0·123 to 0·011 per cent., a loss of 91 per cent.; where the citrate of iron is used, filtration causes only a slight decrease in iron, from 0·121 to 0·107 per cent. In No. 5, where the tincture was also used followed by filtration, the low iron percentage of No. 2 is confirmed; the 500 c.c. of the preparation originally contained 0·631 gramme of metallic iron; while it actually contains, after filtration, only 0·123 gramme, a loss of 80 per cent. Filtration likewise causes a decrease in ash of from 1·113 to 0·723 per cent., a loss of 35 per cent. The higher ash in No. 5 is due to the presence of a large excess of sodium chloride in the meat extract used, a characteristic of most commercial extracts.

In the case of the nitrogen, where the tincture is used, filtration causes a reduction from 0·250 to 0·178 per cent., a loss of 29 per cent.; where the citrate is used the nitrogen loss is negligible. In No. 5 the amount of nitrogen added in the form of meat extract was 1·534 grammes; the first filtration removed 0·168 gramme, and the second 0·274 gramme, a total of 0·442 gramme, or, again, 29 per cent. of the total nitrogen.

The ammonia determination shows mere traces where the tincture was used, and as much as 0·066 per cent. where the citrate was used, incidentally showing that this determination gives valuable evidence as to the form of iron used.

The above facts show that the procedure of the Formulary results in a loss of 29 per cent. of the nitrogen, 35 per cent. of the ash and 91 per cent. of the iron. The substitution of citrate of iron and ammonia for the tincture of citro-chloride of iron, even when double filtration is practiced, prevents these losses almost entirely, besides furnishing a brighter and more attractive preparation.

Ninety-two samples collected from the stock of Connecticut druggists were analyzed. Tests were made for specific gravity, alcohol, extract, ash, iron, nitrogen and ammonia. While a great part of the beef, wine and iron on the market is made by the large wholesale drug houses, nearly every druggist puts out a brand

under his own name, so that practically there are as many nominally different brands as there are druggists. The results presented, therefore, do not mean that the Connecticut druggists are selling a lower-grade article than those of other States, for a large proportion of the samples were made elsewhere. In fact, some of the highest-grade preparations analyzed were made by local druggists and some of the lowest grade by wholesale houses of wide reputation.

It is unnecessary to give the detailed analyses of all the samples in this place, and only typical ones and the average of the ninety-two samples are shown in the accompanying table. The first thirteen samples were sold under the name of the wholesalers, the others under the name of the local druggists.

It is seen that the variations in composition are very wide in every ingredient. Attention at this time will be called only to the nitrogen and iron content. The Formulary states that "4 c.c. (1 fluidrachm) represent 0·13 gramme (2 grains) of extract of beef, and 0·128 c.c. (2 minims) of tincture of citro-chloride of iron." Translated into metrical and chemical terms, if a high-grade meat extract is used as directed, one fluidrachm should contain 0·0122 gramme of nitrogen and 0·0058 gramme of metallic iron, provided that there is no loss entailed by the method of preparation. My own preparations contained in one fluidrachm as follows:

No. 1, unfiltered . . .	10·2	milligrammes	N,	5·0	milligrammes Fe
No. 2, filtered	7·2	"	"	0·4	" "
No. 3, unfiltered . . .	12·1	"	"	5·0	" "
No. 4, filtered	11·4	"	"	4·4	" "
No. 5, filtered	8·9	"	"	1·0	" "

The figures obtained on preparations of known origin show the difficulty of establishing standards particularly for iron. In the light of the above data the use of the word "represent" in the Formulary is explainable, and while the makers of the Formulary doubtless intended to convey no false impression by their phraseology, it has certainly opened the way for gross misrepresentation in the sale of beef, wine and iron. Where the tincture of iron is used, followed by filtration, nearly all the iron is removed and about one-third of the nitrogen. If as much as one milligramme of metallic iron is present in a fluidrachm, therefore, it is impossible to assert with certainty that the preparation is not made by the

TYPICAL ANALYSES OF BEEF, WINE AND IRON.

No.	Specific Gravity.	Alcohol by Vol.	Extract.	Ash.	Iron (Fe).	Total Nitrogen.	Nitrogen as Ammonia.	1 Fluidrachm contains	
								Nitrogen.	Iron.
		Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Mgms.	Mgms.
18652	1·0197	15·19	10·01	2·157	·122	·223	·014	9·1	5·0
19512	1·0408	19·78	16·73	0·443	·032	·175	·016	7·3	1·3
18481	1·0359	20·22	15·55	1·172	·070	·157	·011	6·5	2·9
19464	1·0328	21·92	15·22	1·347	·100	·150	·006	6·2	4·1
18641	1·0343	14·55	13·65	0·357	·027	·148	·054	6·1	1·1
19545	1·0187	17·34	10·35	0·581	·151	·117	·065	4·8	6·2
19447	1·0400	18·69	16·23	0·623	·088	·099	·032	4·1	3·7
18695	1·0196	17·63	10·66	0·685	·152	·098	·050	4·0	6·2
19443	1·0252	18·65	12·38	0·421	·036	·079	·011	3·2	1·5
19440	1·0472	17·17	17·72	0·419	·113	·058	·028	2·4	4·7
18591	1·0568	16·44	20·05	0·365	·029	·040	·003	1·7	1·2
18615	1·0576	16·28	20·20	1·158	·100	·033	·003	1·4	4·2
18516	1·0603	16.87	21·04	0·864	·079	0·6	·002	1·1	3·4
19589	1·0440	19 61	17·54	1·313	·102	·539	·066	22·5	4·3
19441	1·0167	18·19	10·04	0 998	·148	·272	·063	11·1	6·0
18618	1 0198	17·91	10·76	1·693	·142	·269	·012	11·0	5·8
18614	1·0430	14·33	15·84	1·489	·133	·184	·007	7 7	5·6
19524	1·0406	18 90	16 47	1·207	·120	·073	·004	3 0	5 0
18560	1·0641	16·63	21·99	0·358	·100	·039	·002	1 7	4·3
19559	1·0725	8·48	21·86	0·495	·060	·018	-002	0·8	2·6
Max.	1·9725	25·46	24·25	2·157	·355	·539	·131	22·5	14·8
Min.	1·0013	8·48	6 07	0·303	·025	·018	·002	0·8	1 0
Ave.	1·0338	18·39	14 55	0·804	·114	·121	·033	5·0	4·7

official formula. My own preparation, No. 5, made strictly according to the Formulary, contains but one milligramme of iron per fluidrachm.

In the case of nitrogen, while my own preparations show that the filtered material may contain only 7·2 to 8·9 milligrammes per fluidrachm instead of 12·2 milligrammes, as calculated from the Formulary requirement of two grains of high-grade meat extract, the question of a minimum standard is not so difficult; for by no possible manipulation of the formula, provided meat extract of good

quality is used, could much less than seven milligrammes of nitrogen be furnished per fluidrachm, even if citrate of iron and ammonia is not used.

In the ninety-two samples the iron varies from ·025 to ·355 per cent. with an average of ·114. These variations are in great part due to the form of iron used, as has already been pointed out. In forty-six samples the label states that the citrate had been substituted for the tincture, while in seven the tincture and in one phosphate of iron is given as the source of the iron; in the other thirty-eight samples there is no statement as to the iron, although in the majority of them it is evident the citrate was used. The average iron content where the citrate is stated to have been used is ·119 per cent.; where the tincture was used ·090 per cent., or 24 per cent. less.

The nitrogen varies from ·018 to 0 539, with an average of ·121 per cent. Only nine samples contain over ·200 per cent., the amount found in our own preparation made according to formula; forty-two contain from 0·10 to 0·20 per cent., twenty-six from 0·05 to 0·10 per cent., and fifteen less than 0·05 per cent. As already stated, filtration of the preparation causes a considerable loss of nitrogen, and while one fluidrachm may "represent" 12·2 milligrammes of nitrogen, the actual content may be as low as 7 milligrammes per fluidrachm, even if made strictly according to formula. Admitting 7 milligrammes as the minimum standard, the analyses show that only twenty-three of the samples reach this figure; thirty contain from 4 to 6·8 milligrammes, twenty-five from 2 to 3·9 milligrammes and fourteen less than 2 milligrammes per fluidrachm. In other words, fifty-five samples, or 60 per cent., contain less than half the minimum standard. On the average it was found that about one-third of the nitrogen was in the form of ammonia, the greater part of which was derived from the citrate used. It is evident, therefore, what an insignificant amount of meat extract many of these preparations contain.

The propriety of the use of the word "beef" in connection with this material is indeed questionable, as only in rare cases is beef itself actually used; and even if used, only the extractives, of no nutritive value, would be present. Many of the labels on the samples bear other false and misleading statements, such as "one-half fluidounce contains the strength of one ounce of beef," "one ounce

contains the strength of one ounce of beef," "each fluidounce contains one ounce of essence of beef," and one tablespoonful contains the equivalent of 1½ ounces of lean meat." One sample bears two directly contradictory labels; the main label claims that "each fluidounce contains all the strength of 2 ounces of prime, fresh, lean beef;" the other label claims that "each fluidounce contains the extractive strength of ½ ounce of prime, fresh, lean beef."

To summarize the results of my analyses, sixty-nine samples are below N. F. strength in nitrogen, twenty-nine are misbranded, and all but one of the misbranded samples are likewise low in nitrogen. Only twenty-two samples out of ninety two satisfy the calculated N. F. requirement of 7 milligrammes of nitrogen per fluidrachm.

The responsibility for these deficiencies rests partly upon the Formulary itself, partly upon the quality and very largely upon the quantity of meat extract used in their preparation.

Analytical Laboratory, Connecticut
Agricultural Experiment Station,
New Haven, Conn.

HISTOLOGY OF HYOSCYAMUS MUTICUS.

By Charles M. Sterling.

Ever since the nature of the alkaloid occurring in *Hyoscyamus muticus* was determined, the plant has attracted considerable attention. According to Engler and Prantl (Natürlichen Pflanzenfamilien, volume 4, part 3, page 18), the plant grows abundantly in Egypt, and extends eastward into southern Asia to the East Indies. As shown by Mr. Edwin Dowzard in the American Journal of Pharmacy for May, 1908, several excellent assays of the drug have been made, and its superior quality well established.

As the drug appears on the market, it consists chiefly of fruiting stalks gathered after the corollas have withered and fallen off. As the leaves are very fragile, only the smaller ones remain unbroken. Usually both stems and leaves are in much broken fragments. The calyces are of much firmer texture than the leaves, and often retain their structure intact; and as they closely surround the partly matured fruits, these also are frequently well preserved.

The specimen of drug used in the preparation of this article was imported from Egypt.

STEM.

The inflorescence is a dorsi-ventral, one-sided raceme, having the younger portion rolled inward toward the ventral side. However, the inflorescence is almost identical with that of *Hyoscyamus niger*, which Tschirch insists is cymose in structure (Anatomischer Atlas, page 168), and not a close raceme or spike as it is usually described.

The stems are hollow, cylindrical, and longitudinally wrinkled, the younger parts being flattened in drying and often deeply furrowed on the ventral side. They are covered with trichomes, which are

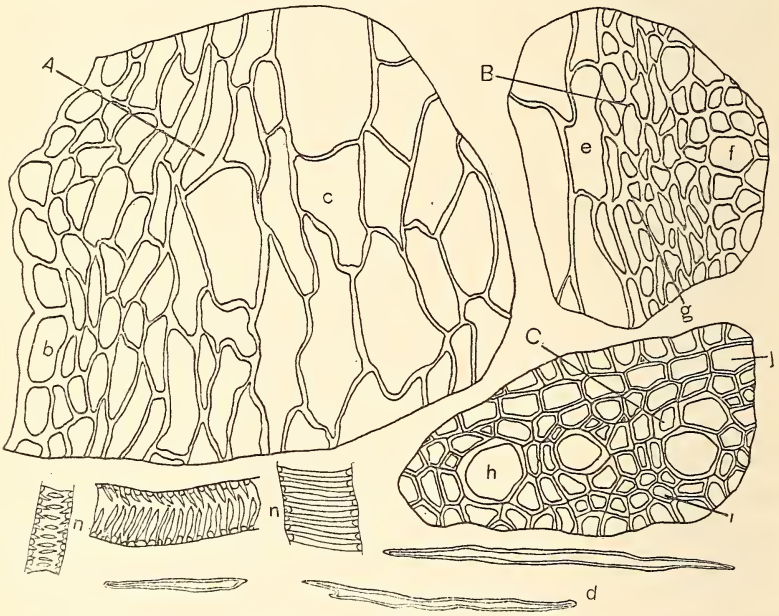


FIG. 1.—*A*, Cross section of stem, showing epidermis *b*, and cortex *c*. *B*, Cross section of stem extending from the cortex *e*, to the xylem *f*, showing the phloem at *g*. *C*, Portion of xylem showing ducts *h*, and wood fibers *i*, and medullary ray at *j*; *d*, wood fibers, separated by maceration; *n*, fragments of ducts from powder.

very prominent on the younger parts, while the older parts may be almost smooth. In color they are grayish-yellow to yellowish-brown, and as they may be 10 mm. or more in diameter, they show externally characteristics which readily distinguish them from the official *Hyoscyamus niger*.

The internal structure of the stem is peculiar and characteristic.

The epidermis consists of a row of regular cells having a thick cuticle. (*Fig. 1, b.*) Lying adjacent to the epidermis is the cortex, composed of large, thin-walled cells which are tangentially stretched. (*Fig. 1, c.*) In a stem measuring 7 mm. in diameter, the cortex is about 15 cells in width. These cells measure radially from 10 microns near the epidermis to 70 in the central part of the cortex, and tangentially from 25 to 150. The vascular bundles are bicollateral, having small groups of phlœm adjoining the medulla as well

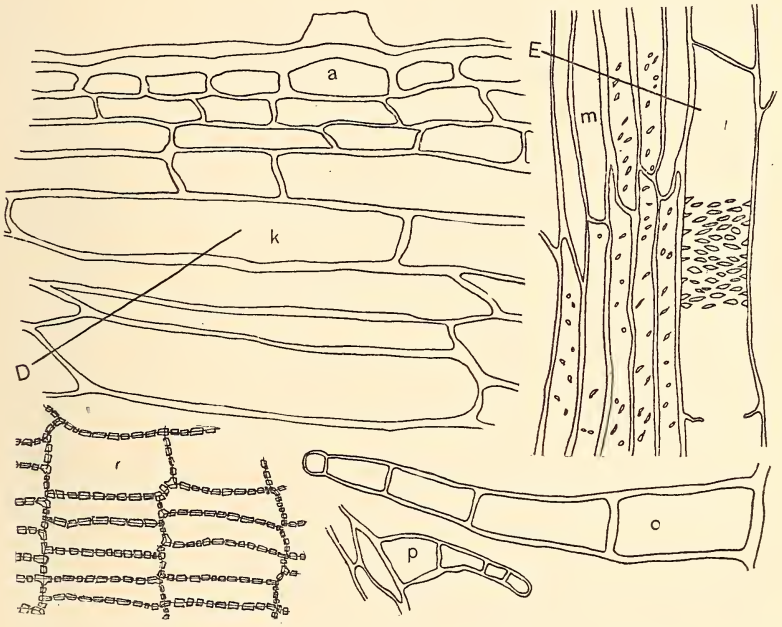


FIG. 2.—*D*, Longitudinal section of stem; epidermis, *a;* cortex, *k*. *E*, Longitudinal radial section of xylem; *i*, duct, and *m*, wood fibers; *o*, a trichome from the inner surface of the calyx; *p*, trichome from stem; *r*, longitudinal radial section of medullary ray.

as the larger groups adjacent to the cortex. The xylem is composed for the most part of wood fibers and ducts. (*Fig. 1, C.*) The ducts are relatively few, and occur singly or in groups of two or three, rarely more, and are annular, spiral, scalariform or reticulate in structure.

The latter may contain either simple or bordered pores. The xylem is rich in fibers which are relatively thick-walled. (*Fig. 1, i.*)

They are long and slender, with sloping or irregular ends (*Fig. 2, m*), and have numerous circular or slit-like pores which may be either straight or oblique. The fibers measure from 10 to 25 microns in width, by 350 to 900 in length.

The medullary rays are composed of cells very regular in form. They are seldom more than one cell wide, and contain many fine pores. (*Fig. 2, r.*)

LEAVES.

The leaves are very fragile and are usually in much broken fragments. However, some of the smaller leaves from the fruiting

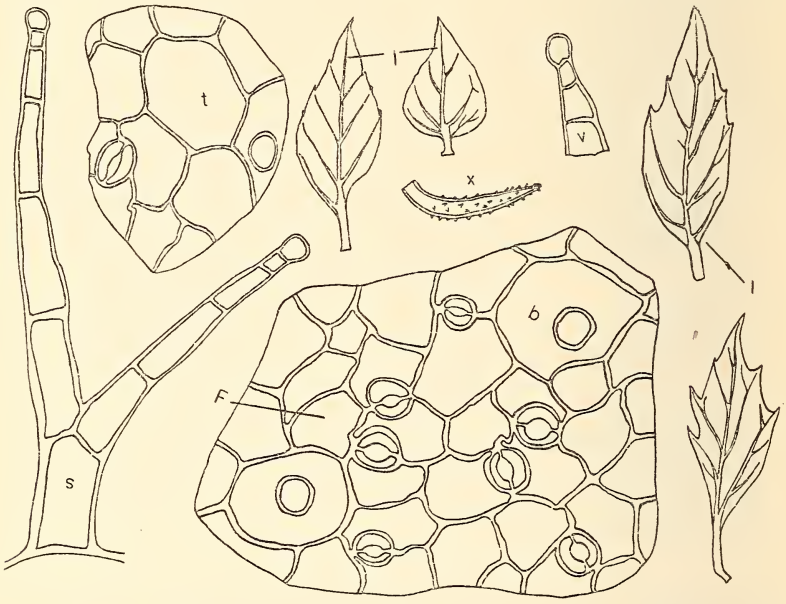


FIG. 3.—*F*, Surface view of epidermis of leaf, under surface, showing scars left by falling trichomes *b; s*, trichome from stem epidermis; *t*, epidermis of leaf, upper surface; *v*, trichome from stem; *x*, trichome from inner surface of calyx; *l*, leaves.

stalks may be found intact. In form they are ovate, lanceolate, or oblong-lanceolate, and measure 30 to 80 mm. in length by 15 to 25 mm. in width. They have either acute or acuminate apices; margins entire or acutely four to six-lobed, and bases oblique or inequilateral (*Fig. 3, l*). The veins stand out conspicuousl yon both the upper and under surfaces of the leaves, but are more prominent

on the under surfaces. They are lighter in color than the rest of the leaf, and running out from the midrib are prominent veins which terminate in the lobes. In color the leaves are green or yellow-green.

Surface views of both upper and under sides of the leaves show cells with relatively even and regular walls (*Fig. 3*, *F* and *t*, and *Fig. 4 J*). On the veins the epidermal cells are elongated and sometimes pointed, resembling prosenchyma in form (*Fig. 4*, *K*). The palisade

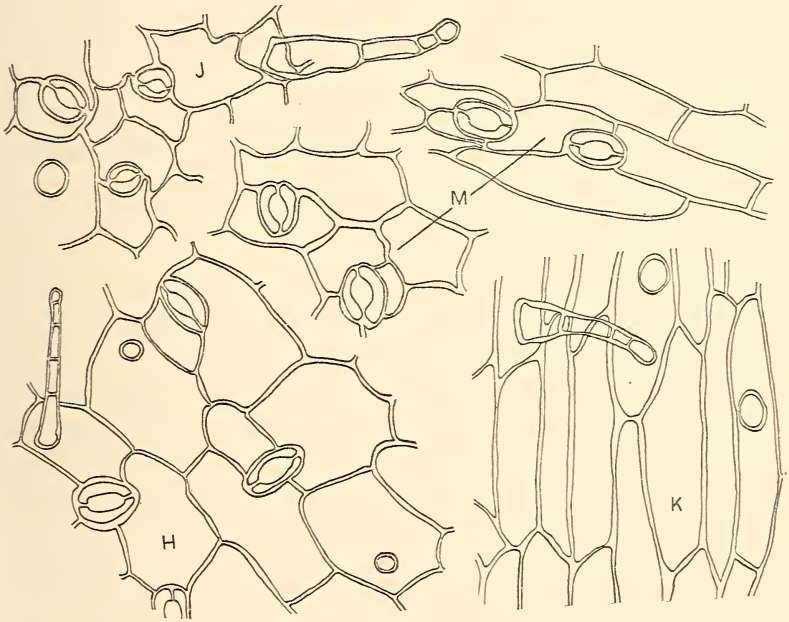


FIG. 4.—*H*, Epidermis of calyx, outer surface; *J*, epidermis of leaf, under surface; *K*, epidermis from midrib, under surface of leaf; *M*, epidermis from inner surface of calyx.

parenchyma consists of a single row of cells which are filled with protoplasm, and contain numerous chloroplasts. They are separated by numerous intercellular spaces. The spongy parenchyma is made up of several layers of irregular cells, between which are large intercellular spaces. These cells are also rich in chloroplasts and those adjacent to the palisade frequently contain crystals. Stomata similar in form and size occur on both the upper and under surfaces of the leaves, and both surfaces are pubescent.

CALYX.

Because of the firm texture of the calyces, they are less broken than the other parts of the plant. They are 10 to 25 mm. long, and are borne on peduncles 4 to 10 mm. in length. They are gamosepalous, bell-shaped, strongly ribbed, and surmounted by five nearly equal, short, blunt teeth. In surface view the epidermis resembles very closely that of the leaves (*Fig. 4 H*, and *M*). Stomata occur on both the inner and outer surfaces of the calyces, and both surfaces are hairy, although the outer surfaces soon become almost smooth. The inner as well as the outer epidermis of the calyx is accompanied by a hypodermal layer of cells similar in size and form to those of the epidermis; while between these two zones of regular cells lies a tissue of large and very thin-walled cells. In this zone of large cells, which is four or five cells in width, are many crystals of calcium oxalate. In color the calyx is a greenish-yellow.

FRUIT.

The calyx closely surrounds the fruit, but is not attached to it. The fruit is a two-locular pixis, and contains many small, light brown or yellowish seeds, which are attached to the central placentæ. The seeds, about 1 mm. in diameter, are flattened, nearly reniform, and finely reticulate. The seed consists of two very distinct coats surrounding a copious layer of endosperm, within which lies curled up a small colorless embryo. The outer seed coat is composed of a single layer of cells which have their radial and inner tangential walls striated and very much thickened, while the other tangential wall remains thin. This thin outer wall usually collapses and lies pressed close against the inner wall, thus giving the finely reticulate structure to the surface of the seed (*Fig. 5, C*). The inner seed coat is composed of a brownish, almost obliterated or partly resorbed, zone of cells.

The endosperm is made up of a zone of tissue, five or six cells in width. The cells are regular in outline, thin-walled (*Fig.* 5, *A*), and are closely packed with aleurone and oil. The aleurone grains (*Fig. 5, w*) are four to six-sided, and four to ten microns in diameter. Lying within the endosperm is the embryo, consisting of a hypocotyl, and two thin-cotyledons (*Fig. 5, L*). Both hypocotyl and cotyledons are made up of thin-walled cells very similar in size

and form (*Fig. 5*, *B* and *H*), excepting a small central portion of the hypocotyl, which shows the procambium strands already formed. The cells of the embryo also contain oil and aleurone, but the aleurone grains are smaller than those of the endosperm.

TRICHOMES.

Trichomes are found on the stems, both surfaces of the leaves and calyces, and are unicellular or multicellular, simple or branching.

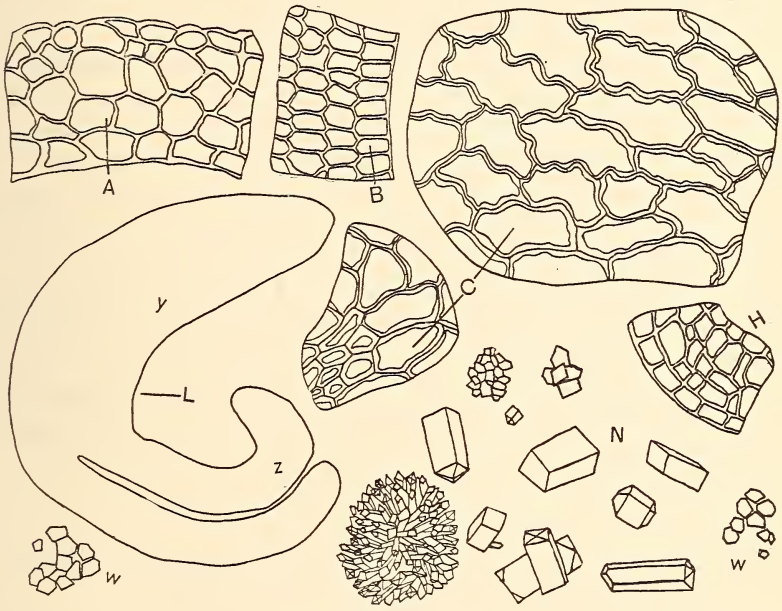


FIG. 5.—*L*, Embryo; *y*, hypocotyl; *z*, cotyledon; *A*, transverse section through the endosperm; *B*, portion of hypocotyl in longitudinal section; *H*, part of cotyledon; *C*, testa, surface view; *N*, crystals; *w*, aleurone.

The unicellular trichomes are curved and non-glandular, but are covered with fine, spine-like projections (*Fig. 3*, *x*), while the multicellular trichomes are smooth and glandular. The simple multicellular trichomes are composed of a two to five-celled stalk, bearing a rounded unicellular glandular head (*Fig. 2*, *o* and *p*). The branching trichomes have a large, multicellular, four to eight-celled stalk bearing one or more branches; the main stalk, as well as the branches, terminates in a one-celled glandular head (*Fig. 3 s*).

CRYSTALS.

Crystals of calcium oxalate are abundant, and are found in all parts of the plant. They are in the form of pyramids, prisms and rosette-shaped aggregates (*Fig. 5, N*). The aggregate crystals, which often measure forty to sixty microns in diameter, occur for the most part in the cortex of the stems, and are relatively few in number. The prismatic and pyramidal forms, measuring four to fifty microns in diameter, frequently occur as twin crystals, and stand out prominently in any mounted preparation, whether it be made from material in the form of powder or from sections.

A comparison of *Hyoscyamus muticus* with the official *Hyoscyamus niger* brings out characteristics which cannot fail to distinguish the two drugs. The much lighter and yellowish color of *Hyoscyamus muticus;* the larger and more conspicuous stem remnants and calyces furnish diagnostic characters, which even to the unaided eye are reliable means of identification. A microscopical examination, however, shows even more striking diagnostic characters. The trichomes of *Hyoscyamus muticus* stand out as the most prominent and reliable diagnostic character that distinguishes the two species. But other characters almost as important are found in the epidermal cells of both leaves and calyces, the wood fibers, the crystals, the large parenchyma cells of the cortex, and the very conspicuous cells of the testa.

THE ALKALOIDAL ASSAY OF BELLADONNA ROOT.

By W. A. Pearson and J. G. Roberts.

Owing to the variation between our results and those of Dr. Carl Enoch, of Hamburg, Germany, as to the alkaloidal content of certain shipments of belladonna root, both our method and that of Dr. Enoch were critically examined and compared.

Dr. Enoch was kind enough to give us the complete details of his method, which is a modification of Keller's, and is as follows:

"The root, after being carefully dried, is powdered medium finely and 12 grammes are placed in a glass-stoppered Erlenmeyer flask of about 200 c.c. capacity, and exactly 90 grammes of ether and 30 grammes of chloroform are added. After inserting the glass stopper securely, allow the flask to stand ten minutes, so that the

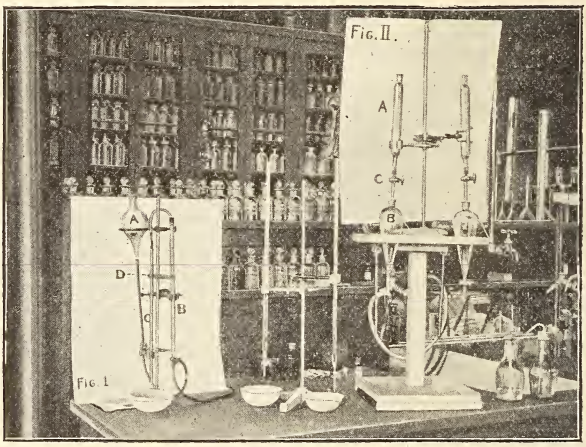
ether and chloroform can properly mix with the powdered root, and then add 10 grammes of 10 per cent. ammonia and shake the flask well at frequent intervals during an hour. The ammoniacal liquid will be entirely absorbed by the powdered root, while the alkaloids and resinous constituents pass into the ether-chloroform solution. Add 15 c.c. of distilled water and shake the flask again strongly for some time. By this addition of water, the powdered root separates entirely from the solution in the form of a paste, so that either through a paper or a pellet of cotton 100 grammes of the ether-chloroform solution can be transferred to a small flask. These 100 grammes now contain all that is soluble out of 10 grammes of the root. The small flask is immersed in boiling water until the ether and chloroform are evaporated, then a few cubic centimeters of ether are added, and this evaporated to be sure that no ammonia remains. The residue is then dried for about twenty minutes in a water oven to remove every trace of ether, chloroform or ammonia.

"In this flask we now have, aside from the total alkaloids, a small amount of very light yellow or white resins, which, however, do not interfere in any way with the following titrimetric determination of the alkaloids as the resins remain insoluble in the flask. To determine the alkaloid, put into the flask, while yet warm, 10 c.c. of absolute alcohol and heat gently until everything, with the exception of traces of resin, is dissolved. Add 50 c.c. of water and several drops of aqueous hæmatoxylin solution. The turbidity brought about by resin contained in the flask is of no consequence. However, I (Dr. Enoch) add a pretty large quantity of aqueous hæmatoxylin solution, which causes the color to change immediately to a deep red-violet shade. I then add tenth normal hydrochloric acid by drops. The color changes very soon into yellow; however, this is not yet the final point of the titration; for after close examination, you will find that each additional drop of acid still causes yellow streaks to appear in the fluid, this being a proof that the red color of the indicator has not all been changed into yellow. I continue to add tenth normal acid by drops until the last drop will no longer cause any clarification nor any formation of streaks. The titration must be carried until this point is reached. This point appears and may be determined so absolutely that I have obtained innumerable results which coincide.

"Multiply the number of cubic centimeters of tenth normal

hydrochloric acid used by 0·0287, and this by 10, and the result will be the per cent. of total mydriatic alkaloids."

For accurate measuring of the tenth normal acid, an apparatus shown in *Fig. 1* was devised. *A* is a small reservoir for water which is connected with a three-way stop-cock of a burette *B*, which is in turn connected at the top by means of a curved glass tube with a 5 c.c. pipette *C*. By turning the stop-cock in the burette, the pipette may be filled with tenth normal acid and accurately added to the flask containing the alkaloids in small drops. To facilitate accurate reading, a clothes-pin, *D*, carrying a strip of white paper,



FIGS. 1 and 2.—Alkaloidal Assay of Belladonna Root.

and on this half of a small round red label, is clamped at any desired point on the pipette and the readings very accurately made. The idea of this device was obtained from Dr. John Anderson, of the Marine Hospital Service. If properly made, the semi-circular red label will show a straight red line through the pipette or burette with which the lowest point of the meniscus can be made to coincide.

For our regular work we use the U.S.P. method with slight modifications, which simplifies the operation and increases the accuracy. The first deviation from the U.S.P. process is in the use of a Gordin combination maceration flask and percolator, which is shown in *Fig. 2, A*. Instead of macerating the belladonna root in an Erlen-

meyer flask and then transferring to a small percolator, as directed by the U.S.P., the ground drug is put in the percolators, together with the menstruum, and macerated for one hour, shaking at frequent intervals. When ready for percolation the percolator is placed so that the percolate will flow into separator *B*, *Fig. 2*.

The rate of flow of the percolate can be easily regulated with stop-cock *C*, which is a distinct advantage over the U.S.P. method, as the drug requires no packing.

The shaking out with acid solution and with chloroform is carried out as directed by the U.S.P.; but instead of combining the three chloroformic solutions and then evaporating, each one is evaporated separately as soon as it is drawn off. By so doing, all ammonia held by the chloroform solution is driven off. Due care is exercised at each step in the shaking-out process, to insure complete separation of the solutions. The last chloroformic solutions are filtered either through a pledget of cotton placed in the stem of the separatory funnel or through a filter into an evaporating dish.

For the titration a low form of evaporating dish is more convenient than a beaker, as the end reaction is more readily detected. In order to facilitate the titration, we dissolve the alkaloidal residue in 3 c.c. of alcohol, add the necessary amount of fiftieth-normal sulphuric acid volumetric solution and 10 drops of cochineal indicator, and then dilute with 75 c.c. of distilled water. Dissolving the alkaloidal residue in alcohol permits the use of a fiftieth-normal sulphuric acid for titrating, which is advantageous, as by using a weaker acid any possible error due to the volumetric solution adhering to the burette is diminished.

Because it is rather difficult to determine the end reaction when using cochineal indicator, on account of the absence of a distinct change, and as it is necessary for absolutely accurate results to have the same end reaction in the alkaloid determination as that obtained when standardizing the fiftieth-normal potassium hydrate, we have adopted a color comparison method.

A blank titration is made in a white porcelain evaporating dish, using the same amount of alcohol, fiftieth-normal sulphuric acid, cochineal and water, and titrating with approximately fiftieth-normal potassium hydrate to a definite color.

Then the alkaloid containing solution in a similar evaporating dish is titrated to the same tint as that obtained in the blank.

By dividing the number of cubic centimeters of fiftieth-normal sulphuric acid used by the number of cubic centimeters of approximately fiftieth-normal potassium hydrate required, a correction is obtained for the potassium hydrate solution. Multiply this correction by the number of cubic centimeters of potassium hydrate solution used in the alkaloidal tritration to find the number of cubic centimeters of fiftieth-normal potassium hydrate used.

Subtract this amount from the number of cubic centimeters of fiftieth-normal sulphuric acid used. Divide this number by 5 to get in terms of tenth-normal solutions, and multiply by 0·0287, and then by 10, and the result will be the percentage of mydriatic alkaloids present.

COMPARISON OF METHODS.

Dr. Enoch's method gives results that can be duplicated easily. It also has the great advantage that it may be quickly carried out. In our experience the results have always been higher than the same sample by the U.S.P. method; but Dr. Enoch says that there is more chance for loss in the U.S.P. method, which is true. The end point in his method seems to be carried too far. We have found that different indicators play an important part in the results obtained, and for that reason we have adopted the colorimetric titration as given above. It must be remembered that Dr. Enoch gives specific directions to thoroughly dry the root before beginning the assay. The U.S.P. makes no specific provision for this additional drying, and as belladonna root will usually lose about 10 per cent. in additional drying, this must be taken into consideration.

The above was sent to Dr. Enoch for correction and for further suggestions in regard to his method, and in reply the following comments were made by him:

(1) It is important in drying the drug previous to assay that the temperature is not raised above 80° C., as below that temperature there is no loss of alkaloid.

(2) For each titration, 1 to 3 c.c. of tenth-normal hydrochloric acid are used. The exact observation of the streaks is the only and best way to determine the end point in the titration.

(3) The end point in Dr. Enoch's method is not carried too far, but is absolutely correct, which you can see by making the same

test with a definite quantity of pure atropine, and besides, the following statements coincide with my results.

In all the literature of pharmacy and pharmacognosy you may read that the amount of alkaloids varies from 0·5 to 0·7 per cent. This is quite in accordance with my results. With the U.S.P. method you never have found more than 0·40 per cent. alkaloid in the highest analysis, even if you analyze the best belladonna root in existence. (? W. A. P. J. G. R.)

Different indicators always play an important part in the final results; therefore, I take hæmatoxylin as your Pharmacopœia formerly advised. If you use cochineal, it is necessary to previously test the tenth-normal hydrochloric acid against this indicator, but it is not so good in this case.

The further drying of the root before powdering is necessary; otherwise, you never compare results of material which have different percentages of moisture.

We are greatly indebted to Dr. Enoch for his co-operation in this work, as well as to several members of the firm we represent.

Research Laboratory,
Smith, Kline & French Company.

POSSIBILITY OF ERROR IN THE U.S.P. ASSAY PROCESS FOR OIL OF PEPPERMINT.

By Dr. Gunnar Heikel.

Inasmuch as oil of peppermint is a solution of about 40 to 45 per cent. menthol in menthyl acetate and other liquid constituents of the oil, it is evident that after elimination of a certain quantity of the latter a separation of menthol crystals will occur.

When the oil is saponified, such an elimination has taken place. All menthyl esters have been transformed in alkali salts and a corresponding amount of menthol liberated. By washing the saponified oil with water, as prescribed in the U.S.P., the remaining liquid constituents may not be present in a sufficient quantity to keep the increased amount of menthol in solution, which consequently separates out in crystalline form in the wash-water.

In case this loss of menthol is overlooked and the total menthol in the remaining oil assayed according to the U.S.P., the percentage found may be much below the truth.

An oil actually containing 9·2 per cent. menthyl ester (as acetate) and 51·6 per cent. total menthol showed, when assayed according to the U.S.P., only 19·6 per cent. total menthol. Hence 32 per cent. had been washed out from the saponified oil. (A large quantity of menthol crystals were actually found in the wash-water.)

Such a separation of menthol does not, however, occur as a rule, it evidently being dependent upon the nature of the oil; but as it can happen, the author considers it safe to change the assay process in such a way that serious errors may be avoided.

The amount of menthyl esters can of course be assayed according to the U.S.P.; but instead of acetylizing the total menthol in the saponified product, the oil should first be acetylized, after which the saponification of the product will give the amount of total menthol present.

The reason for acetylizing the saponified oil is evidently to have all the menthol before saponification in form of menthyl acetate, whereas by the acetylization of the original oil the calculation of the menthol would be based upon the presumption that all the combined menthol is present in the form of acetate.

The U.S.P. finds, however, no objection against such a presumption in the first part of the assay process, and the author thinks it would be advisable to maintain the same also in the second part, as such a change of the process not only would eliminate the possibility of large errors, due to separation of menthol, but also considerably shorten the process.

Chemical Laboratory of Norwich
Pharmacal Company.

THE WORK OF THE AMERICAN MEDICAL ASSOCIATION, WITH SPECIAL REFERENCE TO THAT OF THE COUNCIL ON PHARMACY AND CHEMISTRY IN IMPROVING THE PRACTICE OF MEDICINE AND PHARMACY IN THE UNITED STATES.[1]

By C. S. N. Hallberg, Ph.G., M.D., Chicago.

RETROSPECTIVE.

When in the city of Philadelphia some forty years ago several pharmacists began exploiting the local physicians with some unusually elegant preparations, who could have dreamed that from this small beginning would evolve the modern manufactured pharmaceuticals.

These preparations were at first limited to a few elixirs, then included syrups and wines, and rapidly increased by the addition of dosage-forms until they finally comprised the entire gamut of therapeutic agents in every conceivable and inconceivable form. Their manufacture was originally confined to a few ambitious retail pharmacists, but was followed by some of the more enterprising old-time wholesale drug-houses and eventually by regularly established manufacturing chemists and even by some herb-collectors, such as the Shakers at Lebanon, N. Y. While educated pharmacists even at this early period regarded the exploitation of the physicians by these ready-made preparations as an encroachment on their prerogative and sometimes resented the idea that there was any necessity for them, there was no general opposition and they grew and multiplied.

THERAPEUTIC SACRIFICE.

It was often charged that some of these preparations could not be duplicated even in skilful hands from the purported formula, and that their medicinal strength was overstated so as to give rise to the oft repeated charge that their therapeutic value was often sacrificed for palatability and elegant appearance. The tendency toward these preparations was also largely promoted by the numerous specialties from France, where the "pharmacie elegance" had its inception and has always thrived and flourished.

These ready-made preparations were, however, not so objection-

[1] Read at the Philadelphia College of Pharmacy, April 21, 1908.

able, because they were, as a rule, fairly true to the alleged composition and were introduced under regular pharmaceutical titles which thus avoided mystery and largely disarmed criticism. One of the pioneer manufacturers affixed a label to his preparations containing a statement to the effect "that no proprietorship or exclusive right in its manufacture was claimed, only that the purest and best ingredients were used and that they were carefully and skilfully compounded."

EARLIER ADVANTAGES.

These preparations had thus the advantage of proclaiming in their titles their composition, which was of great convenience to the physician, and yet from their technical and often composite character such knowledge was not easily acquired by the laity and would have been still less so when latinized. They relied for their preference on being specified by the maker's name and, of course, as such were of great disadvantage to the pharmacist, who often was required to keep half a score of different brands of the same preparation on hand.

THE PIONEER SPECIALTY MANUFACTURER.

While a few proprietary preparations, such as "Iodo Bromide of Calcium Compound" and "Elixir Peruvian Bark and Protoxide of Iron" had appeared, it was not until about thirty years ago that a peripatetic preacher from North Carolina began in St. Louis to exploit the doctors with certain specialties which were in a category different from any former kind of medicines. He evidently appreciated that the medical practitioners at that time, especially in the great southwestern country, were not well prepared to write prescriptions, that qualified pharmacists were few and far between and furthermore that the character of the practice often required the doctor to carry medicine with him. So this genius, possibly with the aid of the editor of a certain medical journal which is the reputed sponsor for the products of this "chemists corporation," coined short euphonious and suggestive names for a number of preparations for which "brief" and interesting articles appeared.

THE JOURNAL COMBINATION.

These contributions to medical literature were originally from more or less prominent medical men of "the southwestern metrop-

olis," who appeared to have formed a syndicate for the promotion of clinical therapeutics, but eventually had to share their position with previously unknown "coming lights" of the profession, from such great centers of medical lore as Arkadelphia, Ark., Shreveport, La., and Coffeyville, Kan. As this kind of proprietary-medicine business grew because of the success made by this pioneer, medical journals sprang up at nearly every crossroads and with them developed a peculiar profession—the paid-for-article doctor. The members of this profession were chiefly distinguished by the characteristic that their names were unknown to medical literature until suddenly they burst in all their own effulgent glory in some communication to the "Medical Gold Brick," telling the credulous and unsuspecting doctor how to treat his patient by doping him with "Dopine," by sweating him with "Sweatine," by nerving him with "Nervine," and don't forget it—eliminate his uric acid with "Uricadine." He had solved the great problem. He had reduced the practice of medicine to a science—to an exact science. No groping in the dark—no experimentation; no chance of failure—everything cock-sure. If not satisfied, money back.

Pardon this last lapsus. This never appears in the doctor's learned communication, but in the advertising pages where the especial therapeutic, secernent and synergistic actions of the various wonderful discoveries are proclaimed.

Many of these prolific contributors have been gathered to their fathers, but they are by no means extinct and they exist in places where they would be least expected,—even in medical colleges. It is some satisfaction to know that their fame will not be lost; that they have all been carefully listed and tabulated and sometime in the near future posterity will know, how numerous were the species of Iscariots who sold their birthrights in the most noble profession for a mess of pottage.

POSING AS AUTHORITY.

The business of publishing a medical journal by a doctor, or a coterie of doctors, for the express purpose of "working" their colleagues with a line of proprietary medicines, became so common that one or more such journals were started often in places devoid of the least reason for the existence of such journals, except the editor's ambition and desire to make some money off his readers,

in the guise of a clinical authority. These journals, though having a nominal subscription price, were sent to selected lists of physicians in tributary territory so long as the results were satisfactory, and since they were entered in the post-offices as second-class matter at one cent per pound, they formed the cheapest and most effective kind of advertising. The doctor-proprietor usually hid his identity under aliases representing anonymous chemical companies; one such journal published in Connecticut masquerading as some different company for each of its specialties.

ANONYMOUS COMPANIES.

This "Wily" concern issues a quarterly devoted to the "Uric Acid Diathesis" and its control by a very ordinary effervescent salt sold at an extortionate price, which from being for the exclusive use of physicians has recently been distributed to the laity and the medical testimonials used to extol the wonderful virtues of the salt to the public. These journals are certainly not entitled to the reduced postage of second-class rates since the publishers are also owners of the medicines, which are constantly being extolled, not only in the advertising pages, but in "clinical notes" and "answers to correspondents" and sometimes in leading articles accompanied with the portraits of the distinguished author.

SWINDLING THE POST OFFICE DEPARTMENT.

Since one of these journals pays $6,000 a year postage instead of $48,000 as it should pay at the regular rates, investigation by the Post Office department would seem desirable. While some of these journals have retired during the past two years and others have consolidated, specimens of their kind may be found in the following places: Burlington, Vt.; Danbury, Conn.; New York, Philadelphia, Chicago, St. Louis, North Carolina, Wisconsin and Texas.

SOURCE OF MEDICAL INFORMATION.

Indulgence is asked for this extensive reference to medical journalism, but this subject is indissolubly connected with the discussion of the Proprietary Medicine Question. It brought the issue to the American Medical Association and led to the organization of the Council on Pharmacy and Chemistry as a consequence.

As pharmacists we may easily imagine the state of knowledge of medicines by a considerable portion, probably one-half of the practising physicians of this country, when the character of the literature is considered. Some of these medical publishers, always optimistic in the use of drugs, may also have been altruistic—actuated by motives other than purely mercenary and sordid—in extolling their special manufactures. But as manufacturers they were helpless, often down-right ignorant as to the chemical or pharmaceutic character of their preparations or their constituents. Relying mostly on some manufacturing pharmacist for their preparations, they were often at the mercy of those who, becoming aware of their lack of knowledge, imposed on them to the disadvantage of the medicines. In several well-known specialties from such proprietors the composition has been changed without change in the formula, until attention thereto was directed. Important ingredients have been omitted and others substituted with perfect abandon, without changing the formula or the literature, and upon the correctness of the latter being challenged, such change or substitution has been frankly, sometimes naïvely, admitted as being of no special importance or consequence. One of these medicine-manufacturing publishers, who is exploiting doctors with a line of quack specialties and with unloading on the credulous readers of his journal, self-perpetuating, gold-bearing bonds of the company, and who poses as a great authority on alkaloids, is continuously waging relentless war on the uncertain, instable and unsafe galenicals, and insists that every doctor should employ active principles, and of course these only in the form of this company's tablets.

REAL SUBSTITUTION.

Among these are found tablets of digitalin as a perfect substitute for digitalis; cicutine for conium and aconitine for aconite, which, at least until recently, was not the official alkaloid, the only dependable substitute for this drug. Tablets of veratrin are extolled to the doctors as far more certain than veratrum, the tincture of which is the cardiac sheet-anchor to the physicians, especially in the South—this great alkaloidal exponent being apparently perfectly oblivious to the fact that veratrin is not the active principle of veratrum viride, but an indefinite mixture of principles from the cevadilla seed, whose only therapeutic use is an irritant externally, applied as an ointment or oleate, and popularly used as a parasiticide.

These few examples indicate the very serious condition caused by these doctor-publishers and suggests that the attention of the medical profession be directed to this perversion of the literature and also that the privilege of second class mail rates, through which the Post-Office department is robbed of many thousands of dollars annually, be denied these publications.

Without this privilege these journals could not exist.

STATE ASSOCIATION JOURNALS.

There are now nearly a score of journals published by State medical societies, and the number is steadily increasing. It is hoped that in the near future every State medical society will have its own journal, or that the smaller societies jointly publish an official organ. This will drive out the undesirable class of journals referred to, and since these State journals are responsive to their State medical societies, it will be comparatively easy to keep their pages clean and accept advertisements for medicinal articles only that have been approved by the Council.

To maintain these journals is, however, difficult, since limited in advertisements they often cannot secure sufficient acceptable advertising to pay expense of publication, and since the journals must not be too much of a drain on the revenues derived from dues, their continuance is often a difficult problem for solution. This embarassing situation might be relieved if local pharmacists, or possibly societies, could extend some patronage in this direction.

MEDICAL CURRICULA.

Another agency which must be aligned for co-operation in this work is the instruction in the fundamental branches in the medical schools. This will require not only that the courses be extended to cover more practical work under personal instruction, but that more time be devoted and that the construction of prescriptions be done in the last year of the course instead of the first, as has been the case. The methods of the dispensaries and hospitals and the training of internes must also be radically changed. As now conducted in most institutions it is simply a drilling into the habit of designating numerical mixtures, often without intelligent discrimination; a sort of picking the winner and trusting to chance.

THE COUNCIL ON PHARMACY AND CHEMISTRY.

The Council on Pharmacy and Chemistry has now been actively at work a little over three years, although considerable preliminary work was done principally through the Section on Pharmacology and Therapeutics of the American Medical Association.

Loading up the medical journals with advertisements for all kinds of quack nostrums irritated the better informed physicians and caused them to protest, which found vent in the Section. Year after year the subject of nostrums was discussed in its various phases and resolutions adopted by the Section, until finally the trustees of the American Medical Association arranged for the formation of the Council, and began to prepare to throw out all advertising not acceptable. While the work does not make a formidable showing it nevertheless has done wonders in these few years and has entirely changed the attitude of the medical profession to proprietary medicine. The physicians, as far as their societies and authorities are concerned, are committed to the reform of the Materia Medica.

The first public utterance after publication of the announcement containing the rules, etc., was the report of the analyses of the acetanilide mixtures. In this was nothing new; only what every pharmacist knew.

THE FIRST REVELATION.

But it was startling information to the physicians. Having occasion to cross the continent to attend the meeting of the A.M.A. in Portland, Ore., shortly after this article had appeared in the *Journal* and thus meeting a great many medical men, the expose proving these wonderful synthetic coal-tar derivatives to be nothing but cheap acetanilide mixtures with alkalies, was the general theme of conversation and was actually startling in its effect on the doctors. They felt that they were the victims of misplaced confidence, that they had been swindled, and that possibly they had been the innocent cause of their patients' sufferings.

STARTLING CONDITION.

From this time on many similar articles were examined and proved to be, instead of definite compounds, produced by intricate reaction or synthesized product possessing new and often marvelous therapeutic properties, simple mixtures of well-known substances without any special value.

Similarly many articles were reported to be materially different from the alleged formula, the maker sometimes frankly admitting that the formula had been changed for the better, while others refused to acknowledge the error, simply because of ignorance as to the difference in the action of the constituents. Others as laymen not having the remotest idea—pharmaceutical, medical or ethical—simply refused to explain, believing that the formula was their property with which they could "do as they pleased."

APPALLING MENDACITY.

The false therapeutic claims and dishonest methods of exploitation also came in for their share of attention. Thus the fat-free cod liver preparations—the petroleum emulsions, the hyoscine-morphine-cactin combination, etc., were dissected and their shallow pretense of therapeutic virtues exposed. The startling disclosures of the methods employed to sophisticate scientific government reports in order to boost a certain preparation, which, after having served as an ordinary "Frauen Medizin" in Germany, had been brought over to this country to be pushed on to the medical profession as an exclusive product, proved a shock to many physicians, especially since it was discovered that the wonderful preparation was actually inferior to Blaud's pill.

THE WORK OF THE COUNCIL.

Some 300 articles have been accepted by the Council and admitted to the book, "New and Non-Official Remedies." Many more have been examined, but only such are reported as have been found to be entirely false in composition or for which absolutely unwarranted statement concerning therapeutic properties have been made. Former efforts for reformation in this direction have been made sporadically only to fail because of some criticism appearing, which either could not be proved beyond peradventure or could not be completely substantiated when challenged. The work of the Council has been successful largely because no statement concerning any article has ever been made that could not stand the most rigid scrutiny.

Nearly one-half the articles accepted are foreign, mostly German, manufacture, the remainder being fairly representative of the principal American houses.

NO RECOMMENDATION.

It should be remembered that acceptance of these articles by the Council and their publication in the New and Non-Official Remedies, and monthly in the *Journal of the American Medical Association*, does not carry with it any recommendation; simply that they conform to the rules adopted by the Council to govern the selection of such proprietary articles as physicians may be safe in using and therefore eligible to advertising in medical journals.

In brief, the articles must be true to the composition alleged and no unwarranted therapeutic claims be made for them. The Council would not assume, even were it practicable, to pass judgment on their therapeutic value or clinical efficiency. This is the physician's prerogative with which he can allow no interference.

All he wants to know is that the maker states the truth concerning his products.

FORMER EFFORTS.

At the appearance of every revised edition of the U.S.P., as well as the N.F., there have been more or less efforts directed toward securing physicians' attention to these works, that they may accept the pharmaceutical preparations therein contained and give them preference over the proprietary articles. These efforts have been largely futile because there was no general sentiment among the physicians suggesting its desirability and no awakening to the turpidity of the proprietary medicines.

Now it is different.

With the entire medical profession aware of its perilous position, should the exploitation by the proprietary interests be permitted to continue, with the medical societies and their journals alive to the issue, with the recognition by their authorities that the official preparations to which they have themselves contributed, are equal if not superior to proprietary articles, there is an entirely different feeling, and here is the opportunity for the pharmacist.

JOINT MEETINGS, ETC.

The effects are already apparent. In the larger cities where the movement has been longest in progress there is already a marked falling off in the prescription of proprietaries and a correspondi ng

increase in the preparations of the U.S.P. and the N. F. Meetings are being held jointly with the physicians for the discussion of this and related questions. This of itself cannot fail to be of mutual advantage, since bringing the pharmacist and physician together will result in better understanding and appreciation of each. In Chicago five such meetings have been held during the past two months, in which pharmacists have read papers, participated in the discussions and sometime, exhibited preparations of the U.S.P and N.F. Such a thing was unheard of only a few years ago and not thought possible, until the branches were organized of the American Pharmaceutical Association.

The physicians seem to show the right spirit, and while not always mincing words in speaking of the unprofessional practices of some druggists, such as counter prescribing, substituting and pushing patent medicines, as a rule will patiently "take their medicine" when told of their shortcomings, such as self-dispensing, prescribing proprietaries and forcing multiplication of identical articles. The pharmacists in smaller places may secure at nominal cost the literature prepared by A.M.A. for distribution to physicians and by showing their own make of the official preparation, do equally as well as in the cities. See

"New and Non-Official Remedies."

"A Propaganda for Reform in Proprietary Medicines."

The greatest difficulty lies in having the physicians realize that the use of short, euphonious names for medicines is simply inviting lay self-medication. They should constantly be impressed with the danger of using such names as are designed for patent medicines. No physician should patronize any medicinal article which has not a scientific pharmaceutic, preferably Latin, title.

The public is now using scores of these proprietaries which they would not have become acquainted with if they had Latin titles. Liquor ferri peptonati cum mangano would not be sold on bargain counters, nor would they now be calling for aspirin if it had been prescribed as acidum aceto-salicylicum. The excuse that the physicians cannot learn or remember these names is apocryphal. How can they remember the names of the bones of the body or the names of some new diseases such as trypanosomiases? The official titles must be insisted on and no pharmacist should encourage their abbreviation or simplification. All persons engaged in any scientific

pursuit must learn the technical terms that constitute its language.

We should also observe strict compliance with the pharmaceutical nomenclature, *i. e.*, that when a preparation can be classified with any official class it should bear the class-name in the title. Dosage-forms are being pushed with a simple name when they should be designated pilulae, capsulae, etc.

Matters of this kind are suitable subjects for discussions at these joint meetings, which may result in agreements. Thus the Chicago joint meetings have discussed the prescription and several have already adopted this declaration on the subject.

DECLARATION ON THE PRESCRIPTION.

First. The prescription is an utterance of the prescriber who alone should direct and control its employment. It should, whenever practicable, carry the name of the patient, the age in years, if a minor, and the date when written.

Second. The pharmacist who prepares the medicine should retain the prescription as reference for his services and as record for a certain limited period, not less than five years, for the protection of the prescriber, himself and the patient.

Third. The medicine prescribed should be supplied not more than once on the same prescription: (1) If ordered by the prescriber "not to be repeated" (N. rep.); (2) if containing medicinal substances commonly called narcotic or habit-forming drugs; (3) if called for by some person known not to be the original holder.

Fourth. Copy of the prescription may be furnished and should be written on an especial blank, containing a declaration that it is a copy of a prescription which has been delivered to the original holder and is not to be refilled except on order of the prescriber. The copy is made without recourse to possible error.

Since many physicians have quit writing prescriptions because they cannot control them, this declaration has been formulated by a joint committee of the Chicago Medical Society and the Chicago Branch of the American Pharmaceutical Association.

It has already been adopted by one-half of the branch medical societies in Chicago, and it is believed, when generally observed by pharmacists, it will be instrumental in causing physicians to resume writing prescriptions more generally.

There is nothing new or radical in the requirements—nothing but that every reputable pharmacist will agree to. A definite expression like this is deemed necessary that all concerned may understand their position to the prescription and to each other, and to give the pharmacists who so desire, the authority and the opportunity to align with the profession. Similarly many subjects may be considered at these joint meetings and eventually be formulated in declarations to guide the relations of the pharmacist and the physician and, it is hoped also, the public.

COMING INTO HIS OWN.

With the fulfilment of such a programme the pharmacist will soon come into his own. For years our institutions, like this old Philadelphia College of Pharmacy, with a record of nigh on to a century, have been sending out thousands of youths—trained in the preparations of pharmaceuticals, qualified for the compounding of medicines—to do what? To practise pharmacy—hardly. The encroachment of the proprietary medicine men left but little of the practice. Now it is going to be different.

With the medical profession earnestly, actively interested in this movement, with the impetus given to our great works—the U.S.P. and the N.F.—by the Federal Act, with the branches of the American Pharmaceutical Association aggressively at work in the principal cities, the reformation is now progressing.

THE REFORMATION.

And it is high time for the alignment of the two professions of medicine and pharmacy. The public has lost faith in medicine and has been doing without either physician or pharmacist. The layman has discovered that he can buy patent medicines without paying a physician a fee for recommending them. Many of them have tried all the principal proprietary pharmaceuticals, even synthetics. From these they have fallen victims to the regular patent medicine literature of the press and sometimes the symptom-questions-list of the advertising quack.

They have thus by natural evolution or selection graduated from Osteopathy to Hypnotism, Dowieism, Eddyism, and through every imaginable fad, fake or faith cure.

The public has run the gamut and is ready for a change.

There is an inherent feeling or instinct in the average human being that chemical therapeutics is after all the safest and most certain to remedy ills or to cure disease.

It is believed that now is the psychologic moment.

THE RESTORATION.

Let us then join the medical profession in placing the materia medica on a safe basis and perfect our great medicinal standards for the promotion of our professions and the restoration of public confidence in our practices.

The pharmacist, always accessible and in contact with the public, should be the medium through which this confidence may be restored into humanity's greatest friend—the physician—let him figuratively give the public the glad hand.

Let pharmacy assume its traditional position as a handmaiden to medicine as symbolized in the historical figure of virile old Esculapius, ever ready to combat disease with the aid of the poison pressed from the serpent's fangs by Hygeia—the goddess of Health—the symbol of pharmacy.

NOTE ON THE DISINTEGRATION OF TABLETS.[1]

By George M. Beringer, Jr.

Some time ago the writer had occasion to prepare tablets containing one grain of arecoline hydrobromide for veterinary hypodermatic use. To each of these, two grains of sodium chloride was added. This addition served the purpose of both diluent and lubricant, and the tablets were so furnished on several occasions. It became necessary, however, to prepare them on a very damp day and 10 per cent. of powdered boric acid was added to overcome a slight adhesion to the die and punches of the tablet machine. The veterinarian, for whom they were prepared, volunteered the information that these were better than usual, and went to pieces almost immediately on being dropped into water. Since the arecoline and the salt are both very soluble in water, the increased rapidity of

[1] Presented at the thirty-eighth annual meeting of the New Jersey Pharmaceutical Association at Atlantic City, N. J., June 3, 1908.

disintegration could only be attributed to the boric acid, although that is, by comparison, almost insoluble.

At another time, tablets of ammonium chloride were being prepared. While this salt usually requires no lubricant, the weather was exceedingly damp, and it became necessary to add a small percentage of talcum to overcome sticking. A test of these tablets made on the same machine, without readjustment, before and after adding the talcum, showed the latter to be quicker in breaking down.

In the above cases the additions of material have been of a more or less insoluble substance to a soluble substance forming the body of the tablet, but the reverse gives the same result. A veterinary tablet of arsenic trioxide one grain with cane sugar one grain, disintegrates, so rapidly when dropped into warm water that observers have declared it to be made of an effervescent base. A tablet containing two grains of cane sugar only, dissolves but slowly. Quinine sulphate with 25 per cent. cane sugar gives the same result, although neither quinine sulphate nor sugar alone disintegrates so rapidly. Tablets of the basic bismuth salts made with the addition of 20 per cent. of cane sugar fairly "fly to pieces" when dropped into warm water. This also is true of tablets each containing

Bismuth subnitrate	1 grain.
Cerium oxalate	½ "
Milk sugar	½ "

Although milk sugar is distinctly less soluble than the cane sugar used in the plain bismuth tablets. Perhaps the most striking example of rapid disintegration, where least expected, is in a tablet containing

Reduced iron	2 grains.
Quinine sulphate	1 grain.
Arsenic trioxide	$\frac{1}{50}$ "

when granulated with syrup, yet none of the ingredients is noted for ready solubility in water.

The cases cited and numerous others lead to the inference that a more or less fixed rule applies in all cases where a tablet is composed of two or more ingredients; namely, that, other things being equal, *the rapidity of disintegration of a tablet varies directly with the difference in solubility of the ingredients.* The reason for this is obvious. The more soluble particles being first attacked by the

solvent, a sort of "honey-combing" effect is produced, and the cohesion of the less soluble portions being destroyed as well as more surface exposed to the solvent, the tablet falls rapidly to pieces. While some of the facts in connection with this have been observed, the rule does not appear to have been specifically stated, and hence it is deemed worthy of recording.

BOOK REVIEWS.

PRACTICAL PHARMACY. A Description of the Machinery, Appliances and Methods Employed in the Preparation of Galenicals, with an Account of Pharmaceutical Testing and the Assay of Crude and Manufactured Drugs, together with a Short Treatise on the Art of Dispensing. By E. W. Lucas, F.I.C., F.C.S. Second Edition. 423 pages, cloth, $5. Publishers, London: J. & A. Churchill. Philadelphia: American Agents, P. Blakiston's Son & Co.

The second edition of this English work on pharmacy is before us, enlarged and largely rewritten. It is a compact volume of 423 pages, neatly printed and bound, and the descriptive text is helped by 224 illustrations, many of which are electrotypes of special apparatus manufactured in England, Germany and the United States.

The subject matter is divided into five distinct parts under the titles: I—General Processes and Description of Apparatus; II—Pharmacopœial Preparations; III—Assaying and Testing; IV—Dispensing; V—Tests and Tables. These are subdivided into fifty-nine chapters, each treating of a special subject or class of pharmaceutical preparations.

In studying this volume, the reader is impressed with the fact that the author's view of pharmacy, as exhibited herein, is mainly from the laboratory, and the preparation and testing of drugs has received the major consideration, while the dual duty of the apothecary, the "Art of Dispensing," has received rather scant consideration in Part IV, devoted to Dispensing, and covering only sixty-eight pages. Yet, throughout the other parts of the book, the observant pharmacist will find numerous hints that will be of great assistance at the dispensing counter. Not the least of these is the extensive list of synonyms included with the tables.

Each chapter treats of its special subject in the most concise manner, and these are in the main really commentaries on the subject as treated in the British Pharmacopœia. In some respects these chapters are models of condensed treatment, but occasionally their conciseness is rather disappointing. The entire subject of Collodions is treated in Chapter XXI, just thirteen lines in length. Plasters are considered in one and one-half pages; and compressed tablets a subject that to-day necessarily occupies a large portion of the attention of the pharmaceutical manufacturers, is briefly considered in five pages.

The chapters on Specific Gravity and Percolation are illustrations of concise treatment of pharmaceutical processes, and another subject well treated in the limited space is Ethylic Alcohol, in Chapter XI, where convenient rules for the various alcohol conversions are given. In the table of strength of alcohol ordered in the different pharmacopœias on page 110, occurs one of the few errors noted in the volume. Here the author continues to quote the specifications of the U.S.P., 1890, for alcohol instead of those of the U.S.P., Eighth Revision.

Despite the terseness of the various monographs, the amount of information contained is remarkable. The author has succeeded in incorporating many original determinations and observations of a thoroughly practical character, and the numerous criticisms and suggestions are certainly very valuable. The practical and critical treatment of the classes of galenicals throughout the volume is illustrated by the exemplary chapters on ointments, tinctures and extracts. The chapter on tinctures, while condensed into eleven pages, contains, among other excellent features, the following that are especially praiseworthy: tables giving the average specific gravity, percentage of extractive and alcoholic content of each of the British Pharmacopœial tinctures; also, assay processes for those that can be standardized, accompanied by criticisms and suggestions for improvements; also, dosage tables for the more potent tinctures, and a valuable note on the "Deposits in Tinctures." In considering the extracts, the manipulation necessary to extract each drug is explained and the yield by the official process is stated. In the liquid extracts the specific gravity of each finished product, the percentage of extractive and the alcohol content by volume are given.

Part III, devoted to "Assaying and Testing," is a guide to the important methods of estimating the value of crude drugs, oils and preparations, well worth the careful study of the manufacturing pharmacist, who, under existing conditions, must devote more attention to this subject. Here, again, the author's experience enables him to offer criticisms and suggestions that add greatly to the value of this section.

Numerous original tabulations appear throughout the book, and in addition the volume is replete with reference tables that fill almost all of the needs of the pharmacist.

While this book is essentially an English work and written as a commentary on British pharmacy, and the British Pharmacopœia naturally receives almost exclusive consideration, it is nevertheless a work of distinct merit, adding to the general knowledge of pharmacy, and many of the comments and suggestions are alike applicable to the practice of pharmacy on this side of the Atlantic. It should find a place in the library of every manufacturing pharmacist and apothecary, and will well repay a careful perusal.

GEORGE M. BERINGER.

PRÉCIS DES OPÉRATIONS PHARMACEUTIQUES, a l'usage du Pharmacien et de l'Élève en Pharmacie. Par A. Astruc Docteur ès Sciences, Professeur Agrégé a l'École Supérieure de Pharmacie de Montpellier. Préface de M. le Professeur F. Jadin. Montpellier: Coulet et Fils, publishers.

This compact 8vo volume of 380 and viii pages constitutes, as its name indicates, a descriptive epitome or handbook of pharmaceutical operations.

As is claimed by the author, it is essentially practical and is designed to elucidate and describe the several pharmaceutical operations that are of frequent occurrence in the well-appointed laboratory.

The book is divided into two parts. The first part consists of a short preliminary chapter and a somewhat longer chapter, entitled "General Pharmaceutical Operations," relating principally to the weighing and measuring of medicinal substances.

The second part is descriptive of "Pharmaceutical Operations Proper," and contains, in addition to an interesting definition of what the author understands by the term, chapters on mechanical operations, physical operations, chemical operations and sterilization.

This part of the book is followed by an addendum containing an enumeration of the various forms of medicaments, an alphabetical table of the illustrations, which number upwards of two hundred, and an index.

The author defines pharmacy as the total of the knowledge, technical and scientific, that is essential for the preparation of medicaments.

Pharmacy, he asserts, is at the same time an art and a science. It is an art because of the practical and laborious apprenticeship that is required, and it is a science because its teachings and theories are derived from chemistry, natural history and physics.

Probation and study are the paths that must be followed by the student who is desirous of perfecting himself in this branch of the healing art.

Professor Jadin highly commends the book, in the introduction that serves as a preface, and very properly points out that while this little book may well be the constant companion of the apprentice or student, many pharmacists might also read it with profit.

Practically all of the several pharmaceutical operations, such as weighing, measuring, sifting, levigation, decantation, expression, straining, centrifugation, filtration, clarification, the various processes used for effecting comminution, emulsification, refrigeration, desiccation, evaporation, fusion, sublimation, distillation and crystallization are all enumerated and are described in a concise but readable manner.

Upwards of forty pages are devoted to a description of the several methods that may be used for sterilizing pharmaceutical preparations and utensils. Antisepsis and asepsis are thoroughly defined, their limitations pointed out and the general reasons for preferring asepsis are well illustrated.

The simple but efficient language that is used by the author throughout the book amply demonstrates his ability as a teacher. The book is to be recommended to teachers of pharmacy as an illustration of a concise method of presenting information regarding generally well-known processes. To students and pharmacists, on the other hand, the book will prove interesting as a review, not alone of pharmaceutical processes, but also of scholarly, concise French.

M. I. Wilbert.

THE CHICAGO MEETING OF THE AMERICAN MEDICAL ASSOCIATION.

The fifty-ninth annual session of the American Medical Association, held in Chicago, June 2–5, 1908, was by far the largest, and in many respects the most important, gathering of physicians that has ever taken place in this country.

The total registration of members, 6,446, while large, does not fully represent the actual attendance, as many of the members from nearby cities and towns did not take the time to register and a very large number of physicians, not members of the Association, were present as guests.

The meetings of the several sections were uniformly well attended, and the interest that was manifested on all sides indicated that the communications that were presented, were considered to be of a relatively high order of merit.

There are many reasons why the 1908 meeting of the American Medical Association will be considered as having been a phenomenal one, and one that will do much to mark real progress in matters medical.

Meetings of this kind are usually dominated by some one theme or subject, and to this the Chicago meeting was no exception. The problems most frequently discussed all appeared to bear directly or indirectly on the need for educating the public in matters medical. This need for properly instructing the people in matters relating to the public health was referred to at some length by the President in his address, was the fundamental basis of discussion in the oration on medicine, was freely discussed in the House of Delegates, and was frequently suggested in papers that were presented to one or the other of the many sections. Everywhere it was evident that the present-day medical man believes that physicians should be recognized as the guardians of the public health, and that they should do all in their power to promote the development of hygiene and sanitation for the purpose of preventing disease. To one interested in the development of the physical welfare of the people, the Chicago meeting of the American Medical Association was indeed an inspiration, and the ultimate effects of the meeting will certainly be far-reaching.

As in former years, pharmacy and matters pharmaceutical were

given considerable attention. President Bryant, in his farewell address to the House of Delegates, frankly discussed a number of the abuses that have been shown to exist. He warmly commended the work so far accomplished by the Council on Pharmacy and Chemistry, and condemned, in unmistakable terms, the attempts that have been made to throw discredit on the work or its object.

Dr. J. N. McCormack, in his report as Chairman of the Committee on Organization, referred at some length to the meeting of the American Pharmaceutical Association, in New York, last September, and to the opposition that had been aroused by his address to that body. He expressed the belief that all the better class of pharmacists were willing and anxious to conduct their business with an honest regard for the public welfare, and that these men should receive the co-operation and support of medical practitioners. He also expressed the belief that the creation of a strong conference committee, representing the American Medical Association and the American Pharmaceutical Association, could do much to eliminate misunderstandings and to nullify the repeated misstatements that are now being made by interested parties.

At a subsequent meeting of the House of Delegates, Dr. Lewis S. McMurtry offered the following resolution:

"*Resolved*, that in accordance with the recommendation of the Committee on Organization, the President is requested to appoint a committee of three members to confer with a like committee to be appointed by the American Pharmaceutical Association, in regard to drug reforms, a return to scientific prescription writing and other matters of material interest to these two associations."

On motion of Dr. Philip Mills Jones, of California, this resolution was adopted and the American Medical Association placed on record as being willing and anxious to foster truth and honesty in matters relating to pharmacy.

The sessions of the Section on Pharmacology and Therapeutics were of more than ordinary interest to members of the pharmaceutical profession. In common with all of the other sections, the meetings were unusually well attended and the readers of papers, generally, had the satisfaction of having their contributions liberally discussed.

The address of the Chairman was an illuminating discourse on

simplicity in prescribing, and included a strong plea for discouraging the use of all fixed formulas in the treatment of disease.

Prof. Jos. P. Remington, as Chairman of the Delegation from the American Pharmaceutical Association, presented the greetings of that organization and briefly outlined the present situation of pharmacy in its relation to medicine.

Prof. C. S. N. Hallberg, the Secretary of the Section, presented an unusually interesting report, in which he reviewed the present-day status of so-called "patent medicines." He also directed attention to the all too flagrant abuses of the letter as well as the spirit of the laws regulating second-class postal rates, and advised that the post office authorities be requested to rescind these privileges in the case of publications carrying fraudulent medical advertisements.

The liberal discussion that was evoked by the several communications bearing on the Pharmacopœia and the National Formulary was particularly interesting in that it evidenced a marked reawakening on the part of physicians in matters relating to our National standards.

A paper read by Dr. O. T. Osborne on "The Sufficiency of the Official Drugs and Preparations" precipitated an unusually lively discussion that evidenced the need for differentiating, somewhat sharply, between pharmacists and drug sellers.

The concluding meeting of the Section was devoted entirely to a Symposium on the Pharmacopœia and the National Formulary. Dr. Torald Sollman, Dr. James M. Anders, Dr. H. W. Wiley, Dr. C. F. Wahrer and Prof. H. Vin Arny had prepared papers, and these were read either by the authors themselves or their representatives.

The discussion on these several papers was opened by Prof. Joseph P. Remington, the Chairman of the Committee on Revision of the U.S.P., and was continued by a number of the members present.

Dr. Reid Hunt, as Chairman of the Committee of the American Medical Association, on the Revision of the Pharmacopœia, announced that this committee had been organized and that the members would be in position to proceed with routine work in the very near future.

Throughout the discussion it was evident that physicians were intensely interested in matters relating to the Pharmacopœia, and that in the near future they will be much better able to judge of pharmaceutical products than ever before.

The pharmacologic action and the physiologic testing of drugs were freely discussed in papers on isopral, strophanthus, thyroid preparations, and, more particularly, in a paper on "Physiologic Assay of Some Commonly Used Drugs," by Drs. C. W. Edwards and George B. Roth, of Ann Arbor.

One meeting of the Section on Pharmacology and Therapeutics was devoted to a joint session with the Section on Hygiene and Sanitary Science, which included a symposium on the Prophylaxis of Communicable Diseases.

In the Exhibition Hall the chief attraction, to pharmacists, was the exhibition of U.S.P. and N.F. preparations by the Chicago branch of the American Pharmaceutical Association. This exhibit was advantageously placed with the scientific exhibits and attracted considerable attention. It included upwards of 150 different preparations, so that in variety and number it eclipsed the exhibit made by the Philadelphia Branch, at Atlantic City, last year.

Members of the Chicago Branch were in constant attendance to demonstrate the elegance of the preparations exhibited, to extol their virtues, and, incidentally, to distribute an interesting pamphlet of some thirty-two pages, entitled, "The Pharmacopœia and the National Formulary." This pamphlet, in addition to the enumeration of the composition and the uses of the preparations exhibited, contains much interesting information and is well worth careful perusal on the part of pharmacists as well as physicians.

Altogether, it is not unreasonable to prophesy that the fifty-ninth annual session of the American Medical Association will mark for pharmacy, as it surely has marked for medicine, a very decided step forward. It would indeed be preposterous to suppose that the varied activities of the American Medical Association, evidenced in its Council on Medical Education, its Council on Pharmacy and Chemistry, its Committee on Legislation, its Board of Public Instruction and its Committee on the Revision of the United States Pharmacopœia could be continued without influencing, in no unmistakable way, the development or the progress of pharmacy in this country.

While the American Medical Association has already accomplished much, it bids fair to be but at the beginning of its possible usefulness, and certainly pharmacists should be interested in these possibilities, and see to it that their own profession and their own associations do not lag too far in the rear. M. I. WILBERT.

THE AMERICAN THERAPEUTIC SOCIETY.

The ninth annual meeting of the American Therapeutic Society, which was held in Philadelphia, May 7th to 9th inclusive, was of more than ordinary interest to the pharmacists of this country, in that matters pharmaceutic were given an unusual amount of consideration.

One of the more interesting sessions of the Society was devoted to a joint meeting with the Philadelphia Branch of the American Pharmaceutical Association, and members of the latter organization, on invitation, attended all of the several sessions of the Therapeutic Society and took an active interest on at least several different occasions.

On the afternoon of the first day, a symposium on the United States Pharmacopœia and the National Formulary was contributed to by: Dr. James M. Anders, who read a paper, entitled "The Pharmacopœia from the Physician's Standpoint;" Mr. H. C. Blair, Ph.G., who read a paper on "The United States Pharmacopœia and National Formulary as Standards for Physicians and Pharmacists," and Mr. M. I. Wilbert, who discussed some of the problems bearing on "The Preparations of the United States Pharmacopœia and National Formulary."

At the joint meeting of the American Therapeutic Society with the Philadelphia Branch of the American Pharmaceutical Association, an exhaustive and very interesting paper, by Dr. Chas. E. de M. Sajous, on "The Auto-Protective Resources of the Body: a New Foundation for Scientific Therapeutics," was read. This interesting communication embodied suggestions for investigations along entirely new lines, and in it the author advances suggestions that may lead to the scientific or rational use of a number of remedies that are now used empirically. This communication was followed by a paper by Prof. Jos. P. Remington on "The United States Pharmacopœia, a Therapeutic Standard," in the course of which the author strongly urged the foundation of a Therapeutic Laboratory, to be devoted to the trying out or proving of the claims made in connection with either official or new remedies.

This suggestion was referred to the Council of the American Therapeutic Society, with a favorable recommendation for their further consideration.

The joint meeting was followed by a reception to the members of the American Therapeutic Society and their friends, by the Pharmacists of Philadelphia. The committee on arrangements consisted of Wm. L. Cliffe, A. T. Pollard, H. C. Blair, R. H. Lackey and O. W. Osterlund, all of them actively engaged in the retail drug business, and all prominent members of the Philadelphia Association of Retail Druggists.

The reception was given in the Clover Room of the Bellevue-Stratford Hotel, and was altogether a most enjoyable and most successful affair. Many of the physicians present expressed themselves as being delighted with the general arrangement for this pleasant social diversion, and the occasion cannot help but add force to the now very widespread tendency for a better understanding between the physician and the pharmacist.

Another of the more interesting features of the meeting was an exhibition of U.S.P. and N.F. preparations made by members of the Philadelphia Branch of the American Pharmaceutical Association.

This exhibition was critically examined by a number of the members and visitors who attended the several sessions of the society, and the several articles were generally commented on favorably by all.

In addition to some fifty U.S.P. and National Formulary preparations the members of the local branch also exhibited a number of dosage forms of compound acetanilide powder and of phenolphthalein. These dosage forms included solutions, granular effervescent powder, pills, capsules, tablet triturates, compressed tablets, lozenges and paper cachets, all made by the ordinary pharmacist. The suggestiveness of this particular portion of the exhibition was much appreciated and liberally commented on by a number of medical men who were present. M. I. W.

REPORT OF THE THIRTY-FIRST ANNUAL MEETING OF THE PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

By C. H. and M. R. LaWall.

The Thirty-first Annual Meeting of the Pennsylvania Pharmaceutical Association was held on June 23, 24 and 25, 1908, at Paxinosa Inn, which is situated on the top of Weygadt Mountain, just

outside of Easton, Pa. It was attended by the largest number of members seen at these meetings in recent years, various branches of the business and professional sides of pharmacy being represented by leading members.

On Tuesday, June 23d, at 3 P.M., President C. B. Lowe called the first session to order. The venerable secretary, Dr. J. A. Miller, having died since the last annual meeting, his duties were performed by Acting Secretary L. L. Walton, of Williamsport, who read the secretary's annual report, in which the acquisition of seventy-six new members was chronicled.

Owing to the absence of the treasurer, Mr. J. L. Lemberger, the reading of the treasurer's report was postponed, pending the arrival of the report by express.

The report of the Executive Committee was read by the chairman, Mr. L. L. Walton, and a statement was made regarding the growth of the Association during recent years, and the methods which have been employed to increase the membership. Acting Secretary Walton then read a communication from the N.A.R.D. regarding the propaganda work.

President Lowe appointed a Committee on Nominations, and also appointed a committee to draft resolutions upon the death of Dr. J. A. Miller, who had filled the position of secretary during the thirty years of the existence of the Association. The president then called attention to a movement against the reappointment of W. L. Cliffe as a member of the Pennsylvania State Examining Board, and the importance of impressing Governor Stuart of Pennsylvania with the necessity of continuing him in office. Upon motion, it was decided to draft a telegram to be sent to the Governor, officially expressing the sentiments of the Association in behalf of Mr. Cliffe.

President Lowe announced that the secretary of the Retail Druggists' Association of Easton had extended an invitation to the members and their wives to take a trolley ride around Easton on Wednesday at 2 P.M., and that the President of Lafayette College had also given an invitation to the members to visit that institution.

Acting Secretary Walton then called upon those delegates from other bodies for whom credentials had been regularly received. The National Wholesale Druggists' Association was represented by Dr. A. W. Miller, of Philadelphia. Mr. W. L. Cliffe, of Philadel-

phia, spoke in behalf of the A.Ph.A., and Mr. Walter Rothwell, of Hatboro, spoke for the Montgomery County Retail Druggists' Association. The Philadelphia Association of Retail Druggists was represented by F. M. Apple, of Philadelphia.

The Committee on Resolutions concerning the re-appointment of W. L. Cliffe then offered a report which was unanimously approved by a rising vote, and the secretary was instructed to telegraph the same in full to Governor Stuart.

Mr. J. W. England responded to the call for delegates in behalf of the Alumni Association of the Philadelphia College of Pharmacy. Mr. Charles Rehfuss, of Philadelphia, in speaking for the N.A.R.D., called attention to the expectations that the coming meeting in Atlantic City would be the largest in the history of that Association.

The President then read a congratulatory telegram from Dr. H. M. Whelpley, of St. Louis. The delegates from the P.P.A. to other bodies were then called upon. Mr. G. A. Gorgas stated that while he was a delegate to the New York Association, he was unable to attend, on account of the date of the meeting conflicting with that of the Pennsylvania Association. Dr. W. F. Horn, of Carlisle, reported having attended the meeting of the Maryland Association as a delegate from the Pennsylvania meeting. Mr. William L. Cliffe reported on behalf of the delegates to the Pennsylvania Medical Association at its annual meeting, held at Reading, Pa., in October, 1907. He stated that an exhibit had been made of the preparations of the U.S.P. and N.F., provided by members of the Philadelphia Branch of the A.Ph.A., and previously shown at the meeting of the American Medical Association at Atlantic City. This exhibit was in constant charge of the members of the committee, all of whom labored assiduously to further its objects. Mr. Cliffe stated that the exhibit had attracted great interest among the physicians in attendance at the convention, and that it was personally visited by a great number of the most prominent physicians in the State, who enrolled their names on its register. The Committee unanimously recommends the repetition of this method of representing the P.P.A. at this year's meeting of the State Medical Association. At the conclusion of this report, Mr. L. L. Walton stated that the P.P.A. had expended the money, and that the delegation had given freely of their time, and that the profitable end of this class of work had been particularly shown by the interest developed

among the physicians in his locality regarding the preparations which had been exhibited.

A paper was read by Prof. Joseph P. Remington, entitled "Redivivus." Mr. B. E. Pricthard then read a paper which had been loaned by Dr. J. C. Lange, Dean and Professor of Materia Medica of the Western Pennsylvania Medical College, entitled "Advertised Remedies and the Manufacturing Chemists and Pharmacists."

Mr. Joseph W. England read a paper, entitled "What of the Future of Medical Practice?"

A session was held on Tuesday evening, at which the Association was officially welcomed by the Mayor of Easton. The report of the Committee on Resolutions concerning the death of Dr. J. A. Miller was ready, but its official presentation was postponed until Wednesday at 11 A. M., when an opportunity would be afforded those members who wished to speak in behalf of the valuable services of the deceased secretary.

Mrs. W. E. Lee, of Philadelphia, replied in behalf of the ladies to the address of welcome by the Mayor of Easton. Dr. A. W. Miller replied on behalf of the Association itself. Mr. W. L. Cliffe, of Philadelphia, expressed his personal thanks for the action of the Association taken at the afternoon meeting in sending a telegram to Governor Stuart, and gave a short history of the work of the Board of Pharmacy as recently done, and stated that they were in a better position to do good work than ever before, as they now have the necessary funds, and that the Board might be considered as trustees for the protection of the public, working under the pharmacy laws.

Then followed the reading of the President's address, with Second Vice-President Croll Keller in the chair. Dr. Lowe, in his annual address, recommended that Dr. J. A. Miller's portrait and obituary notice be published in the forthcoming volume of the Proceedings of the Association, and that the resolutions that were to be presented be engrossed and framed and forwarded to the family of the deceased.

He commended the work of the Executive Committee, the voluminous and valuable report of the Committee on Adulterations, and the work of the Committee on Papers and Queries. He spoke highly of the work of the State Pharmaceutical Examining Board, and asked that the Committee on Legislation be instructed to draft a bill providing for the filling of vacancies on the State Board by

the Governor from a list of names submitted to him by the State Association.

He spoke briefly of the Pure Food and Drugs Act and of the Sherman Anti-Trust Law in its relation to pharmacy.

He recommended the renewal of the annual appropriation of twenty-five cents per member for all members in good standing on July 1st, to be paid to the N.A.R.D.

He commended the present efforts to increase the cordiality of the relations between the pharmaceutical and the medical professions, which are being made by the various committees on propaganda. He spoke of the necessity for a new and revised edition of the N.F., which had been given such great legal importance by the enactment of the Food and Drugs Act.

He also dwelt upon the increase of fraternal relations between the physicians and pharmacists. The question of shorter hours for clerks was discussed, with especial reference to Sunday closing hours.

The necessity for increasing the membership was also emphasized.

Then followed the President's reception, with dancing and refreshments.

The second official session of the Association was held on Wednesday morning, June 24, at 10.30. Mr. W. L. Cliffe presented the report of the Committee on Legislation in the absence of the chairman, J. C. Wallace, of New Castle, Pa. Mr. Cliffe reported that nothing of importance had occurred on account of there being no session of the Legislature since the last Association meeting.

The report of the Committee on Trade Interests was presented by Chairman Richard H. Lackey, of Philadelphia, who presented an excellent report, giving details regarding price fluctuations and trade conditions, interesting and valuable. This report was made up after extensive correspondence with leading wholesale and supply houses. It was referred to the Committee on Publication.

A very comprehensive and voluminous report was presented by Mr. C. E. Vanderkleed, chairman of the Committee on Adulterations. In order to economize time, he gave a synopsis of the report, abstracting portions here and there to give a general idea of its character. This report was made up by the committee after correspondence with various firms, and also with pharmacists who are

constantly testing their products. The report was discussed by Mr. F. M. Apple and Dr. Lowe, especially with reference to the purchasing of goods upon an absolute guarantee without further investigation of the character of the product.

Chairman LaWall, of the Committee on Papers and Queries, reported having in the neighborhood of fifty papers, of which more than half the authors were present. He announced that at the sessions for the reading of papers, a time limit would be established for the reading and discussion of the papers, and that preference would be given to those of which the authors were present at the meeting. He spoke of the added value of the Proceedings on account of the publication of these papers, and also of the standing gained by the Association by reason of the frequent publishing of the papers read at these meetings in the pharmaceutical journals, full credit always being given to the Association.

The report of the Committee on Botany was presented by Dr. A. W. Miller.

The report of Treasurer Lemberger was then read, which stated that all claims had been paid and that the Association still has a generous balance in the bank. There are about 800 open accounts, including the seventy new members added during the past year. The receipts from every source during the year amounted to $1,392.50. Unexpended balance at the present time amounts to $1,154.09. The report concluded with a touching tribute to Dr. J. A. Miller, the deceased secretary, who had always been referred to as "the yoke-fellow of the treasurer."

[*To be continued.*]

PHILADELPHIA COLLEGE OF PHARMACY.

MINUTES OF THE QUARTERLY MEETING, HELD JUNE 29, 1908.

The quarterly meeting of the members of the Philadelphia College of Pharmacy was held at 4 P.M. in the Library. In the absence of the president, the first vice-president, M. N. Kline, presided. The minutes of the annual meeting, held March 30, 1908, were read and approved. The minutes of the Board of Trustees for March 3d, April 7th, May 5th and 14th were read and approved.

The Committee on Membership reported several members who

were delinquent in paying the annual dues and were liable to have their membership forfeited. The matter was continued to the committee for further effort to secure payment.

A member called attention to the fact that a corresponding member elected some years ago had since removed to the United States. The by-laws of the college provide that no corresponding member shall continue as such after removing to the United States, but may be elected to active or associate membership. The subject was referred to the Committee on Membership for further correspondence.

A report of the delegates to the meeting of the New Jersey Pharmaceutical Association was made by the chairman, George M. Beringer, who stated that the program was replete with entertainments, papers, committee reports, etc.

The subject of legislation received considerable attention, as during the year there had been passed by the legislature a modification of the State Food and Drug Law enacted last year, and likewise a bill aimed to prevent the sale of narcotic drugs. The latter bill is not satisfactory to the drug interests, and at the next session of the legislature, it is hoped that a general anti-narcotic bill will be passed that will properly control the sales of all narcotic drugs. Professors LaWall and Cook, of the college, contributed interesting papers, and Prof. Henry Kraemer was elected an honorary member of the Association. The next meeting of the Association will be held at Lake Hopatcong.

The delegates to the Pennsylvania Pharmaceutical Association, through the chairman, Prof. C. B. Lowe, made an interesting verbal report.

Prof. Henry Kraemer, who had been appointed to represent the college at the commencement and installation of the new president of Pennsylvania State College, reported as follows: He stated that the universities and colleges of the State were well represented, and that the commencement exercises were very interesting. The address by Dr. Edwin E. Sparks, the newly elected president, on "The Economic Obligation of Public Education," showed the value of technical education, not only to the manufacturer, but to the State and the nation. Addresses were also made by Dr. A. C. Humphreys, president of Stevens Institute of Technology, and Dr. Paul Shorey, head of the department of Greek, the University

of Chicago. The annual address before the Phi Kappa Phi, on "Dr. Evan Pugh," by Prof. A. A. Breneman, of New York, was of special interest. Dr. Pugh was the first president of State College, and an eminent chemist, he having first conclusively proved that plants do not receive their nitrogen supply from the air.

Another feature that deserves mention was the impression made on the visitor by the students, whether at baseball, or at their entertainment, or in their college work. They seemed to be all-round men, well developed physically and well equipped mentally.

A pleasing feature of the exercises was the presence of General Beaver, who is chairman of the Board of Trustees of State College.

A very interesting discussion followed Professor Kraemer's report, which was participated in by Messrs. Hahn, Poley, Lowe, Sadtler, Wilbert and Kline.

The Historical Committee, by its chairman, George M. Beringer, presented, on behalf of Mr. Joseph Jacobs, of Atlanta, Georgia, some invoices of drugs bought during the Civil War.

Professor Kraemer submitted the names of five gentlemen for honorary membership, which, under the rules, lie over for action until the next meeting.

The following appointments were subsequently made by President French:

Delegates to the coming meeting of the American Pharmaceutical Association: Joseph P. Remington, Henry Kraemer, Samuel P. Sadtler, C. B. Lowe, and M. I. Wilbert; and as alternates, M. N. Kline, E. M. Boring, G. M. Beringer, W. L. Cliffe, and J. W. England.

Committee on Nominations: Jacob M. Baer, W. A. Rumsey, C. B. Lowe, F. X. Moerk and O. W. Osterlund.

Historical Committee: George M. Beringer, Henry Kraemer, Thomas S. Wiegand, M. I. Wilbert and J. M. Baer.

Committee on Necrology: Samuel P. Sadtler, Henry Kraemer and Gustavus Pile.

ABSTRACTS FROM MINUTES OF BOARD OF TRUSTEES.

March 3, 1908.—The Committee on Property reported that the new Pure Food and Drug Laboratory was nearly completed. The special Finance Committee reported a number of contributions for the new laboratory, special mention being made of the good work done

by the Women's Organization of the Philadelphia Association of Retail Druggists, to whom the thanks of the Board were extended.

The Historical Committee exhibited part of the display that was to be sent to Harrisburg.

New business.—Mr. French referred to Founders' Week to be celebrated in the Fall.

Samuel C. Henry was elected to active membership. Mr. Beringer called attention to the necessity for a case of medicines for use in emergencies and offered to supply the necessary medicines without charge.

April 7, 1908.—Mahlon N. Kline was elected chairman, George M. Beringer vice-chairman, and Jacob S. Beetem registrar for the ensuing year.

The standing committees for the year were appointed. Committee on Property reported the new laboratory building as practically completed.

The Committee on Appropriations submitted their estimate of the expenses for the coming year, and the Committee on Supplies submitted an estimate for the necessary supplies for the New Pure Food and Drug Laboratory.

The Committee on Announcement recommended that the College Announcement be issued hereafter as a bulletin or periodical, not less than four times a year, without advertisements. The advantages of this plan were freely discussed and the recommendation adopted.

The Special Finance Committee reported that additional contributions had been received for the new laboratory.

May 5, 1908.—Several recommendations in the annual report of the Curator, referred to the Board of Trustees, were respectively referred to the Committees on Property, Instruction, Museum and Herbarium, to report at a later meeting of the Board.

The Committee on Instruction submitted a lengthy report containing a number of recommendations, which, after being separately read and discussed, were adopted. The treasurer presented a report for the year ending April 30, 1908.

May 14, 1908.—An adjourned meeting was held to receive the report of the Committee on Examinations.

C. A. Weidemann, M.D.,
Recording Secretary.

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SEPTEMBER, 1908

NATURAL SALICYLATES.

By Dr. Geo. R. Pancoast and W. A. Pearson.

In a former report on "The Adulteration of Volatile Oils" (American Journal of Pharmacy, May 1908; *American Druggist*, April 27, 1908), the problem of the detection of synthetic methyl salicylate in admixtures of oils of birch and gaultheria was mentioned.

Since the so-called natural salicylates have met with such widespread favor as therapeutic agents, there has been a tendency on the part of a few unscrupulous distillers, dealers and drug merchants, to substitute the low-priced synthetic products. This tendency has more rapidly grown as there has been no accurate means of detecting the sophistication.

For some years chemists have endeavored to detect the presence of synthetic methyl salicylate when added to oil of birch or gaultheria, but, owing to the great similarity of these products, the task has been very laborious. All three of these products contain at least 99 per cent. of absolute methyl salicylate.

Oil of gaultheria also contains small quantities of a paraffin (triacontane $C_{30}H_{62}$?), an aldehyde or ketone, a secondary alcohol ($C_{30}H_{16}O$), and an ester ($C_{14}H_{24}O_2$) according to Power and Kleber The ester is possibly responsible for the optical rotation.

Oil of birch contains about 99·8 per cent. of methyl salicylate and in addition the same paraffin and ester, but not the alcohol.

Synthetic methyl salicylate contains probably ortho- and meta-

creosotic acids as its chief impurities, and to these a great deal of the ill effects is undoubtedly due.

It can be readily seen that the detection of admixtures is exceedingly difficult and several methods are here considered.

(*a*) By means of the differences in optical rotation. It is very improbable that any instrument could positively identify even 50 per cent. of oil of birch or methyl salicylate in oil of gaultheria. The very slight optical rotation could easily be adjusted by the addition of a very small amount of a strongly lævo-rotatory product.

(*b*) The bead test is of some importance in quickly forming an opinion as to whether sample is synthetic methyl salicylate. This test consists of violently shaking the container and noting the rapidity with which the foam disappears. Synthetic methyl salicylate produces a foam which rapidly disappears, while the foam from a natural oil has much more permanency. This test is not reliable, as small amounts of certain mixtures can be added which will produce the proper bead.

(*c*) Color Reactions. Many color reactions have been tried with more or less success. One which gave us distinguishing colors on samples known to be authentic, consists in treating one drop of the oil with two drops of hydrochloric acid and rapidly rotating in a small evaporating dish, add one drop of nitric acid and again rapidly rotate, then two drops of sulphuric acid and again rotate. Pure oils gave a yellow final color, while synthetic methyl salicylate gave a pink.

Another reaction which may prove advantageous with some modification, is the play of colors seen when a drop of the oil is treated with sulphuric acid containing one per cent. of formaldehyde.

(*d*) Physical Constants. The physical properties, such as specific gravity and boiling point, are not of much value in detecting methyl salicylate in oil of birch or gaultheria, although the United States Pharmacopœia requires synthetic methyl salicylate to have a higher specific gravity.

(*e*) Odor Tests. One of the best ways of identifying these products, and even their admixtures, is to educate the sense of smell. The three products each have a characteristic odor, which, while different in various samples, is yet quite prominent for each kind. Pure oil of gaultheria has a very heavy, not particularly strong, odor, but one which is quite persistent. Oil of birch has a sort of

peppery, woody odor, yet not so sharp as the synthetic methyl salicylate. Methyl salicylate has a rather sharp, even more agreeable, odor than the others. The difference in the odors can be more readily recognized by taking accurately 1 c. c. of each, and mixing with separate portions of 100 grammes of powdered sugar, or by dissolving 1 c.c. in 50 c.c. of alcohol and pouring into 1 liter of water. Another thing that should be noted is the relative turbidity of these mixtures. Synthetic methyl salicylate will usually become clear before either oil of birch or oil of wintergreen. These solutions may be diluted with a larger amount of water and the relative odor intensity of the very dilute solutions noted.

(*f*) Cone's Test. This test is of much value in passing on the quality of an oil. We believe it is reliable within certain limits if certain details are very carefully complied with. The test has been published in the AMERICAN JOURNAL OF PHARMACY, 1903, page 406.

Two stock solutions are required:

No. 1.

Caustic soda	320 c.c.
Water q. s.	4,000 c.c.

No. 2.

Hydrochloric acid	1,280 c.c.
Water	4,000 c.c.

Place 6 c.c. of the oil in a 500 c.c. round bottomed flask and add 25 c.c. of solution No. 1 and 25 c.c. of water. Boil till clear. Pour in 350 c.c. of hot water and bring to a boil. Now add 25 c.c. of solution No. 2 and boil for a few moments, then set aside in a moderately warm place, so that crystallization will be slow.

A pure oil will give the characteristic large, square-ended, laminar, opaque crystals which occupy comparatively little space. Methyl salicylate under same conditions will give fine, needle-shaped, voluminous, opaque, fluffy crystals, which occupy nearly all of the flask.

Mixtures of the pure oil with synthetic methyl salicylate give gradations between these extremes, and by making tests on admixtures of known strength, crystals from a given sample may be compared and an intelligent idea obtained of the proportion of adulteration.

Several trials should be made with each sample. We have found that certain details must be carefully watched; namely, having a

slight excess of oil after saponification is complete, also in not losing any hydrochloric acid by excessive ebullition while it is being added. All measurements must be made accurately. One indication of a genuine oil of birch, is the formation of a transient pink color when about half the hydrochloric acid has been added, also the characteristic woody odor at the same time. It is true that irregular results are sometimes met with, but no doubt they are often due to some little fault in manipulation.

(*g*) General. It has been suggested that the natural salicylates are more loosely combined, or have a different structural arrangement, than the synthetic product, and this may lead to a positive means of identification. The natural oils are undoubtedly formed from the decomposition of glucosides, by either water or ferments, or both, while the synthetic product is made in a very different manner. It would seem from their different action, that there was a more important factor than the small difference in composition would indicate. Physicians, as a rule, prefer the salicylates made from true oil of birch or gaultheria and are perfectly willing to pay the corresponding higher price, as many state positively that clinically salicylates from true oils give better results.

Another distinction of natural salicylates is that they are slippery when ground in a mill, while salicylates made from synthetic methyl salicylate are dry and irritating.

One of our main difficulties was in obtaining a supply of oils of birch and gaultheria for experimental work, that we were positive was authentic. We personally distilled some oil of gaultheria and obtained undoubtedly genuine oil of birch from several sources.

Oil of birch frequently comes to us of dark red color. This is supposed to indicate the genuineness of the sample, but frequently it is thus colored by the addition of a very small quantity of ferric chloride. A trace of tartaric acid will remove this color. Some samples are said to be colored with red sanders, but we were unable to color the oil by this means, as the coloring matter does not appear to be soluble in the oil.

We are indebted for much of the information here presented to many who, like ourselves, are anxious to solve the problem of the detection of spurious "Natural Salicylates."

Research Laboratory,
Smith, Kline & French Co., July, 1908.

SOME NEW WORK BY GORIS ON KOLA.

By A. R. L. Dohme.

Most of us who have worked on this once interesting drug have more or less lost interest in it, because the value of the drug appears to be more and more questioned, and, in consequence, less used in medicine. Perhaps this is due to the fact to be brought out in this paper, that fresh kola was preferred to the dried drug, as has been the case with numerous drugs in recent years. It is an open question whether, in most cases, the fresh drug has any advantages, and, if not, perhaps it has some disadvantages, as in case of kola, under the cured dry drug. The French Chemical Society offers annually prizes for the best researches in Industrial Chemistry, Organic Chemistry, Pharmaceutical Chemistry (two prizes, one for discovery of new products and one for discovery of new methods), Chemistry of Tanning, Chemistry of Wines, Spirits, etc. This year's prize for Pharmaceutical Chemistry (new products) was awarded to Mr. Goris, of the School of Pharmacy of Paris, for the discovery[1] that there exists in fresh kola nuts a crystalline tannin-containing substance, kolatine, which is combined chemically with caffeine, as kolatine-caffeine, an unstable body capable of decomposition into kolatine and caffeine by boiling with chloroform or water. Kolatine can only be made to advantage if the fresh nuts are sterilized at 110° C. in an autoclave before extraction, so as to kill all the ferments it contains, and which split up the constituents on curing, standing or drying. Kolatine is difficultly soluble in water, very soluble in methyl and ethyl alcohol, acetic acid and acetone, extremely little soluble in ether, and insoluble in benzine, chloroform or ligroin. It melts at 180° C. and with Fe_2Cl_6 gives an emerald green color, becoming red in adding NH_3 or caustic alkali, and violet on adding sodium carbonate. It reduces ammoniacal silver nitrate solution in the cold and Fehling's solution in the heat.

It precipitates lead acetate, potassium bichromate solutions and copper acetate, but not albumin. It does precipitate gelatin in concentrated solution, but the precipitate redissolves on heating.

Kolatine does not precipitate quinine salts, which shows its difference from Knox & Prescott's kolatannin, and which Goris claims is a

[1] Bulletin de la Société Chémique de France, July 20, 1908, page 814.

mixture of several tannin containing bodies, and not a pure substance. On adding a ferment, preferably an oxidase, to kolatine, this decomposes and precipitates the well-known kola-red as an amorphous red powder. This all indicates that kolatine is a body closely allied to the tannins and much resembles pyro-catechin in its reactions. It is unstable and hard to do much with in the research way. What is of moment, however, is that physiologically kolatine is the opposite of caffeine; both act on the heart and on the systolic energy of the same, but while caffeine accelerates the cardiac movements, kolatine diminishes them. This accounts for the fact that fresh kola nuts act so differently from dried or cured kola nuts, which do not contain any kolatine, and from which we obtain, hence, the full effect of the caffeine, whereas in fresh kola nuts the kolatine prevents the caffeine from producing its effect. Hence the use of fresh kola nuts and preparations of same is to be avoided, and preparations made from dried kola used in their place.

Baltimore, August, 1908.

SOME EARLY BOTANICAL AND HERB GARDENS.

By M. I. Wilbert,
Apothecary at the German Hospital.

Our ancestors of several centuries ago were much more dependent on the use of medicinal herbs, in the treatment of disease, than we are, and it is therefore reasonable to presume that the earliest experiments in the cultivation of medicinal plants in North America were made in connection with the kitchen gardens of the first settlers.

While the herbs used in cooking were probably tbe first that were introduced, it is well known that early in the seventeenth century the cultivation of hops had been experimented with in the Jamestown Colony.

In Massachusetts the cultivation of hops is said to have been well established as early as 1667, and it is quite probable that other European plants, furnishing useful drugs, were under cultivation even before this date.

That a number of the gardens of these early settlers were quite extensive, and could well lay claim to being more than kitchen gardens, would appear from the "History of West New Jersey," by

Gabriel Thomas, published in London, in 1698. In his description of Burlington, then the "chiefest town in that countrie," Thomas says: "There are many Faire and Great Brick Houses on the outside of the town which the Gentry have built there for their Countrey Houses, besides the great and stately Palace of John Tateham, Esq., which is pleasantly situated on the North side of the Town having a very fine and delightful Garden and Orchard adjoining to it, wherein is variety of fruits, herbs, and flowers; as Roses, Tulips, July-flowers, Sun-flowers (that open and shut as the Sun rises and sets, thence taking their name), Carnations and many more; besides abundance of Medicinal Roots, Herbs, Plants and Flowers found wild in the Fields."

The same author in "The History of Pensilvania," when speaking of Philadelphia, says: "There are fine and delightful Gardens and Orchards, in most part of this Country; but Edward Shippen (who lives near the Capital City) has an Orchard and Gardens adjoining to his Great House that equalizes (if not exceeds) any I have ever seen, having a very famous and pleasant Summer House erected in the middle of his extraordinary fine and large Garden abounding with Tulips, Pinks, Carnations, Roses (of several sorts), Lillies, not to mention those that grow wild in the fields."

Quite a famous Colonial garden, although of a somewhat later period, was that connected with the house built by Charles Norris in Philadelphia, about 1750. This garden is described by the annalist of the time as "a spot of elegance and floral beauty." It was "laid out in square parterres and beds, regularly intersected by gravelled and grass walks and alleys." It appears to have been plentifully stocked with flowers, vegetables and fruits of all kinds and also contained a liberal and varied supply of medicinal herbs. Watson, in his well known "Annals of Philadelphia," says: "It was an annual concern of the ladies of the family at Norris' gardens in Philadelphia to collect, dry and lay up various herbs for medicinal purposes, to be given away to the many who called for them."

Probably the first garden in this country to be devoted largely, if not entirely, to the cultivation and study of medicinal herbs and plants was that established in connection with the colony of Mystics or Pietists on the banks of the Wissahickon, near Philadelphia.

This is generally supposed to be the garden that is referred to in the poem, Bachellors' Hall, written about 1729, by George Webb,

an apprentice, to the printing trade, of Samuel Keimer, under Benjamin Franklin.

From the available records it appears that Webb had been an Oxford student, but by some misadventure had been brought to Pennsylvania, as a bound servant, and sold to Keimer shortly before the return of Benjamin Franklin from his first visit to London.

Webb says:

> "Close to the dome a garden shall be joined,
> A fit employment for a studious mind,
> In our vast woods, whatever simples grow,
> Whose virtues none, or none but Indians, know.
> Within the confines of this garden brought,
> To rise with added lustre shall be taught;
> Then culled with judgement each shall yield its juice,
> Saliferous balsam to the sick man's use;
> A longer date of life mankind shall boast,
> And death shall mourn her ancient empire lost."

The Pictist colony itself was comprised of religious ascetics and avowed celibates who had come to America to escape persecution and petty interference with their religious beliefs and practices.

The members were, as a rule, men of more than average intelligence and learning, particularly in their day, and many of them subsequently took an important part in the religious as well as the social development of the American Colonies.

After the death of their first leader, Johannes Kelpius, a number of the then members deserted the Colony and established themselves elsewhere. Among these early deserters was Christopher Witt, an Englishman, who had come to the Colony in 1704. This gifted, though in many respects eccentric physician and naturalist was born in Wiltshire, England, in 1674. He had evidently received a good classical education, and was also well versed in the natural sciences, and appears to have been a medical practitioner of more than average ability. Christopher Witt was a most versatile individual, who, in addition to being a student, scholar, naturalist and physician, was also a mechanician, magician, astronomer, astrologer, artist and alchemist, and he is said to have been most eccentric in his habits. It is little wonder, therefore, that he was able to impress his generally more simple-minded neighbors to such a degree that he was widely known, in Germantown and vicinity, as "Der Hexenmeister," or master of the witches. His advice was generally sought and observed, though his influence may have been feared.

Witt was, however, not the only naturalist in this colony of simple-minded, superstitious and easily impressed peasants from the Palatinate, in the early decades of the eighteenth century. His neighbor to the north was Daniel Pastorius, whose memory is so elegantly preserved by Whittier in the poem, "The Pennsylvania Pilgrim." Pastorius, like Witt, appears to have been a man of considerable learning and carried on correspondence with scholars and scientists in Europe, supplying them with information and specimens of American animals and plants. Tradition has it that the gardens of these two scholars adjoined and that there existed a friendly rivalry between them to secure the greatest number of novel or interesting plant specimens.

Of Pastorius, Whittier says that his teachers

> "Sought out their pupil, in this far-off nook
> To query with him of climatic change
> Of bird, beast, reptile in his forest range,
> Of flowers and fruits and simples new and strange.
> Pastorius answered all; while seed and root
> Sent from his new home, grew to flower and fruit
> Along the Rhine and at the Spessart's foot,
> While in return, the flowers his boyhood knew
> Smiled at his door, the same in form and hue,
> And on his vines the Rhenish clusters grew."

Christopher Witt, however, appears to have had the larger garden, and certainly had a wider range of acquaintances. He is known to have supplied a number of European correspondents with American seeds and plants. Witt's correspondence with European scientists extended over practically the whole of the first half of the eighteenth century, and in the earlier decades, at least, was quite extensive.

Among the better known of his correspondents was Peter Collinson, a London merchant and well-known naturalist of the eighteenth century. Collinson was born January 28, 1693–4 and died August 11, 1768, in the seventy-fifth year of his age. He is known to have had an extensive correspondence with the leading naturalists of Europe, and through him Witt became known to a large number of people who were interested in botany.

Among Collinson's American correspondents was James Logan, an associate and friend of William Penn, and one of the first Governors of the Province of Pennsylvania. James Logan was also inter-

ested in the cultivation of plants, and at his magnificent country seat, Stenton, near Philadelphia, he had extensive gardens and orchards. It is probably at Stenton that he made his well-known experiments with Indian corn or maize, the report of which was published by Gronovius and republished by Collinson in English.

Through his correspondence with James Logan, Peter Collinson became acquainted with John Bartram, the first native American botanist. Bartram was born near the village of Darby, in the Province of Pennsylvania, March 23, 1699. He died at Kingsessing, near Philadelphia, September 22, 1777.

John Bartram had an early inclination to the study of physic and surgery and acquired considerable knowledge and skill in the practice of the same. Although it is not positively known that he ever regularly engaged in the practice of medicine, his name is included in "The American Medical Biography," by Dr. James Thacher, published in Boston in 1828.

From the published correspondence between Peter Collinson and John Bartram it would appear that the latter was particularly interested in medicinal plants, both indigenous as well as imported. As early as 1738 he sent a quantity of ginseng to Peter Collinson, to be forwarded to China.

Under date of February 20, 1735, Peter Collinson wrote to his "Respected Friend, John Bartram:" "I have procured from my knowing friend Peter Miller, gardner to the Physic Garden at Chelsea, belonging to the Company of Apothecaries, sixty-nine sorts of curious seeds and some others of my own collecting."

In 1739, Bartram secured the seeds of Siberian rhubarb from Peter Collinson, who in turn had obtained them from Dr. Ammann, Professor of Botany at St. Petersburgh. Collinson was anxious that John Bartram give the cultivation and use of rhubarb a fair trial and wrote to him at some length regarding the cultivation of the plant. In 1770, Bartram secured through Benjamin Franklin, a quantity of the seed of "true rhubarb," which the latter had obtained from Mr. Inglish, "Who lately received a medal from the society of arts for propagating it." In answer to some inquiry by Bartram, relating to the origin of the seed, Benjamin Franklin wrote, under date of February 10, 1773, "It may be depended on that the rhubarb is the genuine sort, but to have the root in perfection it ought not to be taken out of the ground in less than seven years."

During the Colonial period there appear to have been a number of gardens in Virginia, of more than local reputation. In the autumn of 1737, John Bartram made an extensive tour through Maryland and Virginia, in the course of which he visited a number of these gardens. His subsequent report of this trip, to Peter Collinson, does not appear to have been sufficiently complete for his correspondent, who inquires: "I am informed my friend Custis is a very curious man; pray what didst thou see new in his garden? But I am told Colonel Byrd has the best garden in Virginia, and a pretty green house, well furnished with orange trees."

During this trip John Bartram visited the garden of John Clayton, an eminent botanist of Virginia and also a friend and correspondent of Peter Collinson. Clayton was born at Fulham, in the county of Kent, England, about 1685, and came to America with his father in 1705. He died in Virginia, December 15, 1773, in the eighty-eighth year of his age. In 1739, Gronovius, Professor of Botany at Leyden, published a "Flora Virginica," contributed by John Clayton. His name is also well known to all plant lovers through being associated with the well-known and widely admired "Claytonia Virginica."

Clayton appears to have had quite an extensive garden and had numerous correspondents in Europe, as well as in the Northern Colonies, who supplied him with new and interesting plants and seeds in exchange for the many and varied specimens that he was able to furnish them.

Another garden, of the Colonial period, that attracted considerable attention was that owned by Dr. Alexander Garden, at Charleston, S. C. Dr. Garden was a native of Scotland and a graduate of Edinburgh. He was a member of the Royal Society and devoted much time to the study of scientific subjects and to the cultivation of interesting and rare plants. In 1754 he wrote a description of a new plant, "Gardenia," and in 1764 published an account of the Spigelia Marylandica, or Carolina pink-root.

During the American Revolution Dr. Garden remained loyal to the British Government, in consequence whereof he suffered, not alone the loss of patients and friends, but also considerable loss of property.

Garden returned to England, about the close of the war, and lived for some time in London, where he died, April 15, 1791, in the sixty-second year of his age.

Another quite extensive and generally well-known garden, dating back to the Colonial period, was that of Humphrey Marshall, a cousin of John Bartram, at Marshallton, Pa.

Humphrey Marshall was born in West Bradford, Chester County, Pa., October 10, 1725, and died November 5, 1801. He was the eighth child of Abraham and Mary Hunt Marshall. At an early age he was apprenticed to a stone mason, which vocation he followed for a number of years. The garden at Marshallton was not founded until 1773, from which time Marshall appears to have devoted all of his time to the study of botany. In 1780 he began to prepare an account of the forest trees and shrubs of North America. This is said to have been the first truly indigenous botanical book published in this country and was the means of attracting to Marshallton a number of widely known botanists and scientists.

Frederick Pursh, in the preface to his "North American Flora," says: "I next visited the old-established gardens of Mr. Marshall, author of the small treatise on the forest trees of North America. This gentleman, though then far advanced in years, and deprived of his eyesight, conducted me personally through his collection of interesting trees and shrubs, pointing out many which were then new to me, which strongly proved his attachment and application to the science in former years, when his vigor of mind and eyesight were in full power."

Although Humphrey Marshall was primarily interested in trees and shrubs, his correspondence evidences the fact that he also experimented quite extensively with medicinal plants.

Dr. Thomas Bond, who appears to have had an extensive correspondence with French botanists, with whom he frequently exchanged plants and seeds, wrote to Humphrey Marshall, under date of August 24, 1781: "The opium you sent is pure and of good quality; I hope you will take care of the seed." Indicating that Marshall was among the first, in this country, to make satisfactory experiments in the growing of the opium poppy and the collection of opium.

Under date of October 21, 1787, Dr. Caspar Wistar, another noted medical practitioner of Philadelphia, wrote to Humphrey Marshall asking him for some leaves of foxglove, also some of the seed.

Withering's observations on the remarkable properties of digitalis

were, as yet, comparatively new, and the drug was attracting considerable attention abroad as a new remedy.

Letters from William Hamilton to Humphrey Marshall also contain requests for roots and seeds of medicinal plants. In one of these letters Hamilton asks for such well-known medicinal plants as Polygala Senega, Spigelia Marylandica, calycanthus and podophyllum.

The garden that had been established by William Hamilton, who was a retired Philadelphia merchant, was one of considerable pretension. It was connected with his elegant residence, the Woodlands, on the Schuylkill, near Philadelphia. This garden was, in later years, conducted by botanists of more than local reputation. The first of these, John Lyons, was a Scotchman by birth, and came to America about the beginning of the nineteenth century. While in charge of the garden at the Woodlands, Lyons had an extensive correspondence with botanists and gardeners in England and was instrumental in introducing a number of American plants into foreign gardens. Lyons died at Asheville, N. C., in 1818.

His successor, at the Woodlands, was Frederick Pursh, of German origin but born at Tobolsk, in Siberia, in 1774. He was educated at Dresden and came to America in 1799.

In 1807 Pursh was placed in charge of the Elgin Botanical Gardens in New York. He died in Montreal, Canada, June 11, 1820. His best known work was that done in connection with the collection of plants gathered by the Lewis and Clark expedition of 1804–1806, which forms a large and important portion of his description of the plants of North America, published in 1814.

Dr. Cadwalader Colden, one of the more prominent medical practitioners of the Colonial period, also devoted much of his leisure to the study of botany. He had quite an extensive correspondence on botanical subjects with the leading botanists of Europe.

Dr. Colden was born in Dunce, Scotland, February 17, 1688. He graduated from the academic department of the University of Edinburgh in 1705, and then studied medicine. He came to Philadelphia in 1710, and established himself in the practice of his profession, but returned to England in 1715, where he married a young lady of Scotch parentage, by the name of Christie, with whom he again returned to America in 1716.

About 1718 Dr. Colden removed from Philadelphia to New York,

where he at first practiced his profession, but subsequently occupied sundry public offices. He was appointed Lieutenant-Governor of New York in 1761, and continued in this capacity to the time of his death, September 28, 1776, in the sixty-ninth year of his age.

For many years Dr. Colden took an active interest in botany and appears to have devoted considerable time to the gathering and the cultivation of American plants. He had an extensive correspondence with a number of the leading botanists of Europe as well as America. He had a magnificent country seat at Coldenham on the Hudson, where many of his botanical experiments and observations were made. In his botanical studies he was ably assisted by his daughter, Jane Colden, who was also greatly interested in botany and was probably one of the first women in this country to take an active interest in the study of plants.

One other woman of the Colonial period, who deserves recognition for the work that she did in connection with botany, was Martha Logan, an early correspondent and friend of John Bartram. She was a daughter of Robert Daniel, of South Carolina, and married George Logan, in her fifteenth year. She died in 1779, in her seventy-seventh year.

Gotthilf Heinrich Ernst Mühlenberg, a son of Pastor Heinrich Melchior Mühlenberg, and a brother of the fighting pastor, General Peter Mühlenberg, was born in New Providence, Montgomery County, Pa., November 17, 1753, and died in Lancaster, Pa., on May 23, 1815.

Mühlenberg studied at Halle, and was one of the best informed and most systematic botanists of his day. He had a widespread correspondence with other botanists, particularly in Germany.

At an early date Mühlenberg devoted much of his spare time to the study of the medicinal properties of indigenous medicinal plants. It is said that he furnished Dr. Shöpf with numerous notes on the medicinal properties of American plants, which the latter used in his work on the American Materia Medica, but omitted to mention his source of information.

Mühlenberg appears to have had quite an extensive botanical library, and also a garden, for in a letter to his friend William Bartram he says: "May I ever expect to see you at my house? I have Edwards and Catesby, Jacquin, Gaertner deFructibus, and several other valuable works; likewise Wangenheim on the forest

trees of America, with figures which I would like to compare with you. My Herbarium vivum is pretty large, and would alone take a day to look attentively through."

The services of Mühlenberg have been recognized by several botanists. Schreiber, a close friend and a frequent correspondent of Mühlenberg's, gave his name to a genus of grasses while, Torrey and Gray have perpetuated it in connection with a goldenrod, Solidago Mühlenbergii. Barratt gave his name to a willow, Salix Mühlenbergii, and Grisebach to a centaury, Erythræa Mühlenbergii.

An interesting, though unpretentious, garden was that connected with the Moravian boys' school at Nazareth, Pa. This garden, or pleasure ground as it was sometimes called, was commenced shortly after the founding of the school, in 1759. It appears to have been cultivated by the teachers connected with the institution, and is generally recognized as having had considerable influence on the development of interest in botany and natural history in this country. After an existence of nearly a century it was allowed to fall into disuse, and at the present time there is barely a vestige of its original character still existing.

Among the earlier American botanists connected with this school were the Rev. Christian Denke and the Rev. Samuel Gottlieb Kramsch. The latter particularly was an ardent and ever active botanist and is known to have had correspondence with botanists at home as well as abroad. He was born in Rudolstadt, in Silesia, September 7, 1756, and came to America at an early age. He served for some time as a teacher at Nazareth Hall, Nazareth, Pa., and was subsequently transferred to Salem, N. C., where he died, February 2, 1824. Among other well known botanists, who have been connected with this school and garden at Nazareth, probably the best known was the Rev. Lewis D. deSchweinitz, whose work in mycology is so well and so favorably known at home as well as abroad.

DeSchweinitz was a student and subsequently a teacher at Nazareth Hall.

Another garden, more or less closely connected with the Moravian Church, was the one at Bethlehem, Pa. This garden appears to have been devoted, largely if not entirely, to the cultivation of medicinal herbs and plants. It was probably originated by the Rev. John Andrew Hübner and Dr. J. Matthew Otto. Dr. Schöpf in his "Inci-

dents of Travel" (Bayreuth, 1788) says that he met the Rev. John Andrew Hübner on his visit to Bethlehem, after the Revolutionary War. He also met Dr. Otto, who, he says, attended the community in the threefold capacity of physician, surgeon and apothecary. To Dr. Otto, Schöpf was indebted for a variety of information concerning the medicinal uses of indigenous drugs. This information was probably collected by Otto from the various Moravian missionaries, who, as is well known, had an extensive and intimate knowledge of the habits and practices of the early aborigines.

The herb garden at Bethlehem was, for a number of years, in the direct care of Dr. Otto. He was succeeded, in 1790, by Dr. E. Freytag, who continued in charge until 1836, when he was succeeded by Mr. Simon Rau, who later purchased the apothecary business from the Moravian Church, and conducted it as a private venture. Exactly when the herb garden was discontinued could not be ascertained, but it is quite probable that it was coincident with the transfer of the apothecary shop to private interests.

André Michaux, a noted French botanist, arrived in New York in October, 1785, his object being to collect indigenous plants and seeds for the several botanical gardens in France.

He is said to have established a botanical garden in Bergen County, N. J., some seven or eight miles from New York, for the purpose of more closely studying the several American plants and also to serve as a nursery from which to supply botanical specimens, seeds and a variety of botanical information to larger gardens in France. Michaux traveled quite extensively and is said to have covered the entire territory from Hudson's Bay, in British North America, to the Indian River, in Florida, and from the Bahama Islands to the banks of the Mississippi River. From his original garden, near New York, he made short trips into New Jersey, Pennsylvania and Maryland, and as a direct result of these trips sent to France twelve boxes of seeds and five thousand seedling trees.

Michaux visited South Carolina about 1787, and found that Charleston would likely prove to be a more suitable place for his nurseries. He subsequently established quite an extensive garden in or near that city, making it his headquarters for the remainder of his stay in this country. Darlington, in his memoirs of John Bartram, refers to a botanic garden existing in Charleston about 1807, and it is not

improbable that this may have been the identical garden established by Michaux twenty years before.

In 1801, David Hosack, at that time Professor of Botany in Columbia University, purchased a tract of twenty acres of land in what is now a desirable and fashionable portion of New York City. This tract of land was, at that time, about three and one-half miles out of the city, between Bloomingdale and Kingsbridge, on the middle road. The whole tract of land was intended by Professor Hosack for a botanical garden, the prime object of which was to be the collection and cultivation of native plants of this country, especially such as possess medicinal properties or are otherwise useful. Professor Hosack, at his own expense, furnished the garden with a variety of indigenous and exotic plants. In 1805 there were in actual cultivation nearly 1,500 species of plants, largely, if not entirely, of American origin. The following year Professor Hosack published a catalogue of the plants contained in the botanic garden at Elgin, in the vicinity of New York. This catalogue, now extremely rare, contains an extensive list of the plants then under cultivation, and was intended as a guide for students and others visiting the gardens.

During the session of the New York State Legislature, in 1810, an act was passed for the purchase of what had become known as the Elgin Botanical Garden, the care of which was to be placed in the hands of the Regents of the University.

Some years later the garden was committed to the care of the Trustees of the College of Physicians and Surgeons of New York, to be kept by them "in a state of preservation and in a condition fit for all medical purposes."

With the deflection of the fealty of Professor Hosack and others from the College of Physicians and Surgeons and the inauguration in New York City, of a medical school under the patronage of Rutgers College, New Jersey, it is probable that the custodians of the gardens did not feel that they were obliged to maintain an establishment which did not bring them any direct rewards and for the maintenance of which they were annually expending a considerable sum of money which they could ill afford.

The garden was gradually abandoned, fell into decay and was finally sold for the benefit of Columbia College.

The still existing garden at Harvard was founded in 1805 by Prof. W. D. Peck, the then newly elected Professor of Natural His-

tory. About 1822 the Harvard Botanical Garden was placed in charge of Thomas Nuttall, an Englishman by birth, who did much to develop a widespread interest in American botany.

Thomas Nuttall, born in England in 1786, came to America, when about twenty-two years of age. He had been apprenticed to a printer and during his sojourn in Philadelphia worked at that trade occasionally for a livelihood. It is said that he himself set the greater part of the type for his book, "The Genera of North American Plants, and a Catalogue of the Species to the year 1817," which was published in 1818. Nuttall lectured on botany in 1822, and at the end of that year was appointed curator of the botanic garden at Harvard, where he remained for upwards of ten years.

Nuttall subsequently made an extensive trip through the Western country and devoted an extended stay in Philadelphia to a critical study of his rich collection of indigenous plants. He sailed for England in 1841 and died September 10, 1859.

After the accession of Asa Gray as Professor of Botany at Harvard, the botanical garden rapidly developed, and, owing perhaps to the scientific attainments of the director, even attracted considerable attention abroad.

What is known to have been strictly an herb garden was in existence for many years, in Philadelphia, in connection with the Friends' Almshouse. This institution, made immortal by Longfellow's "Evangeline," was founded in the early decades of the eighteenth century, on a plot of ground that was left to members of the Society of Friends by John Martin, a well-to-do tailor, who died without immediate family. The institution consisted of a number of cottages; the first of these was erected in 1713, and the large front building, sometimes called the Quaker Nunnery, was built in 1729. The institution had an uninterrupted existence of more than a century and has frequently been referred to in song and in story. For many decades the grounds surrounding the cottages were largely, if not entirely, devoted to the cultivation of medicinal herbs. These herbs acquired considerable reputation and for many years were eagerly sought for as being the finest and most desirable that were to be had.

During the early part of the nineteenth century the cultivation of medicinal herbs, in a commercial way, appears to have attracted considerable attention. This is particularly evidenced by the space that is devoted to the directions for cultivating medicinal plants, in

books on gardening and agriculture, at that time. Bernard McMahon, in his "American Gardener's Calendar," devoted much attention and an unusual amount of space to the consideration of the most advantageous methods of caring for and cultivating medicinal plants. He enumerates upwards of sixty different plants that can be grown, in temperate climates, and in addition gives detailed as well as general directions for collecting, drying and preserving all kinds of medicinal herbs, seeds, barks and roots.

McMahon was born in Ireland, about 1775, he arrived in Philadelphia in 1796, and about 1809 founded a botanic garden which he named Upsal. During its existence this garden was usually enumerated among the interesting sights of Philadelphia, and is frequently mentioned by the writers of that period. McMahon's varied knowledge of botany and gardening won for him the friendship of Thomas Jefferson and of others who were interested in botany and the natural sciences. He died about 1830.

So far as known the most extensive growers of medicinal plants in this country, at any time, were the Shakers. They began the cultivation of medicinal plants, at the parent settlement at Mount Lebanon, N. Y., as early as 1800, and soon established a large and lucrative business in this line. The cultivation of medicinal plants was subsequently taken up at several of the other Shaker settlements, particularly at Union Village, O., and continued, with varied success, for a number of years.

At Mount Lebanon, the parent settlement, located near New Lebanon, in Columbia County, N. Y., the annual output of medicinal roots, barks and herbs averaged upwards of 40,000 pounds.

The Shakers were the first to adopt the now widely used compressed package, for their medicinal herbs, and they are no doubt to be credited with at least suggesting the now all too popular compressed pill or tablet. About 1830, or 1832, at the suggestion of Dr. Whitlaw, the Shakers began the manufacture of medicinal extracts. This portion of their business also progressed rapidly and in this particular line they are said to have reached an annual output of upwards of 23,000 pounds.

The large herb house of the Shakers was destroyed by fire in 1875, and since that time they have confined their business, in the line of medicinal products, almost entirely to a limited number of

extracts, made exclusively for two or three large manufacturers of proprietary remedies.

The success of the Shakers, with medicinal herbs, induced others to venture into the same field. At New Lebanon, N. Y., in the immediate vicinity of the Shaker community, Tilden & Co. had, at one time, a tract of upwards of forty acres planted in medicinal herbs. In the AMERICAN JOURNAL OF PHARMACY, for 1851, 1852 and 1855, will be found several interesting articles, written by Prof. William Procter, Jr., on the "Herb Gardens of the Lebanon Valley." These articles record Professor Procter's visit to this section, and in them he gives quite an exhaustive account of the extent and variety of herb culture, as carried on by Tilden & Co. and the Shaker community.

From these articles it would appear that, at that time, upwards of forty varieties of medicinal herbs were being cultivated in Columbia County, N. Y., and that upwards of 100 acres were annually planted in medicinal herbs.

A recent communication from the successors of Tilden & Co. states that they discontinued the cultivation of medicinal herbs some fifteen or eighteen years ago and were not at present engaged in this particular line.

Among medicinal plants that have received more special attention in this country, the cultivation of hops is the most widespread. Hundreds if not thousands of acres in the States of New York, Washington, Oregon and California are annually devoted to this particular crop. It should be added, of course, that but an infinitesimally small amount of the total annual yield is used in medicine. Nevertheless, the hop is, strictly speaking, a medicinal plant.

The cultivation of opium has been tried at various times and under differing circumstances. During the Revolutionary War, and again during the War of 1812, when supplies of foreign drugs were scarce and hard to get, considerable opium was produced in this country. The same is true of the Southern States, where, during the War of the Rebellion, a considerable amount of excellent opium was produced. That the production of opium has not developed as a permanent industry is entirely due to the relatively high cost of labor.

The cultivation of peppermint, largely for the essential oil, was introduced into Wayne County, N. Y., about 1816. For many

years it was confined almost exclusively to this one section of New York State, and Wayne County oil of peppermint was long considered to be synonymous for all of the oil of peppermint produced in this country. The cultivation of the peppermint plant was subsequently introduced into Ohio, and about 1835 the first experiments in peppermint culture, on a large scale, were made in Michigan. The latter State soon led in the quantity, if not the quality, of its output and is even to-day considered to be the chief source of American oil of peppermint.

Of the more strictly native plants the cultivation of ginseng early attracted attention. Experiments in the cultivation of ginseng are known to have been conducted by American as well as foreign botanists and gardeners, and there is direct evidence that John Bartram, Peter Collinson and D. Fothergill all devoted considerable time and study to the growth of ginseng.

In Ewell's Medical Companion there is a record that a Dr. Thornton is said to have been particularly successful in the cultivation of ginseng on a farm near Washington, D. C., as early as 1815.

The particular interest that attaches itself to this plant is of course the relatively high price, and this with the perhaps slightly overdrawn advertisements of modern ginseng growers is no doubt the direct cause of the present-day revival of interest in this evidently inert drug.

The general revival of interest in the cultivation of medicinal plants is, however, due to other causes, largely, at least, economic, and the direct outcome of the ever widening area of land that is being brought under cultivation, the disappearance of our forests and the accompanying difficulty of securing the native medicinal plants that are largely restricted to wooded areas.

The scarcity of drugs such as hydrastis, senega, and serpentaria, has resulted in an accompanying increase in price depending on the popularity and use of these drugs.

The increase in the price of these drugs and their growing scarcity has attracted the attention of botanists and drug brokers, and largely through the frequent inquiries that have been made regarding future supplies of these drugs the Agricultural Department has been induced to take up the study of the several plants with a view of leading up to the cultivation of them on a commercial scale.

SOME MINOR SUGGESTIONS FOR IMPROVEMENTS IN THE UNITED STATES PHARMACOPŒIA.[1]

By George M. Beringer.

The time is rapidly approaching when the convention for the Ninth Revision of the United States Pharmacopœia must be held. The eighth revision has been the official standard since September 1, 1905, and it is believed to have been more generally studied and criticised than any one of the previous revisions. A volume of its size and complex composition cannot be expected to be perfect or free either of errors or criticism.

The present revision gives every evidence of the high ideal of the Committee of Revision, and we have their official assurance that "communications containing suggestions for improvements in the Pharmacopœia will be thankfully received, carefully considered, and utilized as far as possible."

It is certainly fair to assume that every one of the thousands of intelligent users of the Pharmacopœia, including the pharmacists of New Jersey, has noted some omissions, errors or defects in formulas, or has encountered some difficulty in following official directions or has worked out some improvements. These should all be presented to the pharmaceutical societies, discussed and permanently recorded and published so as to be available and of assistance to the Committee of Revision in their most laudable desire to make the next revision a still more satisfactory standard and as near perfect as possible.

The present communication is offered with the hope that the criticisms and suggestions ventured will create discussion, and if any of the suggestions are available that these will receive consideration and be utilized in the next revision.

CRUDE DRUGS.

Drugs of Vegetable Origin.—Definitions and Descriptions.—The value of the Pharmacopœia as a text book as well as an accurate legal authority must not be lost sight of, and also the very uncertain knowledge of the sources of the drugs too frequently possessed and exhibited alike by prescriber and dispenser. This leads to a sugges-

[1] Presented to the New Jersey Pharmaceutical Association at the thirty-eighth annual meeting, Atlantic City, June 5, 1908.

tion, namely, that with each definition there be included a terse statement descriptive of the source and habitat. At first thought this may appear as if it would greatly extend the size of the book, but a few examples will show how in a very condensed form a mass of valuable information can be thus introduced. Illustrating this suggestion the following titles and descriptions are submitted:

Arnica.—The dried flower heads of *Arnica montana* Linné (Fam. *Compositæ*), a small plant growing in Central Europe.

Balsamum Tolutanum.—A balsam obtained by incising the trunk of the tree *Toluifera Balsamum* Linné (Fam. *Leguminosæ*) indigenous to the northern countries of South America.

Benzoinum —A balsamic resin obtained as an exudation on the trunk of the tree, produced by hacking the bark of *Styrax Benzoin* Dryander and other species of *Stryax* indigenous to Java, Sumatra and Siam.

Buchu.—The dried leaves of *Barosma betulina* (Thunberg) Bartling and Wendland (Fam. *Rutaceæ*) a shrub indigenous to Cape Colony and gathered while the plant is flowering and fruiting.

Pimenta.—The dried, full grown but unripe fruit of *Pimenta officinalis* Lindley (Fam. *Myrtaceæ*), a tree growing in the West Indies.

Podophyllum.—The dried rhizome of *Podophyllum peltatum* Linné (Fam. *Berberidaceæ*), a perennial herb growing in the United States and Canada.

If this suggestion be adopted the danger of customers being advised that "Black Pepper is the fruit of a tree growing in Russia" or that "Eucalyptus is the leaf of a vine from North America" would be minimized.

Aloes.—The single title Aloes as now officially used is broadened so as to cover three distinct commercial varieties—Barbadoes Aloes Curacao Aloes and Socotrine Aloes. Either of these or any mixture of these is U.S.P. Aloes. The wisdom of this change is doubtful, especially as the official description and tests given are not sufficiently definite or discriminating. When the Pharmacopœia adopts a title for more than one commercial variety or source of a drug, the official descriptions of each variety should be given under that title. This should be an established rule. Under Ipecacuanha the Pharmacopœia does thus give descriptions of Rio Ipecac and of Carthagena Ipecac and under Pilocarpus of Pilocarpus Jaborandi and of Pilocarpus microphyllus and under Serpentaria of Virginia

Serpentaria and of Texas Serpentaria; but under Aloes only one general description is given and that one rather meagre. There should certainly be a concise description of each commercial variety of aloes, and as a test distinguishing Curacao Aloes from Socotrine, and the absence of this variety as an adulterant in the latter the so-called cupraloin reaction might be given. This test is stated in the British Pharmaceutical Codex as follows: "If 10 c.c. of an aqueous solution of aloes 1 to 1000 be mixed with 1 c.c. of a 5 per cent. solution of copper sulphate and 1 c.c. of saturated solution of sodium chloride and a few drops of diluted hydrocyanic acid added, a fine, deep, persistent claret color is rapidly developed due to isobarbaloin contained only in Curacao Aloes.

Veratrum is another instance where the present revision in the opinion of the writer has erred in placing two drugs entering commerce from two different hemispheres under one title. While recognizing that the American Hellebore and the European or White Hellebore are yielded by two distinct species of Veratrum, the official title and description cover both and the use of either or mixture of the two is thus sanctioned. This is particularly unfortunate, as it is pretty certain that the chemical constituents are not identical and many able physicians recognize a difference in the therapeutic action. As we have no assay process given for Veratrum or its preparations the poorest specimen of white hellebore imported for use as an insecticide can be substituted for the best grade of the American drug or admixed therewith. If the two plants grew together and the drugs were collected mixed as in the case of Viburnum Prunifolium where V. prunifolium L. and V. Lentago L. are thus collected, there would be some justification for such indefiniteness in the U.S.P. But in the case of Veratrum this does not occur.

Apocynum.—The official definition of this drug is "The dried rhizome of *Apocynum cannabinum* Linné, or of closely allied species of *Apocynum* (Fam. *Apocynaceæ*)." This is entirely too broad and would admit the common adulterant the rhizome of *Apocynum androsaemifolium*, which is a closely allied species. The definition should be restricted to the rhizome of Apocynum cannabinum, or to such additional species or varieties or hybrids as can be named.

Cascara Sagrada.—The efforts to popularize the official titles Rhamnus Purshiana and Fluidextractum Rhamni Purshianæ that have been made through two revisions of our Pharmacopœia have

not proven successful, and as physicians persist in prescribing these under the name of Cascara Sagrada, there appears to be no reason why our Pharmacopœia should not follow the example of some of the other national pharmacopœias and Latinize the title of Cascara. If the Pharmacopœia is to be consistent throughout and eliminate as an official title Cascara Sagrada, then other titles such as Cusso should likewise be changed to the botanical name of the plant source.

On the Admission of a Drug Without Introducing a Preparation Thereof.—A rule should be established that a drug that is not administered either in its natural state or pulverized or in the form of an infusion or decoction should not be admitted into the Pharmacopœia without a formula for the preparations in which it is commonly exhibited. This would have either excluded Sabal or made the inclusion of formulas for fluidextract and tincture necessary. Gossypii Cortex is commonly administered either as fluidextract or as solid extract, yet no preparation is given.

Staphisagria is rarely used as a fluid extract but is quite commonly used as a tincture, yet a formula for the former is given and the latter omitted.

Drugs of Animal Origin.—While the official definitions of the drugs of vegetable origin very generally give the origin and family according to the latest botanical classification, the reverse appears when we examine the definitions given for drugs of animal origin. Here we note that the zoölogical classifications are generally omitted. Uniformity of style and the same careful method of description should characterize the treatment of the drugs derived from both kingdoms.

Cera Flava is described as "A solid substance prepared from the honeycomb of the bee, *Apis Mellifera* Linné." A more correct definition would be "A natural secretion forming the wall of the honeycomb of the hive bee *Apis Mellifera* Linné (Order *Hymenoptera*) purified, after removing the honey, by melting with water, separating and straining."

Cantharis.—This should be accompanied by an assay process, and the percentage of active principle fixed within reasonable limits attainable in commerce.

Alcohol Content of Official Preparations.—The National Food and Drugs Act and many of the State laws recently enacted on the sub-

ject of food and drugs require the alcohol content to be stated on the label, even of official preparations. This necessitates that the pharmacists determine the alcohol content in each lot of preparation made, entailing in the aggregate an enormous amount of useless labor. It is recommended that the Committee of Revision have determinations made of alcohol content of official preparations and in each state the "average alcohol" contained in the finished product. As an official statement this would become part of the legal requirement and save the pharmacist an enormous amount of time.

Alkaloidal Assays.—The alkaloidal assay processes need revision, but only after critical review and research, and these reviews and investigations should be made by competent experts not associated with the present accepted methods. The processes for colchicum and conium are far from satisfactory and must be improved. In the assay of aconite and preparations of same, ether is directed as the solvent, although it is well known that chloroform is the better solvent for the alkaloids of aconite, and the writer suggests that in place of ether, chloroform be substituted or a mixture of chloroform and ether as directed in the German Pharmacopœia.

The writer will, at the present time, merely call attention to several basic errors that pervade these official assay processes. The one is illustrated in the direction for assaying extract of belladonna, which advises the introduction of 5 grammes of the extract into a small beaker and its solution in a mixture consisting of alcohol 5 c.c., distilled water 10 c.c., ammonia water 2 c.c., and chloroform 20 c.c. The attempt to dissolve the extract in the beaker in these immiscible fluids is impractical and destructive of accuracy. The better method is to mix the alcohol and water and dissolve the extract in a portion of this mixture and transfer to a separator, reserving a small portion of this mixture to rinse the beaker. The chloroform should then be added to the separator and then the ammonia. By this method of manipulation, the alkaloid is subjected to the solvent action of the chloroform as soon as liberated and the loss of solvent and likewise of active ingredients is thus prevented.

Another error is the use of N/10 sulphuric acid V. S. standardized with methylene orange as an indicator and N/50 potassium hydroxide V. S. standardized with phenolpthalein as an indicator and with these a final titration of the alkaloid with cochineal T. S. as an indicator. N/50 volumetric solutions of both acid and alkali

should be directed to be used that had been previously titrated against each other, using the same indicator as used in the final titration of the alkaloid, thus greatly reducing the danger of experimental error.

CHEMICALS.

Cerium Oxalate.—This title is officially and now legally applied to a varying "mixture of the oxalates of cerium, didymium, and lanthanum and other rare earths of this group." The title should be modified so as to show that it is the so-called "medicinal, commercial, or admixed" salts that is official and not the pure, definite salt.

Safrol.—This is officially defined as "the methyl ether of allylpyrocatechol, found in oil of sassafras, camphor oil, and other volatile oils, purified, if necessary, by repeated chilling and crystallization." This definition leaves out an important statement, namely, the preparation which must precede the purification. In the official statement the following should be added before the word purified, "separated by fractional distillation."

Scopolamine Hydrobromide.—This is defined as "obtained from plants of the *Solanaceæ* and chemically identical with Hyoscine hydrobromide." No tests are given, and if hyoscine and scopolamine are identical and the article is commonly sold under either name, then the U.S.P. should certainly eliminate one title and make in the text a statement of the identity of these two commercial alkaloidal salts. The writer would recommend that the official title retained be Scopolaminæ Hydrobromidum as indicating the most common source, Scopola, and being a distinctive name, serving to prevent confusion and possibly dangerous error from the close similarity of hyoscine with hyoscyamine.

Thymol Iodide.—The writer will once more direct attention to the act that the official definition as "dithymol diiodide" is incorrect despite all the text-book theories. The iodides of thymol supplied and used are mixtures of several iodine substitution compounds of thymol, and a thorough research to settle their composition should authoritatively be undertaken before the next revision.

PHARMACEUTICAL PREPARATIONS.

Ceratum Cantharidis.—The official formula directs that the powdered cantharides be macerated with 150 grammes liquid petrolatum

in a warm place for forty-eight hours. While the petrolatum may soften the powdered beetles, it is but a poor solvent for the active principle and the combined cantharidin is not liberated.

A more effective preparation is secured by macerating the cantharides with 20 c.c. acetic acid for twenty-four hours, prior to adding it to the resin, yellow wax, lard and liquid petrolatum, previously melted together and strained through muslin. The small amount of acetic acid remaining in the finished product is no detriment but rather an aid to its action, and the increase in weight therefrom hardly counterbalances the loss sustained in straining the melted base.

Extracts.—The method of preparing the solid extracts by evaporation of the fluid extracts, which is officially directed in many of the extracts, does not appeal to the manufacturer, as it is wasteful of alcohol, and to the retailer the cost would be greatly in excess of the purchase price of a satisfactory article.

This method likewise exposes the active constituent of the drug to the prolonged heating of both the original preparation of fluid-extract and the evaporation directed in the preparation of the solid extract. I would recommend that this method be discontinued except as an emergency method by the pharmacist and the Pharmacopœia direct in each formula for solid extract the direct extraction with the menstruum.

With powdered extracts the writer has experienced considerable difficulty from caking and solidifying, and believes that this has also been a serious annoyance to the larger manufacturers. This appears to occur mostly in the extracts, such as extract of nux vomica, in which milk sugar is specifically directed as the diluent. I believe that this can be corrected by substituting for the milk sugar as a diluent the finely powdered and dry drug or the dried and finely powdered marc from the process. In the introductory notes on page 52 of the Pharmacopœia "permission is given to employ the dried and powdered marc from the percolation of the same drug as a diluent in place of powdered peeled Russian licorice root," and it is recommended that this permission be extended also to all powdered extracts in which milk sugar is directed.

While the Pharmacopœia does in this revision recognize a number of powdered extracts the list should be extended by the introduction of powdered extracts of belladonna leaves, colchicum corm, hyoscyamus and others that are commonly used in that form.

Fluidextracts.—In the formulas for fluidextracts much useless waste of space can be saved by the adoption of general processes and the direction to use alcohol of a given percentage.

Fluidextract of buchu should be made with alcohol as a menstruum, which yields a preparation in which the oil and resin does not separate as in the present official formula, with a menstruum of alcohol 3, water 1.

Fluidextract of Cascara Sagrada is best made with an aqueous menstruum and the concentrated percolate preserved by the addition of 25 per cent. of alcohol.

Fluidextract of Squill does not fully represent the drug, as no attempt is made to secure complete extraction.

Fluidextract of Glycyrrhiza is not satisfactory and the writer has proposed an improved formula (see Proceedings of New Jersey Pharmaceutical Association, 1905, fol. 75) the product of which keeps well as shown by samples on hand of portions of a lot made more than three years ago.

Fluidextract of Senna.—The preliminary percolation of the drug with alcohol is expensive as it is very wasteful of alcohol, and is likewise of doubtful utility. The griping tendency of senna can be more economically and effectively overcome by the addition of a small amount of a carminative, such as the oils of coriander or fennel.

Liquor Cresolis Compositus.—The drug journals have contained numerous articles expressing difficulty with this preparation. This is an example of a good formula spoiled by faulty directions for manipulation. The official directions for soft soap very properly direct that the linseed oil be saponified by the potassium hydroxide in solution with the aid of heat and the addition of a small quantity of alcohol. Yet in compound solution of cresol, which is only a fifty per cent. solution of cresol and soft soap, it is directed that the linseed oil shall be saponified cold and without any alcohol. If the official method for making soft soap be carried out in the preparation of the compound solution of cresol, there will be no trouble in obtaining a satisfactory product. It is noteworthy that the British Pharmaceutical Codex has exactly followed this suggestion in copying the formula.

Compound Syrup of Sarsaparilla would be improved by increasing the quantity of essential oils of sassafras, anise and gaultheria from

0.2 c.c. to 0.5 c.c. The dilution of the mixed fluidextracts and oils with water and filtration and subsequent exposure to heat as directed, likewise occasions loss of flavoring and the product has no advantage over that produced by the customary practice of adding the mixed fluidextracts and essential oils to syrup. The Pharmacopœia could, with no loss of authority, be made in this to conform to the very general custom. As "oil of gaultheria" is very rarely obtainable, oil of betula should be officially substituted.

Tincture of Cantharides.—Here the addition of 10 c.c. glacial acetic acid to the alcohol directed for maceration is recommended so that the combined cantharidin will be liberated and the preparation represent the full activity of the drug.

Compound Tincture of Gentian.—The menstruum adopted, 6 of alcohol to 4 of water, it was hoped would yield a stable product, but experience shows that the present official preparation precipitates quite as much as that of the previous revision.

Tincture of Strophanthus.—The increase in the drug strength of this preparation from 5 to 10 per cent. has not resulted in doubling the strength of the tincture, as the drug is never exhausted by the menstruum. It is to be noted that this movement of the U.S.P. increasing the strength of this tincture is contrary to the British Pharmacopœia, where the 5 per cent. tincture of strophanthus official in the 1885 edition was reduced in the later revision to 2½ per cent.

The official formula, by using a menstruum composed of 650 c.c. alcohol and 350 c.c. water, aims to leave the disagreeable, odorous and nauseous fat in the marc, but this is not successfully accomplished, and I would strongly urge the preliminary extraction of the fat and oils from the powdered drug with purified benzin and then drying before proceeding to extract for tincture.

COMPARISON OF EXTRACTS OF VANILLA AND LEMON AS SOLD BY GROCERS AND THOSE PREPARED BY THE U.S.P. FORMULAS.[1]

By M. R. Dickson.

There is perhaps not another class of pharmaceuticals more widely known, used, and distributed, than the flavoring extracts, particularly

[1] *Bulletin of the State University of Iowa*, May, 1908, p. 22.

those of lemon and vanilla, the most popular of which is vanilla. All classes of people, be they the most humble or the most high, the most democratic or the most aristocratic, poor or rich, all make constant use of these articles; and yet for all this, where is there an article, the true composition of which is less known or even given a thought by the majority of consumers? For this reason there is unlimited opportunity for those, keen at deceit, to practice their fraud and deception by putting out an article which is not only cheap in the extreme, but is far from being up to the standard of the U.S.P. and conducive to good health.

This is done not only by using cheap grades of material in the manufacture of the article, but by gross adulteration with substances which were never intended for internal administration.

We may take wood-alcohol, for instance. What multitudes have been deceived into the use of this poisonous drug? There is perhaps no way of reckoning the damage to health caused by its use in flavoring extracts as a solvent, in place of the true ethyl alcohol, used simply on account of its cheapness, and perhaps found out only by some poor mortal's attempting to pollute himself by the use of a flavoring extract as an intoxicating beverage. As we all know, a number of cases are on record where blindness and even death have resulted from such a course of action.

But even though this be true, this is not the commonest of adulterants used to lessen the cost of manufacture, for not only are cheap grades of the crude drug employed, but synthetic methods are in constant use for the imitation of the original and they are far from being without success in meeting the demands of the people. And, we may ask, are the manufacturers not justified in this practice? The great majority of the public custom at the present time prefer the flavor of a synthetic or adulterated product to that of a strictly U.S.P. formula.

Cases are constantly occurring in which customers are angered and even feel insulted by being sold a pure article at pure article prices, expecting to receive something extraordinary, when upon trying their purchase declare it not to be the flavoring desired. So it is easily seen that a dealer is almost compelled to have in stock all grades in order to meet the demands of the public. And why this error or deception of taste? The only way it may be accounted for is in the fact that these false grades have been on the market

until the public has become accustomed to them so that a cheap grade is even more desirable to the misled taste than one of the higher price and standard. Hence can we say that the manufacture and use of these is wholly out of order? If a cheap article is demanded why not have such on the market so long as it better suits the taste and pocket-book of the consumer and at the same time contains nothing injurious to health and is sold for just what it is. But the trouble lies in the fact that there are on the market many brands which contain gross adulteration, but are still sold under the name of a pure article.

In the case of vanilla extract, many brands are prepared from a variety of substances containing a small amount of vanillin with a trace of coumarin, which is derived from the tonka bean, to add a hue to the flavoring and caramel or a coal-tar product to give the proper shade of color.

Scoville says: "Vanillin is fully equal to the finest bean, but is too delicate to compare with natural vanilla, hence the use of coumarin to bring out the flavor." Some may wonder why the manufacturer is so prone to use coumarin for this purpose in preference to the true vanilla. This is easily understood, however, when we know that the true vanilla beans cost from $5 to $10 per pound, while tonka beans, from which coumarin is obtained, may be had for 40 to 50 cents per pound.

A favorite formula with many for the manufacture of an artificial grade of extract is the following:

1. Extract of tonka	6 pints
2. Prunes	1 pound
3. Rasins	4 ounces
4. Currants	3 "
5. Peru balsam	3 "
6. Powdered orris root	4 "
Molasses	2 pints
Dil. alcohol q. s. ad	2¼ gal.

It will be noted that in this formula there is nothing particularly injurious, neither is there anything of high price, but, at the same time, such a so-called extract meets with much favor in the hands of the public.

Following is a cheap yet very clever imitation which answers the purpose very satisfactorily and at the same time is far from being the true vanilla extract:

1. Vanillin	1	gramme.
2. Coumarin	1	"
3. Alcohol	125	c.c.
4. Glycerin	65	"
5. Water	1000	"
6. Caramel q.s. to cover.		

It will be seen that in this preparation there is 0·17, each of coumarin and vanillin. By quantitative tests, made personally, upon various brands of extracts there was found as high as 0·12 per cent. of coumarin with almost a like amount of vanillin, which corresponds, very nearly, to the above formula, yet sold under the name of a true vanilla extract. A common method of adulteration is by the use of a very dilute alcohol, increasing the solvent powers by using an alkali. For the best grades of extract a 50 per cent. alcohol should be used, but there are cases where as low as 10 per cent. has been used, the solubility of the vanilla constituents being increased by the use of an alkali, usually potassium bicarbonate.

Out of six specimens tested, four were found to have contained this alkali to increase the solvent powers of the menstruum, indicating that a dilute alcohol had been used in their preparation.

At this point a discussion of the growing, collecting, and curing of the vanilla bean, so-called, might be opportune, but it will suffice here to state only a few of the important points bearing on the subject.

In the first place it may be said that there are four chief varieties of vanilla, viz.: Mexican, Bourbon, Venezuelan and Brazilian, the two former being considered the better grades, and of these the Mexican being by far the superior. The beans, or fruits, which grow on a vine-like plant clinging to the trees of hot damp woods are collected while green and put through a process of curing or sweating. It is upon the care with which this process is conducted that depends largely the quality of the marketed article. This process is carried on by placing the fruit in flannel cloths during the nights and cloudy weather, and curing in the sun on bright days for a period of several weeks, thus giving alternate sweating and drying. In this operation the beans lose, on an average, 35 per cent. in weight and it is during this time that vanillin, one of the chief constituents of the bean, is developed, though it has been stated by some good authorities that the value of the article cannot be estimated by this alone. Furthermore, during this process of curing there is a certain greyish-white

fluorescence developed on the surface of the fruit which is considered by some to be indicative of good quality and is often imitated in poorer grades by a coating of benzoic acid. This, however, may be easily detected by the usual benzoic acid tests. This method of estimation, for the most part however may not be taken as conclusive of quality for the Mexican, without the fluorescence has been found better than the Bourbon with it.

Although all these points are to be taken into consideration, the consensus of opinion of the best authorities goes to show that a certain peculiar resin is the chief active constituent and the one sought after, hence the presence of this indicates a good grade of flavoring extract. Although attempts have persistently been made to substitute a cheap resin for this one, and even to produce it synthetically, it has not as yet been done with sufficient cleverness to avoid detection if the proper tests be applied. Out of six commercial brands of vanilla extract tested, three were found to contain some foreign resin in a greater or less proportion. (Article in Vol. 47, page 473, *Proceedings of the American Pharmaceutical Association.*) Another substitution for the resin has been found in cork-wood in the form of a certain tannin-like substance, which under certain conditions is capable of splitting up into vanillin and other substances.

Upon making a study of this subject one finds it certainly appalling to know the great variety of adulterations used; in some instances even acetanilide being found present.

Although on account of its popularity, we have treated chiefly of vanilla, it is not alone the extract whose formula is the subject of abuse, for it has been as fully demonstrated that the others have been adulterated with equal cleverness, and most especially that of lemon. For this reason, in this great age of scientific advancement one must be constantly on the alert for those greedy in their deceptive practices.

It may be asked, where would a person go to find a pure extract? We would say, to the drug store and surely not to the grocery. For where is there a class of people more capable of judging the quality of this line of goods than the druggist who has made this line of work his life study and hence is not so apt to be the subject of a fraudulent graft. And too, in cases of necessity, he is capable of manufacturing his own flavorings, thus being able to personally guarantee the quality.

PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE MORE INTERESTING LITERATURE RELATING TO PHARMACY.

By M. I. Wilbert,
Apothecary at the German Hospital.

The Annual Meetings of the State Pharmaceutical Associations that were held during the past three months have attracted an unusual amount of attention. These meetings were generally well attended and, from available reports, an unusual amount of time appears to have been devoted to the reading and discussion of scientific papers.

Pennsylvania easily leads in the number as well as the variety of communications that were presented, though the reports of practically all of the State Association meetings show a decided increase of interest in the technical side of the pharmaceutical calling. Legislation and other economic features connected with the drug business were also discussed quite freely. Among the numerous suggestions for improving the economic conditions of the retail druggist, the systematic development of the U.S.P. and N.F. propaganda appears to have met with general favor. In this connection it is to be regretted that the fundamental need of this propaganda, the systematic education of the retail druggist himself, has been generally overlooked.

How really pressing this need is was evidenced by the statement made by Prof. J. Hartley Beal, the official drug inspector of Ohio, who found that only 58·2 per cent. of the drug stores that were visited in the State of Ohio possessed a copy of the U.S.P. VIII, and in only 31·1 per cent. of the stores did he find a copy of the N.F. III.

Similar conditions were reported from North Dakota, by Food Commissioner Ladd, who, in a complete canvass of that progressive commonwealth found that out of 190 retail druggists in the State, 124, or a fraction more than 65 per cent., possessed copies of the eighth revision of the Pharmacopœia of the United States.

Pure Drug Bill in New York, referred to in a previous number of this Journal (June, 1908, page 287), was vetoed by Governor Hughes. At the recent meeting of the New York State Pharmaceutical Association the reasons for this veto were liberally discussed

and it was on motion agreed to favor the reintroduction of the bill at the next session of the State Legislature.

The active interest that has been manifested in organization work, promises well for the annual meetings of the National Associations to be held during the coming month. From present indications these meetings will all be of unusual interest and importance. While the wholesale druggists are thoroughly well organized and will probably devote their meeting to the routine discussion of practical subjects, there is, in connection with both the American Pharmaceutical Association and the National Association of Retail Druggists an evident feeling that reorganization along broader and more comprehensive lines would be of advantage to the associations themselves and be a powerful factor for securing for pharmacists and retail druggists the recognition that is rightfully due them.

British Patent Law.—The revision of our own, admittedly liberal, patent laws has long been agitated by pharmacists and others interested in the trade in chemicals for use in medicine. An important precedent, that may be of use as an argument in future agitations along these lines, is to be found in the law recently enacted in Great Britain which will virtually compel the foreign holders of an English patent to produce the protected article in Great Britain within a specified time, or forfeit all property rights in the patent.

Preventive Medicine—The call to health, as it has been so aptly paraphrased, is attracting widespread attention. The success that has attended past efforts to restrict the spread of diseases has stimulated renewed effort, on the part of medical men, to spread the knowledge of well-known facts relating to hygiene and sanitation. The economic value of public health work has been recognized in a practical way, by both of the large political parties, and it is quite evident that never before, in the history of this country, has the demand for a rational supervision of public health measures been so much in evidence as now.

Medical College Mergers.—The *Journal of the American Medical Association* (July 8, 1908, page 229) announces that in less than three years twenty-three medical colleges have united their forces to form nine larger and stronger ones.

This merger of the medical schools has been the direct outcome of the activity that has been displayed by the Council on Medical Education of the American Medical Association. There can be no

denying the fact that the merging of small, poorly equipped medical schools into a much smaller number of strong, well-equipped institutions forebodes a material advance in the standards of medical education.

The Consolidation of Scio with the Pittsburg College of Pharmacy, as recently announced in the pharmaceutical and drug journals, establishes a precedent that might be followed by other colleges to the material advantage of pharmacy at large.

In pharmacy, as in medicine, it can no longer be expected that the schools can be self-sustaining. In medicine, for instance, it has been actually demonstrated that the annual expenses of the better equipped schools readily amount to double the amount paid for tuition by the students. If pharmacy is to progress, as it should and must, practically the same conditions will prevail with pharmaceutical schools, thus making it impracticable if not impossible to longer continue the smaller, unendowed, colleges of pharmacy.

Food and Drug Standards.—An international congress for suppressing adulteration of foodstuffs and medicines will be held in Geneva, Switzerland, in September. One of the subjects for discussion is a comparison of the demands for purity made by the different Pharmacopœias, the object being to elaborate, if practicable, generally acceptable standards for the more widely used drugs and chemicals. This proposed congress has attracted considerable attention, both in this country as well as abroad, and it is confidently expected that the meetings will be well attended and that the deliberations will be fruitful of permanent results.

An Official Bureau for Testing Pharmaceutical Products was recommended, by Dr. Eichengrün, at the recent meeting of the German Chemical Society. In calling attention to the need for such an official bureau the reader dwelt at some length on the all too rapid increase in the number of pharmaceutical preparations of a proprietary nature, and the fact that the all too frequently untrue and misleading statements that are made regarding composition and uses, by unscrupulous manufacturers, would justify, if not imperatively demand, supervision by some central bureau.

Such a general bureau must consider the general interests of all concerned and would in no way relieve the apothecary or the manufacturer of their direct responsibility for the articles made or sold by them. (*Apothek. Zeit'g*, 1908, page 436.)

Pharmaceutical Chemical Section in the German Chemical Society.—At the meeting of the German Chemical Society, held in Jena, June 10 to 12, 1908, a section for Medico-pharmaceutical Chemistry was formed, with Professor Thoms, Berlin, as chairman.

The section began with a membership of 100, of which number no less than twenty-five are residents of the United States.

The first chairman of the section is well and favorably known in this country. He is the Director of the Pharmaceutical Institute of the University of Berlin, Germany, is a corresponding member of the Council on Pharmacy and Chemistry of the American Medical Association and holds honorary membership in a number of American pharmaceutical societies and associations.

British Pharmacopœia Revision.—The Therapeutic Committee of the British Medical Association has spent much time on the discussion of substances and preparations which it is desirable to omit from and those which it is desirable to add to the coming edition of the British Pharmacopœia.

The principles which have been adoped as a guide for this committee are rather comprehensive, and, in view of the approaching revision of our own Pharmacopœia of the United States, may prove to be doubly interesting.

They include:

The deletion of practically all drugs that are fully represented by an active ingredient.

The deletion of drugs possessing no obvious or serviceable action.

The avoidance of duplication in the preparations of a drug.

The omission of all purely diluent preparations.

The omission of all articles that do not require official definition.

The elimination from the body of the book of articles that are not contained in finished products.

A list containing the drugs and preparations which the committee thinks might be omitted from or added to the Pharmacopœia has been transmitted to the General Medical Council. (*The Chem. and Drug.*, May 30, 1908, page 835.)

The British Pharmaceutical Codex. This book, but recently reviewed in these pages, is already out of print. A second edition is in course of preparation and the opportunity is being taken advantage of to add a considerable number of formulas and to revise some of the monographs in the present first edition.

A supplement, now in press, is designed to supply present owners of the Codex with the more important additions and alterations that have been proposed since the work was published. The price for the supplement from the publishers is 1s. net.

Laboratory investigation of preparations of a proprietary nature is being actively fostered both in this country as well as abroad. A number of interesting reports have been published, particularly in Germany, where work of this kind has met with considerable support from pharmaceutical societies and kindred associations.

An extensive investigation recently reported by the Council on Pharmacy and Chemistry of the American Medical Association relates to :

Diastase Ferments, and includes a comprehensive, comparative study of a number of the proprietary diastase ferments now on the market. In this report the subcommittee making it points out that practically all manufacturers have been making rather misleading claims for their own particular products, and that while some of the articles comply fairly well with the direct claims that are made for them, others fall far short of what might be expected of them, while some are practically inert. The report should be read and pondered over by every pharmacist who is interested in the work now being done by the Council on Pharmacy and Chemistry. It is published on page 140 of the *Journal of the American Medical Association* (June 11, 1908).

Arhovin Capsules were examined by G. Frerichs (*Apothek. Zeit'g*, 1908, page 538), who found them to vary from 54·4 to 103·6 per cent. of the content claimed for them by the manufacturer. Two boxes of fifteen capsules each were found to have an average content of 78·4 and 81·2 per cent. of the amount claimed for them.

Pyrenol tablets were also examined by G. Frerichs (*Apothek. Zeit'g*, 1908, page 521), and the results as published indicate that these tablets, as marketed by the manufacturer, vary considerably in the content of soluble ingredients. A careful examination of a number of specimens showed them to vary from 44.6 to 77 per cent. of the amount claimed for them, thus indicating that the methods of manufacture must be either crude or careless.

Hydropyrin, which is claimed to be sodium acetylsalicylate, was examined by F. Zernik, who found it to contain a mixture of acetic and salicylic acids in addition to the acetylsalicylate. The variable

content of these several acids, both free and in combination, suggests that the acetylsalicylic acid is probably saponified in the course of manufacture and that this change has, as yet, not been taken into account by the manufacturer. (*Apothek. Zeit'g*, 1908, page 529.)

Synthetic Suprarenin or Adrenine.—Prof. Arthur R. Cushny (*Phar. Jour.*, May 23, 1908, page 668) reiterates the opinions previously published, that natural suprarenin has almost exactly twice the power of the artificial base in raising the blood pressure.

He believes this to be due to the fact that d-suprarenin, which comprises 50 per cent. of the synthetic preparation, is inert so far as the blood pressure is concerned. This assumption appears to be further proven by some experiments he has made with a preparation containing a larger proportion of this dextro-rotatory base.

Arterenol is the name given to a derivative of synthetic suprarenin. It is said to possess similar properties and to have the same action as suprarenin. (*Phar. Zeit'g*, 1908, page 529.)

Homorenan is the name given to an intermediate product obtained in the manufacture of synthetic suprarenin, the properties of which it is said to possess. (*Phar. Zeit'g*, 1908. page 529.)

Valuation of Asafetida.—A. Hellström publishes a lengthy investigation of thirty samples of asafetida. He finds that the permissible ash content in all pharmacopœias is too low and should be raised to 20 or 25 per cent. The relation of resin, oil and gum he finds to correspond to the equivalent of 3 : 2 : 1.

His examinations show the following variations: Ash content from 4 to 39 per cent.; alcohol soluble material from 50 to 66 per cent.; acid number from 20 to 39 per cent.; saponification number from 98 to 112; ether number from 67 to 80. (*Phar. Zent'h*, 1908, page 428.)

Detection of Barium in Strontium Salts.—Caron and Raquet recommend the use of a mixture of potassium chromate and potassium bichromate for the detection of barium in either strontium or calcium salts. For solutions containing up to 3 per cent. of a strontium salt they recommend a solution of 3 per cent. potassium chromate, with 1·1 per cent. of potassium dichromate.

For solutions containing more than 3 per cent. of a strontium salt they suggest the use of a solution containing from 1·5 to 2 per cent. of potassium chromate with 1 per cent. of potassium dichromate. This reagent is said to demonstrate the presence of 1-15000 part of barium in strontium. (*Apothek. Zeit'g*, 1908, page 439, from *Bull. de la Soc Chim. de France.*)

Melting Point of Resorcin.—The melting point of resorcin is variously given as being from 110° to 119° C., the latter figure being that included in the U.S.P.

The German Pharmacopœia gives the melting point of this substance as varying from 110 to 111, and this has recently been demonstrated to be correct, by C. T. Bennett, who found the melting point of ordinarily pure resorcin to be 111 while the melting point of a purified specimen, recrystallized from benzole, was found to be 110. (*Phar. Jour.*, 1908, page 758.)

Mexican Poppy Seed Oil.—The seeds of Argemone Mexicana yield 37 per cent. of a fixed oil that is said to have cathartic properties. It is said that this oil has long been in use in India as an external remedy for itch, ringworm and skin diseases generally, as well as for headache following exposure to the sun. (*The Chem. and Drug.*, June 13, 1908, page 896.)

Acetatoxyl, as its name indicates, is an acetyl combination of atoxyl It occurs as a white crystalline powder that contains from 3 to 4 molecules of water of crystalization and is readily soluble in 10 parts of water, it is much more readily soluble in hot water. Acetylatoxyl is not easily decomposed and solutions of it can be sterilized by boiling. It is said to be similar to atoxyl in action and efficiency and may be given, subcutaneously, in daily doses of 0·6 gramme. (*Phar. Zeit'g*, 1908, page 608.)

Arsacetin is a trade name given to acetylatoxyl, the acetyl combination of atoxyl.

Agaroma is a preparation of agar-agar that is being marketed as a cure for constipation. The preparation is supplied with various aromas and is said to be quite agreeable. (*Süd. Deut. Apoth. Zeit'g*, 1908, page 382).

Regulin, a mixture of dry agar-agar with an extract of Cascara Sagrada, has been marketed in this country for some time. It would appear to be similar in properties and action to the mixture described above.

Diaspirin is said to be the succinic acid ester of salicylic acid. It occurs as a white, crystalline powder, having a slightly acid taste, and melts from 176° to 180°.

It is only slightly soluble in water, but much more readily soluble in alcohol, acetone or glacial acetic acid.

Diaspirin may be given in all cases where salicylic acid is indicated. It is said to be an active diaphoretic. May be given in

doses of 1·0 gramme several times a day. (*Phar. Zent'h*, 1908, page 399.)

Eucol is the name given to guaiacyl acetate which is said to be more easily saponified than any guaiacol ester so far experimented with.

From experiments on rabbits it is found to be readily absorbed. The guaiacol present is eliminated in the urine as sulphoguaiacol, soon after ingestion. (*Phar. Jour.*, 1907, page 789, from *Nouv. Rem.*)

Eustenin is a name given to a double salt of theobromine sodium-sodium iodide, thus being somewhat analogous to diuretin in composition. It is said to contain 51·1 per cent. of theobromine and 42·6 per cent. of sodium iodide.

Eustenin occurs as a white powder having a decidedly bitter taste. It is preferably administered in capsules or cachets and may be given in doses of 0·5 to 1·0 gramme. (*Phar. Zent'h*, 1908, page 552.)

Iodomenin is an iodo-bismuth albumen compound that is said to be useful in place of the alkaline salts of iodine, particularly in cases where iodine is to be given for a continued length of time. It may be given in doses of 0·5 gramme three or four times a day. (*Phar. Zeit'g*, 1908, page 529.)

Neoform is said to be a basic tri iodo phenol bismuth. It occurs as a yellow, nearly odorless powder and has been recommended as a dusting powder for wounds. (*Phar. Zeit'g*, 1908, page 529.

Ostauxin is a name applied to calcium paranucleinate which is said to be prepared from casein by digesting with pepsin and hydrochloric acid. This substance occurs as a fine, tasteless powder, easily soluble in water, and contains 17 per cent. of calcium, 9 per cent. of nitrogen, and 2·5 per cent. of phosphorus.

The preparation is designed to assist in the development of bone tissue and to promote metabolism. The dose is from 1·0 to 2·0 grammes three times a day. (*Phar. Jour.*, 1908, page 806, from the *Lancet*).

Sakuranin is the name given to a glucoside that has been isolated from the bark of prunus pseudo cerasus, by Ashina. It occurs as white, bitter tasting needles that melt at from 210° to 212°, and are not soluble in cold water or in ether, they are readily soluble in diluted alcohol and in hot water. (*Phar. Zent'h*, 1908, page 426, from *Jour. Phar. Soc. of Japan.*)

BOOK REVIEWS.

ARBEITEN AUS DEM PHARMAZEUTISCHEN INSTITUT DER UNIVERSITÄT BERLIN. Herausgegeben von Dr. H. Thoms, Professor und Direktor des Pharmazeutischen Instituts der Universität, Berlin. Vierter Band, umfassend die Arbeiten des Jahres 1906.

During the year 1906, eighty-one investigations were carried on in the Pharmaceutical Institute of the University of Berlin. These included investigations of new chemicals; proprietary remedies; and synthetic organic products; chemical pharmacognostical and chemical-physiological studies; the preparation of galenicals and the examination of food and technical products.

F. Zernik examined the following new remedies: Alypin, aspirophen, salicylic derivatives of benzosalin, Formurol, Migranin Höchst, Neu-Sidonal, Proponal, Sajodin, Sulfopyrin, Beta-Sulfopyrin and Thephorin.

J. Kochs examined the following: Antineurasthin, Antipositin, Antisanguin, Augenwol, Ayer's Cathartic Pills, Brandol, Burkhart's Kräuterpillen, Coricol and Assanol, Cista, Creolin Pearson, Anna Csillag's Haarwuchsmittel, Dattel-sirup, Diabet-Eserin, Divinal, Eidol, Epilepsie-mittel, Estor's Vaginalstifte, Fascolsalbe, Fleur de Cologne, Formosa-sprudel, Fulgural, Gallensteinmittel, Grandira, Grazianapräparate, Grossmann's Kraft- und Nähremulsion, Haarfärbemittel, Dr. John P. Haig's Goitre Cure, Dr. B. W. Hair's Asthma Cure, Hair Grower, Dr. P. Harold Hayes' Asthma-Medizinen, Henkel's Schmerzlose Pulpaentfernungstinktur, Isu, Kapitol, Ketel's Antiscabin, Kopfschmerzpulver und Bandwurmmittel, Kruppmittel, Lithosan, Lytrol, Melal, Menstruationspulver Geisha, Myrtill-Laxiersaft, L. and G.'s Nervenheil-Zigarre, Okertin, Ophthalmol, Pallabona, Pararegulin, Pilules du Dr. Laville, Plantal, Plougmann's Dänisches Viehpulver, Poudre uterine de Roux, Reichel's Hustentropfen, Rheumatismuspulver, Dr. Ernst Sandow's künstliche Mineralwassersalze, Styptogan and Thelyolipsalbe.

E. MERCK'S ANNUAL REPORT. Complete Series. Volume XX, 1906. Darmstadt, May, 1907.

This is a report on the advancements of pharmaceutical chemistry and therapeutics during the year 1906. Valuable information is given concerning several hundred chemical substances and pharmaceutical preparations, about 400 pharmaceutical, chemical and medical journals having been consulted.

REPORT OF THE THIRTY-FIRST ANNUAL MEETING OF THE PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

By C. H. and M. R. LaWall.

(*Continued from page 403.*)

At this point Mr. M. N. Kline, of Philadelphia, desired the privilege of the floor, regretting that he had not been present at the previous session when the delegates were called for from the National Wholesale Druggists' Association. He desired to say a few words upon the general subject of legislation, in which the druggists are interested. He called attention to two present-day tendencies in the matter of this particular kind of legislation, one exceedingly gratifying and the other calling for our attention and interest. He spoke of the passage of the Food and Drugs Act in June, 1906, and commended it as a basis for the States to take into consideration in forming laws, which has already been done in a number of Commonwealths. With the exception of Oklahoma and Louisiana, where there have been introduced provisions which are more or less radical from our standpoint, the matter of legislation accomplished, on the whole, calls for congratulation. The tendency of which he particularly wished to speak, because our own law has not yet been enacted, is the fact that in many of the States the regulation of the sale of medicines under these laws has been placed in the hands of people who are not pharmacists, and who are, therefore, not best qualified to enforce the various provisions. The second tendency to which he called attention was the injection of what might be called practical politics into legislative matters of this kind. He warned the members against a law which is now pending in Congress, which was introduced during the closing of its first session by Congressman Mann, which he considers a most specious piece of legislation. It is intended to prohibit the sale of habit-forming drugs; but its provisions in some respects are so radical, that they require modification in order to prevent its working a hardship upon the members of the drug trade. He concluded by calling attention to the manner in which physicians have come together on legislative matters, and suggested that the pharmacists do the same.

Mr. Emanuel arose and defended the present Pennsylvania law,

calling attention to the fact that some of the provisions of the national law are based upon the present Pennsylvania pharmacy law, which was the first one to introduce the N.F. as a standard. He stated that he believed it was a mistake to allow preparations deviating from the official standards to be sold, even if so labeled. He also stated that we have at present all the legislation that we need in this State, and what is needed more is the means to carry on the work. A number of violators of the Pennsylvania law have been prosecuted within the last six months, and the attorneys for the Board declare that the law will stand the test of suits of this character. The law of 1887 was practically useless, because it had to be proved that the adulteration was intentional. The present law goes somewhat to the other extreme, but if wisely administered it is all right.

Mr. Kline, in response to a question as to what the provisions of the bill introduced into the last Congress were, stated that it was too long to give all the details, that the particular provisions affecting druggists are those applying to the manner of labeling poisons.

After some further discussion it was decided to have the bill printed in full in connection with Mr. Kline's remarks, and published in the Proceedings of the Association.

Mr. L. L. Walton asked that the report of the committee who have collected funds to reimburse the pharmacists who paid damages in the Loder suit be made a special order of business at the next morning's session.

The chairman of the Committee on Papers and Queries then assumed charge of the meeting, and a paper was read by Mr. Frailey, entitled "A Reversal of Policy."

Mr. C. L. Bonta, of Oak Lane, Pa., read a paper upon the "Druggist's Own Circulating Library." The paper was discussed by Dr. Lowe, who questioned whether it would be profitable in all stores, as his own experience had taught him that many books are stolen. Mr. Bonta, in reply, stated that he had had only one book stolen in thirteen months, and that he considered it brought business in other lines.

A paper was then read by Mr. Emanuel upon some questions arising in Board of Pharmacy examinations.

The Committee on Time and Place of meeting unanimously recommended that the Association meet at Bedford Springs in 1909.

After some short discussion, it was put to a vote and unanimously carried in favor of Bedford Springs.

Chairman Gorgas, of the Committee on Nominations, then submitted a report, and the following officers were unanimously elected to serve the Association for the ensuing year: President, L. L. Walton, of Williamsport; first vice president, Charles Leedom, Philadelphia; second vice-president, George D. Kressler, Bethlehem; secretary, E. F. Heffner, Lock Haven; treasurer, Joseph L. Lemberger, Lebanon; Executive Committee, Walter Rothwell, Hatboro, chairman; Louis Saalbach, Pittsburg; Louis Frank, Wilkes-Barre, Pa.; C. H. Marcy, of Altoona, was then elected local secretary for next year's meeting.

The reading of papers was then resumed, and E. F. Heffner read a paper entitled "Why a Pharmacist Should Make His Own Preparations," followed by a paper by B. E. Pritchard, "The Vagaries of the Law." This paper was discussed by Messrs. Kline, Emanuel, Lowe, Remington and Walter V. Smith, who took up the particular feature of the paper relating to the illegal sale of cocaine, and confirmed the statements made by the author of the paper, that there was practically no check in the sale and use of cocaine since the passage of the law.

The meeting then adjourned until 10 A.M. Thursday.

The Third Session of the Association was held at 10 A.M. Thursday. After reading and approving the minutes of the previous session, the committee on the fund to reimburse the druggists who lost money in the Loder suit reported that over eleven hundred dollars had been collected, and a detailed list of the contributors was given, after which a committee of three was appointed to audit the accounts of the committee.

The Committee on President's Address then reported upon the various recommendations, they being taken up seriatim and individually approved after considerable discussion.

Prof. J. P. Remington then read the report of the committee appointed to draw up resolutions upon the death of Secretary Dr. J. A. Miller. After these resolutions had been adopted by a rising vote, Col. H. C. Deming, of Harrisburg, read an eloquent tribute to the memory of Dr. Miller.

Mr. J. G. Bone, of Dunmore, made a short speech on the subject of Sunday closing, which led to a discussion participated in by Mr. Horn, of Carlisle, and President Lowe.

The Association then passed a motion to pay L. L. Walton one-third of the secretary's salary for his services since Dr. Miller's death.

C. H. LaWall took charge of the meeting, and a paper was read by Mr. M. I. Wilbert on "The Trend of Education in Matters Medical," which was illustrated by specimens of preparations.

Mr. J. Percy Remington then read a paper on "Capsule Filling," and gave a demonstration of a new device for filling dry capsules at the prescription counter.

Prof. I. V. S. Stanislaus then read a paper, entitled "A Few Laboratory Notes," in which he gave practical working formulas for several unofficial preparations in frequent demand.

Mr. Ambrose Hunsberger read a paper on "Strontium Bromide of the U.S.P., Eighth Revision," which was followed by a paper by Mr. E. Fullerton Cook, on "A Professional Pharmacy."

The meeting then adjourned until 2.30 P.M.

At 2.30 P.M., after the reading of the minutes of the morning's session, a reply was read from the Governor, acknowledging the receipt of the telegram sent him with reference to the appointment of Mr. Cliffe. The meeting was again turned over to the Committee on Papers and Queries. Papers were read in answer to Query No. 8, as to the advantage of buying a year's supply of patent medicines, by Mr. F. M. Apple and Mr. J. K. Thum, both of whom answered the query in the negative. Mr. C. E. Vanderkleed then read a paper, entitled "Can Uniform, and Therefore, Standard Tinctures Be Prepared from Standard Drugs Without Assaying the Finished Product?" The author gave statistics favoring the negative side of the question.

The paper by Dr. Samuel G. Dixon, in answer to the query as to whether the distribution of free antitoxin by the State Health Department was worth while, was read by Mr. E. F. Heffner. Dr. Dixon emphatically answers this question in the affirmative, giving the statistics to show that the actual mental gain to the State was many times in excess of the cost.

Miss Mary E. Tassell read a paper, entitled "Women in Pharmacy," which occasioned quite a discussion, participated in by Professor Remington, Colonel Deming and Mr. Pritchard, all of whom paid a tribute to woman's work in pharmacy.

Papers on the U.S.P. and N.F. propaganda were then read by B.

E. Pritchard, F. M. Apple, Christopher Koch, Jr., and F. H. Cope, in which the subject was treated from various standpoints, and which created a lengthy discussion, participated in by Messrs. Bone, Wilbert, Apple, Koch, Cope, Kressler, Osterlund, Krause and Stanislaus, during which many valuable points were brought out, particularly as to the value and method of detailing physicians with regard to the preparations taken up.

Mr. C. L. Bonta then gave an interesting ten minutes' talk on advertising, illustrated by a number of charts prepared for the purpose. Mr. Bonta was granted a rising vote of thanks on motion of Mr. Bone.

A paper on a new form of mixing device by Mr. I. M. Weills, of Harrisburg, was read by Mr. Croll Keller, who showed the actual working of the apparatus. On motion, it was decided to include a photographic reproduction of the device in the Proceedings.

Mr. Cliffe read two papers, by Mr. G. M. Beringer, on the subject of synonyms of some of the more common preparations, after which the meeting adjourned.

The last session of the Association was held on Thursday evening at 8.30 o'clock. A paper was read by C. H. LaWall, entitled "The Label and the Law," which was followed by a short paper on "A Novel Window Display," by Mr. R. H. Lackey. Chairman LaWall then read by title over twenty papers which had been presented, and which could not be read on account of insufficient time, after which the officers for the ensuing year were installed.

A feature of this year's closing session was the introduction of a new body, called "The Salesmen's Auxiliary," with a membership of about fifty, Mr. Frank W. Smith, of Philadelphia, being President; Mr. A. L. Wolcott, of Philadelphia, Secretary, and Mr. McFerran, of Philadelphia, Treasurer. After the re-appointment of Messrs. Bransome, Byers and Busch, and their installation as the Entertainment Committee for the coming year, the Association adjourned to meet at Bedford Springs in June, 1909.

THE FOLLOWING ARE ABSTRACTS OF SOME OF THE PAPERS:

The Formation of Precipitates by Solutions of Iodides in Enzyme Elixirs.

By H. C. Blair.

The author calls attention to the fact that solutions of the iodides and also of the bromides produced precipitates in compound digestive elixir and essence of pepsin, and on standing for some time, such solutions become darker in color and lose their agreeable odor and taste. He advises that as these elixirs are very often given merely as vehicles, a line of palatable, non-medicinal elixirs be offered to the physician for this purpose.

Beef Extracts.

By H. A. Bradshaw.

Comparative analyses are given of a number of brands of beef preparations, showing the presence of potassium nitrate resulting from the use of cured meat instead of fresh meat in making the preparations.

The Estimation of Acetanilid, Phenacetin, Heroin, and Heroin Hydrochloride.

By Edward S. Rose and Maxwell M. Becker.

A simple and satisfactory process for the estimation of any one of these four substances is given by the use of sulphuric acid and distillation, the liberated acetic acid being titrated. Comparative figures are given, showing the accuracy of the process when used with mixtures of known composition.

Improved Elixir of Terpin Hydrate.

By P. Henry Utech.

The author states that the objections to the U.S.P. and to the N.F. elixirs are, first, their exceptionally high alcoholic content, and second, the minimum amount of medicament. He suggests the following formula: Terpin hydrate, powdered, 256 grains; acetic acid, 80 minims; Tr. sweet orange peel, 2 fluiddrachms; alcohol, 8 fluidounces; glycerin, 4 fluidounces; aromatic elixir, q. s., 16 fluidounces. He states that this preparation will not precipitate, even when exposed to freezing temperature, and that it can be administered with resinous tinctures without precipitation.

Can Uniform and Therefore Standard Tinctures be Prepared from Assayed Drugs Without Assaying the Finished Products?

By C. E. Vanderkleed and L. H. Bernegau.

The authors give the results of a number of assays of tinctures made in various ways in support of the conclusion that uniform tinctures cannot be prepared from assayed drugs without an assay of the final product, the theoretical reasons for variation being due to several causes, as follows: (1) The drug may have a different strength from that given, due to moisture variation or other causes. (2) Faulty manipulation or imperfect percolation. (3) Lack of comparability of the menstrua used in exhausting and assaying the drug. (4) Differences in cellular structure and fineness and uniformity of the powder. Details are given of investigation of the following tinctures: Aconite, belladonna, colchicum, digitalis and nux vomica.

Has the Free Distribution of Antitoxin by the State been taken Unfair Advantage of, and have the Results Warranted the Expense?

By Samuel G. Dixon.

This query is emphatically answered in the affirmative as regards the last part of it, by the author, who gives statistics for two years from the Health Department of the State, showing that of 8,833 cases of diphtheria treated, only 807 resulted fatally. In addition, the free antitoxin was used during this same period to immunize 6,184 persons, of whom only 53 afterwards contracted the disease. The cost of thus protecting more than 15,000 persons was $40,826.-25, and at a conservative estimate of the cost of human life, this investment in one generation should yield a return of more than forty-two millions of dollars.

The author wholly commends the efficient manner in which the pharmacists have co-operated in the work of the Department, as the majority of the 532 distributors scattered throughout the State are the leading pharmacists in their respective localities.

Strontium Bromide, U.S.P., Eighth Revision.

By Ambrose Hunsberger.

The author has made an investigation of the correctness of the statement which is frequently made that the chemical manufacturers of the United States do not supply the grade of strontium bromide

corresponding to the requirements of the U.S.P. A list of questions was sent to each of a number of chemical manufacturers, asking for specific information along this line, and samples were obtained in the open market, of the product as supplied by these same manufacturers. Comparative tests were made with these samples and the samples of the imported product, with the result that the product as supplied by the American manufacturers was found to be far superior to that of foreign origin.

Orange Flower Water as a Perfume and Flavor
By William G. Greenawalt.

The author states that very satisfactory results were obtained in the disguising of the odor and taste of pepsin by the use of orange flower water as a flavor, stating that four ounces of the concentrated orange flower water will satisfactorily flavor a gallon of elixir of pepsin, one sample having retained its pleasant flavor for five years.

Redivivus.
By Joseph P. Remington.

The author refers to the fact that the present revival in medicine and prescription writing is due to the era of common sense and science which has been inaugurated, and which is relegating the facts, fancies and follies of therapeutics to their proper place. The search for panaceas and specifics in medicine will always be fruitless, but the investigator should not be discouraged but commended for his researches.

There are two types of workers at present. The enthusiast who makes the discoveries and the wise servant who preserves them. Each of these is necessary. It is the province of therapeutics to indicate and select the drug. The form of administration is left to pharmacy. A campaign of education is needed to convince the laity that specifics and panaceas are non-existent for the physician. Attempts to practice medicine with one remedy, given in the same dose for all conditions of a certain disease, is following the principles of a nostrum, if ever a nostrum had a principle.

The author referred to the rise of homeopathy, osteopathy and Eddyism, and attributes the great use of nostrums to the fact that faith in the regular practice of medicine was shaken because rational and scientific therapeutics had not kept pace with other sciences. Preventive medicine is not the great Moses who is to lead the regular

physicians out of the wilderness of confusion and doubt, although its importance must be understood, and full credit must be given to those heroes who have risked their lives in the investigation of the methods of preventing yellow fever, smallpox and diphtheria.

Many physicians make the mistake of advising patients who cannot afford it, to take expensive trips or to rest completely from business cares for a long period. The patient appreciates the value of this advice, but being unable to follow it, has recourse to the nostrum. The chance selection may result favorably, and the nostrum gets the credit which the physician might easily have obtained for himself had he written a prescription applicable to the condition of the man's disease, even though it would have been preferable to have had his original advice followed. The patient should be regarded as one who visits a physician because he thinks his condition is serious enough to warrant the necessary financial outlay, having waited for Nature to cure him, and having probably tried household remedies and the recommended nostrums, and he has the right to ask that his adviser will consider his case of sufficient importance to write out an original prescription especially adapted to the treatment of his ailment at the time of the visit.

The consensus of opinions expressed by eminent therapeutists at recent meetings of the medical profession was that the U.S.P. contains preparations fitted for the treatment of practically every disease. A better knowledge of the use of drugs for various diseases and various stages of the same disease, is now demanded. The nostrum business should be relegated to the background. The visit of the physician to the store should be encouraged. The professional knowledge of the pharmacist should always be at the service of the practitioner. No service is too hard or too trivial to aid the physician in any capacity.

The great danger lies in becoming tired or lukewarm in the movement and falling back into the old rut, and the vicious idea that one is in the drug business to sell the goods upon which he can make the most profit. The shelves should be filled in advance of an order or prescription with at least moderate quantities of official preparations, and care should be taken that they are official preparations in name and fact.

Following these ideas the future is full of promise, and it will be possible to stem the tide of drugless cures, psycho-therapy and the nostrum evil.

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SOME OF THE DISTINGUISHING MORPHOLOGICAL CHARACTERS OF BELLADONNA AND SCOPOLIA.*

By Henry Kraemer.

Atropa Belladonna and *Scopolia carniolica* are both members of the *Solanaceæ* and stand in close relationship. The former belongs to the *Solaneæ-Lyciinæ*, or group of plants characterized by tubular corollas and berry-like fruits, and the latter to the *Solaneæ-Hyoscyaminæ*, or plants with funnel-shaped corolla and transversely dehiscent capsular fruits. To this latter sub-group also belongs the genus Hyoscyamus, and botanically Scopolia appears to be more closely allied to Hyoscyamus than to Belladonna.

According to v. Wettstein,[1] *Atropa Belladonna* is found throughout Europe, extending to the Caucasus Mountains and Persia. The plant is also cultivated in Europe, and in some localities in the United States. The leaves and flowering tops are official in probably all of the pharmacopœias, while the roots are official in only some of these standard authorities. Both the roots and herb have been carefully investigated microscopically [2] and chemically, but the subject can not be considered to be exhausted, particularly in view of the necessity of differentiating them from other drugs which are mixed with, or substituted for, them.

While *Scopolia carniolica* was described by the earlier botanists and while it has been used medicinally for many years, it is only

* Read before the Scientific Section of the American Pharmaceutical Association, September, 1908.

recently that the drug has come into prominence, the rhizome and roots now being official in the U. S. Pharmacopœia. The habitat of the plant, according to v. Wettstein,[1] includes the region of the Eastern Alps, the Carpathian Mountains, and the adjoining country, the plant therefore being much more limited in its range than that of *Atropa Belladonna.* The natural history of the drugs derived from *Scopolia carniolica* has been given by Holmes,[3] Maisch [4] and Nevinny.[5] Greenish [6] has compared the histological characters of the rhizome of *Scopolia carniolica* with those of the root of *Atropa Belladonna,* and Moeller [7] has made a comparative study of the leaves of these two plants.

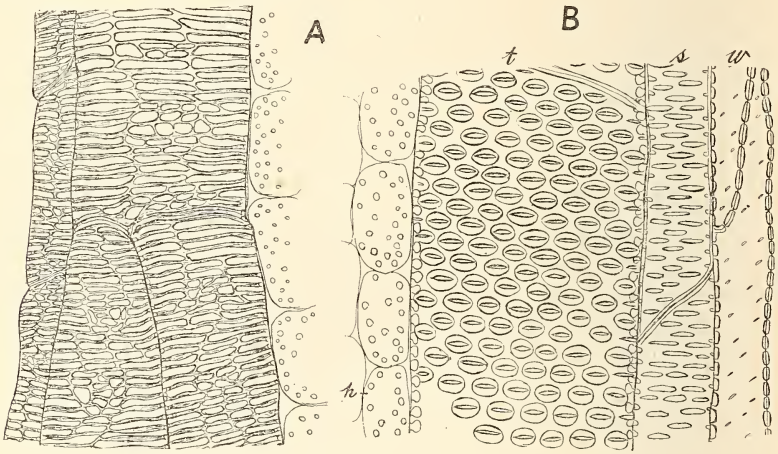

FIG. 1. *A*, longitudinal section of portion of rhizome of *Scopolia carniolica* showing reticulate tracheæ; *B*, longitudinal section of portion of the root of *Atropa Belladonna* showing wood fibers (*w*) with simple, oblique pores, tracheæ (*s*) with simple pores, tracheæ (*t*) with bordered pores, and parenchyma cells (*p*) containing starch.

Having occasion the past summer to examine belladonna roots and herb, and scopolia rhizome, roots and herb, and owing to the need of more definite comparative information for identifying and differentiating these drugs in both the crude and powdered condition by reason of their frequent admixture, it seemed to me to be desirable to present my results at this time.

Belladonna Root.—The following tissues and elements are found in belladonna root: Parenchyma containing starch and cryptocrystalline crystals of calcium oxalate, which is by far the most abundant tissue present; tracheæ, or ducts; wood fibers; cork, and occasionally bast fibers. The starch grains are single or 2- to 3-

compound, from 5 to 25 μ in diameter, and vary from spherical to ellipsoidal or ovoid, frequently having a cleft at the point of origin of growth. The crystals of calcium oxalate are deltoid or

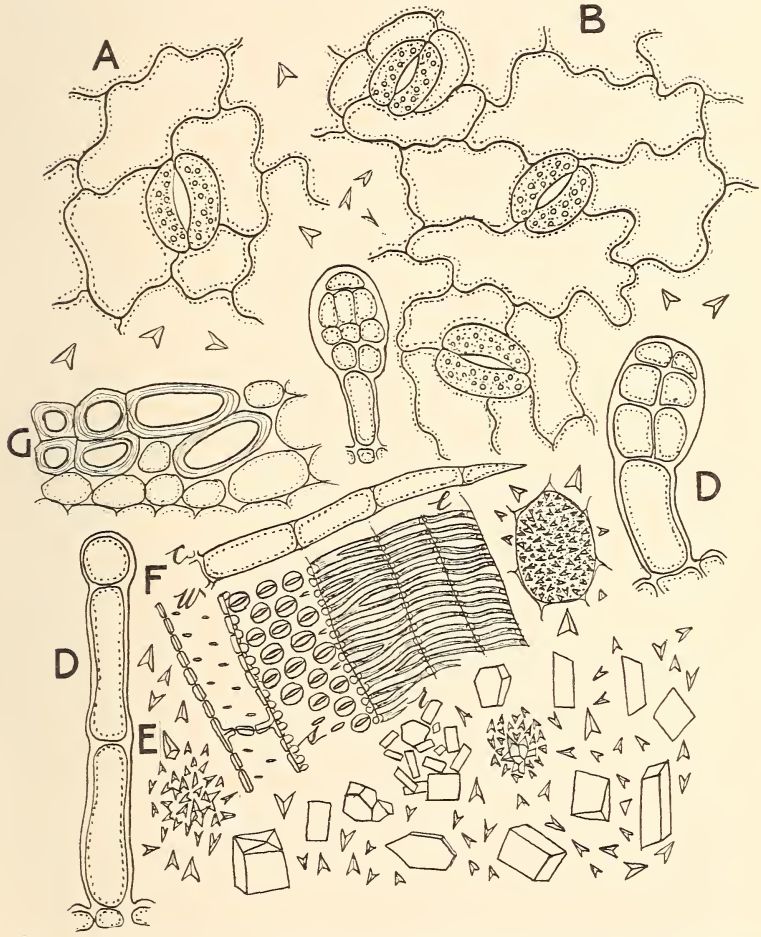

FIG. 2. Belladonna Herb: *A*, section of upper epidermis of leaf showing one stoma; *B*, section of under epidermis of leaf showing three stomata; *c*, 4-celled non-glandular hair; *D*, glandular hairs; *E*, cryptocrystalline crystals of calcium oxalate; *F*, longitudinal section of portion of stem showing wood fibers (*w*), tracheæ (*s*) with bordered pores, tracheæ (*r*) with reticulate markings, tracheæ (*l*) with annular and spiral markings; *G*, transverse section of portion of stem showing six bast fibers and a few parenchyma cells.

arrow-shaped, and vary from 4 to 15 μ in diameter. They are packed in the cells in which they occur, and are readily distinguished in the powdered drug by means of the micro-polariscope.

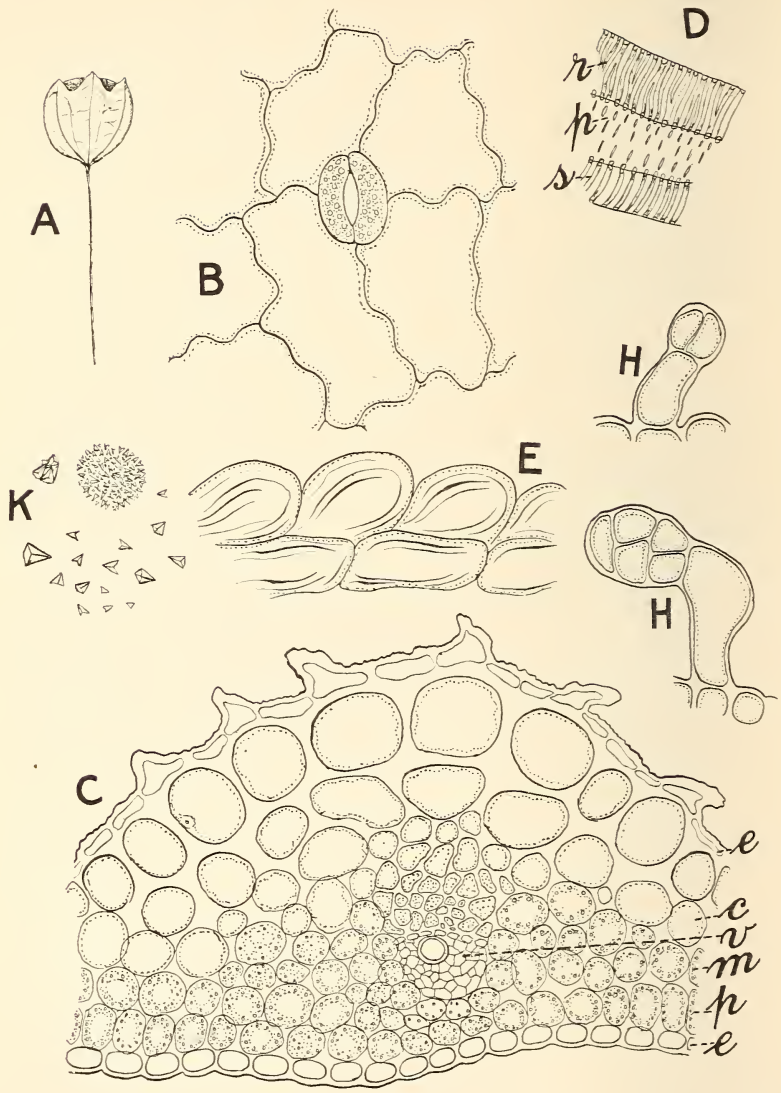

FIG. 3. Scopolia Herb: *A*, pyxis about natural size; *B*, surface section of lower epidermis of leaf; *C*, transverse section of leaf through a vein showing irregular epidermal cells of lower surface (*e*), collenchymatous cells (*c*), fibrovascular bundle (*v*), loose parenchyma (*m*), palisade cells (*p*) and upper epidermis (*e*); *D*, portion of fibrovascular bundle of stem showing tracheæ with reticulate markings (*r*), tracheæ with simple pores (*p*), and tracheæ with annular markings (*s*); *E*, epidermal cells of lower surface of leaf having foldings due to the irregularity of the outer walls; *H*, glandular hairs, which are occasionally found; *K*, cryptocrystalline crystals of calcium oxalate.

The tracheæ are strongly lignified, and are of two kinds,—those with simple pores and those with bordered pores. The tracheæ with the simple pores are the ones that have been most frequently described. The pores are slit-like and are from 10 to 17 μ long, being usually transverse. The tracheæ with bordered pores (Fig. 1, *B*) have not been heretofore described. They vary from 50 to 90 μ in width. In radial-longitudinal section the bordered pores are elliptical or circular in outline, and vary from 5 to 8.5 μ in diameter. The pore itself is narrow, bi-convex, and transverse to the long diameter of the border. With phloroglucin and hydrochloric acid, or chloral solution the wall swells to such an extent as to obscure the border. The wood fibers are lignified and have simple oblique pores, but pass into tracheids having bordered pores. The cork cells are similar to those usually found in plants, the younger ones being sometimes somewhat lignified.

Scopolia Rhizome and Roots.—Practically the same tissues are present in scopolia rhizome and roots as are found in belladonna root except wood and bast fibers. The starch grains are mostly spherical and on an average smaller than those in belladonna root, being from 3 to 13 μ in diameter. Cryptocrystalline crystals of calcium oxalate are present and resemble those found in belladonna root, but are more elongated or pyramid-like, and occasionally form aggregates, which latter are about 15 μ in diameter. The tracheæ vary from 25 to 100 μ in diameter, and are especially characterized by having reticulate markings. Tracheæ having simple, slit-like pores from 10 to 40 μ long, are also present. Both kinds of tracheæ are lignified.

Belladonna Herb.—This drug has three principal distinguishing characteristics: (*a*) The calyx lobes are rather long and spreading, exposing the berry; (*b*) the hairs on the leaves, while not numerous, are of relatively frequent occurrence (Fig. 2, *c*, *D*); (*c*) some of the tracheæ have bordered pores (Fig. 2, *F*). In addition to the small cryptocrystalline crystals of calcium oxalate abundant in some of the cells, there are present in some of the cells of the petiole and stem polygonal crystals (Fig. 2) which are anisotropic and vary from 6 to 15 μ in diameter, and in still other cells narrow prisms which are in spherite aggregates resembling those of some of the carbohydrates. Besides the tracheæ with bordered pores there also occur in the stem tracheæ with annular, spiral and reticulate markings, and wood fibers and bast fibers. The elements of the

fibrovascular bundles are more or less lignified. The bast fibers are nearly a millimeter long; the ends are pointed; and the walls on one side are usually undulate and about 6 μ thick.

Scopolia Herb.—The calyx lobes are relatively short, and the capsular fruit (pyxis) is almost completely enclosed by the calyx tube (Fig. 3, *A*). A very few glandular hairs with a 1- or 2-celled stalk and 2- to 6-celled head may with difficulty be found (Fig. 3, *H*). In addition to tracheæ with annular and spiral markings, and simple pores there are in the stem tracheæ with reticulate markings, but those with bordered pores do not occur. The crystals of calcium oxalate are of the cryptocrystalline character of those found in belladonna. In glycerin preparations spherite aggregates resembling those of carbohydrates are present, especially in the calyx. Acicular crystals sometimes separate in chloral preparations, but as they are isotropic they are not those of calcium oxalate. The epidermis of the leaves, particularly that of the under surface, is very irregular, giving a tuberculate appearance on transverse section (Fig. 3, *C*), and in surface view frequently has the appearance of folds (Fig. 3, *E*). As in the rhizome, bast fibers and wood fibers are apparently not present. There is however a strongly developed layer of collenchymatous cells in the stem, the thickenings being more uniform and more marked than those in the collenchymatous cells of belladonna.

Literature Cited.

[1] R .v. Wettstein: Engler and Prantl's Pflanzenfamilien.

[2] Tschirch and Oesterle's Anatomischer Atlas; Vogl's Pharmakognosie; Moeller's Pharmakognostischer Atlas; Kraemer's Botany and Pharmacognosy (3rd edition).

[3] E. M. Holmes: *Pharmaceutical Journal and Transactions*, **20** (1889), p. 468.

[4] John M. Maisch: *American Journal of Pharmacy*, **62** (1890), p. 107.

[5] Joseph Nevinny: *Pharmaceutische Post*, **27** (1894), p. 333.

[6] Thomas Greenish: *Pharmaceutical Journal and Transactions*, **20** (1889), p. 471.

[7] Citation by Maisch from Moeller's Pharmakognosie, *loc. cit.*

NATIONAL FORMULARY.*

Your committee on National Formulary begs leave to report that the consideration of the enlargement and systematic organization of the Committee began in December of last year, and in March of this year ten auxiliary members were nominated and then were appointed by the Council, and the whole membership was divided into five sub-committees as has been duly described in the *Bulletin*.

The Chairman has collected all the criticisms that have been published and has sent them with other matter to the members of the Committee in ten circular letters covering thirty to forty typewritten pages, copies of which are submitted herewith. This matter and the criticisms have had the careful consideration of all the members during the intervening time. The advisability of holding a meeting of the Committee in June was discussed, but it was finally decided to recommend to the Council that a meeting be held at this place prior to the annual meeting of the Association, the Council duly authorizing the holding of this meeting. The proceedings and recommendations of this meeting are as follows:

In accordance with the action of the Council, the National Formulary Committee assembled at Hot Springs, Arkansas, on Sept. 3, 1908. Nine sessions have been held involving about twenty-three hours of executive work, two sessions being held on Thursday, three on Friday, three on Saturday, and one on Monday.

Thirteen of the fifteen members are present, viz.: Messrs. Diehl, Hallberg, Hynson, Stephens, La Wall, Arny, Beringer, Dunning, Eliel, England, Scoville, Seltzer and Wilbert. The two absent members, Messrs. Cook and Hall, were unable to make arrangements to attend in the brief time which elapsed between the announcement of the Council's action and the time for the meeting, and on this account their absence may be justly excused.

STATUS OF THE COMMITTEE.

The Chairman suggested that the appointment of this Committee be made by the Council, which is composed of members who have been familiar with the duties required and the personality of the various committees rather than by an executive officer who may

* Report presented by the Committee on National Formulary at the meeting of the American Pharmaceutical Association, September, 1908.

or may not be cognizant of the fitness of his appointee for carrying out the specific duties required of them.

In accordance with this suggestion the Committee unanimously recommend to the Association that the Committee on National Formulary be appointed by the Council and that it shall continue until the revision of the Formulary for which it was appointed is completed. It is further recommended that the Committee to be appointed by the Council shall consist of fifteen members.

ORGANIZATION OF THE COMMITTEE.

For the present meeting, the auxiliary members of the Committee were placed on an equal footing so far as official action and voting is concerned, with the members of this Committee appointed by the President.

A Secretary *pro tem.* was appointed, but the committee did not deem it advisable to further change the present organization into sub-committees, etc. until after the above recommendation providing for a more permanent committee has been acted upon by the Association. The work is therefore being conducted under the form of organization with which the Association is familiar. It was deemed advisable, however, to secure the future co-operation and advice of the Medical profession and of the Medical departments of the National Government, and we recommend that the American Pharmaceutical Association, through its properly constituted officers, request the Chief of the Bureau of Chemistry, the Surgeon General of the Army, the Surgeon General of the Navy and the Surgeon General of the Public Health and Marine Hospital Service to co-operate in the work of revision by supplying such suggestions for additions, corrections or eliminations, as may be brought to their attention through or by the physicians and pharmacists engaged in these several services; and that the Chief of the Bureau of Chemistry of the Agricultural Department and the Surgeon General of the Public Health and Marine Hospital Service, be requested to assist in such laboratory work as may be necessary to improve and perfect the National Formulary and in providing such tests of identity and purity as may be necessary. We suggest that the interest and co-operation of the medical profession in this work may be best secured through the Joint Conference Committee proposed and provided for by the American Medical Association at the recent meeting of that Association in Chicago. We further

recommend that the members of this Conference Committee, to be appointed by the American Pharmaceutical Association, be selected from the membership of the Committee on National Formulary.

ERRATA VS. CRITICISMS.

The action of the Chairman in pointing out to certain Government officials that errors in the National Formulary should not be confounded with criticisms of formulas or titles, was indorsed by the Committee.

ANALYSIS OF CRITICISMS.

An analysis of criticisms made on the present Formulary by the Chairman is submitted in connection with this report.

SCOPE AND PURPOSE OF THE FORMULARY.

The scope and purpose of the Formulary is well presented in the preface to the first three editions; and we recommend that the Association continue this as its attitude in regard to the Formulary.

SHORTCOMINGS OF THE FORMULARY.

Touching the shortcomings, we recommend that conservative action is necessary in connection with the introduction of changes that the needs of all classes of pharmacists may be met, and that the question of what is or may be a medicinal preparation, or what may be obsolete or poly-pharmacal calls for liberal interpretation for the purposes of the Formulary.

ALTERNATIVE WEIGHTS AND MEASURES.

As was pointed out that owing to changes in policies on the subjects of weights and measures in successive editions of the National Formulary, much confusion in weights and measures occurred, and consequently a number of errors appear in this regard, due to the fact that the apothecaries quantities were changed into metrical and then subsequently reconverted into their original equivalents, a double liability of error being thus introduced.

After very careful consideration, the Committee recommends that the Metric system only of weights and measures be used in the National Formulary.

PERCENTAGES.

Owing to ambiguities in some statements of percentages in the National Formulary, we recommend that whenever it is desirable

to state the strength of a preparation, it be stated as containing so many grams of substance in one hundred cubic centimeters, except when all the parts are given by weight, when it may be expressed by per cent.

ALCOHOLIC PERCENTAGES.

The requirement of the National and State Pure Food and Drug Laws that the percentage of alcohol in medicinal preparations shall be definitely stated on the label has lead to the suggestions that the National Formulary add a table or other statement of the alcoholic strength of all the preparations containing alcohol.

This question being beset by a number of difficulties, a committee has been appointed to determine by experiments, whether such a statement in the National Formulary is feasible. If found feasible, the Committee will propably recommend that a statement of this character be incorporated, either under the separate preparations or in tables, as may be advisable. If it is not found feasible to state exact percentages, it may be advisable to state a theoretical strength, and to require simply that the alcoholic contents of preparations containing alcohol shall be within ten per cent. of this theoretical strength, and that slight differences in flavors and colors may be disregarded.

IDENTITY STANDARDS.

The criticism being made that the National Formulary contains a number of articles for which there is no recognized standard in the pharmacopœia or other authoritative works, and that in consequence, preparations containing such unofficial articles may vary considerably, owing to commercial variations in the articles sold under the same name. In order to correct this, two methods have been considered. One, to introduce into the Formulary such articles, with tests of identity and standard of strength, as is done in the Pharmacopœia, or for the present, to briefly define such articles in footnotes, and request the Pharmacopœial Committee to introduce such articles with tests of identity and strength of purity in the next edition of the Pharmacopœia. It is very probable that any such request would be complied with by the Pharmacopœial Committee. This Committee has deemed it wise to appoint a special sub-committee to collect that data on the number and character of such simples as are not recognized by authoritative publications before making definite recommendations on this subject.

ADJUVANT PREPARATIONS AND COLOR STANDARDS.

The suitability of some of the preparations which are largely used as vehicles or for flavoring or similar purposes in the Formulary has been questioned by different critics; among such questions are the advisability of using saccharin as a sweetening agent, the stability of some of the elixirs, the alcoholic strength of some of the elixirs, and the question of unformity in color or appearance of various preparations. These are questions needing experimental and any other evidence which may be available, and each has been treated separately and placed in the hands of a special committee. One committee has been charged with the duty of studying the coloring agents and their uses, and if practicable, to recommend some method of standardizing either the coloring agents themselves, or the color of the preparations in which they are used.

Another committee has been asked to devise basic elixirs of varying alcoholic strength which may be used in place of aromatic elixir or other bases when a low alcoholic content in the finished preparations is desirable. Such for instance as the bromide elixir.

The third committee will investigate and report upon the advisability of using saccharin in National Formulary preparations.

LIBERTIES TAKEN WITH FOREIGN PHARMACOPŒIAS.

The present Formulary has been criticised because of uncalled for liberties with the formulas of the British, German and French Pharmacopœias on the ground that a preparation which is intended to be dispensed as identical with or similar to the preparation official in one of these Pharmacopœias should not be changed in any way from the formula of that Pharmacopœia. The deviation in such formulas which have been made in past and present editions have been made for the reason that ingredients in such preparations vary in the different pharmacopœias and it is therefore often impracticable to make a foreign preparation with the American galenicals, and have it even similar to the original preparation. It is therefore necessary in many cases to entirely re-arrange the formula and thus produce a preparation which for all medicinal purposes will take the place of the original preparation, but which differs from it in some minor particulars. Your Committee thinks that such liberties are justifiable for the National Formulary, but does not mean by this that such preparations should be dispensed on foreign prescriptions

which call for the foreign preparations. We recommend that all formulas in the National Formulary be uniform in style, whether they originate here or are taken from foreign authorities.

ELIMINATIONS.

Regarding eliminations, the Committee agrees with the Chairman that the therapeutics or therapeutic incompatibilities of N. F. preparations are not within the province of the National Formulary Committee. The physician may be reasonably expected to know what he wants, and if he chooses to prescribe preparations which are therapeutically incompatible, it is the duty of the pharmacist to supply what is ordered. The Committee therefore feels that it is not justified in dismissing or rejecting any preparation simply because it is stated to be therapeutically absurd, but feels it to be our duty to supply formulas for medicaments which may be prescribed by physicians if the demand for these is sufficient to justify our attention, and if an acceptable formula can be devised or obtained. We think that some such statement should be placed in the preface to the next edition of the N. F. Individual pharmacists may point out the absurdity of some of the combinations and aim to discourage their use and demand, but the physician must decide what he wants, and if his therapeutics are at fault, it is not within the province of the National Formulary to officially criticise or correct them. Regarding detailed consideration of elimination from the Formulary, the Committee wished to act conservatively and the matter has been referred to a sub-committee, which will report on any doubtful article on the basis of actual demand as shown by statistics or other information.

ADDITIONS TO THE FORMULARY.

Your Committee agrees with the Chairman that the acceptance of formulas for any new preparation should be based upon consideration of merit in the article, of demand for the same, and upon the reliability of any formula, which may be offered. On the other hand, we must be equally careful to omit no meritorious preparations that conform to these requirements. The Formulary may also include and give suitable definitions for all articles that serve as ingredients for preparations described therein and for which no standard of quality and identification is given in the U. S. P., for which an authoritative standard may fail to be adequate for a correct recognition, either as to kind or quality.

STATUS OF THE APPENDIX.

The Committee has given a careful consideration to this question. The present appendix is occupied solely with preparations which have been discarded from previous editions of the U. S. Pharmacopœia, and are not therefore any part of the work of the N. F. Committee, but as the status of the appendix is not well established, your Committee believes that the best way of meeting this condition is to eliminate the word "Appendix" and to divide the book into two parts, each part to contain such articles as may be appropriately placed therein.

PROPAGANDA.

Under this head, the Chairman presented an analysis of the work of pharmacists and the various Sections of the A. Ph. A. which we recommend be referred in its entirety to the Section on Commercial Interests.

EXPENSES OF THE COMMITTEE.

In the past, the work of the National Formulary Committee has been wholly gratuitous, but the present legal position of the Formulary makes the work of the Committee more onerous and responsible than it has been hitherto, and we think that the regular expenses of the Committee involving correspondence, use of materials for investigation and to carry on the work should be met by the Association. Such legitimate expenses may be defined more definitely later and are not likely to be of any large amount unless by special provision and agreement as in the present case.

GENERAL SUBJECTS.

Under this title, a number of details were considered affecting the title of the National Formulary, titles to preparations, etc.

We make the following recommendations:

1. That the title page of the National Formulary should omit the words "Of unofficial preparations," and the title should be simply "The National Formulary."

2. That the nomenclature and the titles of the N. F. should be in harmony with those of the U. S. P.

3. Titles and synonyms not official should conform to modern ideas of chemistry.

4. Synonyms or English titles should agree with the Latin titles.

5. N. F. titles should be descriptive of the true composition of the preparations.

6. The introduction of therapeutic or anatomical names in the future should be prohibited, and we recommend that present therapeutic titles be eliminated as far as is practicable.

7. The method of citing botanical sources and authorities should be made to conform to modern botanical nomenclature.

8. A record of publication should appear on the title page to the N. F.

10. Authority should be given to the Committee to establish a specific date on which the next edition of the National Formulary should go into effect.

11. The *Bulletin* should serve as the official organ of the Committee on National Formulary, and should promptly publish such matters as may be sent to it by the Chairman.

Our Chairman further presented a very complete report on the keeping qualities of N. F. preparations made according to the first edition of the book, and extending over a period of twenty years. This report is available for reference, is of much value, and in the opinion of the Committee should be published in the proceedings.

The final sessions of the Committee were devoted to a detailed consideration of each separate article in the Formulary. Wherever any change was suggested, either in title, in the formula, or in the directions for manipulation, the article was referred to its appropriate sub-committee for investigation.

This detailed consideration occupied four full sessions and no article in the Formulary was omitted from consideration. This work being unfinished, is not submitted in detail at this time.

SUMMARY OF ACTS AND RECOMMENDATIONS OF THE N. F. COMMITTEE.

1. The Committee to be appointed by the Council for a full period of revision.

2. The Committee to consist of fifteen members.

3. That the co-operation of the Medical profession and the Medical Departments of the National Government be secured.

4. That the present scope of the Formulary as indicated in the preface, be continued.

5. That conservative action and liberal interpretation be given to the consideration of suitable articles for the Formulary.

6. That the metric system only be used.

7. That strength of preparations be stated as so many grams in one hundred cubic centimeters.

8. That all formulas be uniform in style.

9. That a statement be inserted in the preface to the effect that the National Formulary does not assume any responsibility for the therapeutic value of any preparation, and that the question of additions or eliminations be decided mainly on the basis of commercial demands.

10. That suitable definitions for unofficial ingredients may be inserted.

11. That the term "Appendix" be eliminated and the book designated as parts one and two.

12. That the Chairman's résumé of the Propaganda be referred to the section on Commercial interests.

13. That the expenses of the Committee be reasonably provided for.

14. The book to be simply "The National Formulary."

15. That nomenclature titles and synonyms should be in conformity with the U. S. P. or with modern ideas should be descriptive of composition, and that therapeutic or anatomical titles should be discouraged. (G. S. 2, 3, 4, 5, and 6 and 7.)

16. Insert record of publication on the title page.

17. Trade mark names shall not be introduced.

18. The *Bulletin* should serve as the official organ of the N. F. Committee.

19. Authority should be given to the Committee to establish a specific date on which the next edition of the National Formulary should go into effect.

OIL OF ORANGE.

By Edwin Dowzard.

Two varieties of orange oil occur in commerce,—sweet and bitter; the former is the oil principally used, the latter being produced only to a limited extent. It is impossible to distinguish between the two, except by their odor and taste.

Wallach has shown (*Liebig's Annalen, 227*, p. 289) that orange oil consists of about 90 per cent. of d-limonene. A small quantity of citral and l-limonene appears to be present. According to Flatau and Labbé (*Bull. Soc. Chem., Paris,* (3) 19, 361) myristinic acid and myristicol are present in small quantities, besides traces of citronellol and a new aldehyde with a characteristic odor of oranges. The above chemists have also separated an ester which is in the form of an amorphous powder. Its melting point is 64° to 65° C. and it has a strong orange odor. The presence of the methyl ester of anthranilic acid in sweet orange oil was first detected by Parry (*Chemist and Druggist, 56*, p. 462), and afterwards confirmed by Schimmel & Co. (Report, April, 1900).

The following results were obtained in the examination of seventeen samples of sweet orange oil:

	Specific Gravity 15° C.	Rotation 20° C.	Rotation First 10% distillate 20° C.	Remarks
1	.849	+70° 44′	+66° 36′	Adulterated, probably lemon oil and turpentine
2	.850	+95° 15′	+97° 20′	Normal
3	.851	+95° 20′	+95° 40′	"
4	.849	+93° 10′	+95°	"
5	.850	+95° 20′	+98° 8′	"
6	.852	+92° 14′	+93° 40′	Rotation rather low; otherwise normal
7	.848	+95° 16′	+94° 30′	Normal
8	.849	+97° 24′	+97°	"
9	.855	+94°	+94° 50′	"
10	.852	+79° 50′	+73°	Adulterated, probably turpentine or lemon oil
11	.851	+85° 30′	+85° 48′	" "
12	.854	+89° 10′	+89° 44′	" "
13	.847	+96°	+95° 40′	Normal
14	.854	+95° 10′	+96° 30′	"

	Specific Gravity 15° C.	Rotation 20° C.	Rotation First 10% distillate 20° C.	Remarks
15	.847	+86° 50′	+87° 30′	Adulterated, probably turpentine, lemon oil or terpenes
16	.847	+96°	+98° 30′	Normal
17	.846	+92° 20′	+87°	Adulterated, probably lemon terpenes

Specific Gravity.—The following are the limits given by the various authorities for this constant:

Gildemeister & Hoffmann ..... .848 to .852 at 15° C.
Schimmel & Co. ..... .848 to .853 at 15° C.
Parry ..... .848 to .856 at 15° C.
U. S. P. ..... .842 to .846 at (25° C.)

The figure .856 is exceptional; from .848 to .853 covers most commercial samples of sweet orange oil.

The specific gravity of bitter orange oil varies between .854 and .857. The addition of lemon oil or turpentine raises the specific gravity slightly, alcohol lowers it.

Rotation.—The following are the variations for this constant:

Gildemeister & Hoffmann ... +96° to +98° (20° C.)
Schimmel & Co. ..... +95° to +98° (20° C.)
Parry ..... +94° to +98° 20° C.
U. S. P. Not less than..... +95° at 25° C.

The rotation of bitter orange oil varies from +90° to +93° at 20° C. Schimmel & Co. (Report, April, 1895) have shown that the rotation of orange oil varies greatly with changes in temperature.

	Variations for each degree of temperature.
Between 10° and 20° C.	14.5
Between 20° and 30° C.	13.2

It is customary to report the rotation of orange oil at 20° C. It is not, however, necessary to determine the rotation at this temperature, as by using the above corrections the constant may be determined at any temperature between 10° and 30° C.

Owing to the high rotatory power of orange oil, sophistications such as turpentine and lemon oil are easily detected. In doubtful cases the oil should be distilled and the rotation of the first 10 per

cent. of the distillate determined. The rotation should be not at all or only slightly lower than that of the original oil. Ogston & Moore (*Chem. and Drug., 60* (1902), p. 155) state that the distillate from pure oil has a rotation of at least 1° above that of the original oil; if the increase in rotation be less, or below that of the original oil, there must be a strong suspicion that the oil has been adulterated with lemon oil or terpenes of lemon oil.

Adulterants.—The common adulterants of orange oil are: turpentine, lemon oil, terpenes of lemon and orange oils and alcohol. All lower the rotation except orange oil terpenes. Alcohol may be detected by shaking a known volume of the sample with water, the alcohol is removed by the water which of course is increased in volume. Resin has been used as an adulterant and may be detected by a residue determination. The residue on evaporation of pure oil is from 2 to 4 per cent.

The U. S. P. gives a test for turpentine by the formation of pinene nitrosochloride, but the observation of the rotation of the original oil and that of the first fraction of 10 per cent. obtained on distillation is quite sufficient for the detection of turpentine.

The constants for pure sweet orange oil are as follows:

Specific gravity, 15° C.	.848 to .853
Rotation (20° C.)	+95° to +98°

Rotation of first 10 per cent. of distillate should not be lower than that of the original oil.

Analytical Department,
Parke Davis & Co.

AMERICAN PHARMACEUTICAL ASSOCIATION.

FIFTY-SIXTH ANNUAL MEETING.

The fifty-sixth annual meeting of the American Pharmaceutical Association, held at Hot Springs, Arkansas, September 7–12, was one of the most important and successful in the history of the Association. The week was almost entirely devoted by those in attendance to sincere and earnest work tending to the development of the science and art of pharmacy and the upbuilding and realization of a greater American Pharmaceutical Association. From the open-

ing meeting until the close of the sessions it was apparent in the discussions that while there might be differences of opinion, yet every one was loyal to the Association and had the true interests of pharmacy at heart. The result was effective work in the sections and general sessions, which must in a measure give an impetus to the work of the branches this winter.

First General Session.—The opening session was held at the Eastman Hotel on the Government Promenade on Monday, September 7th, at 3 P.M., with the President, W. M. Searby of San Francisco in the chair. An address of welcome in behalf of the officials and citizens of Hot Springs was made by Hon. William H. Martin in the absence of Mayor Jodd. Frank Schachleiter, President of the Arkansas Pharmaceutical Association followed with an address of welcome on behalf of the pharmacists of Hot Springs. These addresses were responded to on behalf of the Association by Prof. H. P. Hynson and Prof. C. S. N. Hallberg. At this time Miss Mary A. Fein, Secretary of the Arkansas Association of Pharmacists presented the President with a bouquet of 56 roses, emblematic of the number of years of existence of the A. Ph. A. These were received in a most happy speech of appreciation by President Searby and we could not help but feel that it was this incident and the impromptu address of the President that did much to make the meeting pleasant as well as profitable.

Other addresses were made as follows: Alrick Hammar spoke on behalf of the pharmacists of the United States Navy; Albert M. Roehrig responded on behalf of the Public Health and Marine Hospital Service; Lyman F. Kebler brought the greetings from the Bureau of Chemistry of the U. S. Department of Agriculture; F. M. Apple represented the National Association of Retail Druggists; and W. L. Dewoody made a felicitous address on behalf of the National Association of Wholesale Druggists.

Telegrams with greetings were received from the members of the Association residing in Cuba and in the Philippine Islands. These were acknowledged by telegrams. As the Treasurer, S. A. D. Sheppard was unable to be present, owing to illness, a telegram was sent him expressing the sympathy of the members of the Association. Professor Caspari read a letter in which he stated that Mr. Sheppard had sent a check for one thousand dollars to be added to the Endowment Fund of the Association. A letter from the Honorary President Philip C. Candidus was read stating his

inability to be present and expressing his hearty wishes for a successful meeting.

Professor Oldberg, first Vice-president was called to the chair and the President proceeded to read his address which was an able and forceful essay devoted to the consideration of the following subjects: reorganization, membership, local branches; membership in proportion to population; status of pharmacists; prerequisite laws; profession, trade, ethics; commercial pharmacy; patent medicines and fads; pharmacists and physicians; manufacturing pharmacists; pharmacists in the government service; legislation affecting pharmacists; the *Bulletin;* and the endowment fund.

In conclusion President Searby said:

"The American Pharmaceutical Association has reason to celebrate its fifty-sixth anniversary in a cheery mood, because it has made substantial advances during the past year. Its membership roll is higher than ever before, and gives promise of further growth. Its activities have been greater, benefiting a larger number, as its local branches have brought the pharmacists of new localities more immediately within the sphere of its influence. This beneficent work is in its infancy, for the number of these branches is sure to increase. The cause of pharmacy is to be congratulated in the fact that the desire to obtain better drugs and pharmaceuticals is well-nigh universal in this great land, and that the Pure Drug Laws, now so numerous, are but the enactment into legal statutes of the long-cherished desire that gave birth to this Association. Again, the success of the "get together" movement wherever it has been seriously tried, encourages the belief that pharmacists and physicians have passed their apogee, and that the perigee of mutual co-operation for mutual good is coming, let us hope, with a comet-like swiftness. And while physicians are breaking away from prescribing proprietaries, druggists are also manifesting a more healthy sentiment on the subject of patent medicines. One movement helps the other. It is true that in certain parts of the West and Middle West some druggists do still permit displays of nostrums in their store windows thereby giving tacit endorsement to questionable remedies. Yet the tendency is to discourage their sale and to encourage sane medication under medical advice. Shorter hours of business in drug-stores, and especially on Sundays, are being adopted in many towns, and the movement will surely grow. These steps towards ethical

and social improvement, together with the general endorsement of the "tell-the-truth" policy in regard to labels and advertisements, operating concurrently with the general advance in educational requirements by colleges and boards of pharmacy, and with the increase of prerequisite state laws—these things are all conducing to an elevation of the status of the pharmacist, and will in due time tend to his securing better compensation."

"So as I close this address, I ask you to turn your faces toward the rising sun; feast your eyes on visions of a brighter day, towards which we are all working, as we seek to promote true pharmacy by education, by legislation, and by steady, persistent efforts to develop a scientific, practical and ethical pharmacy."

Second General Session.—The meeting was called to order by President Searby and after the reading of the minutes of the first session by Secretary Caspari and of the Council by the secretary, Prof. Whelpley the Committee on Nominations reported through the Chairman, Harry B. Mason. The following members were nominated and subsequently elected to the respective offices: President, Oscar Oldberg; Vice-presidents, E. G. Eberle, William Mittelbach and James H. Beal; Members of council, Henry P. Hynson, S. A. D. Sheppard, W. M. Searby and F. W. Meissnêr. According to the new by-laws the officers of the Association for 1909–10 will be elected by ballot through the mail and the Committee reported the following nominations: For President, E. G. Eberle, H. H. Rusby, and A. B. Stevens; for first Vice-president, C. B. Lowe, F. B. Lillie and Frank B. Schachleiter; for second Vice-president, Charles W. Johnson, Francis B. Hays and Murray G. Motter; for third Vice-president, E. V. Howell, W. B. Day and John B. Bond. For members of council, George M. Beringer, Oscar Oldberg, Albert M. Roehrig, Charles E. Caspari, Joseph W. England, Frederick W. R. Perry, William Mittelbach, William L. Dewoody and Harry B. Mason.

The Council recommended the nomination of S. A. D. Sheppard for Honorary President. The nomination was approved and Mr. Sheppard was accordingly elected honorary president. The report of the Treasurer was read by the Secretary, Professor Caspari. In it was shown that the "net cash balance July 1, 1908 exceeded that of July 1, 1907 by $1835.45, and the increase in value of the Funds, during the year, was $3065.42, making a total of $4900.87."

The total value of the several funds, viz.: Ebert Fund, Centennial Fund, Life Membership Fund and Endowment Fund amounts to $21,670.47. After the report was adopted Professor Remington offered resolutions testifying to the appreciation of the members of the arduous labors of Mr. Sheppard, who for 22 years has acted as Treasurer of the Association and who through illness was unable to attend this meeting. The resolutions were signed by all the members present and subsequently forwarded Mr. Sheppard.

Professor Caspari read the report of the financial accounts in the care of the General Secretary. In the report of the Committee on Publication prepared by Professor Caspari it was stated: "that the demand for the new edition of the National Formulary continues, but not as actively as last year; and that it became necessary to print another issue of 5000 copies of the book during the past year, making a total of 29,000 copies to date. The total expense to date of publishing, advertising and delivering the 3rd edition of the National Formulary amounts to $9699.06."

The most important report presented at the session was that of the Committee on National Formulary which was read by W. L. Scoville and which will be found on p. 465 of this JOURNAL.

Reports from the following were also received: Committee on National and State Legislation, Oscar Oldberg, Chairman; Committee on President's Address, Joseph W. England, Chairman; Reporter on Progress of Pharmacy, C. Lewis Diehl; Committee on the Bulletin, H. P. Hynson, Chairman; Committee on Status of Pharmacists in the Army, Navy and Public Health and Marine Hospital Service of the United States, George F. Payne.

The following resolution on the appointment of a committee on standards of non-official drugs and chemical products was offered by Professor J. H. Beal and after some discussion adopted:

Resolved:

1. There shall be a standing committee of the Council to be known as the Committee on Standards of Non-official Drugs and Chemical Products, consisting of fifteen members elected by the Council, but the members of such Committee need not be members of the Council.

2. The first Committee shall be constituted as follows: two representatives from firms engaged in the manufacture of pharmaceuti-

cals, two representatives from firms engaged in the wholesaling of drugs and chemicals, five retail druggists and four representatives from the faculties of colleges of pharmacy.

3. The Committee shall prepare from existing sources of information, a tentative list, subject to revision, correction and extension by this Association, of the principal drugs, chemicals and medicinal preparations not recognized by the United States Pharmacopœia, with a suitable system of nomenclature for the same, and shall adopt suitable limits of strength and purity therefor.

4. The chairman of said Committee shall be designated by the Council and the Committee shall report progress annually.

5. The Committee first chosen shall serve for one year, and at the next annual meeting of the Council shall report upon a plan for the permanent organization of the Committee, and also upon a plan for the permanent continuance of the work.

Third General Session.—On Friday evening an extra general session was held which was mainly devoted to a discussion on the time and place of next meeting. As there was a strong desire on the part of the members to arrange to hold a meeting simultaneously with the National Association of Retail Druggists it was decided to leave the matter in the hands of the Council with power to act.

At this session it was reported that 265 new members had been elected during the past year. A resolution was passed suspending the by-laws during the meeting next year so as to allow additional time for the Section on Scientific Papers. This Committee will probably arrange for seven continuous sessions, allowing ample time for the reading of papers and discussions thereon.

The greetings of the American Medical Association were presented through Dr. C. Travis Drennen, former President of the Arkansas Medical Association. Dr. J. C. Miner of the Hot Springs Medical Society also spoke for the local Medical Society. Professor Remington responded for the American Pharmaceutical Association. The report of the Committee on United States Pharmacopœia of the Association was read by Professor Hallberg. The Committee on the William Procter, Jr. Monument Fund presented a report through the Chairman, Dr. John F. Hancock. The following officers for the ensuing year were appointed by the Council: General Secretary, Charles Caspari, Jr.; Reporter on the Progress of Pharmacy, C. Lewis Diehl; Treasurer, Henry M. Whelpley.

Final General Session.—The last general session was held on Saturday morning. The minutes of the new Council showed the election of the following officers: Joseph P. Remington, Chairman, and Joseph W. England, Secretary. A number of reports of Committees were received and resolutions referred to the general sessions from the sections were adopted. The most important work of the meeting was the adoption of all the resolutions offered by the Committee on National Formulary and the discussion on the re-organization of the Association. While no active steps have been taken to re-organize the work of the Association it is not unlikely but that steps will be taken in the near future to concentrate the work, and shorten the time of the meetings. After the installation of the new officers President Oldberg declared the fifty-sixth meeting of the Association adjourned *sine die*.

SECTION ON SCIENTIFIC PAPERS.

This Section held two sessions on Thursday. The Chairman of the Section, Professor Virgil Coblentz, was unable to be present on account of trouble with his eyes and his address on "Our Pharmacopœial Rubrics" was read by the Secretary, Chas. E. Vanderkleed, who also acted as chairman of the Section. The Ebert Prize was awarded to A. B. Stevens and L. E. Warren for their paper, on "Poison Sumac" (Proc. 1907, p. 423; AMER. JOUR. PHARM., 1907, p. 499). The report of the Committee on Drug Market was read by Lyman F. Kebler. The following officers were elected for the ensuing year: Chairman, Charles E. Vanderkleed; Secretary, M. I. Wilbert; Associate, Albert H. Clark. The following are abstracts of some of the papers which were presented:

CRUDE AND POWDERED DRUGS AT THE PORT OF NEW YORK DURING THE YEAR 1907–08.

By H. H. Rusby.

"Doubtless the most important part of the year's results is the demonstration that much of the adulteration of drugs is intentional and studied, and is a business proposition purely." The findings of Dr. Rusby will be published in a later issue of this JOURNAL.

On the Crystalline Alkaloid of Calycanthus Glaucus.

By H. M. Gordin.

This is a continuation of the work by the author. From another lot of seeds although extracted in a similar manner to that by which he obtained the alkaloid calycanthine (Proc. 1904, p. 345; 1905, p. 224) he now obtains a different alkaloid, to which he has given the name isocalycanthine, and which he considers to be isomeric with the previously isolated alkaloid calycanthine.

Air-dried isocalycanthine melts at 212–14°. It is easily soluble in acetone and pyridine, more difficultly in ether, almost insoluble in benzene, and insoluble in petroleum ether. A saturated solution in alcohol, prepared by shaking excess of finely powdered isocalycanthine with alcohol in a mechanical shaker for eight hours, contained 1.4 grams in 100 Cc. A saturated solution in water, prepared by the same method at the same temperature, contained 1 part in about 6000 parts of solution. In both cases the residues left after evaporating the solvent were not dried to constant weight, but kept at 80° for three hours and then in desiccator for one hour. The saturated aqueous solution of isocalycanthine gives no turbidity with Mayer's reagent unless acid be present; with Wagner's reagent turbidity appears even in absence of acid.

On prolonged exposure to the air, isocalycanthine becomes yellowish. The color reactions so far examined seem to be identical for both alkaloids. An attempt to determine the molecular weight of isocalycanthine by titration with standard hydrochloric acid, using hematoxylin as indicator, gave unsatisfactory results, the end reaction being very unsharp. Other indicators were not tried.

Following is a report on the crystallography of isocalycanthine by Dr. E. H. Krauss:

"The crystals of isocalycanthine which were subjected to a crystallographic examination were obtained by slow crystallization at room temperature from a solution in hot alcohol. They are rather small, the largest being about 2 mm. in length. The crystals are clear, colorless and transparent, and possess high refractive power. For the most part the crystals are well developed, the faces being bright and affording excellent images.

From the angular measurements of the crystals and the form and position of the etch figures on the basal pinacoid, the crystals must be referred to the orthorhombic bisphenoidal class.

Some of the Distinguishing Morphological Characters of Belladonna and Scopolia.

By Henry Kraemer.

This paper appears on p. 459 of this Journal.

The Estimation of Phenol.

By W. A. Puckner and A. H. Clark.

The experiments here described were undertaken with a view of evolving a satisfactory method for the isolation and estimation of phenol in pharmaceutical products, such as tablets, powders, etc., when other substances which interfere with a direct estimation are present.

Most of the experiments were made on tablets containing bismuth, opium, aromatic powder, and phenol or on mixtures containing these substances in known proportions. As a means of isolating phenol, distillation first suggested itself. Some of the substance was placed in a distilling flask, water added, the liquid rendered acid, and then distilled nearly to dryness. The phenol in the distillate was determined by the bromine absorption method of the U. S. P. Results in this way were not quite satisfactory, as it was thought impossible to distill all the phenol and keep the volume of the distillate within such limits as would permit an accurate estimation of the phenol present therein.

Extracting the powdered substance with ether, removing the phenol from the ether solution by shaking with a solution of potassium hydroxide and determining the phenol in this liquid gave results which were uniformly high when applied to mixtures of known composition. This was found to be due to the use of ether, and the method accordingly abandoned.

Extracting the powdered substance with water either by percolation or by maceration, and after standing some time removing an aliquot portion of the clear supernatant fluid, and in this aqueous solution determining phenol, was tried. The results again were high; this and also the difficulty in filtration, uncertainty in measurements, etc., lead to the abandonment of this method.

Extraction after the manner outlined above for ether, substituting chloroform for the ether, gave results which were very uniform, and on mixtures of known compositions were entirely

satisfactory. Thus in a prepared mixture containing 7.14 per cent. of crystallized phenol, assaying 96 per cent. by the U. S. P. method, 7.00 per cent., 7.01 per cent., 6.9 per cent., 7.09 per cent. and 7.15 per cent. of the phenol was found.

In trying to confirm the results obtained by extraction with chloroform an entirely different method was suggested, namely, that of distillation in a current of steam. Results obtained by this method at first seemed to agree with and to confirm the accuracy of the chloroform extraction method, but it was soon found that on some of the tablets results considerably higher were obtained, while on the other hand two specimens gave results much lower. In some of these experiments the distillate assumed a yellow color, the tribromphenol did not separate well, and in the final titration the end point was not sharp.

The authors after careful investigation found the cause of these untoward results and have obtained satisfactory results with the following method: The substance containing the phenol was placed in a round-bottomed distilling flask and water sufficient to cover it was added. The flask was connected by means of a double perforated rubber stopper, on the one hand, with a Liebig condenser, and on the other with a tin reservoir containing water. A current of carbon dioxide was then passed from a Kipp generator through the reservoir and distilling flask for fifteen minutes or more. (In the case of the known mixtures of phenol and potassium hydroxide V. S., phenolphthalein was added and carbon dioxide passed until colorless, about five minutes being sufficient.) The water was then heated to boiling and the distillation continued, a brisk current of carbon dioxide * passing through the apparatus continually until 250 Cc.† of distillate was obtained. Of this distillate

* Simple saturation with carbon dioxide will not liberate all the phenol, but a stream of the gas must be passed during the distillation; when in an experiment the supply of carbon dioxide was cut off as soon as the saturation was complete, and then the distillation continued, only 88.64 per cent. of the phenol was recovered in one case, 90.48 per cent. in another, and 86.68 per cent. in a third.

† If 250 Cc. of distillate is collected, as shown in an experiment with pure phenol, the first 100 Cc. of distillate in one case contained 96.48 per cent. of the phenol taken and in another 97.22 per cent.; with a mixture of phenol, opium, bismuth subnitrate, and aromatic powder, and containing 7.21 per cent. phenol, the first 100 Cc. distillate contained 98.61 per cent. of the phenol present.

50 Cc. was taken and placed in a 250-Cc. glass-stoppered flask, 25 Cc. of standard bromine solution added, and the mixture acidulated with 5 Cc. hydrochloric acid U. S. P.; the mixture was shaken frequently during one-half hour, and then 5 Cc. potassium iodide T. S. was quickly introduced and the mixture well shaken. The stopper and neck of the flask were rinsed with water, a small amount of chloroform added, and the iodine titrated with standard sodium thiosulphate V. S.

The following conclusions are drawn from these experiments: First. The method of the U. S. P. for the valuation of phenol is entirely satisfactory, and also may be applied when the volume of the phenol solution is as great as 50 Cc. and the amount of phenol present sufficient to absorb from 10 to 90 per cent. of the bromine solution added. Second. Phenol can be completely removed from a solution containing much potassium hydroxide by first saturating with carbon dioxide and then distilling with steam in a current of carbon dioxide. Third. Under these conditions as much as .150 Gm. phenol is found in the first 100 Cc. distillate. Fourth. The presence of such bodies as sulphites, bromates, and nitrates does not affect the estimation of phenol by this method.

Solution of Chlorinated Soda.

By H. V. Arny and O. H. Dawson.

This was a critique of the process of manufacture of this product as given by U. S. P. VIII, showing that solutions prepared by this process, yielded respectively, 2.01, 1.65 per cent. and 1.65 per cent. available Chlorine, despite the fact that the amount of chlorinated lime used was increased to represent the pharmacopœial content (30 per cent.). A report of experiments with modifications of the process of the Pharmacopœia of 1880, by which the chlorinated lime paste is mixed with sodium carbonate solution and filtrate collected was given. In three experiments, 12 Gm. chlorinated lime (26.7 per cent.) and 6.5 Gm. monohydrated sodium carbonate were used, the difference in methods being in the amount of water employed and consequently the amount of filtrate obtained; the quantities of filtrate being 25 c.c., 43 c.c. and 90 c.c. respectively. In the fourth experiment, a tenfold recipe was used and 900 c.c. filtrate collected. The four finished solutions assayed respectively 3.05 per cent., 2.50 per cent., 2.67 per cent., and 2.85 per cent. available Chlorine.

The authors stated that in view of our food and drug laws, state and national, the instability of chlorinated lime and of solution of chlorinated soda, is a menace to every dispenser of these two compounds. It is useless for the retailer to comfort himself with the assurance that no food official would prosecute the seller of these unstable products, nor is it wise to dismiss the subject with the short answer that Labarraque's solution is rarely called for. The fact still remains that 30 per cent. chlorinated lime, and 2.4 per cent. Labarraque's solution are official; that these strengths are practically never possessed by the chemicals dispensed by the retailer; and that unless other strengths are distinctly stated on the label, it is understood that the products are of pharmacopœial strength.

To the writers the only apparent way out of the dilemma, as far as chlorinated lime is concerned, will be the reduction of the official strength of that chemical to 25 per cent. at the next pharmacopœial revision; and as for solution of chlorinated soda, it should be freshly prepared by the pharmacist, and that by a modified recipe, such as suggested in this paper and from chlorinated lime of unimpeachable quality.

In this connection the writers suggest to those wholesalers who specialize in chlorinated lime, the advisability of dispensing same in 12 Gm. lots in sealed glass tubes, similar to those used for amyl nitrite. By having the tube long enough, it should be possible to use the heat necessary to seal the tube without unduly heating the chemical and this device may prevent loss by volatilization. That the chemical deteriorates even when sealed with paraffin in cork or glass-stoppered bottles, the data found in this article clearly show.

The quantity, 12 Gm. of chlorinated lime, is suggested as affording a convenient basis for making up 100 cubic centimeters of Labarraque's Solution by the modified recipe suggested in this paper.

Proteid Compounds of Heavy Metals.

By H. A. B. Dunning.

The paper consisted of a collection of notes on the preparation of compounds of albumen and peptonized albumen with iron, mercury, silver and copper. Referring to the iron compounds, various methods were used to produce them. The object of the experimental work was to devise satisfactory processes for the production of

soluble compounds. To accomplish this, various chemical substances —sodium hydroxide, sodium citrate, ammonium citrate and magnesium citrate—were employed to promote solution.

Oil of Sandalwood.

By A. R. L. Dohme and H. Engelhardt.

This was a reply to papers by E. J. Parry and Schimmel & Co. on the value of optical rotation as a test of purity. The authors have controverted the arguments of these two authors and offered, besides their own experience, the experience and results of two other large distillers of this oil, in favor of reducing the optical rotation of the U. S. P. on sandal oil. The authors maintained that assay of santalol, the active principle, solubility in 70 per cent. alcohol, and specific gravity are ample to define a pure oil, but saw no objection to including the acid and saponification numbers to recognize adulterations. If optical rotation must be included, they insist that it should be lowered to $-12°$ as a minimum requirement, so as to avoid ruling out much of the oil now distilled, perfectly pure, and meeting all requirements.

Purity of Some Official and Non-Official Drugs and Chemicals.

By A. R. L. Dohme and H. Engelhardt.

An examination of about 10,000 drugs and chemicals was made and a report was given of those that did not measure up to requirements. The results showed a marked improvement in quality of goods examined since the passage of the Pure Food and Drugs Act. Among the drugs not usually attaining standard requirements were mentioned asafœtida, ergot, hyoscyamus, jalap, croton oil, oils of eucalyptus, bitter orange, and savin. A strong recommendation was again made for incorporating in the U. S. P., 1910, a "Chloroform pro narcosi" as very few if any on the market meet the requirements of such a product. A digestive strength test for papain was suggested to be made official. Resin scammony made from the roots of scammony or orizaba root was suggested to be made official, as the virgin scammony was found to be practically off the market. Saffron should be returned to the U. S. P., as it is used considerably and is frequently adulterated.

Notes on the Estimation of Hydrastine.

By Frank R. Eldred and C. M. Pence.

Data were given relative to the purity of the hydrastine obtained in assaying golden seal by different methods. The estimation of hydrastine in glycerin solutions was also considered.

A Note on the Separation of Emulsions for Analysis.

By Frank R. Eldred and W. C. Bartholomew.

The authors stated that practically all emulsions may be separated by alcohol in such a manner that the oils, emulsifying agents, and other ingredients can be accurately determined and examined. Results illustrating the accuracy of the method were given.

A Further Study of the Alkaloids of Gelsemium.

By L. E. Sayre.

This was a brief review of former work, upon the constituents of the drug, by the author. A review of Thompson's work on gelsemine and gelseminine was given, and further progress in the investigation of these two alkaloids of Thompson, by employing 40 pounds of the drug from which the alkaloids were extracted and the resulting principles examined was reported. Physiological tests were made of the products. A process for the assay of gelsemium preparations was also suggested.

The author says that Havenhill's gravimetric process gives results which are entirely too high on account of adherent coloring matter, but that the Webster general process for alkaloids which is given in the American Journal of Pharmacy for July, 1907, and applied by him (see Proceedings Amer. Pharm. Ass'n, 1907, p. 356) is decidedly the most favorable process for alkaloidal gelsemium estimation. Care has to be used in shaking out the alkaloid that no emulsion occurs. This can be obviated by avoiding vigorous shaking during the process. The great advantage of the Webster process is that the final solution for titration is apparently free from coloring matter. It has only a slight fluorescence and makes an ideal solution for titration. As an indicator Mr. Webster prefers a solution of iodeosin in water saturated with ether, the neutral point being determined by noting the color of the mixture on agitating. His results were obtained by using cochineal as indicator.

The Superiority of Artificial Mineral Waters.

By Enno Sander.

The author gave the origin of mineral waters. He stated that Meteoric water penetrates the earth's crust and returning to the surface loaded with materials, creates healing springs, and that they are beneficial only at their source. They have no uniformity of composition at different times, and are easily decomposed by various causes. They cannot be bottled or transported. It was stated that Dr. F. A. Struve constructs apparatus for preparing artificial waters of same composition as the natural but without their disposition to degeneration, and that scientists of all countries indorse the invention. On the other hand opposition had been active but vain. The author said that there is necessity for pure materials and stated artificial waters have many merits.

The Detection of Phenol and Cresotic Acids in Salicylic Acid and its Derivatives.

By H. Engelhardt and H. W. Jones.

The Carletti reaction for the detection of phenol in salicylic acid by the use of a 2 per cent. alcoholic solution of furfurol was applied to a number of samples of salicylic acid and its derivatives. The investigation was extended to discover whether this reaction is also applicable to cresotic acids which are formed during the process of manufacture of salicylic acid. The authors found that the cresotic acids give the same color-test as phenol with Carletti's reaction, the sensitiveness being even greater than with phenol. Of eighty samples of salicylic acids and derivatives, only 60 per cent. were found free from contamination.

Notes on Syrup of Hypophosphites and Syrup of Calcium Lactophosphate.

By H. W. Jones.

The results were given of a study of the progressive inversion taking place in the above named U. S. P. syrups. These results, presented in the form of curves, showed the rate and extent of this inversion in Syrup of Hypophosphites, U. S. P., and Syrup of Calcium Lactophosphate, U. S. P., and in experimental syrups containing varying amounts of either mineral or organic acids. It

was found that all the cane sugar of Syrup of Calcium Lactophosphate, U. S. P., was inverted, under ordinary conditions, within twenty weeks, while 19 per cent. of that contained in Syrup of Hypophosphites, U. S. P., is inverted in the same time.

The Desirability of More Elaborate Pharmacopœial Standards.

By L. D. Havenhill.

The author claimed that the primary aim of the U. S. P. is to provide the physician with an armament of drugs and medicines of standard quality. He stated that the gradual replacing of the crude drugs by crushed and powdered ones, as well as the increased demand for them and the attendant variation in quality, makes it desirable to have more elaborate official descriptions and standards for the latter. In the light of our present knowledge of the quality of crude drugs, pharmacists cannot hope to prepare preparations of satisfactory uniformity without standards for color, ash, and extractive, as well as for the recognized active constituents.

Deterioration of Hydrocyanic Acid.

By Virgil Coblentz and Otto B. May.

The deterioration of this acid, prepared from potassium ferrocyanide and also silver cyanide, was studied under various conditions with the following results: Diffused light plays no important part in the decomposition. The employment of 50 per cent. alcohol as a medium serves as an excellent preservative, as well as the employment of a 1 per mille solution of acetanilide or acidification with an inorganic acid. Prussic acid is best preserved in paraffined bottles where every contact with glass is avoided, the loss amounting to about 6 per cent. in nine months. Decomposition is brought about through the presence of alkali cyanides, especially ammonium cyanide.

Quantity of Arsenic in Bismuth Salts and Testing Same for Arsenic.

By Virgil Coblentz and Otto B. May.

The authors advise against the use of nitric acid in the ignition of the various organic salts of bismuth previous to testing for arsenic, owing to the difficulty encountered in removing the last traces of nitrate from the ash.

This ash, when boiled with a solution of potassa and filtered, to remove the bismuth, gives up its nitrate which, when acidified and introduced into a Marsh-Berzelius or any form of apparatus based on the generation of arsine gas, causes the decomposition of the latter. Simple ignition of bismuth salts does not cause any loss in arsenic content. Quantitative estimations of the arsenic content of twenty-five samples of commercial bismuth salts were made, among which there were six free and two with barest traces of arsenic, while the remaining contained from 0.05 to 0.2 parts of arsenous oxide per 100,000.

The Acetic Acid Fluid Extracts of the U. S. P., VIII.

By Joseph Feil.

These preparations keep well, but lose acidity on standing, the loss varying for each fluid extract. Their odor improves. It is thought that a large number of this class of galenicals would find extensive use in veterinary practice. It is suggested that a veterinary surgeon would be a valuable addition to the Revision Committee of the next Pharmacopœia, as druggists are finding an increased demand for medicines intended for domestic animals. It is further suggested that a similar line of argument could be applied to the dental profession and a D.D.S. be made a member.

Interference of Sodium Bicarbonate in the Testing of Pancreatin.

By C. E. Vanderkleed and L. H. Bernegau.

Although pancreatin is supposedly most active in alkaline solution, the presence of sodium bicarbonate seriously interferes with its amylolytic action, as shown in the assay of Compound Pancreatic Powder, N. F., and other mixtures of pancreatin and sodium bicarbonate, unless the latter be first neutralized with acid.

Section on Pharmaceutical Education and Legislation.

This section held three sessions on Wednesday with J. W. England, Chairman and Charles H. La Wall, Secretary, both present. The address of the Chairman was devoted to the work of the section and among other things stated, " that, at the present time, there is no real need for 90 schools of pharmacy in this country.

One-half this number could do the work better than it is done. Few of the schools have received endowments, although some received a part of the state appropriations made to state universities. Hence, if the smaller schools would combine, their facilities for instruction would be increased, their instructors would be better paid and the general conditions of pharmaceutical education would be distinctly improved."

The Secretary presented a report which contained considerable statistical information in regard to the curricula and number of students of the colleges and schools of pharmacy, the work of the Boards of Pharmacy and the reports on the new and proposed legislation in the various states. The Chairman, Jos. W. England and the Secretary, C. H. La Wall were re-elected as officers of the section for the ensuing year. The following are the associates: Cornelius Osseward, Julius A. Koch and Leo R. A. Suppan. The following are the abstracts of some of the papers which were presented:

Importations of Opium, Coca and their Chief Alkaloids.

By Henry P. Hynson.

The author has compiled figures on the amount of these drugs which has been imported from 1903 to 1907 inclusive. The figures do not show that the active legislation and punitive campaign of the last five years would cure the abuse of these drugs. There seems to be great need for the adoption of other means than those already tried to prevent and counteract the growing evil. While the reputable importers and manufacturers of alkaloids have stated that they believe the sale of these drugs especially cocaine has decreased, the government figures flatly deny such a condition and plainly suggest the probability of the existence of dishonorable and secretive sources of supply, not known to honorable members of our profession.

Professor Hallberg offered the following resolution which received the approval of the Association: As the importation of coca and its alkaloids can be controlled only through the custom's service, every importation should be registered at the Port of Entry and the Treasury Department or other department of the Federal government should keep an account of the sale and distribution of the same and report where it goes.

Pharmacy Facing a Crisis.

By Harry B. Mason.

In an exhaustive paper the author considered: (*a*) the scope and success of the temperance movement; (*b*) the secret of its strength and permanence; (*c*) the danger to pharmacy; (*d*) the remedies; and (*e*) legislative measures. The whole sum and substance of Mr. Mason's paper was a plea that pharmacists should realize the danger which confronts them understand that it points to the necessity of prompt and vigorous measures, that it is clearly their duty to take absolute control of the situation as it affects their own calling, and that only by such methods can they avoid public disgrace and dishonor besmirching the entire profession and dragging its standards in the dust.

The following resolution was passed and received the endorsement of the Association at the general session on Saturday:

Whereas, a great tidal wave of temperance legislation and reform is sweeping over our own and several foreign lands, and nearly half the entire population of the United States, occupying two-thirds of the geographical area of the country, has already outlawed the saloon in no uncertain manner; and

Whereas, a small minority of druggists are taking illegal and dishonorable advantage of the situation to do a general business in the sale of liquor, while non-druggists, seizing upon the opportunity, are employing registered men, opening nominal drug stores, and really conducting saloons under the protecting cloak of pharmacy; and

Whereas, this condition of things presents pharmacy with a grave and threatening danger, is already bringing odium and calumny upon the whole profession, and calls for prompt and courageous measures if we are to save the honor and integrity of the calling; therefore be it

Resolved, by the members of the American Pharmaceutical Association, that we discountenance the sale of liquor in drug stores for other than legitimate medicinal purposes; that any pharmacist or pseudo-pharmacist who strives to take advantage of temperance legislation for personal profit is a disgrace to the profession and should be ostracized by it; and that as members of an upright and conscientious calling we should ourselves undertake the discovery and punishment of those within our ranks who bring us all into dishonor. Be it further

Resolved, that we call upon the city, county and state pharmaceutical associations throughout the "dry" sections of the country to co-operate with the local authorities, prove the intention of the drug trade to respect the law, show its determination to tolerate no liquor evils, and assist in exposing and penalizing those druggists who abuse their privileges and who thus drag the name of Pharmacy into the mire of infamy and degradation.

The Food and Drug Act as an Educator.

By L. F. Kebler.

The author referred to the beneficial influences of the Food and Drugs Act of June 30, 1906. The discrepancies in the U. S. Pharmacopœia and National Formulary have to some extent been reviewed and in many cases adjusted. A revision of the labels has been made in connection with food and drug products so as to conform to the requirements of the law. Advertisements have been carefully gone over so that they do not contain statements which are misleading. He also called attention to the fact that during the past two years there has been a marked dearth in chemists properly qualified. Of the 1400 applicants for the position of inspector who took the examination only about 14 received a marking of 70 per cent.

The Committee of One Hundred and the American Health League.

By M. I. Wilbert.

The author showed the origin and nature of the public health movement in the United States and that both political parties are committed to the establishment of a National Bureau of Health. A resolution was offered and subsequently approved by the Association at the general session that the Association was in accord with the work of the Committee of One Hundred and the American Health League.

Commercial Training as a Factor in the Teaching of Pharmacy.

By Joseph P. Remington.

The author contends that commercial training is as important as any other department of instruction when planned so as to give what is necessary for the pharmacist, and to exclude the vast amount of training suited to other kinds of business.

Commercial Training Applied to Laboratory Work.

By H. V. Arny.

The author considered the practical application of the fundamental principles of commerce to the Laboratory Course devoted to the manufacture of standard chemical preparations.

Ingredients for some 16 chemical preparations—such as Solution of Soda, Solution of Ferric Sulphate, etc.—are collected in sets and, at beginning of Course, are supplied to students, who prepare the necessary commercial paper—such as orders, day receipts and bills—and who finally furnish promissory note covering invoice.

Preparations are made, are assayed as per U. S. P. by Senior students, reports of analyses furnished the individual manufacturing student, along with an estimated percentage value of each product. Bills are prepared by the individual student, based on market and quality value of each product and are paid by checks which are deposited, thus giving ideas of banking. At end of Course, the bank accounts are checked up, outstanding notes for original goods are taken up and the bank balance of each student is used as one of the factors in his grading. With each step of the Course, the particular business detail is explained in a short address.

The Teaching of Pharmacognosy.

By Henry Kraemer.

Pharmacognosy is a comparatively new branch of botanical science and is still in a state of evolution. Its value heretofore has not been well understood, but with the progress that is being made it is coming to be better appreciated.

In view of the problems that confront us and that are constantly arising, the aim in the study of pharmacognosy first should be the attainment of a definite and working knowledge of the macroscopic and microscopic characters of the drugs rather than a general knowledge of them. In other words, the student of pharmacognosy should be taught how to identify vegetable and animal drugs in the crude, comminuted or powdered condition, to determine their quality, and to prevent their deterioration. The following general principles should be borne in mind in the teaching of this branch.

1. It is necessary that the student acquire not only a good

general knowledge of botany, but that he be especially grounded in structural botany, including external morphology and internal morphology, or histology, and also that he be instructed in obtaining a practical or working knowledge of systematic botany.

2. The training in connection with the use of the microscope, including the application of reagents, is only second in importance to that of the study of the plant material itself, because it is a means to an end. For, if the technique is not well understood, the results are likely to be misinterpreted and in some cases more harm than good done.

3. As individual collections of authentic drug specimens are not only useful to the student for purposes of study during his college course, but also for purposes of comparison subsequently, it is highly desirable that each student be encouraged to make such collections. In connection with the course of instruction in the Philadelphia College of Pharmacy, the students are given specimens of all of the official drugs and some of the important non-official drugs, and they are expected to put the collection in a permanent form, and are rated upon the care taken with the specimens and their knowledge of them and ability to identify them. Some years ago one of the students suggested the use of type trays, such as are used by printers, and which are covered with glass, for keeping the specimens, and this method of keeping them has become rather popular, for the reason that the tray with its compartments, is compact, inexpensive and attractive.

4. While the student can not be expected to become familiar with all of the plants that yield vegetable drugs, it is highly essential that he acquire a knowledge of as many of the living medicinal plants as possible, as a knowledge of the habits and characters of the plants from which drugs are derived is often helpful in judging of the quality and characters of the drugs themselves, and is also of importance in the collecting of authentic material for purposes of study and comparison. A botanic garden should be connected with every college of pharmacy, and botanic excursions should be conducted in conjunction with the course of instruction.

5. With the advances in preliminary educational requirements for students of pharmacy, the most serious handicap to the development of the courses in pharmacognosy, lies in the shortness of the courses in the schools and colleges of pharmacy. The time devoted to laboratory instruction in pharmacognosy is by no means

adequate. The number of hours for the entire course should be at least two hundred, and the number should be increased to four hundred as soon as practicable.

Pharmacopœial Nomenclature.

By Henry M. Whelpley.

The author stated that the pharmacopœial nomenclature is ignored by many of the manufacturers and jobbers and recognized in only a half-hearted way in the price-lists, while many of the sets of examination questions issued by boards of pharmacy indicate gross carelessness in nomenclature. A motion was offered that the Association request the manufacturers, the jobbers, the publishers of price-lists and the boards of pharmacy to adopt the pharmacopœial nomenclature. This resolution was adopted by the Association at the general session on Saturday.

Harmful Effects of Our Pharmacy Laws.

By William F. Kammerer.

The author contends that our pharmacy laws have not benefited the retail pharmacist but have done real harm because that section of the law which was intended to prevent a drug store from being left in charge of an unregistered clerk during the temporary absence of the responsible head, is not enforced and on account of the character of the Board of Pharmacy examinations and the manner in which they have been conducted.

The Value of Pharmaceutical Advisory Boards to State Boards of Health.

By L. E. Sayre.

The author suggests that the proper thing for the pharmacists to contend for is a fair, just and proper representation upon the Board of Health, such a representation as is obtained in the State of Kansas, for example.

We suggest as a general resolution that: *"The State Boards of Pharmacy in those States having food and drug laws analogous to the national law, the State Boards of Pharmacy be requested to offer their services to the State Board of Health as an 'Advisory Board' in pharmaceutical matters."*

The pharmacists in Kansas thus far have been most generously represented in this way, and they are likely to have more, as

fairness and justice may demand. This representation is to be brought about by the harmonious action of the Board of Health and the pharmacists of the state. We contend that this is the most wholesome kind of reform when reform is needed, a reform that is brought about by harmonious action rather than contention. In Kansas the Board of Health has attached to it as far as possible an advisory board representing the different professions and commercial interests. When any matters come up that seriously affect the pharmacist, a committee composed of representative pharmacists is called in for consultation, and a pharmacist is a member of the Advisory Board.

The Next Step—A Practical Plan for the Professional Advancement of Pharmacists.

By George H. Meeker.

The author proposes a plan based upon the coöperation of the American Pharmaceutical Association and the American Medical Association in examining and certifying clinical chemists; in establishing the official laboratory standards; in adopting a special code of ethics; in educating the public; and in demanding from national, state and local governments the recognition of the principle that physicians and pharmacists contribute the intelligent public opinion regarding the purity and wholesomeness of foods and drugs.

The plan is as follows:

1. Let the A. Ph. A. appoint a special committee and invite the A. M. A. to appoint a similar committee.

2. Let these two committees combine and organize.

3. Let the combined committees take steps to bring about finally the following state of affairs:

A. A national central examining board representing the A. Ph. A. and the A. M. A. will conduct examinations of applicants who desire to obtain the title of "Certified Clinical Chemist" together with the privileges accruing from the same. These examinations will be uniform, will be conducted simultaneously by various local committees and will be modeled after the U. S. Civil Service examinations.

B. The examinations will be based upon the "Official Clinical Laboratory Methods"; will be both theoretic and practical; will be rigid, searching and impartial; and will require a high proficiency, say 90 per cent., for success.

D. The successful applicant will be entitled, conformably with the "Official Code of Ethics," to make himself known to the public and profession as a "Certified Clinical Chemist" (or by some other suitable title).

E. The "Official Clinical Laboratory Methods" will have been formulated and adopted by authority of the A. Ph. A. and the A. M. A.

F. The "Official Clinical Laboratory Methods" will be subject to criticism and periodic revision and amplification through the automatic operation of an officially prescribed procedure for this purpose.

G. There will be special sections upon clinical laboratory methods at the annual meetings of the A. Ph. A. and the A. M. A.

H. Special attention will be paid in the "Bulletin" of the American Pharmaceutical Association and the "Journal" of the American Medical Association to this new movement.

I. There will be a joint standing committee of the A. Ph. A. and the A. M. A. to take special charge of a propaganda of education of the medical, pharmaceutic and lay public—that the physician may feel it his duty systematically to employ the certified clinical chemist; that the pharmacist may equip himself and his pharmacy for clinical laboratory work; and that the lay public may become alive to the necessity of laboratory information in the diagnosis, prognosis and treatment of disease.

J. The A. Ph. A. and the A. M. A. and the various state pharmaceutic and medical societies will have, by concerted efforts, completed such arrangements with the national and state governments, that properly certified druggists will be employed in caring for a portion of the colossal volume of detail laboratory work of food and drug inspection, etc., demanded by an efficient enforcement of the multitude of public health laws for the control of foods, drugs, hygiene and sanitation.

Legal Requirement for Licensure Determines the Standard of Pharmaceutical Education.

By John T. McGill.

The author considers the relative value of drug store experience and laboratory work at college and expresses the opinion that while the former may be helpful from a commercial point of view it

might not be so from the legal point of view, *i.e.,* if the student did not gain a laboratory knowledge of substances he is unqualified when it comes to a test.

National and State Legislation.

By Oscar Oldberg.

This was a voluminous report prepared by the Committee on National and State Legislation of the Association which it is hoped will be printed later in the *Bulletin* of the A. Ph. A. and be placed in the hands of every retail pharmacist in the United States.

Section on Practical Pharmacy and Dispensing.

Two sessions of this section were held with the Chairman, Franklin M. Apple and the Secretary, W. L. Scoville present. The address of the Chairman was in part devoted to a review of the work of the section during the ten years of its existence. Referring to the recommendation contained in the address of the chairman of this committee of last year to the effect that closer relationships should exist between the several committees of this Association, particularly so those of the Scientific Section and this Section, he said:

"This post-graduate course in pharmacy should be conducted with perfect system and order, thereby increasing its effectiveness many fold, and making it more attractive to those students who are anxious to keep abreast of the times and prove themselves creditable votaries of their calling in life.

"The physicians are awakening to a full realization of the manifold advantages of adhering closely to the U. S. P. and N. F. preparations as their armamentarium in the treatment of disease, and they are demanding more thorough courses of instruction in the colleges of medicine upon the U. S. P. and N. F. preparations, which will prepare the future physicians to pass more critical judgment upon those preparations; hence a far greater responsibility devolves upon the dispensing pharmacists, who must look for their future education, in matters practical, largely to this Association."

The following officers were elected for the ensuing year: Chairman, Leonard A. Seltzer; Secretary, E. Fullerton Cook; Associate, Otto Raubenheimer.

Following are abstracts of some of the papers presented:

Syrupus Scillæ Compositus.

By William Mittelbach.

In the official directions for making this syrup, it is stated: "Strain the syrup, and add water enough through the strainer to make the required amount." The author suggests that by reversing the finishing steps in the procedure, adding the requisite amount of water for the quantity wanted, and then straining, he has found that the process is shortened, and believes a more stable syrup is obtained. The little loss of sugar hanging to the strainer does not materially affect the preparation, and none of the foam and other inert matter hanging to the strainer is washed into the syrup. Several of the other official syrups are improved likewise, if manipulated in this way.

The Syrups of the U. S. P. (8th Rev.).

By E. Fullerton Cook.

The official Syrups were prepared in the quantity prescribed in the Pharmacopœia, with great care, and the directions therein followed minutely. It has been the purpose of the writer to critically examine the details of the processes and suggest improvements wherever possible, and also report upon the keeping quality of the Syrups during a period covering one year, with samples kept under different conditions.

Unguentum Aquæ Rosæ.

By Val. Schmidt.

The author has obtained excellent results with the following formula: White wax, spermaceti (of each 5½ ounces); Russian mineral oil, pure white (30 ounces, troy); distilled water (12 fluid ounces); pure borax (2½ drachms); otto rose (30 drops).

Melt the wax and spermaceti over a slow fire in a large porcelain evaporating dish; tare, and weigh the oil into it; then apply a gentle heat until clear. Dissolve the borax in the distilled water, previously heated to 150° F.; allow the wax, spermaceti and oil to cool to about the same temperature; add the solution of borax *all at once* and stir briskly for a few minutes, then add the otto of roses, continuing the stirring until cool.

Bismuthi Hydroxidum.

By Otto Raubenheimer.

The author proposed a better title and an improved formula for Bismuthi Oxidum Hydratum N. F., and gave practical experiments and stœchiometric calculations.

Notes and Suggestions on Some Official Cerates and Ointments.

By J. M. Good.

Observations were made on the following: Resin Cerate, Chrysarobin Ointment, Diachylon Ointment, Mercuric Nitrate Ointment, Yellow Mercuric Oxide Ointment, Ammoniated Mercury Ointment, Tar Ointment, Zinc Oxide Ointment, Manipulation of Ointments in Prescription Work.

Compound Solution of Phosphate of Soda, U. S. P.

By H. G. Posey.

The author gives the results of experiments to overcome the tendency of this preparation to deposit crystals; also to avoid the growth of fungi therein. He recommends that the quantity of citric acid be increased to 260 Gm., and that solution of both the salts and the acid be affected by aid of a water bath instead of continued trituration in a mortar, as directed by the Pharmacopœia, and that the resultant product be filtered while yet hot, thereby producing a beautiful, clear liquid, which will compare favorably with the many sodium phosphate solutions now on the market, and will be a credit instead of a discredit to our Pharmacopœia.

Fluidglycerates.

By George M. Beringer.

The author suggests a new class of liquid galenicals—1 c.c. to represent 1 Gm. of the drug with glycerin replacing alcohol as a solvent. A general formula with method of manipulation in manufacturing these products is given together with the results of experimentation upon a number of drugs, the results being confirmed by assays of the finished products.

Some Dosage Forms of Medicines.

By M. I. Wilbert.

The author considers the available methods for the administration of medicines; forms in which medicines may be administered; the need for adopting the dosage form to the condition and the idiosyncrasies of the patient; the origin of some of the existing forms of medicines and the need for elaborating and increasing this variety; and some dosage forms that should be developed and could readily be exploited by the dispensing pharmacist.

A Method of Preparing Lime Water That Insures Conformity With the U. S. P. Requirements.

By W. L. Cliffe.

The method proposed consists in slaking the lime as directed by the Pharmacopœia and washing the resultant calcium hydroxide by decantation. The washed calcium hydroxide is then made into a creamy magma with water and placed in an ounce bottle which is securely corked.

To prepare Lime Water (U. S. P.) take one ounce bottle of the Magma of Calcium Hydroxide and one gallon of cold water.

This method if adopted would obviate any possibility of dispensing a Lime Water below the standard of the U. S. P., as each ounce bottle contains more than enough to thoroughly saturate a gallon of cold water and repeated examinations have shown a wide margin of safety. The ounce bottles can be re-used indefinitely.

Some Interesting Prescriptions.

By H. A. B. Dunning.

The author exhibited a collection of twelve copies of prescriptions recently filled in a retail drug store. These were selected from a large number because of interesting features observed while compounding, or where special treatment was required to produce a more desirable finished preparation. They were exhibited for general discussion without any suggestions by the collector as to how they should be compounded.

Elixir Diethylbarbituric Acid (Veronal).

By W. C. Kirchgessner.

Diethylbarbituric acid, 18 Gm.; Compound tincture of vanillin (N. F.), 16 c.c.; Alcohol, 175 c.c.; Glycerin, a sufficient quantity to make 500 c.c. Dissolve the diethylbarbituric acid in the alcohol, add the compound tincture of vanillin, and enough glycerin to make 500 c.c.

Solution of Iron, Manganese and Pepsin.

By W. C. Kirchgessner.

Iron and ammonium citrate, 30 Gm.; Manganese sulphate, 3 Gm.; Glycerole of pepsin (1–10), 30 c.c.; Alcohol, 100 c.c.; Simple syrup, 100 c.c.; Tincture of orange, 4 c.c.; Tincture of vanilla, 4 c.c.; Aromatic fluidextract, 2 c.c.; Acetic ether, 0.5 c.c.; Ammonia water, a sufficient quantity; Distilled water, a sufficient quantity to make 1000 c.c.

Dissolve the iron and ammonium citrate, and the manganese sulphate in 500 c.c. of distilled water, add the glycerole of pepsin and a sufficient quantity of ammonia water to neutralize the solution, making a clear solution. Mix the alcohol, simple syrup, tincture of orange, tincture of vanilla, aromatic fluidextract and acetic ether. Add to the above solution, then add a sufficient quantity of distilled water to make 1000 c.c. Filter if necessary.

Elixir Hexamethylenamine Compound.

By W. C. Kirchgessner.

Saw palmetto berries, granulated, 125 Gm.; Corn silk, ground, 125 Gm.; Sandalwood, ground, 31.25 Gm.; Hexamethylenamine, 41 Gm.; Simple syrup, 125 c.c.; Compound spirits of orange (U. S. P.), 10 c.c.; Alcohol; Distilled water, of each, a sufficient quantity to make 500 c.c.

Mix the drugs and moisten them with 8 fluidounces of a mixture of alcohol 1 part, and water 2 parts, and allow to macerate for 48 hours. Pack into a percolator; then add enough menstruum of the same proportions as aforementioned to make 360 c.c. of percolate. In this dissolve the hexamethylenamine, then add the compound spirits of orange and simple syrup. Filter if necessary.

Pharmacy's Unexplored Field.

By Jos. Weinstein.

The author states that great possibilities await pharmacists in the field of bacteriology, whereby they can prove acceptable co-workers with the physicians and demonstrate thier abilities as scientific men.

The Evolution of "Unofficial Formulæ."

By C. Lewis Diehl.

The object of this paper is to point out the slender material upon which the earlier efforts to secure uniformity in preparations of the same name were based; to trace the evolution of the earlier collection of formulas to the magnificent collection now available to pharmacists; to reconcile the younger members of our profession with conditions of imperfections which were probably far more difficult to correct in the past than they are at the present time.

Construction of Official Preparations.

By H. C. Blair.

The claim was made that as the U. S. P. is intended to serve as a formula book for pharmacists and not simply a book of standards for manufacturers, it should contain formulas that are simple, plain and as exact as possible, with a consideration for expedition and expense. The paper was illustrated with samples and improved formulas were offered.

Notes on Some Official Iodine Solutions.

By F. W. Nitardy.

The following modified formula was presented as representing an improvement over the present official formula for tincture of iodine: Iodine, 70 Gm.; Potassium iodide, 50 Gm.; Water, 35 c.c.; Alcohol, a sufficient quantity to make 1000 c.c. Introduce the iodine, potassium iodide and water into a graduated flask or bottle, shake until completely dissolved, and add sufficient alcohol to make the finished tincture measure 1000 c.c.

As alcohol is not the active constituent of this preparation, its value is in no way reduced by the introduction of 3½ per cent. of water; while the saving of time is considerable since only a

few minutes are required for the preparation of tincture of iodine by this method.

In several official preparations containing iodine, potassium iodide and water, the potassium iodide solution used as a solvent for the iodine is made entirely too dilute. Considerable time and work can be saved by modifying the working directions of these preparations to the extent of making a concentrated solution of the potassium iodide, dissolving the iodine in this solution and then adding the remaining water.

Formulas Recommended for Introduction into the N. F.

By F. W. Nitardy.

Glyceritum hydrastinæ compositum. (Compound glycerite of hydrastine or "colorless hydrastis"): Hydrastine hydrochloride, 5.00 Gm.; Aluminium chloride, 5.00 Gm.; Dilute hydrochloric acid, 1.50 c.c.; Glycerin, 500.00 c.c.; Distilled water, a sufficient quantity to make 1000.00 c.c. Dissolve the salts in 100 c.c. of distilled water, add the dilute hydrochloric acid, and mix this solution with the glycerin. Then add a sufficient quantity of distilled water to make the product measure 1000 c.c.

Petrolatum saponatum iodatum. ("Iodized liquid petrox"): Iodine, 10 Gm.; Liquid saponated petrolatum N. F., a sufficient quantity to make 100 c.c. Mix them and dissolve by occasional shaking.

Linimentum Ammoniæ.

By Otto Raubenheimer.

The author gave the advantages of an Ammonia Liniment, prepared by shaking together Oleum Sesami and Aqua Ammoniæ, over the U. S. P. formula and directions for preparing the same, and the results of extensive experiments with a large number of oils.

A Plea for Real Pharmacy.

By Wm. Mittelbach.

The author remonstrated against the tendency to increase the number of compound preparations to be called to the attention of the medical men. An appeal for greater simplicity in medication was made suggesting that the physicians indicate which combinations of drugs are most desirable, by writing original formulas for the same in the form of individual prescriptions.

The Opportunity of the Hospital Pharmacist in Advancing the U. S. P. and N. F. Propaganda.

By J. T. Harbold.

The author showed the great possibilities open to the hospital pharmacists in advancing the propaganda efforts in behalf of the U. S. P. and N. F. by taking advantage of the intimate relationships that exist in those institutions between the internes and the pharmacists.

Some Chemical Reasons Why Solutions Deteriorate.

By Frederick E. Niece.

The author called attention to the causes for many solutions deteriorating from chemical changes, together with recommendations how to overcome the same.

Notes on Several New Elixirs.

By Franklin M. Apple.

Attention has been called, by some writers, to the similarity of flavor of the official elixirs; also to the high alcoholic strength of the U. S. P. aromatic elixir, which has been the cause for severe condemnation thereof, hence it has been the author's aim to originate several elixirs as follows:

Elixir dulcis, or elixir aromaticum. (Sweet elixir, or aromatic elixir): Anethol, 12 minims.; Oil of coriander, 1½ minims.; Oil of myristica, 2 minims.; Tincture of vanilla (U. S. P.), 1 fluidrachm.; Alcohol, 6½ fluidounces.; Simple syrup and Distilled water, of each a sufficient quantity to make 32 fluidounces; Purified talc, 1 ounce.

Elixir aurantii florum compositum. (Compound elixir of orange flowers.): Oil of cinnamon (U. S. P.), 6 minims.; Alcohol and Stronger orange-flower water, of each, 6 fluidounces; Simple syrup, 12 fluidounces, Distilled water, 8 fluidounces; Purified talc, 1 ounce.

Whereas the American Medical Association has condemned the compound digestive elixir N. F., and suggested that it be expunged from the list of official preparations; also, inasmuch as many medical practitioners have stated that they have prescribed various proprietary products, as vehicles, owing to their beautiful red color and aromatic taste, there can be no question that an elixir

meeting the demands of these practitioners should be made official. The following product will meet the demands of the most exacting physicians:

Elixir dulcis rubrum, or elixir aromaticum rubrum. (Red sweet elixir, or red aromatic elixir.) Tincture of cudbear (N. F.), 6 fluidrachms; Compound tincture of cudbear (N. F.), 2 fluidrachms; Sweet elixir, a sufficient quantity to make 16 fluidounces. Mix. Allow to stand for 48 hours, if possible, and filter. This preparation has a rich, ruby-red color, and is neutral in reaction—a distinction from compound digestive elixir. The author called attention to the fact that when tincture of cudbear N. F. and compound tincture of cudbear N. F. are mixed in the above proportions, a very beautiful red color results upon dilution thereof—one free from the purplish tint of the dilutions of tincture of cudbear N. F.; also free from the brownish tint of the dilutions of compound tincture of cudbear N. F.

Section on Commercial Interests.

This section held sessions on Tuesday and Thursday afternoons. Owing to the absence of the chairman, Jacob Diner the section was called to order by A. V. Pease. In the absence of the Secretary, G. O. Young, this position was filled by Harry B. Mason. The address of the Chairman was read, a number of papers were presented and ten questions were discussed by various members. The following officers were elected: Chairman, Harry B. Mason; Erich H. Ladish, Secretary; Associates: P. Henry Utech, Arthur L. Cheney and Waldo M. Bowman.

The following are abstracts of some of the papers which were presented:

Commercialism in Drugs.

By Lyman F. Kebler.

The term "commercial" as used in the past in connection with certain commodities meant either manipulated or adulterated goods or articles of doubtful quality. Of the arguments used by certain dealers, brokers, and importers justifying transactions in inferior, adulterated and manipulated goods the following were discussed by the author: (*a*) There would not be enough of the pure material to supply the demand. (*b*) The price of pure goods would be so much enhanced as to prohibit their sale. (*c*) Full strength products

would not satisfy the tastes of many consumers. (*d*) Certain goods are not used directly, but are employed in the manufacture of other preparations. (*e*) Articles of standard quality would be detrimental to the welfare of the public.

A large majority of manufacturers, dealers and importers, are desirous of having the law enforced so as to establish honest competition and eliminate fraud and adulteration of all forms. They are not looking for the assistance of shrewd and cunning lawyers to devise ways and means for manufacturing, importing or shipping into interstate commerce adulterated and misnamed drug products.

H. K.

[*To be continued.*]

National Association of Retail Druggists.—The tenth annual convention of the National Association of Retail Druggists was held in Atlantic City, New Jersey, September 14–18. The meeting was characterized by an earnestness and enthusiasm that did credit to the delegates that represented the retail druggists of the United States. The address of the President, Thos. H. Potts was "an inspiring document and enthusiastically received by the delegates." The following officers were elected for the ensuing year: President, W. S. Elkin, Jr.; Vice-presidents: H. B. Guilford, A. O. Zwick, C. Coonley; Secretary, Thomas H. Potts; Treasurer, John Coleman; Executive Committee: Charles Renner, F. F. Ernst, Edward Williams, Charles F. Mann, Geo. W. McDuff and E. H. Ladish.

The Women's Organization of the N. A. R. D. held a successful meeting at Atlantic City at the time of the N. A. R. D. convention. The address of the President, Mrs. Leslie O. Wallace was highly appreciated and both Mrs. Wallace and Mrs. Adelaide M. Godding were the recipients of silver gifts presented in appreciation of their work as founders of the W. O. N. A. R. D. The following officers were elected: President, Mrs. William Estell Lee; Vice-presidents: Mrs. Adelaide M. Godding, Mrs. A. O. Zwick, Mrs. W. D. Aufderheide; Miss B. Arete Johnson; Mrs. R. G. Rutherford; Secretary, Mrs. Joseph F. Forbrich; Treasurer, Mrs. A. M. Richardson, Executive Committee: Mrs. Leslie O. Wallace, Mrs. Otto Groenland, Mrs. Isaac Light, Mrs. Louis Emanuel, Mrs. J. F. Finneran, Mrs. Eliot Johnson, Mrs. Charles Fuhrman and Mrs. W. D. Streeter.

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THE DETERMINATION OF CHLOROFORM IN LOZENGES.

By Edwin Dowzard.

As it cannot be expected that the full amount of chloroform incorporated in a lozenge mass will be retained in the finished product, it was considered a matter of sufficient interest to determine, if possible, the actual amount of chloroform present.

After some preliminary work a satisfactory method was worked out based on that of Nicloux (*Comptes Rendus*, 1906, 142, 163) for the determination of traces of chloroform in alcoholic solutions and air.

Chloroform when present in alcoholic solution in a quantity not exceeding 0.1 Gm. can be determined by boiling in a flask under a vertical condenser with an alcoholic solution of potassium hydroxide. After cooling, the liquid is neutralized and the chlorine determined by titration with standard silver nitrate solution.

In the method about to be described the following reagents are required:

1. Alcoholic Solution of Sodium or Potassium Hydroxide. (25 Gm. of pure NaOH or KOH are dissolved in 1000 c.c. of 75 per cent. alcohol.)

2. Dilute Nitric Acid. (200 c.c. of nitric acid, S. G. 1.42, are diluted to 1000 c.c. with distilled water.)

3. Calcium Carbonate, free from chlorides.

4. Phenolphthalein Solution, U. S. P.

5. Potassium Chromate Solution, U. S. P.

6. Standard Silver Nitrate Solution. (8.545 Gm. of silver nitrate are dissolved in water and made up to 1000 c.c.) The solution should be standardized against pure sodium chloride—

(1 c.c. = 0.002 Gm. chloroform).

One, or half a lozenge, is weighed and placed in a 200 c.c. flask containing 70 c.c. of alcoholic alkali. The flask is then connected with a reflux condenser and the contents heated not quite to boiling point until the lozenge dissolves or disintegrates. The liquid is then gently boiled for 45 minutes. 25 c.c. of water are added to the hot liquid, followed by four drops of phenolphthalein solution and sufficient dilute nitric acid to render the liquid slightly acid. 0.5 Gm. of calcium carbonate is then added and the contents of the flask shaken. After cooling, the liquid is titrated with standard silver nitrate solution, using potassium chromate as an indicator.

A correction must be applied for the chlorides present in the reagents and lozenge. 70 c.c. of alcoholic alkali are diluted with 25 c.c. of water and neutralized with dilute nitric acid, 0.5 Gm. of calcium carbonate is added and the liquid titrated with standard silver nitrate solution. It is only necessary to determine this correction once for each batch of reagents. The correction for chlorides in the lozenge is determined as follows: One lozenge is weighed and dissolved in 30 c.c. of hot water, a slight excess of nitric acid added, followed by 0.5 Gm. of calcium carbonate, and the mixture titrated with standard silver nitrate solution.

The corrections for the reagents and lozenge are added together and subtracted from the figure obtained in the chloroform determination, the difference representing the chlorine present as chloroform.

The accuracy of the method was determined as follows: 1.8502 Gm. of pure chloroform were diluted to 99.54 c.c. with alcohol, and the chloroform determined by the above method with the following results:

Quantity of chloroformic solution taken.	Chloroform present.	Chloroform found.
2 c.c.	0.03717	0.0364
4 c.c.	0.07434	0.0700

There is a slight loss which, however, is not likely to occur when a lozenge is under examination, as the latter dissolves slowly, liberating the chloroform gradually.

The lozenges must not be powdered, but a whole or half lozenge used. When a chloroform lozenge is powdered, even coarsely, a large proportion of the chloroform is lost in a few minutes, as will be seen from the following results:

	Chloroform
Lozenge, not powdered	3.12%
Powdered lozenge weighed a few minutes after powdering.	1.52%

To obtain a correct estimate of the chloroform present, two or three determinations should be made and the mean taken.

Lozenges containing up to 3 per cent. of chloroform do not vary much, but over that figure variation is likely. But even in the latter case, if the chloroform is determined in two sets of duplicates, the mean of each will be in fair accordance, as will be seen by the following example:

Chloroform.	Average.	Minims $CHCl_3$ per lozenge.	Average.
1*a*. 5.28%	5.86%	1 $\frac{5}{100}$	1 $\frac{17}{100}$
2*a*. 6.44%		1 $\frac{29}{100}$	
1*b*. 5.43%	5.65%	1 $\frac{8}{100}$	1 $\frac{12}{100}$
2*b*. 5.88%		1 $\frac{17}{100}$	

No two lozenges are likely to contain exactly the same percentage of chloroform, although sometimes the results are almost identical. Lozenges containing licorice give dark colored solutions on boiling with alkali; this does not affect the titration, as the treatment with nitric acid and calcium carbonate decolorizes the liquid.

In the following table are recorded the results obtained in the examination of nine samples of chloroform lozenges. Each sample was tested in duplicate, the results represent the mean:

No.	Average weight of lozenge.	Chloroform per cent.	Minims of chloroform in each lozenge.
1.	9.2 grains	3.40	$\frac{22}{100}$
2.	23 "	3.12	$\frac{51}{100}$
3.	32 "	1.02	$\frac{23}{100}$
4.	28 "	5.86	1 $\frac{16}{100}$
5.	37 "	2.56	$\frac{67}{100}$
6.	30 "	2.53	$\frac{54}{100}$
7.	24.5 "	5.08	$\frac{88}{100}$
8.	43 "	1.90	$\frac{58}{100}$
9.	28 "	1.72	$\frac{34}{100}$

The percentage of chloroform may be converted into minims per lozenge by the following formula:

$$\frac{C \times .7104 \times L}{100}$$

C = per cent. $CHCl_3$.

L = average weight of lozenge.

Chloroform lozenges vary in their keeping qualities. Two samples were kept in card-board boxes at room temperature for one month, with the following results:

		Average weight of lozenge.	Chloroform. Before aging.	Chloroform. After one month.	Ch'oroform minims per lozenge. Before aging.	Ch'oroform minims per lozenge. After one month.
No. 1.	White lozenge	37 grains	1.11%	0.15%	$\frac{29}{100}$	$\frac{4}{100}$
No. 2.	Brown lozenge contains licorice	29 grains	1.13%	1.10%	$\frac{23}{100}$	$\frac{22}{100}$

Lozenges containing licorice extract appear to hold chloroform better than a plain sugar base, the extractive renders the base impermeable. A well-made chloroform and licorice lozenge may be heated for some time at 100° C., and still retain a considerable proportion of chloroform. The following results illustrate this:

Average weight of lozenge.	Chloroform. Before heating.	Chloroform. After heating to 100° C. for 1 hr.	Chloroform minims per lozenge Before.	Chloroform minims per lozenge After.
9.2 grains	3.4%	1.33%	$\frac{22}{100}$	$\frac{9}{100}$

The average loss of chloroform in the process of manufacture appears to be about 50 per cent.

Analytical Department,
Parke, Davis & Co.

NOTES ON THE CONVENTION OF THE NATIONAL WHOLESALE DRUGGISTS' ASSOCIATION.

By Clarence M. Kline.

I have been requested to say a few words at this meeting in regard to the recent convention of the N. W. D. A. at Atlantic City.

It is understood, of course, that many of the matters there discussed are purely commercial, and, therefore, would prove of little interest to this audience.

However, the jobber is finding it more and more to his advantage to acquire an intimate knowledge of the more strictly technical side of his business. If he does not possess the knowledge himself, he must constantly consult some one who has such knowledge, in order to comply with the modern conditions of the drug trade. He can no longer be satisfied with market quotations only, but must understand scientific standards and usages and how to apply them in the marketing of his goods. These conditions tend to make the jobber listen with deep interest to the reports of committees on scientific matters. Thus, two years ago, after the Food and Drugs Act had been passed, the National Wholesale Druggists' Association appointed a committee on "Standards and Tests of the U. S. P. and National Formulary" to coöperate with other committees, and to offer assistance to the Revision Committee of the U. S. Pharmacopœia. This committee, under the able leadership of Mr. Thomas F. Main, immediately set to work, and by searching the files of those houses who had been performing analytical work, was able to furnish the Revision Committee with figures which, undoubtedly, were of considerable assistance to that committee in adopting revised standards, which you will remember they did, either immediately before or immediately after the law went into effect. This committee was continued during the last year and submitted a report containing many items of interest.

In the report of the committee at the previous annual meeting in Denver, they made the following recommendation: "We also recommend that the committee bring to the attention of the Trustees of the U. S. Pharmacopœia, without delay, the necessity of the establishment of a Pharmacopœial Research Laboratory." This recommendation, apparently, did not bring any decisive action. There was, however, brought to the attention of the committee the fact

that the Public Health and Marine Hospital Service is about to establish a laboratory having as a part of its work the compilation and publication of a series of bulletins or digests of comments on the U. S. Pharmacopœia. The department is under the charge of Dr. Reid Hunt as Pharmacologist, and has as other members, Mr. M. I. Wilbert and Dr. Murray Galt Motter. The N. W. D. A. Committee expressed the opinion that this department will not be of the same value as the one suggested, but, undoubtedly, will be of great help to the Revision Committee.

In this connection it will interest you to know that Prof. Joseph P. Remington, the Chairman of the Committee on Revision of the U. S. P., in an address which he delivered at one of the meetings, recommended to the N. W. D. A. that the latter establish a department which should have for its purpose the performing of experiments, in order to suggest new tests for the Pharmacopœia, also tests and standards to be established for new drugs and chemicals, which should be admitted to the Pharmacopœia in future editions. Prof. Remington asked for the appointment of a committee to investigate the feasibility of his suggestion; he also said that the American Therapeutic Society had decided to establish a laboratory to test the therapeutic activity of official drugs.

Professor Remington's recommendation was carefully considered, and a committee appointed to investigate the feasibility of establishing such a laboratory. Professor Remington stated, also, that, in his opinion, a five-year revision of the Pharmacopœia, instead of a ten-year revision, would seem to be reasonable and proper. This suggestion evoked considerable discussion, but when offered as a recommendation by the Board of Control, received the indorsement of the Association. This is a very important change, and it is of interest to know that the Pharmacopœias of Germany and Japan, according to the statement of Mr. Albert Plaut, are revised every five years, and that the English Pharmacopœia has an annual supplement.

One of the points mentioned by this committee, and which has been much discussed by importers of drugs and chemicals during the past year, is the present stringent law governing importations. Undoubtedly, it was the intention of the legislators in framing the Food and Drugs Act of 1906, to have the provisions of that Act apply to importations, as well as interstate commerce. Nevertheless, after the law was passed, it was found that the old law of 1848 had

never been repealed and was still in force on importations. This law prohibits the entry into the country of all drugs inferior in strength or purity to the standards established by the United States, Edinburgh, London, French and German Pharmacopœias and Dispensatories, and if its terms were strictly abided by there would be a wholesale rejection of drugs at all our ports. The authorities, however, have interpreted the law with leniency, and importations of drugs below standard have been allowed, particularly where it could be established that no drugs could be had of proper strength.

It is well known that vegetable drugs, like other vegetable products, differ in strength and quality from year to year, depending on conditions of soil and climate, and seasons have come, and will come again when it will be impossible to obtain drugs of standard strength, on reasonable terms. The Committee on Standards and Tests, therefore, made the following recommendations: "That the present law should be amended so as to allow the importation of drugs that differ from U. S. P. standards, when they are plainly marked to show their differences from such standards, and under a suitable guarantee; that they be used and sold only for manufacturing purposes."

In passing this resolution, the committee had in mind that, whereas it is desirable to keep this country from being a dumping ground of drugs of inferior strength, it is an unnecessary hardship that the manufacturer should be prevented from using low-strength-drugs for manufacturing purposes, particularly at an off season when the cost of those of full strength is prohibitive. It is also to the advantage of the consumer that the honest manufacturer be allowed to utilize such drugs, since the result is a less expensive article to the public.

Another point of interest which the writer wishes to interject into this paper, and which has nothing to do with the meeting in Atlantic City, but which he thinks may be of some interest is this: that the government has under favorable consideration the adoption of a plan of inspection whereby the importer shall be allowed to accept the shipment without awaiting the results of the analysis performed by the inspecting officials, and that if the article is found to be adulterated or below strength, further importations of the same lot are to be prevented. It will, however, in this case, be impossible to return the shipment which in itself has failed to pass the requirements.

One of the measures which evoked criticism and condemnation in the report of the Committee on Legislation, was the Mann bill, which is shortly to be presented to Congress. This bill is so radical and so unnecessarily harassing to the drug trade, that it is confidently hoped that it will be defeated.

Mr. Carey Peter brought up the matter of the Express companies, and their methods of doing business were roundly condemned by a number of speakers. Their inexcusable delays, which they do not even take the trouble to investigate, their high charges, and their political wire pulling were all brought to the attention of the members of the Association. Their actions were held to be largely responsible for the desire expressed in some quarters for a parcel post. The whole matter was referred to the Committee on Transportations, and, undoubtedly, some action will be forthcoming.

The point which most impressed itself on the writer's mind was the perfect harmony and good will that characterized the meetings, and the manifest willingness to sacrifice individual wishes for the good of the whole trade, not only from the standpoint of the wholesale trade, but also from the standpoint of the retail trade, it being recognized that the interests of each are the interests of both, in the distribution of drugs to the general public.

FORTY-FIFTH ANNUAL MEETING OF THE BRITISH PHARMACEUTICAL CONFERENCE.

By John K. Thum.

On September 14, 1908, the British Pharmaceutical Conference began its forty-fifth annual meeting in Aberdeen, this being the second time in twenty-three years that the Conference has held its annual meeting in this "ancient and beautiful city."

The following résumé of the work accomplished was prepared from the very complete reports of the proceedings published in the British pharmaceutical journals.

The proceedings opened on Monday evening, September 14, with a reception to the delegates at the Art Galleries. Baillie Milne, in the absence of Lord Provost Alexander Lyon, extended a cordial welcome to the Conference and said that he hoped that their deliberations would add to pharmaceutical progress.

On Tuesday morning the regular sessions of the Conference opened in the Marischal College with the President, Mr. Robert Wright, F. C. S., in the chair.

After addresses of welcome by Principal Lang, of Aberdeen University, and others, Mr. Wright proceeded to read his presidential address. Contrary to the expectation that he would speak on a subject of which he is an authority—the standardizing of alkaloidal drugs—Mr. Wright, who is one of the foremost of British practising pharmacists, devoted his address to a survey of present conditions and future prospects of pharmacy. In speaking of the decline of pharmacy as a profession, Mr. Wright said that illegitimate competition has lowered the general tone of pharmacy, and he claimed that pharmacists were in part responsible for such a deplorable condition, because they allowed themselves to be used as the distributing agents for other men's products; products which reflected anything but credit on the professional attainments of those who handled them. He also made the statement that until the retail pharmacists returned to the practice of early days and prepared most of their galenicals and other preparations themselves, which is not the general practice at the present time, they could not hope to obtain that standing in the public eye which other professions enjoy. He touched upon the increasing sale of "patent" medicines and hoped that the time would soon come when the Legislature would require the publication of the formulas of all of those medicines that contain noxious and habit-forming drugs. In speaking of counter-prescribing, he said that: "neither the prescribing-chemist nor the dispensing-doctor was practising in the best interests of the public." In the concluding paragraph of his address he said: "The advancement of pharmacy as an honorable calling, worthy of educated men, will depend upon the extent to which pharmacists are willing to sink their own personal interests and work together for the good of the body corporate. On the scientific side this involves whole-hearted devotion to pharmaceutical research, for let it be remembered that the researcher must always lead the way, and all pharmaceutical work, small or great, if thoroughly done, becomes a distinct asset to the whole body of pharmacists."

After the usual routine business, such as presentation of delegates, committee reports, reports of delegates to other conventions, the reading of papers commenced, abstracts of which follow.

Note on Formic Acid and Some Formates.

By George Luman.

The author described the chemical properties of formic acid, and gave the strength of commercial samples. In view of the fact that physicians are now using the formates as muscular tonics, Mr. Luman advises a combination of the calcium, sodium, and strychnine salts in an aromatic glycerin menstruum, as therapeutically the best mode of administration.

The Characters and Actions of the Seeds Omphalea sp. and Garcia Nutans.

By J. Theodore Cash.

The author states that while the seeds are all of euphorbiaceous origin, those of the *Omphalea* species, or the extracted oil therefrom, form a pleasant and simple laxative, while the seeds of *Garcia Nutans* are ten times as powerful, and contain an acrid principle with a marked local purgative action, the effect of full doses being that of a drastic hydragogue cathartic. It is doubtful whether these drugs will find a place in medicine.

Notes on the Electrolytic Administration of Drugs.

By T. Maltby Clague.

The writer referred to experiments by Leduc with strychnine and potassium cyanide, in which one rabbit was killed by strychnine ions given off at the positive pole, and another was killed by cyanogen ions from the negative pole. He also alluded to results obtained in St. Bartholomew's Hospital clinics by local electroionic applications of certain salts, and among other cases cited the following: A patient had half a dozen black patches on the face due to the use of an arsenic ointment which evidently had formed a colloidal deposit. The patient's hand was placed in a vessel of water and also the positive lead from 6 cells, and a pad of wet lint connected with the negative pole over a black spot. After 15 minutes the coloration was completely removed from the skin, and the pad showed the presence of arsenic by Marsh's test. Similar treatment removed the other spots.

Some Powdered Drugs.—F. A. Alcock showed in this contribution the value of the solvent action of water on certain drugs in determining their purity; and gave data on the ash yielded by the exhausted marc, and by extracts.

Note on the Examination of Bismuth Salicylate for Free Salicylic Acid.

By J. Bristowe Harrison.

The author of this paper stated that he found the B. P. and B. P. Codex test for this salt useless. He claimed the following test is more satisfactory: Shake one gram of the salt with 10 c.c. of methylated ether sp. gr. 0.720, filter, transfer the clear filtrate to a glass dish, and evaporate the ether on a water bath. The evaporation should be carefully watched and the dish removed just as the last traces of ether are passing, to avoid loss of salicylic acid by volatilization. Treat the residue with 0.50 c.c. of cold distilled water and test with one drop of dilute ferric chloride in the usual way.

Charas.

By David Hooper.

This was really a very complete monograph on the subject, dealing with the history, commerce, chemistry, and physiology of the resin of Indian hemp as naturally obtained in India and nearby countries.

Notes on Some B. P. Codex Formulas.

By Harold Wyatt.

The author gave the result of a critical examination of half a dozen preparations. In making the Elixir Pini et Terpini et Acetomorphinæ he recommends the use of liquid terpene in place of terpin hydrate in crystals, liquid terpene being as active medicinally and possessing a more pleasant flavor.

The Examination and Valuation of Jalap Resin.

By W. B. Cowie.

The author makes the assertion that B. P. tests are of little value on account of lack of specific details, U. S. P. tests being in advance of those of the B. P. in that regard. He gives a method which

includes determination of moisture, ash, solubility in 0.720 ether, acid value and saponification equivalent. A good jalap, he says, should not contain more than 6 per cent. of moisture and the limit of ash he places at 1 per cent.

The Examination and Valuation of Scammony Resin.

By W. B. Cowie and B. M. Brander.

It was stated that the criticisms in the above abstract apply also to tests for this resin except that for the ether solubility limit. The method of estimation given above answers also for valuation of scammony resin.

Note on Commercial Ethers.

By W. B. Cowie and T. O. Broadbent.

The writers of this paper give the results of a general examination of commercial ethers by the usual methods. Water-solubility tests give excellent results in a general way, but the boiling-point determination is regarded by them as the most reliable test, this showing the presence or absence of methyl ether, alcohol, water, and acids in one step.

Commercial Pilulæ Hydrargyri.

By Gilbert Simpson.

The author gave the results of an examination of twelve samples from wholesale firms and two from retail pharmacists. The wholesale samples varied in mercury content from 31 to 36 per cent., the retail samples showing 32.5 and 33.77 respectively. Traces of mercurous oxide occurred in 25 per cent. of the samples, and a trace of mercuric oxide in 8.3 per cent. of samples.

Determination of Mercury in Unguentum Hydrargyri.

By P. H. Crewe.

The author objects to the method of extracting the fatty base by repeated treatment with ether or other solvent because of difficulty in getting the mercury into globular form. He suggests a process in which the ointment is warmed with an alcoholic solution of potassium hydrate and the saponified fat removed with hot water. This method is simpler and the mercury is obtained in a more satisfactory form.

Phases of Pharmacy in Scotland—An Historical Sketch.

By J. P. Gilmour.

This paper gives a very interesting account of the beginning and growth of pharmacy in North Britain, and could well be used as a model for a historical contribution to the Historical section of the A. Ph. A. Every one present agreed that it was the best paper of the series.

Note on the Strychnine Standard for Galenical Preparations of Nux Vomica.

By Robert Wright.

The writer showed that a strychnine standard for nux vomica preparations is preferable to one of total alkaloid. Work on the relative toxicity of the two alkaloids, strychnine and brucine, was carried out and the results of the experiments seem to indicate a marked difference between the two, so much so, in fact, as to make it inadvisable to express the clinical value of one alkaloid in terms of the other.

Notes on the Action of Brucine.

By W. Dixon and W. H. Harvey.

Brucine is generally regarded as having an action similar to that of strychnine and for this reason it has not been regarded of serious moment that galenical preparations of nux vomica should contain variable amounts of brucine, first, because its action is of the same nature as strychnine, and second, because its toxicity is so much less, being as 33 to 4. Mr. Wright made some pure brucine which the authors used on mammals and found it to act more like methyl-strychnine than strychnine.

The Characters of Official Iron Arsenate.

By F. B. Power and H. Rogerson.

The authors gave methods for making and testing this salt, and showed that the amount of ferrous iron contained in a specimen of iron arsenate prepared according to the directions of the B. P.—namely 7.11 per cent.—would correspond to 18.9 per cent. of anhydrous ferrous arsenate, the Pharmacopœia test requiring nearly 10 per cent.

The Preparation of a Soluble Ferric Arsenate.

By F. B. Power and H. Rogerson.

The preparation of a soluble salt was described and the characters of this scale compound (which is practically a citro-arsenate of iron and sodium) were given, likewise a simple method of assay.

Standards of Alkaloidal Drugs and Their Fluidextracts.

By J. C. Unmey and C. T. Bennett.

The authors contribute what they describe as "somewhat disjointed notes" with the object of bringing forth opinions from other workers to aid in revision of the next B. P. They appreciate the necessity of fixing high standards for drugs consistent with the natural variations in them, from season to season. They give figures and results of their work on the more potent drugs.

Valenta's Test for Oils.

By E. W. Pollard.

If equal weights of a fixed oil and glacial acetic acid are mixed at about 80° C., a clear mixture results, and it remains clear until a lower temperature is reached. The temperature of turbidity varies with different oils, as 53° for cottonseed oil and 70° for olive oil. Mr. Pollard explained the test and advised the use of an acid entirely free from water.

Tasteless Liquid Extract of Cascara Sagrada.

By Ernest Quant.

Debitterizing the drug by means of magnesium hydroxide, macerating and percolating with glycerin and water is the process given for making a tasteless fluidextract of cascara. The author claims that the preparation is pleasant to take and active.

Note on Commercial Lead Plaster and Litharge.

By E. F. Harrison and H. E. Watt.

The authors give the results of the examination of a number of samples, besides a few as ordinarily supplied for pharmaceutical use. While the samples of litharge did not conform exactly to B. P.

requirements, yet most of them could not be reasonably objected to. They prepared samples of lead plaster from olive oil, cottonseed oil, and nut oil, and gave the results of comparative tests.

The Alcohol Solubility of Resin of Podophyllum.

By S. Taylor.

Freshly prepared podophyllum resin of the B. P. is completely soluble in 90 per cent. alcohol. Mr. Taylor shows that the resin in part gradually becomes insoluble; thus at the end of one year the soluble sample contained 0.7 per cent. insoluble matter, and at the end of the second year, 2.4 per cent. From the percentage of insoluble matter it may be possible to deduce the age of a sample.

Upon the invitation of Mr. Maltby Clague it was decided to hold the Conference in Newcastle-on-Tyne next year. The election of officers resulted in the selection of Mr. J. E. Tocher, Ph. C., B. Sc., F. I. C., of Peterhead, for president for the coming year and of Mr. Maltby for local secretary.

FLUIDGLYCERATES.*

By George M. Beringer.

In a paper presented to the New Jersey Pharmaceutical Association, at the meeting of last year, the author proposed a new class of liquid galenicals to be known as "Fluidglycerates."[1] As proposed these are to be of a uniform drug strength, the same as the official fluidextracts, 1 c.c. of the preparation representing 1 Gm. of the drug. The title "fluidglycerate" was selected as a distinguishing term to designate this class and as being so distinctive that it would prevent confusion with the heterogeneous glyceroles, glycerins and glycerites already introduced and some of which are official under these titles in the various pharmacopœias.

The peculiar solvent and sweetening properties of glycerin were early recognized and numerous attempts have been made to utilize

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* Presented at the meeting of the American Pharmaceutical Association, September, 1908.

[1] Proceedings N. J. Phar. Ass'n, 1907, 56. *Amer. Jr. Phar.* 79, 410 (Sept., 1907).

these in pharmaceutical preparations, usually, in combination with alcoholic liquids. Its extensive use in tinctures and fluidextracts has been criticized as an abuse. It is but an indifferent solvent for resins, fats, and fixed oils and, in fact, for most substances requiring alcohol as a perfect solvent, and consequently is of but little use as a solvent where such constituents represent the activity of the drug and its use, even with alcohol in such preparations, is contraindicated. But in many drugs, these constituents are not valuable and with the associated inert extractives are a source of annoyance from the continuous forming of precipitates.

In the writer's experiments with fluidglycerates, the endeavor has been to confine these to preparations of drugs where such alcohol-requiring constituents do not represent the value of the drug and when present and not essential to leave these undesirable constituents in the marc. On the other hand, glycerin is a good solvent for many of the sweet, bitter, astringent and essential flavoring constituents of drugs, and possesses a marked solvent action on many of the alkaloids, glucosides and neutral principles.

Preliminary experiments to determine the amount of glycerin necessary to preserve glycerol-water liquid extracts of drugs showed that if glycerin was present in the finished preparation in a proportion of not less than one-third of the volume, the preparations were fairly stable. If only one-fourth or less was present, then decomposition invariably took place sooner or later, but if one-half was used the preparations were permanent and in the fluidglycerates as experimented upon and described in this paper it has been aimed to have approximately fifty per cent. by volume introduced in the products.

In the paper referred to, a formula for fluidglycerate of krameria was published as a type formula and of a preparation that clinical experiments had already demonstrated to be a useful form for the exhibition of this drug, especially, in catarrhal affections of the rectum. Subsequent extended practical use by a number of physicians, has fully confirmed that it is a satisfactory preparation and remedy.

When presenting this paper before the New Jersey Pharmaceutical Association, the writer announced that he was continuing the study of the subject and intended to extend his experiments to all drugs that appeared as probably suitable for such extraction.

In the more extended work, a number of practical problems presented themselves and had to be overcome. The process of percolation was adopted wherever practical in the extraction of the drugs, but it was found that percolation with glycerin-water menstruum was somewhat more difficult than ordinary percolation with hydroalcoholic liquids. The tendency to pack, "clog" and "block" the percolation is pronounced and each drug has to be studied to determine the best method of procedure to overcome this trouble. As a rule the drug should be ground very much coarser than ordered by the Pharmacopœia for the making of tinctures and fluidextracts. The penetrating property of glycerin is so marked that usually a number twenty powder is sufficiently fine to yield good results. With fine powders an inert substance must be admixed and here again a selection is required; for guarana coarse sharp sand was satisfactory and for gambir pumice stone, not too fine, was needed. Thorough and even moistening of the drug is essential and the packing in the percolator must be even, but it must not be firmly or tightly packed; the rapidity of percolation being best controlled by means of a compressor on the exit tube. A few drugs are not amenable to percolation with glycerin-water mixture, senna leaves being a notable example, and for such either of the following methods must be adopted, maceration with the menstruum and expression, or an aqueous infusion prepared and concentrated to which the glycerin can be added.

Another problem that presented itself was the tendency of the drug in the percolator to undergo fermentation and even putrefaction before the final extraction with water was completed. In warm weather this tendency was very evident. It was found that by using chloroform water instead of distilled water in forcing out the balance of the first menstruum and in finishing the extraction, this was effectually overcome. The chloroform is entirely dissipated in the evaporation on the water bath.

In my original paper I recommended that the first 60 parts of the percolate be set aside as a reserve. Subsequent work demonstrated that this was not always practical as the remaining portion of the percolate frequently contained so much matter in solution that it was not advisable to concentrate it to 40 parts, and consequently I have adopted 50 parts for reserve. The remainder of the percolate is concentrated to 60 parts, the reserve added, and the product concentrated to 100 c.c. for each 100 Gm. of drug used.

The following has been adopted as a general formula or type and is referred to in this paper as the "type process" so as to avoid useless repetition. It is stated in terms for 100 c.c. of finished product, the quantity being that used in each of the numerous experiments tried.

Take of the drug in coarse powder.....100 Gm.
Glycerin ..... 50 c.c.
Distilled water .....150 c.c.
Chloroform water a sufficient quantity to make of finished product .....100 c.c.

Mix the glycerin and distilled water and moisten the drug thoroughly with sufficient of the mixture, and then pack it very lightly in a cylindrical percolator and saturate thoroughly with menstruum, cork up and cover the percolator and allow to macerate for two days, then continue to percolate till the drug is exhausted, using first the remainder of the menstruum and then chloroform water. Reserve the first 50 c.c. of percolate and set this aside. Evaporate the remaining percolate on a water bath, the weaker portion first, then the stronger till reduced to 60 c.c., and then add the reserve and continue the evaporation till the product measures 100 c.c. If evaporation has been carried too far, make up to 100 c.c. with distilled water. Set the product aside for several days to settle, decant the clear supernatant layer and strain the remainder through muslin.

For some of the alkaloidal drugs the addition of an acid to the menstruum to insure extraction was deemed essential and in these the same acid was not used throughout but a selection was made that in each case appeared to be the most appropriate to insure extraction with the least amount of decomposition of the alkaloids. In the selection of the acids the writer has quite likely erred in judgment at times. In a few other drugs, such as glycyrrhiza and senega, the addition of an alkali was deemed necessary and these additions are all detailed in the formulas.

Unless otherwise specified, the acid or alkali was added to the portion of the glycerin-water menstruum used to moisten the drug.

In the July issue of *Merck's Report*[2] appeared the reprint of an

[2] *Merck's Report,* 179 (July, 1908).

article from the *Chemist and Druggist,*[3] which I had not seen before, entitled "Glycetracta or Glycetracts," by W. Harrison Martindale, Ph. D. That gentleman admits that he has "adopted" my suggestion and refers to the initiatory paper before the New Jersey Pharmaceutical Association "on a method of preparing 'fluidglycerates,' representing the fluidextracta of the U. S. P.; notably, the fluidglycerate of krameria being described." He further states, "I have elaborated and extended the idea to other drugs." His entrance into this promising field of experimentation is welcomed and his results in many points confirm my own. It is to be regretted, however, that he should ignore the writer's suggestion for the title for this distinct class of preparations and add further confusion by suggesting another coined modification.

The fluidglycerates as a class possess many advantages that should appeal to physicians and also to the retail druggists. To the former they fill a want for a concentrated infusion and many of the drugs should be administered in that form. The simple dilution of the fluidglycerate with cold or hot water as may be desired will supply a satisfactory substitute for infusion of such drugs as Apocynum, Chimaphila, Eupatorium, Pareira, Pilocarpus, Rhus Glabra, Scoparius, Spigelia, Triticum and Uva Ursi all of which are preferably administered in that form and all of which yield good fluidglycerates.

Again, alcohol is frequently therapeutically contraindicated and the alcohol content has been considered detrimental to the action of the tinctures and fluidextracts of such drugs as Cimicifuga, Cypripedium, Sumbul, Valerian, Veratrum and Viburnum, and it is noticeable that these all likewise yield to glycerin their active constituents. With many patients predisposed to the alcohol habit the use of alcoholic medicines should be avoided, and here again it is noteworthy that glycerin extracts the aromatic principles and the bitter tonics, and that fluidglycerates of such drugs as Marrubium, Salvia, Orange Peel, Gentian and Chirata all appear to be satisfactory preparations, thus enabling the medical practitioner to direct aromatics and bitter tonics without the use of alcohol, and this alone should merit medical attention. Their miscibility as a class with syrup and water also aid in the elimination of alcohol.

To the retail druggist they should appeal as a class that he can

[3] *Chemist and Druggist,* 488 (March, 1908).

readily and economically prepare and not be dependent upon manufacturers, as they can be prepared even more easily on a small scale than on a large one. Again we must look forward to the time in the near future, when the druggists will be compelled to compound remedies of potent drugs only with preparations made within recent and specified time. With glycerin replacing alcohol, the fluidglycerates would be an economical means for each pharmacist preparing his own remedies and guaranteeing them and renewing stock frequently.

The writer does not consider that his experiments covering nearly 100 drugs have in all cases been conclusive and in the detailed formulas the shortcomings of a number of these are pointed out. He frankly admits that numerous experiments are necessary to prove the stability of each one of these fluidglycerates and also that physiological and chemical tests should be applied to determine the value of many of them. He hopes that some one will thus undertake to prove by clinical experiments and physiological tests the value of such fluidglycerates as those of Digitalis, Ergot, Gelsemium, Lobelia, Pomegranate, and Veratrum. The work so far done on the subject is only preliminary, but it appears to be a very promising field for practical pharmaceutical experimentation.

Fluidglycerate of Aconite.

Take of Aconite Root, in number 20 powder..... 100 Gm.
Tartaric Acid ..... 2 Gm.

Dissolve the tartaric acid in 60 c.c. of the glycerol-water menstruum and moisten the drug with the solution and then proceed to percolate and finish as per the type process.

Very little sediment has formed in this preparation. It has remained entirely clear above this and the smallest amount gives the characteristic acrid taste and tingling sensation of aconite. It mixes clear with water, syrup or diluted alcohol, but becomes cloudy with alcohol. It assayed by the U. S. P. process of assaying Fluidextract of Aconite 0.435 Gm. of alkaloid in 100 c.c. The powdered dry marc is nearly free from acridity and the aconite was practically exhausted.

Fluidglycerate of Anthemis.

Take of Anthemis in number 20 powder..... 100 Gm.

Follow the type process using 120 c.c. of the glycerol-water menstruum to moisten the drug.

The resulting preparation contains the bitterness of the drug and considerable of the aroma. It has formed a semi-gelatinous precipitate distributed throughout the liquid and while miscible with but slight turbidity with water, syrup, diluted alcohol or alcohol I do not consider it entirely satisfactory.

Fluidglycerate of Apocynum.

Take of Apocynum in number 20 powder..... 100 Gm.

Follow the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

The resulting preparation has formed only the faintest sediment, is a clear red-brown syrupy liquid, is bitter, and has the characteristic taste of the drug. It mixes clear with water, syrup or diluted alcohol, and cloudy with alcohol. It appears to fully represent the drug, and I believe it to be an excellent form for the exhibition of its action.

Fluidglycerate of Asclepias.

Take of Asclepias in number 20 powder..... 100 Gm.

Proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

This preparation precipitated slightly before straining, is now clear and appears to be a good preparation of the drug. It mixes clear with water, syrup or diluted alcohol, but turbid with alcohol.

Fluidglycerate of Belladonna Leaves.

Take of Belladonna Leaves in number 40 powder..... 100 Gm.
Tartaric Acid ..... 2 Gm.

Dissolve the tartaric acid in 80 c.c. of the mixture of glycerin and distilled water, and use this solution to moisten the drug, and proceed to percolate and finish, following the type process.

On standing the deposit formed at the bottom of the container was about one-tenth of the volume, but after decanting and filtering the preparation remained clear. From physical appearances it appears to represent the drug. It mixes clear with water or diluted alcohol, not quite clear with syrup, and with alcohol it produces a cloudiness.

It assayed by U. S. P. process for assaying Fluidextract of Belladonna, 0.27542 Gm. alkaloids to 100 c.c.

Fluidglycerate of Belladonna Root.

Take of Belladonna Root in number 20 powder.....100 Gm.
Tartaric Acid ..... 2 Gm.

Dissolve the tartaric acid in 60 c.c. of the mixture of glycerin and distilled water and moisten the drug with this solution, and proceed to percolate and finish, following the type process.

On standing this preparation deposited some starch-like sediment, but the decanted and filtered portion has since remained clear. It mixes clear with water, syrup or diluted alcohol, and turbid with alcohol. It assayed 0.37884 Gm. alkaloids to 100 c.c.

Fluidglycerate of Berberis.

Take of Berberis in number 20 powder.....100 Gm.

Follow the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

The resulting preparation is clear, greenish-brown in color and mixes clear with water, syrup or diluted alcohol, and only slightly cloudy with alcohol. It appears to be an entirely satisfactory preparation.

Fluidglycerate of Calumba.

Take of Calumba in number 20 powder.....100 Gm.

Follow the type process, using 60 c.c. of the gylcerol-water menstruum to moisten the drug.

Only a slight precipitate formed in the preparation and after straining it was a clear, deep brown, very bitter, liquid, and appears to fully represent the drug, and to be an excellent form for its exhibition. It mixes clear with water, syrup or diluted alcohol, but turbid with alcohol. The dried marc shows that the drug was extracted.

Fluidglycerate of Cascara Sagrada.

Take of Cascara Sagrada in number 20 powder.....100 Gm.

Follow the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

The resulting preparation is bitter and has not precipitated, and no doubt fully represents the activity of the drug. Its miscibility is, however, peculiar, as it mixes clear with alcohol or diluted alcohol and makes a somewhat cloudy mixture with syrup, and is decidedly turbid with water.

Bitterless Fluidglycerate of Cascara Sagrada.

Take of Cascara Sagrada in number 20 powder..... 100 Gm.
Lime ..... 5 Gm.

Mix the lime with 200 c.c. of distilled water and stir in the Cascara Sagrada, moistening the drug evenly and thoroughly. Dry the moist powder by exposure to a moderate heat till air dry; then proceed with this as directed in the type process using 80 c.c. of glycerol-water menstruum to moisten the drug.

The resulting product is deep red-brown in color, bitterless and entirely free from sediment, and quite satisfactory. It mixes clear with water, syrup, diluted alcohol, and cloudy with alcohol.

Aromatic Fluidglycerate of Cascara Sagrada.

Take of Bitterless Fluidglycerate Cascara Sagrada..... 75 c.c.
Fluidglycerate of Glycyrrhiza..... 25 c.c.
Oil of Fennel ..... .1 c.c.
Oil of Cloves ..... .1 c.c.
Oil of Cassia ..... .1 c.c.
Mix.

This is an excellent aromatic preparation in which cascara is effectually disguised.

Fluidglycerate of Castanea.

Take of Castanea leaves in number 20 powder..... 100 Gm.

Proceed as directed in the type process, using 100 c.c. of the glycerol-water menstruum to moisten the drug, and pack very lightly.

The resulting preparation is free from precipitate, is a thick, clear, red-brown liquid having a faint odor of the leaf and slightly acidulous, pleasant bitter and astringent taste. It mixes clear with water, syrup, or diluted alcohol but alcohol coagulates it.

Fluidglycerate of Caulophyllum.

Take of Caulophyllum in number 20 powder.....100 Gm.

Proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

The finished product was free of sediment and has remained clear and brilliant with characteristic taste of the drug. With water it mixes with a slight cloudiness and also forms cloudy mixtures with alcohol or diluted alcohol, but with syrup it mixes clear. It appears to be a satisfactory preparation.

Fluidglycerate of Chimaphila.

Take of Chimaphila in number 20 powder.....100 Gm.

Proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

The resulting product appears to be an excellent preparation, is free from sediment and has remained clear, and should be an acceptable form for administering the drug. With water it makes a slightly cloudy mixture and with alcohol a turbid one results, but it mixes clear with syrup or diluted alcohol.

Fluidglycerate of Chirata.

Take of Chirata in number 20 powder.....100 Gm.

Proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

The resulting preparation showed a very slight sediment which was readily strained off, and the remainder has been clear since. It is a thick, dark-brown, exceedingly bitter liquid, fully representing the drug. It makes with water, syrup or diluted alcohol clear mixtures but produces with alcohol a cloudiness.

Fluidglycerate of Cimicifuga.

Take of Cimicifuga in number 20 powder.....100 Gm.

Proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

This preparation was one of the surprises of the series. It has

remained clear, with only the faintest trace of sediment. It is rich in color and taste of the drug, and appears well worthy of medical consideration. It mixes entirely clear with water, syrup, or diluted alcohol but with alcohol the mixture is turbid.

Fluidglycerate of Cinchona.

Take of Cinchona in number 40 powder..... 100 Gm.
Hydrochloric Acid ..... 5 c.c.

Add the Hydrochloric Acid to 100 c.c. of the glycerol-water menstruum, and in this mixture rub up the cinchona to a paste; set this aside for 24 hours to macerate, then stir up thoroughly and transfer to a conical glass percolator. Then proceed to extract and finish in accordance with the type process.

The product is a thick red liquid, which while slightly cloudy, has deposited practically no sediment. It is acid and very bitter. It mixed clear with alcohol or diluted alcohol, and with syrup produced a slight cloudiness, but with water there was formed a precipitate of the bright red coloring matter. Assayed by the official process for Assay of Fluidextract of Cinchona, it showed 3.58 Gm. anhydrous ether-soluble alkaloids in 100 c.c.

Fluidglycerate of Coca.

Take of Coca in number 20 powder..... 100 Gm.

Proceed according to the type process, using 100 c.c. of the glycerol-water menstruum to moisten the drug.

On concentrating the percolate there was produced a decided precipitate, gritty to the feel and taste. This was isolated, washed and tested, and proved to be calcium oxalate. The strained liquid has remained clear and has a decided taste and odor of the coca leaf, and this is brought out on dilution. It mixes clear with syrup or diluted alcohol and slightly cloudy with water, and is coagulated by strong alcohol. Assayed by the official process for Assay of Fluidextract of Coca, it showed 0.3 Gm. ether-soluble alkaloids in 100 c.c.

Fluidglycerate of Coffee.

Take of Coffee in number 40 powder..... 100 Gm.

Proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

Fluidglycerates of both green, or unroasted, and of roasted, coffee were prepared, and both appear to be satisfactory preparations. That of the roasted coffee will fill a demand that is growing in the trade for a concentrated extract of coffee for making syrup, flavoring for ice cream, soda water, etc. The following formula is submitted for

Syrup of Coffee.

Take of Fluidglycerate of Roasted Coffee..... 10 c.c.
Syrup ..... 70 c.c.
Mix.

The product, while only one-half the coffee strength of the N. F. formula for syrup of coffee, will be found quite strong enough for soda water syrup, and if a stronger syrup is wanted the proportion of the fluidglycerate can be increased.

Fluidglycerate of Colchicum Corm.

Take of Colchicum Corm in number 20 powder..... 100 Gm.
Acetic Acid ..... 10 c.c.

Mix the acetic acid with 50 c.c. of the glycerol-water mixture and moisten the drug with the mixture and then proceed as per the type process.

In this preparation there separated a starch-like sediment amounting to about 10 c.c., which was strained out, and the liquid has since remained clear. It has a bitter and acidulous taste and mixes clear with syrup and cloudy with alcohol and slightly cloudy with water or diluted alcohol. Assayed by the official process for assay of Fluidextract of Colchicum Seed it gave 0.290 Gm. colchicine in 100 c.c.

Fluidglycerate of Colchicum Seed.

Take of Colchicum Seed in number 20 powder..... 100 Gm.
Acetic Acid ..... 15 c.c.

Mix the acetic acid with 60 c.c. of the menstruum of glycerin and distilled water and moisten the drug with this; then proceed according to the type process.

The product deposited a scanty sediment and after straining this off, it remained clear and bright. It is red-brown in color with an acidulous and characteristic bitter taste and well represents the activity of the drug. It mixes slightly cloudy with water or diluted alcohol and clear with syrup, but turbid with alcohol. Assayed by the official method for the assay of Fluidextract of Colchicum Seed it gave 0.36 Gm. of colchicine in 100 c.c.

Fluidglycerate of Colocynth.

Take of Colocynth in number 30 powder..... 100 Gm.

Proceed according to the type process, using 90 c.c. of the glycerol-water menstruum to moisten the drug.

This product deposited a heavy albuminous precipitate and although the strained liquid has remained clear, the marc shows that the drug has not been exhausted, and I do not consider it satisfactory. The addition of an alkali may be necessary to the glycerol-water menstruum in order to make it a satisfactory medium.

Fluidglycerate of Conium.

Take of Conium in number 30 powder..... 100 Gm.
Acetic Acid ..... 5 c.c.

Mix the acetic acid with 45 c.c. of the glycerol-water menstruum and moisten the drug with the mixture, and then proceed according to the type process.

An albuminous sediment formed at once on heating. This was allowed to settle in the product and then gotten rid of by decantation and straining. The preparation has since remained clear and possesses the odor and taste of the drug. It mixes clear with syrup, slightly cloudy with water, more so with diluted alcohol and quite turbid with alcohol. Assayed by the official process for assay of Fluidextract of Conium it yielded 0.466 Gm. of coniine in 100 c.c.

Two other samples were made from the same conium in the one using 10 c.c. of acetic acid and the other no acid. The former assayed 0.408 and the latter 0.120 Gm. of coniine. From these experiments, we are justified in concluding that an acid is essential to the extraction of conium but that a quantity in excess of that directed is not advisable.

Fluidglycerate of Cotton Root Bark.

Take of Cotton Root Bark in number 20 powder.....100 Gm.

Proceed according to the type process, using 100 c.c. of the glycerol-water menstruum to moisten the drug.

The product deposited a scant sediment and appears to be a satisfactory preparation. It mixes clear with water, syrup, or diluted alcohol, and turbid with alcohol.

Fluidglycerate of Cypripedium.

Take of Cypripedium in number 20 powder.....100 Gm.

Proceed according to the type process, using 70 c.c. of the glycerol-water menstruum to moisten the drug.

This product has remained perfectly clear and has the characteristic odor and taste of the drug and the marc shows that the extraction was practically complete. It mixes clear with syrup or diluted alcohol and slightly cloudy with water and still more so with alcohol.

Fluidglycerate of Digitalis.

Take of Digitalis in number 40 powder .....100 Gm.

Proceed according to the type process, moistening the drug with 70 c.c. of the glycerol-water menstruum.

The product deposited a slight sediment, but after straining has remained clear and has a marked taste and odor of the drug. It mixes clear with syrup and slightly cloudy with water or diluted alcohol and turbid with alcohol. This product should be submitted to physiological testing.

Fluidglycerate of Dioscorea.

Take of Dioscorea in number 20 powder .....100 Gm.

Proceed according to the type process, using 100 c.c. of the glycerol-water menstruum to moisten the drug.

This product deposited a copious starchy sediment which it was impossible to remove entirely by straining and is for that reason not satisfactory. It mixes clear with water, syrup or diluted alcohol but turbid with alcohol.

Fluidglycerate of Ergot.

Take of Ergot in number 20 powder.....100 Gm.
Acetic Acid ..... 2 c.c.

Mix the acetic acid with 40 c.c. of the glycerol-water menstruum and moisten the drug with this mixture, then proceed according to the type process.

The product deposited very little sediment and has remained clear after straining. It is a dark red-brown, thick liquid with strong odor and taste of ergot, and mixes clear with water, syrup or diluted alcohol, but becomes turbid with alcohol. It appears to be a good preparation but should be tested physiologically.

Fluidglycerate of Eupatorium.

Take of Eupatorium in number 30 powder.....100 Gm.

Proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

The product deposited scarcely any sediment and remained clear after straining. It appears to be a good preparation, possessing the faint bitter taste and aroma of the drug. It mixes clear with syrup, but slightly cloudy with water and still more so with diluted alcohol, and turbid with alcohol.

Fluidglycerate of Frangula.

Take of Frangula in number 20 powder.....100 Gm.

Proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

This is an excellent preparation that has shown no signs of a precipitate, and shows that alcohol is not necessary for the extraction of either of the official barks of Rhamni. Its solubility is peculiar, as it mixes clear with syrup or diluted alcohol and only slightly cloudy with alcohol, but decidedly cloudy with water.

Fluidglycerate of Gambir.

Take of Gambir .....100 Gm.
Pumice Stone in small pieces.....200 Gm.

Beat the gambir and pumice in a clean mortar till reduced to a uniform number 40 powder; mix this with 100 c.c. of the

glycerol-water menstruum and set aside for 24 hours and then rub this up with the addition of sufficient of the menstruum to make a thin sludge and transfer to the percolator. Continue the extraction and preparation in accordance with the type process.

The clayey matter present in gambir makes the percolation of this drug difficult. The product is a thick almost viscous preparation that represents the drug fully. It mixes clear with syrup or diluted alcohol and produces a slight cloudiness with alcohol and an increased turbidity with water.

Fluidglycerate of Gelsemium.

Take of Gelsemium in number 20 powder..... 100 Gm.

Proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

This product remains clear and appears to be a good preparation and the marc also indicates complete extraction. It should receive a thorough medical trial and physiological testing. It mixes clear with water, syrup or diluted alcohol, but alcohol produces a precipitate and turbidity.

Fluidglycerate of Gentian.

Take of Gentian in number 20 powder..... 100 Gm.

Proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

On evaporating the weaker aqueous portions of the gentian extract there formed as the concentration became near completion a gelatinous thickening. On adding the reserve portion and stirring this was broken up and largely redissolved and on allowing the product to stand for a few days with occasional shaking had almost disappeared. The strained liquid has remained clear and has the bitterness and flavor of the drug. It mixes clear with water, syrup or diluted alcohol, but alcohol produces a decided turbidity.

Fluidglycerate of Geranium.

Take of Geranium in number 20 powder..... 100 Gm.

Proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

No sediment has formed in this product and it appears to be an excellent form for the administration of this drug, the valuable astringent principle being well extracted. It mixes clear with syrup or diluted alcohol, cloudy with water, and turbid with alcohol.

Fluidglycerate of Glycyrrhiza.

Take of Glycyrrhiza in number 20 powder..... 100 Gm.
Ammonia water ..... 5 c.c.

Mix the ammonia water with 60 c.c. of the glycerol-water menstruum and moisten the drug with this mixture, and then proceed according to the type process.

The product is rich in the flavor of licorice and the marc shows that the drug has been exhausted. It has remained clear and forms clear mixtures with water, syrup or diluted alcohol, but turbid with alcohol.

Fluidglycerate of Guarana.

Take of Guarana in number 60 powder..... 100 Gm.
Clean sharp white Sand..... 250 Gm.

Mix the guarana and sand and proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

The product, while not as deep in color as the fluidextract, is bright, clear, and rich in the peculiar flavor of the drug. It mixes clear with syrup, slightly cloudy with water or diluted alcohol, and still more cloudy with alcohol. It is one of the good preparations in these experiments and assayed 3.8 Gm. of alkaloid in 100 c.c.

Fluidglycerate of Hæmatoxylon.

Take of Hæmatoxylon in number 20 powder..... 100 Gm.

Proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

This is another good product that has shown no signs of sediment, and fully represents the astringency of the drug. It makes clear solutions with water, syrup, alcohol or diluted alcohol.

Fluidglycerate of Hamamelis Bark.

Take of Hamamelis Bark in number 20 powder.....100 Gm.

Proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

This is another good preparation that has not deposited any sediment and no doubt fully represents the drug. It mixes clear with water, syrup or diluted alcohol and almost clear with alcohol.

Fluidglycerate of Hamamelis Leaves.

Take of Hamamelis Leaves in number 20 powder.....100 Gm.

Proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

This is likewise a good preparation without any sign of sediment, and having a pleasant astringent taste and a faintly aromatic and herbaceous odor. It mixes clear with water, syrup or diluted alcohol but alcohol produces a coagulation and turbidity.

Fluidglycerate of Hellebore.

Take of Hellebore in number 20 powder.....100 Gm.

Proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

This product had a copious deposit, which separated slowly, and while it was bitter and tasted of the drug, it was not satisfactory. It made cloudy mixtures with water, syrup, alcohol or diluted alcohol.

Fluidglycerate of Hops.

Take of Hops in number 20 powder.....100 Gm.

Proceed according to the type process, using 180 c.c. of the glycerol-water menstruum to moisten the drug.

This product at once deposited a small amount of sediment, which was readily strained off, and the liquid has remained clear from sediment, but having an opalescence. It possesses in a marked degree the bitterness and aroma of hops. It mixes clear with diluted alcohol and cloudy with water or syrup and turbid with alcohol.

Fluidglycerate of Hyoscyamus.

Take of Hyoscyamus in number 40 powder..... 100 Gm.
Tartaric Acid ..... 2 gm.

Dissolve the tartaric acid in 60 c.c. of the glycerol-water menstruum and then proceed according to the type process.

This product deposited considerable sediment but the decanted and strained liquid is clear and has the taste and odor of henbane, and this becomes more pronounced on dilution with water. It mixes clear with syrup, cloudy with water or diluted alcohol, and turbid with alcohol. Assayed by the official process for the assay of Fluidextract of Hyoscyamus it gave 0.06658 Gm. of alkaloids in 100 c.c.

Fluidglycerate of Hydrastis.

Take of Hydrastis in number 30 powder..... 100 Gm.

Proceed according to the type process, using 70 c.c. of the glycerol-water menstruum to moisten the drug.

This preparation deposited a sediment soon after made, but the strained liquid has remained clear and has the color, taste and odor of the drug. It mixes clear with syrup, cloudy with water or diluted alcohol, and turbid with alcohol, with a copious precipitate. It assayed by the official process for assay of Fluidextract of Hydrastis 1.86 Gm. hydrastine in 100 c.c.

Fluidglycerate of Ipecac.

Take of Ipecac in number 40 powder..... 100 Gm.
Acetic Acid ..... 10 c.c.

Mix the acetic acid with 50 c.c. of the glycerol-water menstruum and then proceed according to the type process.

The product is nearly clear, has deposited no sediment, and is fully active. It mixes clear with syrup or diluted alcohol and shows only a slight opalescence with water, but is turbid with alcohol. It assayed by the official process for assay of Fluidextract of Ipecac 1.4756 Gm. alkaloids in 100 c.c.

Fluidglycerate of Krameria.

Take of Krameria in number 20 powder..... 100 Gm.

Proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

This has proven to be an entirely satisfactory preparation and a sample two years old shows no deterioration. It mixes clear with syrup, diluted alcohol or alcohol, but makes with water a slightly cloudy mixture, having a purplish tinted opalescence.

Fluidglycerate of Lappa.

Take of Lappa in number 20 powder..... 100 Gm.

Proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

This product deposited a copious starchy semi-gelatinous sediment, and although it had the odor and taste of the drug, I do not consider it satisfactory. It mixed clear with water, syrup or diluted alcohol, but turbid with alcohol.

Fluidglycerate of Lobelia.

Take of Lobelia in number 30 powder..... 100 Gm.
Acetic Acid ..... 25 c.c.

Mix the acetic acid with 75 c.c. of the glycerol-water menstruum and moisten the drug with this mixture and then proceed according to the type process.

This is a good product, showing but a trace of precipitate and possessing all the acridity and irritating taste of the drug. It mixes clear with water, syrup or diluted alcohol, but turbid with alcohol.

Fluidglycerate of Marrubium.

Take of Marrubium in number 20 powder..... 100 Gm.

Proceed according to the type process, using 100 c.c. of the glycerol-water menstruum for moistening the drug.

This product has deposited but a very scant sediment. It has the odor and taste of horehound and should prove useful. It mixes clear with water or syrup and nearly clear with diluted alcohol, but alcohol produces a copious precipitate and turbidity.

Fluidglycerate of Matricaria.

Take of Matricaria in number 20 powder..... 100 Gm.

Proceed according to the type process, using 100 c.c. of the glycerol-water menstruum to moisten the drug.

The product deposited a copious gelatinous precipitate and was not considered to be entirely satisfactory, although possessing the bitterness and aroma of the drug. It mixes clear with syrup or diluted alcohol, slightly cloudy with water, and turbid with alcohol.

Fluidglycerate of Nutgall.

Take of Nutgall in number 20 powder..... 100 Gm.

Rub up the nutgall in a clean mortar with 120 c.c. of the glycerol-water menstruum and then transfer it to the percolator and proceed according to the type process.

It is very difficult to percolate powdered nutgall in the usual way. If the powder is too fine, it will at once gum and resist all attempts at extraction with the menstruum, and so it was found necessary to use a coarsely ground drug and to make this into a very thin paste before attempting extraction. The product separated what, at first, seemed like considerable sediment, but this deposited as a small amount of precipitate, closely adhering to the bottom of the bottle, and from which the clear liquid was readily decanted. It mixes clear with water, syrup, or diluted alcohol and almost clear with alcohol.

Fluidglycerate of Nux Vomica.

Take of Nux Vomica in number 20 powder..... 100 Gm.
Acetic Acid ..... 5 c.c.

Mix the acetic acid with 80 c.c. of the glycerol-water menstruum and moisten the drug with this mixture, and then proceed according to the type process.

This product is peculiar from the fact that while it has not precipitated, it has become thick and opalescent, and the thickening has increased to a mucilaginous consistence. It mixes clear with syrup, cloudy with water or diluted alcohol and turbid with alcohol. It assayed 0.996 Gm. strychnine in 100 c.c. This preparation will require further experiment and possibly a change in the acid constituent will make it entirely satisfactory.

Fluidglycerate of Bitter Orange Peel.

Take of Bitter Orange Peel in number 20 powder..... 100 Gm.

Proceed according to the type process, using 100 c.c. of the glycerol-water menstruum to moisten the drug.

The product formed a mucilaginous sediment, but after straining has remained clear. It has the bitterness and considerable of the flavor of orange peel, the aroma being brought out on dilution. It mixes clear with water, syrup or diluted alcohol and cloudy with alcohol.

Fluidglycerate of Sweet Orange Peel.

Take of Sweet Orange Peel in number 20 powder.....100 Gm.

Proceed according to the type process, using 100 c.c. of the glycerol-water menstruum to moisten the drug.

The product formed much less precipitate than that from the bitter orange, was readily decanted and after straining has remained clear. It is slightly acid, pleasantly bitter and has a good aroma. It mixes clear with water, syrup or diluted alcohol and slightly cloudy with alcohol.

Fluidglycerate of Pareira.

Take of Pareira in number 20 powder.....100 Gm.

Proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

This product deposited a starch-like sediment which was readily removed by straining. It has since continued clear and is decidedly bitter and makes slightly cloudy mixtures with water, syrup or diluted alcohol and turbid with alcohol.

Fluidglycerate of Phytolacca Root.

Take of Phytolacca Root in number 20 powder.....100 Gm.

Proceed according to the type process, using 100 c.c. of the glycerol-water menstruum to moisten the drug.

The product was a clear, red-brown liquid, which on standing has become thick, almost gelatinous, and for this reason I do not consider the preparation satisfactory. Probably poke root yields too much to solution to permit of a preparation of this strength.

Fluidglycerate of Pilocarpus.

Take of Pilocarpus in number 20 powder.....100 Gm.

Proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

The precipitate formed in this product was not appreciable. It is rich in odor and taste of the leaf and should be an ideal form of administering the drug. It mixes clear with water, syrup or diluted alcohol and turbid with alcohol. Assayed by the official process for assaying the Fluidextract of Pilocarpus, it yielded 0.35 Gm. of alkaloids in 100 c.c.

Fluidglycerate of Pomegranate.

Take of Pomegranate in number 20 powder..... 100 Gm.

Proceed according to the type process, using 70 c.c. of the glycerol-water menstruum to moisten the drug.

The product is a perfectly clear, astringent and bitter liquid, which doubtless represents the drug, and should prove a valuable remedy. It mixes clear with syrup or diluted alcohol and turbid with water or alcohol.

Fluidglycerate of Quassia.

Take of Quassia in number 20 powder..... 100 Gm.

Proceed according to the type process, using 90 c.c. of the glycerol-water menstruum to moisten the drug.

This product is an excellent preparation of the drug that has deposited no appreciable sediment and the marc shows that the drug was exhausted as far as possible. It mixes clear with water, syrup or diluted alcohol and opalescent with alcohol.

Fluidglycerate of Quillaja.

Take of Quillaja in number 20 powder..... 100 Gm.

Proceed according to the type process, using 100 c.c. of the glycerol-water menstruum to moisten the drug.

This is another good preparation, being clear and active. It mixes clear with water, syrup or diluted alcohol and cloudy with alcohol.

Fluidglycerate of Red Clover.

Take of Red Clover in number 20 powder..... 100 Gm.

Proceed according to the type process, using 160 c.c. of the glycerol-water menstruum to moisten the drug.

The product separated at first a mucilaginous sediment that occupied nearly one-third of the bottle. After some time this deposited

and the strained liquid has remained clear. It is pleasant, acidulous, and astringent and mixes clear with water, syrup or diluted alcohol and turbid with alcohol.

Fluidglycerate of Red Rose.

Take of Red Rose in number 60 powder..... 100 Gm.

Mix the powdered Rose petals with at least an equal bulk of clean sand and proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

This product is not entirely satisfactory, being exceedingly astringent but deficient in color. The addition of acid would possibly improve the formula. It mixes clear with syrup or diluted alcohol but cloudy with water or alcohol.

Fluidglycerate of Rhubarb.

Take of Rhubarb in number 30 powder..... 100 Gm.

Proceed according to the type process, using 50 c.c. of the glycerol-water menstruum to moisten the drug.

This product is thick, clear, rich in odor and taste of the drug and is an excellent preparation, and the marc shows that the drug was fully exhausted. It mixes clear with syrup or diluted alcohol but cloudy with water, and alcohol makes a turbid mixture with a decided precipitate.

Fluidglycerate of Rhus Glabra.

Take of Rhus Glabra in number 20 powder..... 100 Gm.

Proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

This is a handsome preparation, being a clear red liquid possessing the acid astringent taste of the drug and fully representing it, and should be a very proper form for the exhibition of this remedy. It mixes clear with water, syrup or diluted alcohol and slightly cloudy with alcohol.

Fluidglycerate of Rubus.

Take of Rubus in number 20 powder..... 100 Gm.

Proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

The product deposited a gray colored sediment, closely adhering to the bottom of the bottle and from this it was readily strained, and it is now a somewhat opalescent, very astringent liquid that mixes clear with syrup or diluted alcohol, cloudy with water and turbid with alcohol.

Fluidglycerate of Rumex.

Take of Rumex in number 20 powder..... 100 Gm.

Proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

This is another good product that has but a trace of sediment. It mixes clear with syrup or diluted alcohol and cloudy with water and turbid with alcohol.

Fluidglycerate of Salvia.

Take of Salvia in number 30 powder..... 100 Gm.

Proceed according to the type process, using 100 c.c. of the glycerol-water menstruum to moisten the drug.

This product has deposited but a trace of sediment, is clear and possesses the well marked odor and taste of the drug, which it appears to well represent. It mixes clear with water, syrup or diluted alcohol and turbid with alcohol.

Fluidglycerate of Sanguinaria.

Take of Sanguinaria in number 20 powder..... 100 Gm.
Acetic Acid ..... 25 c.c.

Mix the acetic acid with 40 c.c. of the glycerol-water menstruum and moisten the drug with the mixture and then proceed according to the type process.

This product has not proven to be entirely satisfactory, as it has developed considerable sediment. It mixes cloudy with water or syrup, nearly clear with diluted alcohol but turbid with alcohol. It is intended to continue the experiments with sanguinaria as it is believed that a satisfactory fluidglycerate can be made.

Fluidglycerate of Sarsaparilla.

Take of Sarsaparilla in number 20 powder..... 100 Gm.

Proceed according to the type process, using 65 c.c. of the glycerol-water menstruum to moisten the drug.

This product is an ideal preparation, clear, bright, and represents the drug fully. It mixes clear with water, syrup, or diluted alcohol but is turbid with alcohol.

Fluidglycerate of Scoparius.

Take of Scoparius in number 20 powder ..... 100 Gm.

Proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

This is another satisfactory preparation that has deposited no sediment. It mixes clear with syrup or diluted alcohol, but cloudy with water and turbid with alcohol.

Fluidglycerate of Scutellaria.

Take of Scutellaria in number 20 powder ..... 100 Gm.

Proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

The product formed but a small amount of compact sediment, from which it was readily strained, and has since remained clear and well represents the drug. It mixes clear with syrup or diluted alcohol and cloudy with water, and is coagulated by alcohol.

Fluidglycerate of Senega.

Take of Senega in number 20 powder ..... 100 Gm.
Solution of Potassium Hydroxide ..... 5 c.c.

Mix the solution of potassium hydroxide with 50 c.c. of the glycerol-water menstruum and moisten the drug with this mixture, and then proceed according to the type process.

The product is opalescent and quite thick, but has been free from sediment. It mixes clear with syrup, opalescent with water, cloudy with diluted alcohol and turbid with alcohol.

Fluidglycerate of Senna.

Take of Senna in number 20 powder ..... 100 Gm.
Glycerin ..... 50 c.c.
Distilled Water a sufficient quantity.

Infuse the senna in 250 c.c. of warm distilled water and when cold strain with pressure, repeat the infusion twice with the same

amount of warm distilled water, mix the strained liquids and evaporate on the water bath to 50 c.c., add the glycerin and strain.

It was found to be impossible to percolate senna with the glycerol-water menstruum as it assumed a gummy mass which absolutely blocked the percolator. Consequently, an infusion process was here adopted. The product is very thick and dark and mixes clear with syrup, cloudy with water or diluted alcohol and is coagulated by alcohol.

Fluidglycerate of Spigelia.

Take of Spigelia in number 20 powder.....100 Gm.

Proceed according to the type process, using 85 c.c. of the glycerol-water menstruum to moisten the drug.

This is an excellent preparation, has not precipitated and has the aroma and peculiar pungent and acrid taste of the drug. It mixes clear with syrup, slightly cloudy with water or diluted alcohol, and turbid with alcohol.

Fluidglycerate of Squill.

Take of Squill in number 20 powder.....100 Gm.

Place the squill in a suitable percolator, merely shaking it down and not packing, and then proceed to percolate with the menstruum as directed in the type process.

On evaporating the percolate there formed a flocculent coagulated albuminous precipitate. This was strained off and the finished product filtered through absorbent cotton, and this has since remained clear. It is quite bitter and acrid, and the marc indicates extraction. It mixes clear with water, syrup or diluted alcohol but alcohol in excess produces a milky turbidity.

Fluidglycerate of Stillingia.

Take of Stillingia in number 20 powder .....100 Gm.

Proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

This is a good preparation of the drug, possessing its odor and taste strongly and free from sediment. It mixes clear with water, syrup or diluted alcohol and turbid with alcohol.

Fluidglycerate of Stramonium.

Take of Stramonium in number 30 powder ..... 100 Gm.
Tartaric Acid ..... 2 Gm.

Dissolve the tartaric acid in 60 c.c. of the glycerol-water menstruum and moisten the drug with this mixture, and then proceed according to the type process.

The product was not entirely satisfactory, as there formed in it a copious gelatinous precipitate, which was strained off. The preparation mixes clear with syrup, cloudy with water or diluted alcohol and turbid with alcohol. Assayed by the official process for assaying Fluidextract of Stramonium, it yielded 0.2296 Gm. alkaloids in 100 c.c.

Fluidglycerate of Sumbul.

Take of Sumbul in number 20 powder ..... 100 Gm.

Proceed according to the type process, using 100 c.c. of the glycerol-water menstruum to moisten the drug.

The product was surprisingly strong in the odor and taste of the drug, and has deposited only a slight gelatinous sediment. It mixes clear with syrup, opalescent with water, cloudy with diluted alcohol and turbid with alcohol.

Fluidglycerate of Taraxacum.

Take of Taraxacum in number 20 powder..... 100 Gm.

Proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

In this product there has formed a small amount of gelatinous sediment readily removed by decantation. It mixes clear with water, syrup or diluted alcohol and turbid with alcohol.

Fluidglycerate of Tea.

Take of Tea in number 30 powder..... 100 Gm.

Proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

The product is clear and satisfactory and has the odor and taste of the leaf well preserved. It mixes clear with syrup, opalescent with water or diluted alcohol, and turbid with alcohol.

Fluidglycerate of Triticum.

Take of Triticum in number 20 powder..... 100 Gm.

Proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

The product has deposited scarcely any sediment, has a pleasant malt-like taste and mixes clear with water, syrup or diluted alcohol and turbid with alcohol.

Fluidglycerate of Uva Ursi.

Take of Uva Ursi in number 20 powder..... 100 Gm.

Proceed according to the type process, using 80 c.c. of the glycerol-water menstruum to moisten the drug.

The product is fine, being heavy and clear. It mixes clear with syrup or diluted alcohol, opalescent with water, and is coagulated by alcohol.

Fluidglycerate of Valerian.

Take of Valerian in number 20 powder..... 100 Gm.

Proceed according to the type process, using 60 c.c. of the glycerol-water menstruum to moisten the drug.

This product was one of the surprises. It has deposited but a very scant sediment, is now clear, has a strong odor and taste of the drug, and the marc appears to be extracted. It mixes clear with water, syrup or diluted alcohol and turbid with alcohol.

Fluidglycerate of Veratrum Viride.

Take of Veratrum Viride in number 20 powder..... 100 Gm.
Tartaric Acid..... 2 Gm.

Dissolve the tartaric acid in 80 c.c. of the glycerol-water menstruum and moisten the drug with this mixture and then proceed according to the type process.

A slight sediment formed in the product but soon settled, and the preparation is now clear. It has the taste and slight tingling sensation and acridity of the drug, and is well worth medical trial. It mixes clear with water, syrup or diluted alcohol and turbid with alcohol.

Fluidglycerate of Viburnum Opulus.

Take of Viburnum Opulus in number 20 powder..... 100 Gm.

Proceed according to the type process, using 100 c.c. of the glycerol-water menstruum to moisten the drug.

The product deposited scarcely any sediment and appears to be another good preparation. It mixes clear with syrup or diluted alcohol, slightly cloudy with water and cloudy with alcohol.

Fluidglycerate of Viburnum Prunifolium.

Take of Viburnum Prunifolium in number 20 powder.... 100 Gm.

Proceed according to the type process, using 30 c.c. of the glycerol-water menstruum to moisten the drug.

This product has remained clear, is of a deep rich color with a strong valerian-like odor and taste and should be a valuable preparation. It mixes clear with syrup or diluted alcohol, and cloudy with water and still more so with alcohol.

Fluidglycerate of White Oak Bark.

Take of White Oak Bark in number 20 powder..... 100 Gm.

Proceed according to the type process, using 70 c.c. of the glycerol-water menstruum to moisten the drug.

The product is rich in tannin, deep in color and strong in taste of the drug and has remained clear. It mixes clear with water, syrup or diluted alcohol and only slightly cloudy with alcohol.

Fluidglycerate of Wild Cherry.

Take of Wild Cherry in number 20 powder..... 100 Gm.

Proceed according to the type process, using 70 c.c. of the glycerol-water menstruum to moisten the drug.

The product deposited a small amount of gelatinous sediment, but after straining has remained clear. It has the characteristic bitter and astringent taste and odor of the drug in a concentrated form. It mixes clear with syrup or diluted alcohol, slightly cloudy with water or alcohol.

AMERICAN PHARMACEUTICAL ASSOCIATION.

[*Continued from page 510.*]

Prescription Nostrums.

By Lyman F. Kebler.

The author calls attention to a scheme which is intended to deceive the more enlightened public and evade the provisions of the Food and Drugs Act of June 30, 1906. The scheme consists essentially of the publication in newspapers of advertisements extolling the virtues of certain remedies in the treatment of specific diseases. The prescription or recipe for the remedy is published in the advertisements, is furnished by the advertiser upon application without cost, the understanding being that it can be filled by any local druggist. The prescription, however, always contains at least one product bearing a unique coined name, the nature and composition of which is known only to the advertiser, the manufacturer, or parties interested in furthering the sale of the remedy. As a result the local druggist is either unable to compound the prescription or in doing so, he is compelled to use a product usually composed of simple well-known ingredients which must be obtained from the parties interested in promoting the sale of the remedy.

In connection with this paper the following resolution was offered which subsequently received the approval of the Association at the general session on Saturday morning.

The American Pharmaceutical Association founded in Eighteen Hundred and Fifty-two, in Convention assembled, representing the best sentiments of professional, scientific, educational and commercial pharmacy, would respectfully submit to the editors and managers of the secular press that the respect of the more intelligent classes of society, for the press, is being certainly and most unfortunately lowered, and that its beneficent influence thereby greatly lessened because of the publication of *medicinal recipes* couched in false and misleading language, and printed in misleading form which are placed in locations calculated to help in the deception of exploiting proprietary nostrums as regular non-protected medicines.

Matter of this kind received and paid for as advertisement is allowed to appear as editorial advice upon medical treatment, the editors and managers appearing to assume responsibility therefor, thus betraying the confidence of readers in the integrity of the press.

It is also respectfully submitted that these advertisements are purposely written in a style intended to create false impressions, and are paid for to produce the belief that such recipes are *not* advertisements. It is submitted as unquestioned fact that these recipes *do* abundantly mislead and betray your confiding readers.

The American Pharmaceutical Association with fifty-six years of devoted and unselfish service to the cause of humanity earnestly appeals to American Journalism to carefully consider this matter, and, in behalf of diseased mankind, begs it to take such effective steps as will prevent the further practice of what is believed to be opposed to the best interest of society and the integrity of the press.

Historical Section.

The opening meeting of this section was held on Thursday evening when Professor Whelpley gave an illustrated lecture on "Past Meetings and Past Members." The regular session was held on Friday morning with the Chairman, E. V. Howell, and E. G. Eberle, Secretary, both in their places. In his extemporaneous address the Chairman emphasized the importance of getting people interested in making collections for this section and furnishing information to the Historian as to where books and collections may be found. He furnished titles of over 400 books treating of Botany and Materia Medica. He also donated to the section a copy of Wm. Turner's book on names of herbs published in 1548 and with a collection of synonyms in use prior to 1653. Mr. Howell exhibited poppy capsules grown in North Carolina which yielded an opium containing 6 per cent of morphine; specimens from the "Pinehurst Tea Gardens" at Summerville, S. C. and wools and cloths dyed by the natives of North Carolina with vegetable dyes.

A number of other specimens were presented, including the programs of the Philadelphia Branch of the Association and badges used by the earlier officers of the Association by Henry Kraemer, and a written translation of the "Neue Hannoverische Pharmakopœ in das Deutsche ubersetzt (Gronau, 1842) which had been purchased of a book-dealer in St. Louis by M. I. Wilbert while on his way to the meeting.

The following papers were read:

An Interesting Pharmacopœia and Some Hospital Formularies.—By M. I. Wilbert. In connection with this paper the author pre-

sented the following formularies: Boston City Hospital, Roosevelt Hospital, Syracuse Hospital, Hospital of the Good Shepherd, West Penn Hospital, Philadelphia Hospital, New York Hospital and City Hospital of Worcester, Mass.

Phytochemical Work of Henry Trimble.—By Nellie Wakeman.

Some Pharmaceutical Book Plates.—By Edward Kremers. This title was the subject of an interesting extemporaneous talk which was illustrated with reproductions of plates on pharmacy, medicine, dentistry, etc., from Jost Amman-Hans Sach's work "Beschreibung Aller Stände auf Erden." The exhibit also included book plates of the Swiss Pharmaceutical Society; of Prof. A. Tschirch; and Dr. O. Oesterle, which had been designed by Marie Flückiger (now Mrs. Oesterle); of the Pharmaceutical Institute of Bern; of the pharmacists of Switzerland; of M. B. Reber, Geneva.

Drug Conditions in Connecticut in 1835.—By S. J. Hinsdale. This was a copy of a paper read at the first meeting of the N. C. Pharmaceutical Association in 1880.

Sketch of Walter B. Kilner and His Formulary.—By A. H. Clark.

E. V. Howell also presented papers on the following: Sketch of the Crude Drug Business in North Carolina; Materials for a Sketch of the History of Materia Medica; Early Chemical Symbols; Early Pharmaceutical Laws of Great Britain; a List of Indigenous Medicinal Plants Recommended by the Confederate States of America for Hospital Service; Formation of the North Carolina Pharmaceutical Association and the Present Poison Law of the State.

Drug Collections at Washington.—By Lyman F. Kebler. The author called attention to a collection of about 7000 specimens (2000 being on exhibition) which are in the Division of Medicine, Department of Anthropology of the United States National Museum. This represents a collection of foreign drugs which was exhibited at the Centennial exhibition in 1876.

Report of Historian.

By Edward Kremers.

Because of absence for practically one-half of the time since our meeting in New York a twelve month ago, your Reporter has not been as active a collector as in previous years. The appended list, however, reveals the fact that the past year has not slipped by entirely without new accessions.

If the work of collection has not kept pace with previous years, something of greater immediate importance has been accomplished. Owing to the appropriation of $25.00 made by the Council at the request of this Section, your Reporter has been enabled to secure clerical assistance in the mounting of documents and their classification. Miss Nellie Wakeman has devoted a good share of her vacation to the mounting of some 1500 to 2000 documents and has arranged them in such a manner that they can be permanently classified and made available to students of the history of our calling. While in past years your Reporter has gladly spent many an evening doing work of this nature, the accumulations since 1902 had grown to such an extent that each additional contribution of miscellaneous documents threatened discouragement instead of proving a new source of enthusiasm.

I would suggest, therefore, that this Section ask for another allotment of $25.00 for clerical work, also for a like sum for material. Paper for mounting and covers for mounted and classified documents are as essential as clerical assistance. If the Association desires to ask for space in the National Museum two years hence much work will have to be done in order that such a request may be backed up by something more than an expression of a desire to utilize the space we intend to ask for. If we can make a good showing of work already done our request will unquestionably be much more favorably received than otherwise.

On the other hand, there are many things in the way of collection that it would be unwise to attempt at the present time. What we need most of all at the present time is the promise of collections now in the hands of members of this Association. A few of such promises have already been received, but we need many more.

Your historian cannot refrain, in closing his brief report, from alluding to the pharmaceutical collections he has seen while abroad last fall and winter. While fully appreciating the pharmaceutical collections of individuals, of educational institutions and cities, two collections stand out prominently in his memory, viz., those of Nürnberg and Zurich. These are the model exhibits of the national museums of Germany and Switzerland respectively, such as we should have at Washington. When the time for asking for space at Washington has arrived, it will afford me great pleasure to give to this Section a fair idea of what has been done along this line by other countries and to indicate what we as a national association

ought to attempt. If meanwhile some of our pharmaceutical manufacturers were to supply the means necessary to purchase some of the private collections in the hands of several European collectors and offered for sale, we might take a very great step indeed toward the realization of our goal.

Report of Committee on Proposed Pharmaceutical Collection at Washington.

By Edward Kremers, Chairman.

As pointed out in last year's report, it will take at least two years before the collection now in the old museum building can be transferred to the new. The best we can do, therefore, at present is to keep alive our interest in the history of our calling and to be prepared when the proper time comes to ask for floor space in the old National Museum in which the exhibits of the several callings are to be housed. In order to be in a position to back our requests we should have a collection—or rather a sufficient number of offers of contributions—that will appeal to the authorities of the Museum. It is to be hoped, therefore, that such offers will be made voluntarily in the near future. Appeals for funds for the purchase of one of the several large pharmaceutical collections now offered for sale have thus far been unsuccessful. Other associations have offered very large collections to the National Museum. Unless the American Pharmaceutical Association is in a position to make a respectable offer, we shall have to be content with a very limited, and possibly unsatisfactory space. H. K.

PHILADELPHIA COLLEGE OF PHARMACY.

MINUTES OF THE SEMI-ANNUAL MEETING.

The semi-annual meeting of the members of the College was held in the Library on September 28th, at 4 P. M., with President French in the chair. The minutes of the meeting held June 29th were read and approved. The minutes of the meeting of the Board of Trustees held June 9th were read by the Registrar, J. S. Beetem, and approved.

The Committee on Membership reported progress. The Com-

mittee on Nominations presented list of Nominations for members of the Board of Trustees.

Delegates to the American Pharmaceutical Association Meeting held at Hot Springs, Arkansas reported verbally—a complete report was published in the AMERICAN JOURNAL OF PHARMACY for October and November. Mr. Beringer, for the Historical Committee alluded to the Souvenir Volume that was being prepared in connection with the celebration of the 225th Anniversary of the Founding of the City. He thought the college should be represented, and there would be some expense connected with supplying the necessary illustrations, an appropriation was voted for the purpose.

Professor Remington asked the permission of the college to loan to the Historical Committee at the City Hall during the Founders Week Celebration, historical and other interesting old articles in possession of the college. The articles loaned would be well cared for and safely returned. The request was complied with, and Messrs. Beringer and England were requested to assist in preparing the exhibit.

The election for three trustees being next in order, Messrs. Boring, Cliffe and Poley were appointed tellers, who, after a ballot was had reported that George M. Beringer, Harry L. Stiles and Joseph W. England had been re-elected to membership in the Board of Trustees for the ensuing three years.

The President announced the death of William J. Miller, which occurred on July 22, 1908. He joined the college in 1867.

The President re-appointed to the Committee on Membership, C. B. Lowe, Chairman, M. I. Wilbert, E. M. Boring, R. M. Shoemaker and C. A. Weidemann.

The following gentlemen having been previously nominated were elected to honorary membership:

William Albert Noyes, Professor of Chemistry in the University of Illinois.

Beverly Thomas Galloway, United States Department of Agriculture.

Henry George Greenish, Professor of Pharmaceutics to the Pharmaceutical Society of Great Britain, London, England.

Edward Strasburger, Professor of Botany, at the University of Bonn.

William Trelease, Director of the Missouri Botanic Gardens, St. Louis, Mo.

ABSTRACT FROM MEETINGS OF BOARD OF TRUSTEES.

June 2, 1908.—At the request of several members of the Board the regular meeting called for this day was postponed till the 9th to enable a number of the members to attend the meetings of the American Medical Association and New Jersey Pharmaceutical Association.

June 9, 1908.—Adjourned meeting held. Minutes of meetings held May 5th and 14th read and approved. Committee on Property presented final certificate covering settlement in full for the Pure Food and Drug Laboratory Building. The matter of additional electric lighting to cover the new Laboratory was left to the Committee on Property. Committee on Library reported a number of accessions to the Library. The Committee on Accounts and Audit reported auditing the accounts for the past year of the Treasurer, Registrar and Committee on Publication, and found them correct. Committee on Announcement reported that the announcement would hereafter be issued quarterly in the form of a bulletin. The Secretary was instructed to write a letter of thanks to the Honorable Ralph D. Cole, Reverend D. M. Steele and Reverend August Pohlman for their services at the late commencement. The thanks of the Board were voted to George M. Beringer for the donation of Medical supplies for the emergency case. The thanks of the Board were voted to Professor Wallace S. Truesdell, the Instructor in Latin, for the return to the Treasurer of cheque covering salary, which owing to a change in the curriculum, dispensing with his services for a part of the session, he did not feel entitled to.

C. A. Weidemann, M.D.,
Recording Secretary.

NOTES AND NEWS.

Frederick B. Power.—In recognition of his "services to pharmaceutical education and science," the University of Wisconsin, on June 17th conferred upon Dr. Frederick B. Power the honorary degree of Doctor of Laws. Dr. Power was present to receive the degree in person, and the event marked the 25th anniversary of his appointment as professor of pharmacy in the University of Wisconsin, he having been the first professor in this branch in the University and having planned the course.

Whether pharmacy or chemistry has the greater claim to Dr. Power need not concern us, but it is a matter of congratulation when within the ranks of either those may be found who are devoting themselves exclusively to research work, particularly when it is of the high character of that being done by Dr. Power.

M. I. Wilbert, who for more than 17 years past was apothecary at the German Hospital, Philadelphia, has been appointed Technical Assistant in the Division of Pharmacology, Hygienic Laboratory, U. S. Public Health and Marine Hospital Service, and on October 1st went to Washington to assume charge of his new duties. Among the first of these will be the preparation of a series of bulletins giving digests of comments on the U. S. Pharmacopœia. Mr. Wilbert has been a constant contributor to pharmaceutical periodicals since 1899, and has been actively identified with every movement having for its object the betterment of pharmacy. While his presence will be greatly missed in both pharmaceutical and medical circles in Philadelphia, it is to be hoped that his new position will open up a yet wider field of usefulness for him.

The Southern Pharmaceutical Journal is the name of a new monthly periodical, which purports to be published in the "interests of the retail druggists, the wholesale druggists, the chemical and pharmaceutical manufacturers." It is owned by a stock-company composed of well-known Texas pharmacists, and with Prof. E. G. Eberle as editor, the outlook for this new journal seems promising. The publication office is at 416–418 Jackson Street, Dallas, Texas.

THE AMERICAN
JOURNAL OF PHARMACY

DECEMBER, 1908

CHEMICAL EXAMINATION AND PHYSIOLOGICAL ACTION OF NUTMEG.

By Frederick B. Power and Arthur H. Salway.

A Contribution from the Wellcome Chemical Research Laboratories, London.

The nutmeg, although considerably used as a condiment or flavoring agent, and to some extent medicinally as an aromatic stimulant, has long been known to possess a decided narcotic action when administered in any appreciable amount. The general recognition of this property is evident from the fact that it is recorded in many of the standard works descriptive of the *materia medica,* as the following few abstracts will indicate.

The "United States Dispensatory," nineteenth edition, p. 799, makes the following statement: "Nutmeg unites to the medicinal properties of the ordinary aromatics considerable narcotic power. In the quantity of two or three drachms (7.7 or 11.6 grammes), it has been known to produce stupor and delirium, and dangerous if not fatal consequences are said to have followed its free use in India." The "National Standard Dispensatory," p. 990, remarks as follows: "Nutmeg possesses aromatic, narcotic, and intoxicating properties. Given in overdose it produces stupor, decreased reflex excitability, slowness of respiration, and slight cardiac sedation." The "Pharmacographia Indica," Vol. III, p. 193, records the following information: "Mahometan doctors describe nutmegs and mace as stimulating, narcotic, digestive, tonic, and aphrodisiac." Also *Ibid.,* p. 196: "The narcotic effects of nutmegs noticed by the old

Mahometan physicians have been confirmed by Bontius, Rumphius, Lobel, Schmid, and Cullen, and more recent experiments upon man and animals agree in showing that they have a narcotic and intoxicating action. In a case related by Cullen, two drachms of powdered nutmeg produced drowsiness, which gradually increased to complete stupor and insensibility. The patient continued for several hours alternately delirious and sleeping, but ultimately recovered."

The above general statements concerning the narcotic action of nutmeg are fully confirmed by the numerous cases of "nutmeg poisoning" which have been recorded in the medical literature of more recent times, among which the following few references may be cited: *The Lancet,* April 12, 1902, p. 1035; Squibb's *Ephemeris of Materia Medica, etc.,* Vol. VII, 1904, p. 243; *The British Medical Journal,* 1906, pp. 539, 778, 900, 984; *Chem. Zeit. Rep.,* Feb. 12, 1908, p. 79, from *Deutsch. med. Wochenschrift,* 1907, Bd. 33, p. 2001; Cushny, in *Proceedings of the Royal Society of Medicine, Therapeutical and Pharmacological Section,* 1908, Vol. I, pp. 39–44.

With regard to the constituent of the nutmeg to which its narcotic effects may be attributed, the following statement in the "United States Dispensatory," nineteenth edition, p. 799, is of interest: "Dr. H. C. Wood found in experiments upon the lower animals that the oil of nutmeg is a powerful narcotic, with very much less sedative influence upon the heart than is possessed by most volatile oils. Injected into the circulation of the dog, it caused profound sleep, with slowing of the respiration, and, if the dose had been large enough, loss of reflex activity."

In the *Bericht* of Schimmel & Co., Leipzig, April, 1904, pp. 159–165, special consideration was given to the subject of nutmeg poisoning by a contribution from Dr. Fritz Jürss, Assistant at the Pharmacological Institute of the University of Rostock, entitled: "On Myristicin and some closely related substances." This comprised an account of the action of myristicin, $C_{11}H_{12}O_3$, a constituent of the essential oil of nutmeg, on frogs, fish, birds, and mammals, especially the guinea pig and rabbit. It was noted by this investigator (*loc. cit.,* p. 159) that "the oils of nutmeg and mace only cause fatal poisoning in a rabbit in doses of 10.0 to 12.0 grammes, whereas a single nutmeg (4.0 to 5.0 grammes) is capable of producing in man serious effects," and the conclusion was therefore drawn that the oil is less poisonous for animals than for man. It should be considered, however, in this connection that the essential oil of

nutmeg is very variable in character, and that some specimens may be practically free from myristicin, or even consist entirely of terpenes (compare *Ber. d. deutsch. chem. Ges.*, 1890, **23**, p. 1804). The experiments of Jürss on birds and mammals were conducted by the subcutaneous injection of myristicin, in amounts varying from 2 c.c. to 6 c.c. per kilo of bodyweight in the case of guinea pigs, or 0.9 c.c. to 1.76 c.c. per kilo of bodyweight in the case of rabbits. The effects were manifested by a paralysis of the central nervous system, with a reduction of temperature, followed by death without convulsions. A post-mortem examination of the animals showed, among other phenomena, extensive degenerative changes in the liver, such as coagulative necroses, vacuolation of the protoplasm, and the abundant presence of fat, resembling the effects of phosphorus poisoning.

Although the above-noted experiments afford ample evidence that myristicin is a substance possessing a considerable degree of physiological activity, it is also evident that the results are hardly comparable with the symptoms produced in man by the administration of relatively small amounts of nutmeg. If, for example, two nutmegs, an amount which is known to be capable of producing serious effects in man, be considered as weighing 10 grammes, they would contain on an average not more than about 1.0 gramme of essential oil, of which a very small proportion is myristicin. On the other hand, the toxic effects produced in guinea pigs weighing 500 grammes and in rabbits weighing from 1300 to 2200 grammes respectively were obtained by the subcutaneous injection of myristicin in amounts many times greater than are contained in two nutmegs, and even considerably exceeding the total amount of essential oil contained in the latter (compare also *Semi-annual Report* of Schimmel & Co., Leipzig, Oct., 1904, p. 103). From a consideration of these facts, it appeared possible that the narcotic effects produced in man by the nutmeg might not be due solely to the essential oil or the myristicin contained therein, and it was, therefore, with the object of elucidating this question that a complete study of the constituents of the nutmeg was undertaken.

Some considerable time after beginning this investigation a paper was published by Dr. A. R. Cushny (*loc. cit.*) on the subject of "nutmeg poisoning." It was noted in this communication that some years ago Dr. G. B. Wallace had undertaken an examination of the pharmacological action of nutmeg on animals and the separa-

tion of its poisonous constituent, the results having been published in 1903 in "Contributions to Medical Research," dedicated to V. C. Vaughan, Ann Arbor, Michigan. For the purpose of completeness it is desirable that the following brief abstract of the recent paper by Cushny should be included in this account of the subject.

"The nutmeg contains from 3 to 8 per cent. of volatile oil, and when this has been extracted from it the residue produces no effect whatever on animals, while small doses of the oil itself induce characteristic effects. The oil contains several terpenes and small quantities of higher boiling substances which can be separated by fractional distillation.[1] The terpenes are devoid of action except in enormous quantities, while the fraction boiling at 150° C. at 14 mm. pressure [2] proved to be a powerful poison."

Wallace conducted experiments with the high-boiling fraction of the oil on frogs, rabbits, and cats, and the following observations and conclusions drawn therefrom are further noted by Cushny, as follows:

"The cat is much more susceptible to the action than the rabbit, as is very generally the case with drugs acting on the central nervous system. About 0.4 gramme per kilo of the highest distillate given *per os* causes restlessness with weak spasmodic movements and tremor resembling that seen in carbolic acid poisoning, and profuse salivation. The restlessness passes into quiet with persistence of the tremor, incoördination of the movements, weak reflexes and partial anæsthesia. The pupils are dilated. Soon a stage of stupor, gradually deepening, sets in, the respiration is labored and feeble, and finally ceases some eight to twelve hours after the ingestion of the poison. In many cases, however, after some hours of stupor, a gradual improvement begins, and in fifteen hours from the taking of the poison the animal appears fairly normal save for unusual quietness and disinclination to move about. This improvement is only temporary, however, the cat again becoming weaker and more depressed, eating nothing and paying no attention to its surroundings, until coma returns, followed by death in 36–72 hours from the time the oil was taken."

"The symptoms in mammalia are thus, as in the frog, to be attributed to action on the central nervous system, which is depressed

[1] Compare Power and Salway. *Journ. Chem. Soc.*, 1907, 91, pp. 2037–2058.

[2] According to the results of our investigation of the essential oil of nutmeg (*loc. cit.*), this fraction would consist chiefly of myristicin.

for the most part, but exhibits some indication of stimulation in the form of restlessness, slight convulsive movements, and tremor. Animals, therefore, correspond very closely to man in their reactions to nutmeg poison."

"Many volatile oils induce fatty degeneration of the liver and other organs, but nutmeg poison has little or no action in this direction."

"Wallace's results do not indicate any useful purpose which nutmeg might serve in therapeutics, but are of interest in drawing attention to the possibility of serious poisoning from one of our common domestic flavoring agents."

The above record of experiments would appear to have established the fact that the narcotic properties of nutmeg are to be attributed to myristicin, and that much smaller amounts of the latter substance are required to produce the characteristic symptoms of nutmeg poisoning when administered by the mouth to a cat than when injected subcutaneously into the guinea pig or rabbit, as indicated by Jürss (*loc. cit.*). It may be noted, however, that the statement by Cushny, that nutmeg poison has little or no action in inducing fatty degeneration of the liver, is quite at variance with the observations of Jürss, and is not confirmed by the results of the experiments conducted by Dale, as recorded in the latter part of this paper.

EXPERIMENTAL.

In the beginning of this investigation it was thought possible that the narcotic action of nutmeg might be due to the presence of either small amounts of an alkaloid or of a soluble toxic protein. Special tests were therefore made for both of these classes of substances, but with negative results. For the further systematic investigation of the subject it was decided to make a complete study of (I) the essential oil, (II) the expressed oil or fat, and (III) the "press-cake" remaining after the removal of the latter, as all the constituents of the nutmeg would be included in these products.

I. *The Essential Oil of Nutmeg.*

A complete account of our investigation of this product, which was specially distilled for us from Ceylon nutmegs by Messrs. Stafford Allen & Sons, of London, has already been published (*Journ. Chem. Soc.*, 1907, **91**, 2037), and therefore need not be

specially considered here. The opportunity may, however, be taken of presenting a few comments on the requirements made for this essential oil by the United States and British Pharmacopœias.

In the "United States Pharmacopœia" (8th revision) the specific gravity of this oil was given as 0.862 to 0.910 at 25° C., and in the list of additions and corrections to June 1, 1907, these figures were altered to 0.884 to 0.924. It is evident, however, that in this alteration an error has been made, and that the limits were intended to be placed at 0.864 to 0.924 at 25° C. (compare the *Semi-annual Report* of Schimmel & Co., Leipzig, April, 1906, p. 71). The "British Pharmacopœia" requires a specific gravity of 0.870 to 0.910 at 15.5° C., the German 0.890 to 0.930, and the Belgian 0.865 to 0.920 at 15° C. The last-mentioned limits would appear to be those most in accordance with normal products of distillation.[1] In this connection it is of interest to note that the present "German Pharmacopœia" (4th edition, 1900) has adopted for the essential oil of nutmeg ("Aetherisches Muskatnussöl") the Latin title of *Oleum Macidis*. This not only involves an etymological inaccuracy, but also the assumption that the essential oils of nutmeg and mace are identical in character and composition, which has not as yet been proved to be the case. In the second (1882) and third (1890) editions of the "German Pharmacopœia" *Oleum Macidis* was correctly defined as mace oil ("Mascisöl"), and the last-mentioned title and definition have been adopted by the "Swedish Pharmacopœia" (*Pharmacopœa svecica,* ed. VIII) with the following requirements: specific gravity at 15° C. = 0.855 — 0.930; optically dextrogyrate; soluble in 3 parts of alcohol (see *Semi-annual Report* of Schimmel & Co., April, 1902, p. 73).

The "United States Pharmacopœia," in its latest edition, has introduced a requirement for oil of nutmeg, evidently adapted from the "British Pharmacopœia," which is as follows: "When 2 or 3 c.c. of oil are evaporated on a water-bath, no residue which crystallizes on cooling should be left." The purpose of this test, as stated in the "British Pharmacopœia," is to ensure the "absence of the concrete oil of nutmeg." It is likely, however, to involve the exclusion of constituents of a normal essential oil which are not without considerable value, for any crystalline residue which would be obtained from a genuine oil under these conditions would

[1] Compare Allen and Brewis, *Pharm. Journ.*, 1901, 66, p. 328.

consist of myristic acid, and this usually accompanies the highest boiling constituents of the oil in the process of distillation. In order, therefore, to exclude these very small amounts of myristic acid, it would be necessary that the essential oil should represent only its more volatile constituents, consisting chiefly of terpenes, and it thus becomes evident that the requirement is a thoroughly irrational one.

II. *The Expressed Oil of Nutmeg.*

This product was obtained by the expression of 23.7 kilogrammes of Ceylon nutmegs, the operation having been kindly conducted for us by Messrs. Stafford Allen & Sons, of London. An account of its complete investigation is recorded in the *Journ. Chem. Soc.,* 1908, 93, p. 1653, to which reference may be made.

III. *Examination of the "Press-cake" from Nutmeg.*

The so-called "press-cake," resulting from the expression of the above-mentioned 23.7 kilogrammes of nutmegs, amounted to about 16 kilogrammes. After being finely ground, it was mixed with purified sawdust, and successively extracted in a large Soxhlet apparatus with (A) light petroleum (b. p. 30–40° C.) and (B) alcohol.

(A.) *The Petroleum Extract.*

This consisted of a nearly colorless, solid fat, amounting to 2800 grammes, or 17.5 per cent. of the total press-cake. It was expected to contain, although in different proportions, the same substances as had previously been found by us in the expressed oil of nutmeg (*loc. cit.*), which proved to be the case.

A quantity (250 grammes) of the fat extracted by petroleum was hydrolized by heating for an hour on a water-bath with an alcoholic solution of 80 grammes of potassium hydroxide. The greater part of the alcohol was then removed, water added, and the alkaline, aqueous mixture extracted repeatedly with ether. The combined ethereal liquids were washed with a little water, dried with anhydrous sodium sulphate, and the ether removed, when about 10 grammes of a thick, yellow oil were obtained. This oil, when treated with an equal volume of dilute alcohol, deposited a small amount of a solid, which was collected, and crystallized from a mixture of

alcohol and ethyl acetate. Colorless leaflets were thus obtained, which melted at 134–135° C., and afforded the color reactions characteristic of the phytosterols.

After removing the alcohol from the liquid from which the phytosterol had originally been deposited, the residual oily product was distilled under a pressure of 10 mm., and fractions collected which boiled between 70–200° and 200–280° C./10 mm. respectively. The first of these fractions consisted of a mixture of various constituents of the essential oil of nutmeg, while the second fraction, on redistillation, boiled for the most part at 270–274° C./10 mm., and, at the ordinary temperature, formed a yellow, transparent, extremely viscid liquid, which showed no tendency to crystallize. On analysis it gave the following result:

0.2523 gave 0.6274 CO_2 and 0.1546 H_2O. C = 67.8; H = 6.8
$C_{18}H_{22}O_5$ requires C = 67.9; H = 6.9 per cent.

This substance was evidently identical with the compound $C_{18}H_{22}O_5$, which had previously been isolated from the expressed oil of nutmeg, and was fully described in connection with the latter product (*loc. cit.*). It possessed no apparent physiological activity.

The Fatty Acids.—The alkaline liquid from which the unsaponifiable material had been removed, as above described, was acidified with sulphuric acid and distilled with steam, but the distillate only contained a small amount of myristic acid. The contents of the distillation flask were then extracted with ether, the ethereal solution being washed, dried, and the ether removed. A quantity of fatty acids was thus obtained, which was distilled under 15 mm. pressure, when more than 90 per cent. of the material passed over at 196–197°, the remainder distilling from 197–240° C./15 mm. The portion boiling at 196–197° C./15 mm. melted at 54° C., and was found to consist of pure myristic acid.

0.5087 required 4.45 c.c. $\frac{N}{2}$ KOH for neutralization.
Acid value = 245.
$C_{14}H_{28}O_2$ requires an acid value of 246.

The fraction 197–240° C./15 mm. was only small in amount and contained some unsaturated acid, since it absorbed bromine in chloroform solution. On digesting it with alcohol it deposited a

very small quantity of a solid substance. The latter, after recrystallization from hot alcohol, melted at 74–75° C., and was identified as cerotic acid, which had previously been isolated by us from the expressed oil of nutmeg.

(B.) *The Alcohol Extract.*

This was a dark brown mass, amounting to 2300 grammes, or about 14.4 per cent. of the total press-cake. It was mixed with water, and the mixture distilled with steam until all the volatile substances present had been removed.

Volatile Constituents of the Alcohol Extract.

The aqueous distillate, which contained some oil floating on the surface, was extracted with ether, the ethereal solution being washed with a little water, dried with calcium chloride, and the ether removed. A quantity (about 26 grammes) of a pale yellow oil was thus obtained, which possessed an aromatic, and also somewhat pungent odor. Its density was 0.9362 at 20° C., and the optical rotation + 2° 59′ in a 100 mm. tube. The presence of furfural was indicated by the odor, and by the production of a deep red color when tested with aniline in acetic acid solution.

The essential oil was first extracted with a 10 per cent. solution of sodium carbonate. This removed about 1 gramme of a solid substance which, after recrystallization from alcohol, melted at 53–54° C., and was identified as myristic acid. The oil was subsequently extracted with a 5 per cent. solution of sodium hydroxide. On acidifying the alkaline liquid, and extracting with ether, a small quantity (about 0.5 gramme) of an oil was obtained which possessed a strong odor of eugenol, and yielded a crystalline benzoyl derivative melting somewhat indefinitely between 84 and 98° C. This phenolic product evidently consisted of a mixture of eugenol and *iso*eugenol, these substances having previously been identified by us as constituents of the essential oil of nutmeg (*loc. cit.*).

After the above treatment the oil was distilled under the ordinary pressure. It commenced to pass over at 190° C., the temperature gradually rising to 265° C. The amount of this essential oil was much too small for a complete examination, and it would naturally be expected to contain the same substances as had previously been

identified in the normal product obtained by the direct distillation of nutmegs. The last portions of the distillate were, however, specially tested for myristicin, the presence of which was established by the formation of the crystalline bromo-derivative, melting at 128–129° C.

The aqueous distillate, from which the essential oil had been removed by extraction with ether, as above described, had an acid reaction. It was therefore neutralized with baryta, and the solution concentrated, when three successive crops of crystals were obtained, amounting in all to 4 grammes. Each of these barium salts, after drying at 110° C., was analyzed, with the following results:

(*a*) 0.3787 of salt gave 0.3388 $BaSO_4$. Ba = 52.6
(*b*) 1.2626 " " 1.1381 $BaSO_4$. Ba = 53.0
(*c*) 1.0017 " " 0.9040 $BaSO_4$. Ba = 53.1
$(C_2H_3O_2)_2$ Ba requires Ba = 53.7 per cent.

It is thus evident that the volatile acid consisted chiefly of acetic acid.

Non-volatile Constituents of the Alcohol Extract.

After the removal of the volatile substances by distillation with steam, as above described, there remained in the distillation flask a reddish-brown, aqueous liquid (*α*) and a large quantity of a very dark colored resin (*β*). The latter was separated and thoroughly washed with water, the washings being added to the aqueous liquid.

Examination of the Aqueous Liquid (α).

The aqueous liquid, together with the washings from the resin, was concentrated to a convenient bulk. It was first tested for the presence of an alkaloid, but, as in the previously mentioned preliminary test with powdered nutmeg, the result was negative. The liquid was subsequently extracted several times with ether, the combined ethereal liquids being washed, dried, and the ether removed, when about 20 grammes of a semi-solid, dark colored, resinous substance was obtained. This was redissolved in ether, and the ethereal liquid extracted successively with solutions of sodium carbonate and sodium hydroxide, but this treatment removed only

substances of a resinous character. The ethereal liquid was finally washed until free from alkali, and the ether removed, when about 0.5 gramme of a solid substance was obtained. The latter, after recrystallization from alcohol, melted at 54° C., and was identified as trimyristin.

The aqueous liquid, after extraction with ether, was treated with a solution of basic lead acetate, which yielded a voluminous brown precipitate. The latter was collected, washed, suspended in water, and decomposed by hydrogen sulphide. On filtering the mixture a reddish-brown liquid was obtained, which, when concentrated under diminished pressure, yielded only a resinous product. It gave a deep green color with ferric chloride, and appeared to consist chiefly of tannic and coloring matters.

The filtrate from the basic lead acetate precipitate was deprived of the excess of lead by means of hydrogen sulphide, again filtered, and the liquid concentrated under diminished pressure. A large quantity (about 1000 grammes) of a thick syrup was thus obtained, but after standing for a long time it deposited nothing crystalline. It was optically inactive, contained an abundance of sugar, and readily yielded an osazone which, after a few crystallizations from pyridine, melted at 212–213° C., and was evidently *d*-phenylglucosazone. A portion of the syrupy liquid was dried on prepared sawdust, and the mixture successively extracted in a Soxhlet apparatus with ether, ethyl acetate, and alcohol. The ether removed nothing, and the other solvents yielded only syrupy extracts from which nothing crystalline could be obtained. Another portion of the original syrupy liquid was heated for some time with dilute sulphuric acid, when a little furfural was produced, but there was no evidence of the presence of a glucoside.

Examination of the Resin (β).

The resinous matter which had been separated from the aqueous liquid, as previously described, formed, when dry, a black, brittle solid, and amounted to 490 grammes. It was dissolved in alcohol, and intimately mixed with purified sawdust. The mixture was then thoroughly dried, and extracted successively in a Soxhlet apparatus with light petroleum (b. p. 40–60° C.), ether, chloroform, ethyl acetate, and alcohol, when the following amounts of extract, dried at 100° C. were obtained:

Petroleum	extracted	47	grammes	or	9.6	per cent.
Ether	"	66	"	"	13.5	"
Chloroform	"	33	"	"	6.7	"
Ethyl Acetate	"	55	"	"	11.2	"
Alcohol	"	170	"	"	34.7	"
		371	grammes	or	75.7	per cent.

It is evident that by this treatment a considerable proportion of the original resin had been rendered insoluble.

Petroleum Extract of the Resin.

This was a soft, dark brown mass. It was dissolved in ether and the ethereal solution extracted, first with small successive portions of aqueous sodium carbonate, and afterwards with a solution of sodium hydroxide. The sodium carbonate extracts were of a dark brown color, and, when acidified, yielded soft, resinous solids. The latter were distilled under diminished pressure, when a small fraction was collected between 210 and 230° C./20 mm., which became crystalline on cooling. After recrystallization from alcohol, it melted at 52–53° C., and proved to be myristic acid. The sodium hydrate extract, when acidified, yielded a light yellow solid, which was readily soluble in hot, but not in cold alcohol, and was deposited from its hot solution in an amorphous state.

The portion of the petroleum extract which was not soluble in alkalies amounted to about 30 grammes. It was hydrolized by heating on a water-bath with an alcoholic solution of 12 grammes of potassium hydroxide. After the removal of the alcohol, water was added, and the alkaline mixture extracted with ether, the ethereal solution being washed, dried, and the ether removed. A quantity (about 5 grammes) of unsaponifiable material was thus obtained, which was distilled under diminished pressure, and the following fractions collected: 160–175° ; 175–280° ; 280–310° C./15 mm. Only the highest fraction, 280–310° C./15 mm., was sufficient in amount for further examination. This was a yellow, viscid product which, on digesting with dilute alcohol, yielded a very small amount of solid substance. The latter, after crystallization from a mixture of alcohol and ethyl acetate, melted at 135°, and yielded the color reactions characteristic of the phytosterols.

The above-mentioned aqueous, alkaline liquid, after extraction with ether, was acidified with sulphuric acid and distilled with steam, but the only volatile product was a little myristic acid. The contents of the distillation flask were then extracted with ether, the ethereal solution being washed, dried, and the ether removed. A quantity of solid acids was thus obtained, which was distilled under diminished pressure to remove some resinous matter. The greater portion passed over at 205° C./20 mm., and consisted of practically pure myristic acid, melting at 53° C. From a smaller fraction, collected between 205 and 250° C./20 mm., a small quantity of cerotic acid, melting at 74–76° C., was isolated. Some unsaturated acids were also present in the mixture.

Ether Extract of the Resin.

This was a soft, reddish-brown solid. It was digested with an amount of ether insufficient to dissolve the whole, and the sparingly soluble portion separately examined. This latter portion was a brownish, brittle mass, which was readily soluble in hot, but only moderately soluble in cold alcohol. It was systematically fractionated from alcohol, but the deposits all appeared to be amorphous. In order to ascertain whether a crystalline acetyl compound could be obtained from this product, it was heated with acetic anhydride and anhydrous sodium acetate for several hours. The mixture was then treated with water, when a solid substance separated, which was collected, washed with water, and dried on a porous plate. On fractionating this substance from hot alcohol, the first few deposits, representing the greater portion of the material, were quite amorphous. The mother-liquors, however, on standing for some time, yielded a small quantity (about 0.2 gramme) of a crystalline substance, which was separated from some amorphous matter by filtration through muslin. The crystalline substance was thus obtained in flat plates, melting at 163–164° C., and, after drying at 105° C., was analyzed.

0.1016 gave 0.2580 CO_2 and 0.0889 H_2O. C = 69.3; H = 9.7.

It was then recrystallized from methyl alcohol, when, after drying at 105° C., it melted at 164–166° C., and was again analyzed.

0.0706 gave 0.1798 CO_2 and 0.0596 H_2O. C = 69.5; H = 9.4

$C_{27}H_{44}O_6$ requires C = 69.8; H = 9.5 per cent.

The substance afforded a color reaction similar to that characteristic of the phytosterols. Thus, when dissolved in chloroform with a little acetic anhydride, and a drop of concentrated sulphuric acid added, a pink color was produced which rapidly changed to blue and finally to green.

The composition and character of the above-described substance render it evident that it is diacetylipuranol, $C_{23}H_{38}O_4$ $(CO.CH_3)_2$. The dihydric alcohol, ipuranol, $C_{23}H_{38}O_2$ $(OH)_2$, was first isolated in these laboratories from the resin of *Ipomœa purpurea,* Roth (*Amer. Journ. Pharm.,* 1908, **80,** p. 264), and subsequently from olive bark (*Journ. Chem. Soc.,* 1908, **93,** p. 907).

The above-mentioned ethereal solution of the more readily soluble portion of the ether resin was extracted, first with small successive portions of a saturated solution of sodium carbonate, and subsequently with a 10 per cent. solution of sodium hydroxide. The first sodium carbonate extract formed a thick, dark brown emulsion of an insoluble sodium compound which could not be filtered. It was, therefore, directly acidified, when a yellow solid was obtained, which was collected and washed with water. The attempts to obtain it in a crystalline form were unsuccessful, and it also yielded nothing crystalline on acetylation. The subsequent sodium carbonate extracts were similar in character and behavior to that above described. The sodium hydrate extracts were dark in color, and, on acidification, yielded brown, amorphous products. After extracting the ethereal solution with the above-mentioned alkalies, it was washed, dried, and the ether removed, but only a small amount of a pale yellow, amorphous product was obtained.

Chloroform, Ethyl Acetate, and Alcohol Extracts of the Resin.

The portion of resin extracted by chloroform was a reddish-brown solid, while the portions removed by ethyl acetate and by alcohol respectively were soft, black masses. Nothing of a crystalline character could be obtained from any of these products. In order to ascertain whether the alcohol extract of the resin contained anything of a glucosidic nature, a quantity (50 grammes) of it was heated for several hours in alcoholic solution with such an amount of sulphuric acid that the latter represented 5 per cent. of the mixture. After the removal of the greater portion of the alcohol, water was added, and the mixture distilled with steam. A small amount of a volatile oily product was thus obtained, which was found to contain

furfural. The distillation flask then contained a quantity (35 grammes) of a black resin, together with an aqueous liquid of a reddish color. The resinous matter was separated by filtration, and carefully examined, but nothing crystalline could be obtained from it. The filtered aqueous liquid was first extracted with ether, which, however, removed only a little amorphous coloring matter. It was then treated with an amount of baryta just sufficient for the removal of the sulphuric acid, and the filtered liquid concentrated under diminished pressure. A dark colored product was thus obtained which reduced Fehling's solution, but no osazone could be prepared from it.

In considering the results of this investigation, it may be noted that the only constituents of the petroleum and alcohol extracts from the "press-cake" of nutmeg which had not previously been identified in either the essential oil or the expressed oil were the following: sugar, tannic acid and coloring matters, resins, and a very small amount of the crystalline alcohol, ipuranol, $C_{23}H_{38}O_2(OH)_2$.

Physiological Tests.

In order to obtain confirmation of the statements which have previously been recorded that the narcotic effects produced by nutmeg are due to the essential oil or the myristicin contained therein, and also to ascertain whether any of the other products obtained in the course of this investigation possessed physiological activity, a considerable number of tests were conducted for us by Dr. H. H. Dale, Director of the Wellcome Physiological Research Laboratories. Many of these tests were performed prior to the publication of the observations by Professor Cushny on the subject of nutmeg poisoning, to which reference has been made in the introductory portion of this paper.

It was found by Dr. Dale that nutmeg itself, when administered to a cat, in doses of 5 grammes, has a very marked effect. Thus a cat weighing 2640 grammes was given 5 grammes of nutmeg at 2.30 P.M. A small amount of this was vomited during the night, but the cat seemed practically well on the following day. On the second day after administration, however, the animal was found to be very sluggish. It could walk when roused, but very quickly dropped into a semi-comatose condition, and at 3 P.M. on this day it died. Apart from a slight congestion of the intestinal mucous membrane, the only post-mortem abnormality was a fatty degenera-

tion of the liver. In another case, in which 10 grammes of nutmeg were given, no effect except slight malaise and some salivation could be observed until the third day after administration, when the cat was found in a state of very deep coma, and shortly afterward died. Another cat, to which 5 grammes of nutmeg were given, died on the morning of the fourth day after administration. The liver again showed marked fatty degeneration, and the urine contained much bile and a little albumin. The kidneys were not noticeably abnormal.

In connection with the above results it may be noted that the dog appears to be comparatively insensitive to the toxic action of nutmeg, since doses amounting to as much as 20 grammes of the substance, and even 10 c.c. of myristicin, have been given by the mouth to this animal without any perceptible effect. Injections of the essential oil and of myristicin intravenously did, indeed, cause acute symptoms of incoördination and, in some instances, complete unconsciousness; but the value of such observations is seriously diminished by the consideration that the insoluble oil will produce multiple emboli, certainly in the lungs, and possibly also in the cerebral capillaries, insofar as it passes into the lungs and gets into the general circulation. Pulmonary hemorrhage was actually the cause of death in these cases.

With regard to the action of myristicin, $C_{11}H_{12}O_3$, the high-boiling constituent of the essential oil of nutmeg, to which, in accordance with the observations of Wallace, the narcotic effects produced by nutmeg are attributed by Cushny, as also independently by Jürss (*loc. cit.*), the following experiments may be noted.

Quantities of myristicin which were appreciably greater than the amount of this substance contained in a toxic dose of nutmeg, for example, 0.1 to 0.2 c.c., when given by the mouth to a cat, produced no apparent effect. A dose of 1 c.c. of myristicin, however, produced results which were not dissimilar to those produced by 5 to 10 grammes of nutmeg. Thus a cat to which 1 c.c. of myristicin was given by the mouth survived without marked symptoms until the third day after administration, when it was found lying in a semiconscious condition. The fatty degeneration of the liver, and staining of the urine and all the tissues with bile pigment, were the only noticeable abnormalities post mortem. Another cat, to which an equal dose was given, survived until the seventh day after administration, but the changes observed post mortem were similar in character to those above described.

These results, whether produced by nutmeg itself, or by myristicin in doses up to 1 c.c. of the latter, clearly differ from the recorded effects of nutmeg on man. By the administration of rather larger doses of myristicin to the cat, some light was thrown on this discrepancy. Thus 1.5 c.c. of myristicin, given by the mouth to a cat of 3 kilogrammes, produced after a few hours a condition not unlike that described by Wallace, as reported by Cushny. The animal showed considerable excitement, together with some incoördination, and avoided obstacles imperfectly. The pupils were dilated. No actual stupor or narcosis, however, was observed, but the excitement was succeeded on the following day by a condition of unusual quietness. The second day after administration the cat became deeply jaundiced, comatose, and died. A post-mortem examination showed very advanced fatty degeneration of the liver. Another cat, to which 2 c.c. of myristicin were given, showed marked excitement and incoördination about half an hour after administration. It then became unconscious and lay narcotized for about three hours, but subsequently recovered consciousness, and the primary effects gradually disappeared. In this case again, after an intérval of a day without symptoms, jaundice and coma appeared, and on the third day after administration the cat died. The primary effects—excitement, incoördination and narcosis—are not markedly different from the effects reported to be produced by nutmeg in man. Apart from the question of dosage, the difference, in any case, is not greater than that observed in other drugs affecting principally the brain. On the other hand, the remote effects of myristicin, including the terminal coma, may with considerable probability be regarded as secondary to the degenerative changes in the liver. In man the dose necessary to produce narcosis is too small to lead to these remote bad results, while in the much less sensitive cat a dose which is large enough to cause the primary cerebral symptoms causes also extensive liver changes, and is therefore ultimately fatal.

The main discrepancy between the results produced by nutmeg on the one hand and those produced by myristicin on the other is that due to dosage. It would be quite reasonable to attribute all the effects of nutmeg on the cat to myristicin, but for the fact that the dose of nutmeg sufficient to cause death in a few days represents a quantity of myristicin which, given by the mouth, produces no appreciable effect. It seems possible, however, that the discrepancy may be explained by a consideration of the conditions of absorption. Thus the failure to obtain an effect with small doses of myristicin

may be due to its being only imperfectly absorbed when given in a pure state, and passing out to a large extent in the fæces. A small dose of myristicin might, therefore, be expected to be effective if injected hypodermically, for although the absorption of such a substance from the subcutaneous tissue would be very slow, none at least would leave the body without passing through the circulation. It was found, in fact, that a dose of 2 minims (about 0.12 c.c.) of myristicin, when injected hypodermically into a cat, produced a very slow, but ultimately extensive degeneration of the liver, the latter effect being manifested during life by wasting and jaundice. This slow degeneration is what might be expected when a substance so sparingly soluble as myristicin has to be absorbed from the connective-tissue spaces.

The other products from nutmeg which were subjected to physiological tests comprised the following:

1. A *viscid substance,* boiling at 270–280° C. under 15 mm. pressure, and agreeing in composition with the formula $C_{18}H_{22}O_5$, which was separated from the unsaponifiable constituents of the expressed oil of nutmeg (*loc. cit.*).

2. The *resins* obtained from the "press-cake."

3. The *aqueous liquid* obtained, as described in this paper, from the alcoholic extract of the "press-cake," after the separation of the resins.

The viscid substance (1) was given to a cat in doses of 0.5 and 1.0 gramme respectively, but no physiological effect could be observed. The resins (2) and the aqueous liquid (3) likewise produced no noticeable effects when administered in amounts corresponding to many times the toxic dose of nutmeg. All these products must therefore be regarded as physiologically inactive.

With consideration of the results above described there would appear to be no doubt that the narcotic property of nutmeg is correctly attributed to myristicin, $C_{11}H_{12}O_3$, and it may be assumed that the latter substance when associated with the other constituents of the nutmeg is in a condition much more favorable for absorption than when in a pure state. As in the case of many other narcotics, the lower animals are much less sensitive than man to the direct action of nutmeg on the cerebral functions.

In conclusion, we desire to express our best thanks to Dr. H. H. Dale for having conducted the large number of physiological experiments involved in this investigation.

METHODS FOR PREPARING SOME PHARMACEUTIC CHEMICALS.

By Dr. Gunnar Heikel.

Acidum Hydriodicum.

The official U. S. P. process for making this acid gives a product, which may be pure enough for most medicinal purposes, although it is far from being a chemically pure acid, owing to the fair solubility of potassium bitartrate in hydriodic acid, and to the addition of an appreciable amount of potassium hypophosphite. The allowable residue after evaporation, which according to the latest revision of the U. S. P. can be as high as 8.3 per cent., shows clearly that the degree of purity is very low indeed.

Another method for preparing diluted hydriodic acid, which is found in most of the text-books, is to conduct sulphuretted hydrogen gas into water in which iodine in fine subdivision is suspended. The reaction is thus:

$$I_2 + H_2S = 2HI + S$$

In the author's hands this method has proven unsatisfactory, as the iodine soon becomes entirely coated with the liberated sulphur and further action consequently ceases. If, however, the iodine be dissolved in carbon disulphide or chloroform, the solvent readily takes up the sulphur and the hydriodic acid goes into the supernatant water, which after separation from the solvent, is evaporated down to the desired concentration. The action of sulphuretted-hydrogen-gas upon a solution of iodine is also much more rapid than upon the iodine in solid form. Nevertheless, this method of preparation is slow, and the working with the bad-smelling sulphuretted hydrogen is very unpleasant. When a larger quantity of the acid is required the use of this method is almost out of question.

Hydriodic acid of a high degree of concentration, used, for example, as a reducing agent for organic compounds, is made by the action of phosphorus on iodine in the presence of water. The method being both tedious and expensive, and besides somewhat dangerous, is not suitable for pharmaceutical purposes.

A good, simple method for preparing an almost chemically pure acid, used in numerous instances by the author, is as follows: A solution of iron iodide is prepared in the usual way from iodine and iron-filings. To this solution somewhat more than the equiva-

lent quantity of pure precipitated barium carbonate is added, and the mixture boiled for 3–6 hours when the reaction: $FeI_2 + BaCO_3 \rightleftharpoons FeCO_3 + BaI_2$ takes place. The equation is a reversible one, but proceeds from left to right in the beginning, much more rapidly than in the opposite direction, as in a state of equilibrium only a very small amount of iron iodide is present. According to the law of mass action the speed of a reaction is proportional to the concentration of the reacting substance. If therefore one of the products of a reversible reaction be removed, the reaction will go on in the direction to form more of that product. Hence, when ammonia, added to the filtered solution produces only a slight precipitate, which after prolonged boiling does not diminish, the equilibrium is reached, and the iron carbonate should be removed by filtration. The slight amount of barium carbonate in solution will usually be sufficient to precipitate the iron from the filtered solution, which, consequently, after cooling and standing for a few hours, becomes turbid, and after renewed filtration will be found perfectly free from every trace of iron. Should this not be the case, a further boiling with a little barium carbonate will throw out all the iron, and a solution of pure barium iodide will result.

This solution is now diluted to a definite volume and its strength accurately determined, which can be done by precipitating the barium with sulphuric acid and weighing the sulphate. The author prefers however to determine the iodine by the Volhard's method (the direct titration with potassium chromate as indicator can not be used on account of the insolubility of barium chromate), which is both rapid and very accurate. When the amount of barium iodide is known such a calculated quantity of a dilute (10–20 per cent.) exactly standardized sulphuric-acid solution is added as to cause an exact precipitation of the barium. The barium sulphate settles quickly, and if the strength of the solutions were accurately determined the resulting hydriodic acid solution gives only a slight precipitate either with sulphuric acid or barium chloride test solution. As barium as an impurity is more objectionable than sulphuric acid, the solution should be fixed by the addition of small amounts of sulphuric acid, so as to give just a very slight cloud with barium chloride test solution, when it is filtered or decanted and evaporated down to the desired concentration. The acid, which is decomposed to a slight extent, is decolorized by boiling it 10–15 minutes with a

small quantity of hypophosphorous acid (the solution should contain about 0.5 per cent. of the absolute acid). In this condition it will keep unchanged for more than a year.

The yield is quantitative provided that the precipitates are washed completely.

ACIDUM HYPOPHOSPHOROSUM.

The U. S. Pharmacopœia does not give any process for preparing this acid. An imperfect preparation may be made by using potassium hypophosphite and tartaric acid in the same manner as the potassium iodide was used in the manufacture of hydriodic acid. The National Dispensatory also suggests to make the acid from calcium hypophosphite by exact precipitation with oxalic acid. The resulting calcium oxalate, although insoluble in water, is, however, to a considerable extent, soluble in hypophosphorous acid. The acid prepared that way will consequently not stand the U. S. P. requirement of giving a clear solution after neutralizing with ammonia. Calcium oxalate as an impurity is really very objectionable, owing to its marked poisonous character.

It is evident that the best way to prepare hypophosphorous acid would be to decompose barium hypophosphite with the exact quantity of sulphuric acid. This salt is, however, about six times as expensive as the official potassium and calcium salts, and therefore the buying of the same for making hypophosphorous acid would not be economical.

The author uses the following method for preparing a solution of pure barium hypophosphite:

Calcium hypophosphite in solution is precipitated with somewhat more than the equivalent quantity of ammonium oxalate (prepared by neutralizing a solution of oxalic acid with ammonia water).

The reaction is thus:

$$Ca(H_2PO_2)_2 + (NH_4)_2C_2O_4 = 2NH_4H_2PO_2 + CaC_2O_4$$

The calcium is completely precipitated, the oxalate being perfectly insoluble in the neutral solution of ammonium hypophosphite (with the small excess of ammonium oxalate). The solution is filtered and the filtrate boiled with barium carbonate in excess, preferably under a hod, until the odor of ammonia has disappeared. The reaction is thus:

$$2NH_4H_2PO_2 + BaCO_3 = Ba(H_2PO_2)_2 + 2NH_3 + CO_2 + H_2O$$

The surplus of ammonium oxalate is also eliminated by the process, the reaction products being ammonia, carbonic acid and insoluble barium oxalate. To accelerate the reaction it is advisable to keep the mixture very concentrated, avoiding, however, an evaporation to dryness, which would cause a decomposition of the barium hypophosphite with evolution of the exceedingly poisonous phosphine-gas. When the reaction is complete the product is treated for a considerable time with a large amount of water, and filtered away from the surplus of insoluble barium carbonate and the small amount of barium oxalate. The strength of the barium hypophosphite solution is, after concentration, exactly determined and the decomposition with the calculated quantity of dilute sulphuric acid is conducted, preferably in boiling hot solution. The filtrate should be absolutely free from barium and give only a slight test for sulphuric acid.

BISMUTH SUBSALICYLATE.

As other metals with a weak positive nature, bismuth is characterized by the easy hydrolysis of its neutral salts, with formation of insoluble basic salts. Theoretically the bismuth hydroxide $Bi(OH)_3$ gives with the monobasic salicylic acid $C_6H_4OH\ COOH$ the following salts:

Neutral bismuth trisalicylate $(C_6H_4OH\ COO)_3Bi$ with an ignition residue of $37.9\%Bi_2O_3$.

Monobasic bismuth salicylate $(C_6H_4OH\ COO)_4Bi_2O$ with an ignition residue of $47.8\%Bi_2O_3$.

Dibasic—or bismuth subsalicylate $C_6H_4OH\ COO\ BiO$ with an ignition residue of $64.5\%Bi_2O_3$.

The National Dispensatory states that bismuth subsalicylate can be prepared by Duyk's process by shaking freshly precipitated bismuth hydroxide with salicylic acid in the presence of water. The author has tried the process, but even by using a large excess of salicylic acid, in order to get the benefit of the mass action, and shaking continuously for several days, the product when washed with hot water until free from salicylic acid, consisted mainly of the hydroxide with only a small amount of subsalicylate, showing that the action of the weak salicylic acid upon the insoluble bismuth hydroxide is very slight indeed. The dibasic salt must consequently

be prepared through the hydrolytic dissociation of the neutral salt just as the subnitrate precipitates out, by diluting a solution of bismuth-trinitrate.

The hydrolysis takes place according to the equation:

$$[C_6H_4(OH)COO]_3Bi + H_2O = C_6H_4OH\ COO\ BiO + 2C_6H_4OH\ COOH$$

The actual course for preparing bismuth trisalicylate and effecting its subsequent hydrolysis is briefly as follows:

Metallic bismuth, or the subnitrate, is dissolved in nitric acid, care being taken to obtain a concentrated solution with a minimum amount of free acid. Into this an ammonium salicylate solution containing somewhat more than 3 molecules of salicylic acid to 1 atom of bismuth, is slowly poured, under constant stirring (both solutions have to be cold in order to avoid a pink coloration due to the oxidation of salicylic acid through the ammonium nitrate formed). At first salicylic acid precipitates out in quantity equivalent to the free nitric acid in the bismuth solution. After that the salicylic acid loosely combines with the bismuth, forming the unstable trisalicylate. Ammonium salicylate is added until no further precipitate is produced in the filtered solution.

In order to remove the bulk of the ammonium nitrate, the precipitate is poured upon a strainer and washed twice or thrice with cold water, after which it is transferred to a kettle, boiled with water, again strained and the operation repeated until the filtrate does not redden blue litmus paper.

The salt when dried at a low temperature is perfectly white, bulky, and conforms to all requirements of the U. S. Pharmacopœia. The salicylic acid is recovered from the wash water by concentration.

As the alkali salts of salicylic acid readily dissolve in water, it seems as if advantage could be taken of that property by using an alkaline solution for washing out the loosely combined salicylic aci[1]. This is, however, not advisable as even a very diluted alkali-solution readily decomposes the subsalicylate, while pure boiling water has no effect upon the same. By using for the first washing a sodium carbonate solution, in a quantity not sufficient to combine with all the salicylic acid present in excess of the subsalicylate, and washing until neutral with hot water, the product left by ignition 67.6% Bi_2O_3 showing that the carbonate already had acted upon some subsalicylate with formation of the hydroxide.

The bismuth salicylate with 40% Bi_2O_3 is as shown by the formulas not a definite compound, although the composition comes near to that of bismuth trisalicylate. After washing the bismuth trisalicylate with cold water until free from ammonium nitrate, an analysis will show if the product has to be further washed with hot water, or if salicylic acid should be added in order to obtain a salicylate with an ignition residue of 40% Bi_2O_3.

ZINC PERMANGANATE.

This is not an official preparation and its medicinal use is rather limited. No doubt the salt is a very good antiseptic and astringent and the publication of a cheap practical method for its preparation may therefore be of interest.

The National Dispensatory states that this salt may be made by exact precipitation of barium permanganate with zinc sulphate, but the barium salt is an expensive article, making the method impracticable unless it can be cheaply prepared. The author has manufactured a considerable quantity of zinc permanganate by the following process:

To a saturated solution of potassium permanganate the equivalent quantity of a concentrated silver nitrate solution is added. Sparingly soluble silver permanganate is precipitated at once according to the equation:

$$KMnO_4 + AgNO_3 = AgMnO_4 + KNO_3$$

The mixture is kept cold by addition of ice and left standing for a couple of hours to make the precipitation as complete as possible, after which the silver permanganate is filtered (preferably using a suction pump and berliner funnel) and washed with cold water until free from potassium nitrate. The pure silver salt is then dried below 100° C. The yield is about 80 per cent. of the theoretical quantity. To the washings which contain the rest of the silver, sodium chloride is added and the precipitated silver chloride collected by filtration.

The dry silver permanganate is accurately weighed, transferred to an evaporating dish, 5 to 8 times its weight of water added, and heated on a steam bath. To this the exactly equivalent quantity of pure zinc chloride is added and the whole heated with frequent stirring for a couple of hours.

The reaction is as follows:

$$2AgMnO_4 + ZnCl_2 = Zn(MnO_4)_2 + 2AgCl$$

When the reaction is thought to be complete, which can be judged by the disappearance of silver permanganate crystals, a few c.c. of the liquid are decolorized by heating with nitric acid and formaldehyde, divided in two portions and tested for silver or chlorides, respectively, with sodium chloride or silver nitrate test solutions. If the right amount of zinc chloride was added, the decolorized solution will, after completion of the reaction, give only a slight test either for silver or chlorides. If the former is present, a small amount of zinc chloride should be added and the heating continued until the solution gives just a slight test for chlorides. If the contents of zinc chloride is found to be too large, some silver permanganate, or if none of the same is at hand, some silver oxide, should be added until only traces of chloride are found in the zinc permanganate solution, which then is filtered from the silver chloride and evaporated to dryness on a steam bath. The yield of $Zn(MnO_4)_2 6H_2O$, is somewhat more than the potassium permanganate originally taken.

The collected silver chloride is reduced to the metallic state by means of zinc in a hydrochloric acid solution. The amount of silver recovered is quantitative, and if desired the original amount of silver nitrate can be restored by dissolving the metal in nitric acid, evaporating and crystallizing. The cost of the preparation will therefore not much exceed that of potassium permanganate.

It is evident that by decomposing silver permanganate with barium, calcium, magnesium, or other metallic-chlorides, the corresponding permanganates will result. Hence the barium permanganate, after having been prepared from the silver salt can be used, if so desired, for manufacturing other permanganates.

As a fact of curiosity rather than a matter of any practical value the author observed the interaction between manganese sulphate and barium permanganate. Theoretically a manganese permanganate $Mn(MnO_4)_2$ should be formed. Such a combination does not, at least under ordinary conditions, exist, the result of the reaction being a solution of permanganic acid with a precipitate of barium sulphate and manganese dioxide according to the equation:

$$3Ba(MnO_4)_2 + 3MnSO_4 = 3BaSO_4 + 5MnO_2 + 2HMnO_4$$

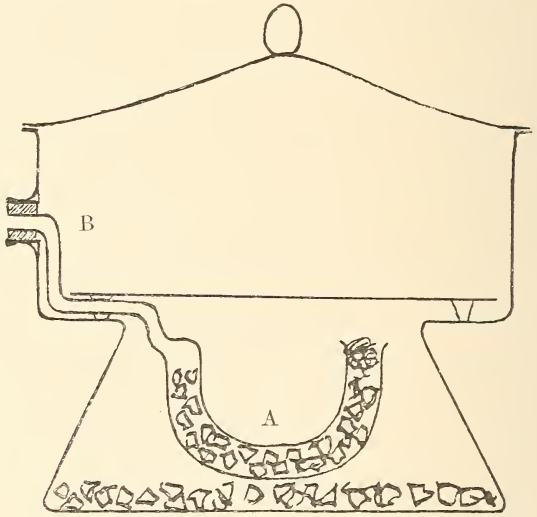
The reaction is remarkable in the respect, that an acid is formed through the interaction of two perfectly neutral salts.

Experimental Laboratory of The Norwich Pharmacal Company.

A PRESSURE EQUALIZING ATTACHMENT FOR DESICCATORS.

By Edwin Dowzard.

Everyone has noticed the jump and side-slip of desiccator lids after placing hot crucibles or basins therein. This is of course caused by the expansion of the contained air, brought about by the hot article. When the contents of the desiccator have cooled there is a slight vacuum which renders the lid somewhat difficult to remove; when the lid has been removed there is a sudden inrush of



A. $CaCl_2$ tube charged with $CaCl_2$. B. Tube connecting U-tube with outside air.

air which does not improve the efficiency of the desiccator. These faults may be remedied in a very simple manner by the attachment illustrated in the sketch. The apparatus consists of a calcium chloride U-tube to which has been fused a piece of glass tubing bent to fit against the inside surface of the desiccator. The end of the tube passes through a perforated rubber stopper fitted in the neck. It will be seen that the U-tube charged with calcium chloride allows the expanded air to escape and also allows dry air to enter, thus keeping the air inside the desiccator at the same pressure as the surrounding atmosphere.

This apparatus has been in use for several years, giving perfect satisfaction.

Analytical Department, Parke, Davis & Co., Detroit.

PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE MORE INTERESTING LITERATURE RELATING TO PHARMACY AND MATERIA MEDICA.

By M. I. Wilbert, Washington, D. C.

The meetings of pharmacists and of druggists that were held in this country, in Canada and in England, during the past months, again evidenced the altogether too well established fact that the rank and file of the men connected with the drug trade, in English speaking countries, are altogether too apathetic to the progress that is going on about them. It is true that there is some indication that this apathy is gradually giving way to an awakening, by some, to live up to the duties that are involved and the responsibilities that are incurred by the vocation of their choice.

Compared with the intensity of interest that is manifested by the agricultural chemist, or the food and dairy commissioners, the interest that was manifested in the science of their calling, by American pharmacists or their English brethren, is not to be commended.

The twenty-fifth annual convention of the Association of Official Agricultural Chemists was held in the city of Washington, November 11 to 14, 1908. Apart from being an incentive to greater interest in the science of their own business, this meeting was of particular interest to pharmacists in that matters relating to drugs and medicines were given an unusual amount of attention, while pharmacopœial tests and requirements were discussed in a way that will surely be helpful in the future revisions of that book.

The shortcomings of the official assay methods were discussed at some length and the difficulty of obtaining concordant results was clearly evidenced. The reports of progress in several lines of investigative work gave promise of definite advances in the near future. One of the more interesting communications of the series on drugs and chemicals was a paper by Prof. Rusby, who pointed out very clearly the need for a wider conception in regard to the standards for drugs and demonstrated very clearly that chemical methods alone were far from being satisfactory in accurately estimating the efficiency, the identity or the purity of any given drug.

The First International Food Congress.—L. M. Douglas (*Pharm. Jour.*, London, Oct. 3, 1908, p. 437), in discussing the several prominent features of the first food congress, of an international character, points out that the value of any resolutions passed by this congress

must be considered as being, largely at least, of an academic character, inasmuch as the nation with a preponderance of delegates present must control the issues.

Gnomon (*Pharm. Jour.,* London, October 10, 1908), in discussing the same subject, asserts that "Congresses are being sadly overdone." He further discusses the attempts that were made to establish acceptable definitions for various food products and says: "It cannot be said that uniform success attended the efforts in this direction, for while some of the definitions recorded are obviously incomplete or wrong, others which were submitted proved to be of such limited applicability that no two manufacturers of certain articles could agree as to their fitness."

The next congress will be held in Paris, in 1909, and it is thought that a greater and more representative collection of delegates will assemble at that time and that more definite results may be expected.

The eightieth meeting of the German Naturalists and Physicians was held this year at Cologne, during the week following September 21.

The section on Pharmacy and Pharmacognosy was presided over by Dr. Frerichs, of Bonn. The program for this section was an unusually meagre one and included but three papers.

The International Congress on Tuberculosis, which was held in the city of Washington, during the week following September 28, 1908, has very properly been characterized as a convincing demonstration of the wide-spread interest in the tuberculosis problem and a most promising showing of the success that has attended the combating of this dread disease.

Not the least interesting portion of this congress was the exhibit, which demonstrated, as words never could, the work that is being done in all parts of the world to prevent infection, to recognize the disease at an early period so as to prevent its progress and, whenever possible, to effect a cure.

Next in importance to the several meetings and congresses that have been held, during the past three months, few occurrences have attracted more wide-spread attention than the publication of the new French Pharmacopœia.

French Codex.—According to the reviews that have appeared in the European pharmaceutical journals the new Codex is in many ways an improvement on its predecessor. The latter had 728 pages while the present edition has 999 pages. In the present edition the

monographs appear in alphabetical order, in place of being arranged in classes as formerly.

The provisions of the Brussels Conference for the unification of the formulæ of potent medicaments were generally included, the noteworthy exceptions being the standards for syrup of ferrous iodide and for mercurial ointment.

Among the newer remedies that have been included we find Adrenalin, Arrhenal, Aspirin, and Sodium Cacodylate.

Fluidextracts have also been included and are now represented by ten titles, including Frangula, Cascara, Ergot, Grindelia, and Hydrastis.

The serums include Antidiphtheritic, Antipest, Antistreptococcic, Antitetanic, and Antivenom.

The dilute acids and Aqua ammoniæ are now required to contain 10 per cent. of their respective constituents, and in this respect closely correspond to the requirements of our own Pharmacopœia. Altogether it may be said that the new French Codex is another step in advance, in matters pharmaceutic, and that the long wished for Universal Pharmacopœia, at least so far as the more active medicaments are concerned, is a possibility of the near future.

Postgraduate instruction in Switzerland has proven to be not alone feasible, but an accomplished fact; and, a rather unexpected success.

Following the course at the University of Bern (reported in this JOURNAL some months ago), a similar course was offered at the University of Zurich. The applications for this course were so numerous that despite the fact that three separate sections were organized, several of the applicants were compelled to wait the formation of a fourth section later in the year.

As at Bern earlier in the year the work was both didactic and practical, covering from seven to nine hours each day for ten days. The branches that were reviewed included sterilization, the use of indicators, alkaloidal assay methods, the estimation of iodine and saponification numbers, chemical composition of the newer remedies, the determination of the melting- and boiling-points, the use of the refractometer, and the use of the compound microscope.

Cleveland School of Pharmacy Affiliated with the Western Reserve University.—This item of news will undoubtedly please all who are in any way interested in the progress of education along pharmaceutical lines. As the pharmaceutical department of a

great and growing university the Cleveland School of Pharmacy will undoubtedly strive to emulate the example that has been set for it by the medical school of the same University, and we may reasonably expect that in the very near future the Cleveland school will be second to none in its requirements and in the character of its curriculum.

Council on Pharmacy and Chemistry.—The Journal of the American Medical Association (September 26, 1908, p. 1078) records an account of the meeting of the Council on Pharmacy and Chemistry which was held at the Association Building, Chicago, July 17 and 18, 1908. From this account it appears that as its chief business the Council discussed the revision of the rules and the rearrangement of the matter contained in "New and Non-official Remedies." It was decided that in future this book shall contain descriptions of the proprietary articles accepted by the Council and of such simple non-proprietary and unofficial substances as are of sufficient importance. It was decided that proprietary mixtures shall not be included in the main body of the book unless they show some originality and present a marked advance over similar products, but when they conform to the rules they shall be included in the form of an appendix to the book. Articles which are official in the "United States Pharmacopœia" or in the "National Formulary," and non-proprietary mixtures of official articles are not eligible for inclusion in the book. The rules (see *A. J. P.*, 1905) were modified in some minor particulars, the following modifications being of first importance:

Rule 5 was so amended as to require that the actual identity of the manufacturer of a product be furnished.

The Council voted to interpret Rule 8 so that after January 1, 1909, pharmaceutical preparations and mixtures will be admitted only under a pharmaceutical title which shall indicate the most potent ingredients. Arbitrary coined names will not be recognized for pharmaceutical mixtures.

It was also decided that no pharmaceutical mixture shall be accepted whose name indicates its therapeutic action or is suggestive of the names of diseases or pathologic conditions in which it is to be used. After January 1, 1909, this rule is to be extended to simple articles.

The Council voted to condense Rules 9 and 10 to become Rule 9 and adopted a new rule, as Rule 10, under which recognition will be

refused to articles, which, because of their unscientific composition, are useless or inimical to the best interests of the public or of the medical profession.

If these several rules of the Council, as amended, are carefully studied it will be found that they are designed to at least counteract, if they do not serve to eliminate, much of the secrecy and fraud that has served to bring discredit to American pharmacy and to convert the average medical practitioner into an unpaid peddler of nostrums.

The Council also endorsed the publication, in pamphlet form, of the series of articles, which had appeared in the *Journal of the American Medical Association,* entitled: "The Broader Aims of the Council on Pharmacy and Chemistry of the American Medical Association." This pamphlet, containing 48 pages of material, is now available and should be carefully studied by everyone interested in the progress of medical sciences in America.

The Committee of One Hundred of the American Association for the Advancement of Science has been actively agitating for an increase in the work done by the several Bureaus devoted to the promotion of the public health. Professor Irving Fisher, the president of the committee states (*Science,* Nov. 13, 1908, p. 676) that President Roosevelt has definitely taken up the program of the committee as part of his administration policy. He intends to incorporate the recommendation in his next message to Congress—that the health bureaus of the government be concentrated into a common department, from which the bureaus not consistent with health and education will be removed elsewhere. This will be the first and most important step toward a powerful department whose special interest will be health and education.

The Mann Bill.—H. R. Bill No. 21,982, which is designed to regulate and in a measure control interstate commerce in habit-forming and other noxious and potent drugs, has been freely criticised in medical as well as in drug journals during the past three or four months. The same measure was also vigorously denounced at the meeting of the National Wholesale Druggists' Association, at Atlantic City this year. While many if not all manufacturers and wholesale dealers will admit that something should be done to restrict the traffic in habit-forming drugs they nevertheless feel that the provisions of this particular bill are altogether too far-reaching and would tend to restrain and to interfere with legitimate trade

rather than regulate the illicit traffic in noxious or habit-forming drugs.

Patent Medicine Bill in Canada.—The law recently enacted in Canada to regulate the manufacture and sale of so-called patent medicines, embodies several features that promise to be efficient in controlling many of the abuses that have arisen from the promiscuous sale and use of the more or less harmful nostrums. The Canadian law provides that manufacturers must secure a license from the Minister of Inland Revenue and that when a compound contains one or more of a list of about thirty drugs the exact content of any of these drugs must be furnished. If the quantity is thought to be excessive or if the mixture as a whole otherwise objectionable, the license is to be withheld.

British Patent Law.—The *Pharmaceutical Journal* in discussing the practical working of the recently enacted patent law points out that a number of well known English firms are now preparing to manufacture some of the articles now patented in that country, when the patent rights, according to the new law, have elapsed. (*Pharm. Jour.,* London, Sept. 9, 1908, p. 319.)

A Botanical Garden at Johns Hopkins University has been provided for by the setting apart of two acres of ground, at the new site for such a purpose. On this ground it is proposed to erect a greenhouse and a laboratory for plant physiology. One and one-quarter acres of the land have been laid out in formal squares bounded by hemlock hedges, within which are beds and pools planted with some three hundred types illustrating the adaptation of vegetative organs of plants, the structure and cross pollination of flowers and the dispersal of fruits and seeds. (*Science,* Oct. 16, 1908, p. 511.)

Barium a Cause of the Loco-weed Disease.—Bulletin No. 29 of the Bureau of Plant Industry is devoted to a report of the work done by Crawford on the so-called loco-weeds of the western states. Crawford has found that certain plants, of themselves harmless, or even available as forage, when growing on certain soils, take up barium in quantities sufficient to cause either acute or chronic poisoning in live stock. This discovery is particularly surprising because of the fact that much time and thought has been expended on these so-called loco-weeds, in years gone by, with little or no practical results.

Poisoning by Bismuth Subnitrate.—In a recent number of the

Schweizerische Wochenschrift für Chemie u. Pharmacie (page 621) Dr. Fleissig comments on several cases of fatal poisoning that have followed the ingestion of large quantities of Bismuth subnitrate for diagnostic purposes in connection with the Röntgen rays.

He concludes that the poisoning was due to liberated nitrite compounds rather than the absorption of bismuth or to possible contamination, the theory being that the intestinal bacteria tend to decompose the nitrate with subsequent formation of nitrous acid.

Hypodermics of Iron in Tuberculous Anæmia.—Peters, in the *Medical Record,* says that excellent results can be obtained by hypodermic injections of iron, in cases of secondary anæmia accompanying tuberculosis. He uses a solution of iron citrate, with or without strychnine and sodium arsenate. (*J. Am. M. Assoc.,* Oct. 24, 1908, p. 1461.)

Commercial Thyroid.—Hunt and Seidell (*J. Am. M. Assoc.,* Oct. 24, 1908, p. 1385) point out that there is a great variation in the activity of the commercial preparations of thyroid. Thus, for instance, a so-called five-grain tablet of thyroid may contain but two grains of dried thyroid, so as to represent five grains of the fresh gland, or it may contain five grains of the dried gland and thus represent ten or more grains of the fresh substance.

Adulterated Gentian.—The adulteration of powdered gentian has been quite common, in England. As a ready means of differentiating between the true and the adulterated material, Wightman suggests a practical application of the faculty of the several components to absorb water. He points out that the genuine drug absorbs much more water than any of its adulterants and that when 8 or 10 grammes are placed in about 150 c.c. of water in a 200 c.c. graduate the sediment of the pure drug will measure much more than the corresponding sediment from an adulterated sample. (*Pharm. Jour.,* London, Aug. 29, 1908, p. 255.)

Caffeine-free Coffee.—Sendrich and Murdfield have analyzed fourteen samples of so-called caffeine-free coffee and ten samples of ordinary roasted coffee and have found that while the latter contained an average of 1.186 per cent. of caffeine the former averaged 0.218 per cent. or about one-sixth the amount present in ordinary coffee. (*Pharm. Jour.,* Oct. 10, 1908, p. 464, from *Zeitschr. f. Unters. Nahr. u. Genussmittel.*)

Deterioration of Fluidextracts.—Dr. William Jay Schieffelin reports that from tests conducted in the laboratory of Schieffelin &

Co. it was found that fluidextract of aconite deteriorates 10 per cent. and fluidextract of hyoscyamus 9 per cent. in the course of a year. A number of other fluidextracts that were under observation showed practically no deterioration during the same period of time. (*Am. Drug.*, Oct. 26, 1908, p. 264.)

New Reagent for Morphine and Oxydimorphine.—Sodium molybdate 0.15 Gm., formaldehyde solution 35 per cent., 10 drops, and strong sulphuric acid 30 c.c. are freshly mixed. The reagent so obtained is very sensitive to morphine and especially to oxydimorphine. With the latter it gives at first a violet color then suddenly a bluish-green which disappears on dilution with water. With morphine the violet color at first obtained becomes bluish violet and finally a dull green. (*Pharm., Jour.*, Oct. 3, 1908, p. 434, from *P. J. Jap.*)

Allophan.—This is said to be the allophanic acid ester of santalol and it is claimed to contain 72 per cent. of santalol. It is further said to be similar to santalol in its action but to be entirely devoid of any tendency to irritate. (*Pharm. Ztg.*, Sept. 30, 1908, p. 778.)

Almatein.—This is said to be a condensation product of hæmatoxylon and formaldehyde. It is directed to be given, internally, in diarrhœas of children and in dysentery as an astringent and externally as an antiseptic dressing. (*Pharm. Ztg.*, 1908, Sept. 30, p. 778.)

Aperitol is said to be valeryl-acetyl phenolphthalein. It is recommended as an aperient in doses of 0.2 Gm. (*Pharm. Ztg.*, 1908, Sept. 30, p. 778.)

Arsacetin is the name given to sodium para-acetylamino-phenyl-arseniate, the equivalent of an acetyl combination of atoxyl. This compound is stated to be five times less toxic than arsenites and may be given in nervous affections and in anæmia in doses of from 0.1 to 0.2 and even 0.5 Gm. by gradual increase of hypodermatic injections. (*Pharm. Jour.*, London, Sept. 12, 1908, p. 302, from *Pharm. Ztg.*)

Beta Eucaine Lactate.—Chemically this is the lactate of benzoyl-vinyl-diaceton alkamine. It occurs as a white crystalline powder soluble in water at the ordinary temperatures to about 22 per cent., in alcohol to about 11 per cent., in chloroform to about 20 per cent. Its uses are the same as Beta eucaine hydrochloride over which it has the advantage of greater solubility. (*J. Am. M. Assoc.*, Oct. 17, 1908, p. 1337.)

Diplosal.—This is said to be the salicylic acid ester of salicylic acid or salicylosalicylic acid. It is being recommended as a substitute for salicylic acid in cases of acute articular rheumatism. Dose 1 Gm., or daily doses of from 5 to 6 Gm. (*Pharm. Ztg.*, Sept. 30, 1908, p. 778.)

Eulaxans is being exploited as an aperient. It is said to consist of one molecule of phenolphthalein and 2 molecules of sodium hydroxide. (*Pharm. Ztg.*, Sept. 30, 1908, p. 778.)

Euphyllin is the name given to a compound of theophylline with ethylene diamine. The new compound is a crystalline product consisting of a mixture each gramme of which corresponds to 0.82 grammes of theophylline. (*Pharm. Jour.*, Sept. 5, 1908, p. 280, from *Therap. Monatsh.*)

Iodalbin.—This is the name given to a compound of iodine and blood albumin and containing approximately 21.5 per cent. of iodine. It is recommended as a substitute for the soluble alkaline iodides. May be given in doses of from 0.30 to 0.60. (*J. Am. M. Assoc.*, Oct. 24, 1908, p. 1427.)

Iodothyrin.—Hunt and Seidell (*Jour. Am. M. Assoc.*, Oct. 24, 1908, p. 1388) point out that the commercial preparation bearing this name evidently varies more or less in composition. This variation was evidenced both by chemical and physiologic tests.

Lecebrin is the name given to a preparation of lecithin from the brain in combination with nucleoproteins, containing 33⅓ per cent. by weight of lecithin. (*Jour. Am. M. Assoc.*, Oct. 24, 1908, p. 1427.)

Novaspirin Quinine.—On mixing ethereal solutions of quinine and of novaspirin, in their molecular proportions, combinations corresponding to an acid and to a basic salt of quinine with citrosalicylic acid may be obtained. The former contains about 18 per cent. and the latter 34 per cent. of quinine. Both salts are insoluble in water but soluble in alcohol and in chloroform. (*Pharm. Jour.*, London, Oct. 10, 1908, p. 464, from *Boll Chim. Farmac.*)

Panase is the name given to a combination of digestive enzymes of the pancreas derived from the pancreatic gland of the pig. It occurs as a light yellowish powder having a slight odor and somewhat mucilaginous taste. It is incompatible with strong alcohol, acid alkalies and other substances which tend to destroy the activity of ferments. It is given in doses of 0.13 Gm. or more. (*Jour Am. M. Assoc.*, Oct. 31, 1908, p. 1513.)

Phenol Tablets.—Under this name a firm in Germany is now marketing a compressed tablet containing the oxalic acid ester of phenol. This substance contains 32 per cent. of oxalic acid and 68 per cent. of phenol, has a melting-point of from 122° to 124° C., is non-hygroscopic, practically non-caustic and, on solution, dissociates into its constituents. (*Pharm. Centh.*, 1908, p. 797.)

Spirosal is defined by the Council on Pharmacy and Chemistry of the American Medical Association as the monoglycol ester of salicylic acid. It occurs as an almost odorless and colorless oily fluid, easily soluble in alcohol, ether, chloroform and benzol and soluble in about 110 parts of water and in 8 parts of olive oil. It is recommended to be used externally in rheumatic affections. (*Jour. Am. M. Assoc.*, Oct. 31, 1908, p. 1513.)

Tannyl.—This occurs as a yellowish-gray, odorless and practically tasteless powder containing about 50 per cent. of tannin in combination with oxychlor casein. It is only very slightly soluble in water or in alcohol, but is readily soluble in alkaline solutions. It has been recommended as an internal astringent.

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AUTHORS.

[1] Compiled by Florence Yaple.

SUBJECTS.